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Abstracts

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Disclosure Statement

The abstracts included in this supplement were reviewed and selected by the 62 members of the Scientific Committee headed by Dr. Sylvia Cruchet, (members list included as Supplementary Material). The committee has no conflicts of interest in connection with the congress and the selection of abstracts.

Sponsor Note

The organizers of the FINUT 2022 Conference would like to thank our sponsors, collaborators and delegates for their trust and participation in this 2nd Edition. We will meet again in 2024.



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Opening Lecture

OP1

Alterations in the Gut Microbiota Associated with Obesity and Metabolic Disease: Cause or Consequence?

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The human microbiota consists of the set of microorganisms that naturally colonise the skin and mucous membranes. From a functional point of view, the gut microbiota is the most important; it has a profound influence on host physiology, affects metabolism and the immune system, protecting against numerous pathogens, and modulates the growth and development of the gastrointestinal system. Disturbances in the composition of the gut microbiota are associated with numerous disease states and are particularly important during early postnatal life and in old age, given the fragility of the immune system at these stages of life.

Among the potential determinants of obesity, the gut microbiota has been proposed for its impact on energy balance homeostasis. Alterations in the ratio of Firmicutes to Bacteroidetes phyla have been consistently associated with obesity. Also, increased levels of bacterial lipopolysaccharide have been reported in obese subjects. Consequently, modulation of the microbiota towards a healthier “non-obesogenic” pattern is thought to be a key preventive tool. Recent evidence also suggests that the composition of the microbiota is altered in type 2 diabetes (T2D). Furthermore, considering the close metabolic relationship between the gut and the liver, it is understandable that the gut microbiota affects numerous gut and liver pathologies, both acute and chronic, including infectious diseases and some chronic diseases such as liver disease of non-alcoholic origin.

Current scientific evidence in relation to overweight and obesity indicates that some probiotics and symbiotic contribute to a significant reduction in abdominal adiposity and body mass index. In addition, there is an improvement in glycaemic metabolism, as well as an improvement in the metabolic stress associated with T2D and insulin resistance syndrome (IRS). In addition, an improvement in lipid profile has been observed in patients with T2D after symbiotic intake. However, there is controversy due to the diversity of results obtained in several studies due to the use of different strains, a small number of patients, and inappropriate design. Therefore, there is an undeniable need for medium- and long-term dose-response

studies of intervention that evaluate their effects on major disease-related variables and the persistence of effects.

Conflicts of Interest: The author declares no conflict of interest.

Thematic Conferences

CT2

Childhood Obesity in the Community Context

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In Mexico, childhood obesity has been increasing up to 10% in the last two decades; as well as efforts to prevent the increase of overweight, especially in school children and adolescents. Worldwide there is agreement that the etiology of obesity is multifactorial and that, in order to reduce it, strategies are required that are not only of short duration (one year) or in a single environment (school) or applied to a change of conduct (seals on packaging), as has been done for several years. What is required are sustainable and innovative strategies that work at multiple levels of influence: on behavior, on the skills of the population (Hennessy, Korn, Economos). For this reason, sustainable community manoeuvres should be considered, identifying a community as the space where a group of people works (e.g., company or institution or school), or where a group of people lives (eg town, city, region) or where they meet for their social identity (e.g. sports or spiritual practices). Thus, the community strategy would be developed specifically for a given community, involving social and economic policies specific to that community, and environmental modifications that as a whole can reduce the risk of childhood obesity in the group. Examples of this are the North Karelia Project in Finland (1970), which involved community leaders and offered positive messages focused on the modification of practices for the reduction of cardiovascular risk, low cost and sustainable in the long term. The project *Prevenons l'Obesite Des Enfants (EPODE)* (2004-) uses social marketing and training and has been implemented in more than 500 communities in Europe and Mexico (Borys JM). In Mexico, the 5 Steps for School Health strategy was linked to the National Agreement for Food Health (ANSA) and achieved its implementation in schools from the individual context of the subject to consumption strategies in the school store, linked to government policies to promote the reduction of risk of childhood overweight and obesity.

Conflicts of Interest: The author declares no conflict of interest.

CT3**Big Data and Machine Learning as Tools for the Biomedical Field**

Anguita-Ruiz, A.; Aguilera, C. M.; Torres-Martos, A.; Bustos, M.; Ruiz-Ojeda, F. J.; Alcalá-Fdez, J.

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Big Data involves data whose Volume, Variety (diversity), Velocity, & complexity requires new techniques, algorithms, and analyses to extract valuable and hidden knowledge. The biomedical field has undergone a true Big Data revolution during the past decades headed by the reduction in costs of omics technologies, and the benefits of the Internet of Things (e.g., wearable technologies). Fortunately, major advances in our ability to generate biological data have been also observed in computational mathematics. Particularly, Machine Learning (ML), a subbranch of Artificial Intelligence, has experienced a notable boost due to its ability to automatically generate predictive and descriptive models from massive amounts of data. Thanks to ML algorithms, today we are able of providing results that were not possible just twenty years ago. In the biomedical field, ML models can be used for descriptive purposes (to understand a complex reality), diagnostic goals (to determine why did it happen), making predictions (to forecast what will happen), and prescriptive intentions (to establish how can we make it happen). When the purpose is to establish a diagnosis or to make a prediction, ML techniques belonging to the Supervised Learning group are selected (opting for classifiers or regressors depending on the outcome type). On the other hand, when the goal is to understand a complex scenario (e.g., disentangling a molecular network or identifying new patient endotype subgroups) Unsupervised Learning ML techniques are preferred (e.g., clustering or association rules). Despite the noticeable advances of ML, most of the employed techniques still suffer from trustworthy interpretability and explainability of the obtained models since they do not explain their predictions in a human-understandable way, which is known as the black box problem. This issue gives rise to what is known as eXplainable Artificial Intelligence (XAI), which recommends the use of transparent models that are understandable themselves, and of post-hoc explainability techniques which aim to communicate understandable information about how a complex model produces its predictions for any given input. This new XAI trend is gaining relevance, especially in the biomedical field, since medical experts do not trust decisions provided by black-box models. In the past years, our research group has pursued the implementation of ML techniques for solving biomedical problems asserting the XAI trend recommendations. Particularly, we have employed association rule unsupervised ML techniques for the understanding of the molecular mechanisms underlying weight loss in obesity, and for the construction of early-life predictive models of insulin resistance. For that, we have employed self-explainable ML models, such as association rules, or applied post-hoc explainability techniques such as the famous SHapley Additive exPlanations (SHAP).

Our results have supposed great advances in the biochemistry nutritional field. If validated in independent populations, their implementation in healthcare systems would improve the quality of life of children with obesity who might avoid suffering metabolic disturbances in the future.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Big Data, Machine Learning, Biomedicine, Obesity, Nutrition, Children.

CT4**Thermogenesis and Adipose Tissue: Effect of Genistein**

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In recent years, thermogenesis has gained interest, as it can have a significant impact on energy expenditure and thus on the control of obesity. It is now known that adipose tissue is of great importance in the generation of thermogenesis, as there are two types of adipose tissue, brown and beige adipose tissue, which have thermogenic activity. Although the origin of these two types of adipose tissue is different, both express the uncoupling protein known as UCP1, which uncouples oxidative phosphorylation generating heat. Several studies have shown that overexpression of this protein in experimental animals makes them resistant to obesity despite consumption of a high-fat diet. This has given it an important relevance in the search of strategies against obesity. It is now known that there are several molecules that can activate the browning process, which involves the conversion of white adipocytes into beige adipocytes which express several proteins associated with the thermogenesis process, in particular UCP1, are dietary bioactive compounds found in several dietary foods. Studies with the soy protein isoflavone genistein, have demonstrated that this compound can increase white adipose tissue thermogenesis with a concomitant increase in energy expenditure. It has been demonstrated that studies with cells and animal models revealed that consumption of genistein stimulates the “browning” process. In addition, further research has established that stimulation of the stromal vascular fraction obtained from human adipose tissue that contains adipose tissue precursors with genistein, also promotes the conversion of these cells into beige adipose tissue. Stimulation of these processes with genistein also increased mitochondrial activity. In addition, evidence has shown that genistein consumption also modifies the gut microbiota, which was associated with improved insulin sensitivity. However, further studies are needed to assess whether modification of the gut microbiota may also be associated in part with improved thermogenic activity. Thus, this mechanism of these bioactive compounds may be a novel part of dietary strategies to attenuate the development of obesity and its metabolic consequences.

Conflicts of Interest: The author declares no conflict of interest.

CT5

Pediatric Obesity and Comorbidities: A Question of Time and Genetics? The Portuguese Experience

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Introduction: Obesity represents a serious public health problem, not only because of its pandemic dimension but also because of the economic and social impact of its multi-systemic comorbidities, with a reduction in life quality and expectancy. Tracking of obesity and its cardiometabolic (CM) comorbidities from pediatric age to adulthood is unequivocal. Genetic/familial background, age of onset, and duration of the disease but also growth and maturation can influence the magnitude of its expression.

Objectives: Describe a Portuguese multicentric experience of behavior treatment and follow-up of pediatric obesity.

Methods: Retrospective cohort study of children aged 2–18 years with overweight and obesity, followed in 2 Portuguese reference outpatient clinics for pediatric obesity. The exclusion criteria were secondary obesity. Family risk factors for obesity and cardiovascular diseases as well as personal background, anthropometric data (WHO criteria), and CM comorbidities were evaluated. The results presented refer to admission (1998-2006; G1 and 2012-2017; G2) and to 8 years of follow-up (G1) and 2 years of follow-up (G2). The study was conducted through the consultation of clinical records, using a protocol previously prepared and approved by the institution's Ethics Committee. Software SPSS version 24.0* (IBM Corp., Armonk, NY, USA) was used for the construction of databases and data analysis.

Results: 580 (G1; 9.9±3.4y; 50.7%M) and 223 (G2; 10.5±3.4y; 39.9%M) children and adolescents were evaluated. The baseline BMI z-score was 3.9±1.8 and 2.7±0.9 respectively with early onset of obesity associated with more intra-abdominal deposition of fat. A high prevalence of family obesity was observed, with one obese parent in 89.0% (G1) and 84.3% (G2). 72.9% (G1) and 75.8% (G2) started obesity before 6 y of age. 41.9% (G1) 11.5% (G2) have hypertension. Hypertension and insulin resistance show a duplication of prevalence during adolescent age. Aggregation of two or more CM risk factors occurred in 49.9% (G1) and 5.8% (G2), with a greater frequency than the prevalence of metabolic syndrome (G1 24.7%; IDF2007). Duration of obesity was strongly associated with hypertension and insulin resistance but not with dislipidemia. After 8y (G1) and 2y (G2) multidisciplinary behavior intervention, a significant decrease in BMI-Z-score ($p<0.001$ G1 and G2) was observed but the high severity of obesity still persists. A worsening of all comorbidities during follow-up was observed, with statistical significance for systolic blood pressure (G1 $p=0.001$; G2 $p=0.011$), high-density lipoprotein (G1 $p=0.003$; G2 $p=0.005$) and especially for insulin resistance ($p<0.001$ G1; $p=0.009$ G2), who triplicate in G1.

Conclusions: early onset of severe obesity is associated with family obesity and with early onset of CM comorbidities, showing a share of both genetic susceptibility and obesogenic environment. Even with multidisciplinary behavior intervention obesity persists and the prevalence of comorbidities increases, namely insulin

resistance and hypertension, as also the aggregation of CM risk factors shows the effect of time and maturation. Early prevention-based strategies during the first 1 100 days are urgent and are the only way to stop the mortgage of future generations.

Conflict of Interest: none

Keywords: Pediatric obesity, Comorbidities, Genetic susceptibility, Growth, Maturation.

CT6

Nutrigenomics of Inflammation

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Introduction: Inflammation is an immune-related defense mechanism against endogenous/exogenous harmful stimuli. Inflammatory processes are associated with a coordinated and chain response of different cell types and mediators that in turn activate different metabolic pathways depending on the type of aggression. Furthermore, the inflammatory state is often accompanied by vascular and endothelial dysfunctions that are characterized by an increase in reactive oxygen species leading to oxidative stress. These phenomena contribute to atherosclerosis, hypertension, altered metabolic markers, and the occurrence of major adverse cardiovascular events. In this context, Systemic autoimmune diseases (SAS), viral infections, obesity and metabolic syndrome (MS), and related complications are characterized by a chronic inflammatory state where different mediators and common mechanisms are involved, and whose needed understanding will support Precision Nutrition actions

Methods: Chronic inflammation and low-grade proinflammatory states are accompanied by an increase in mediators, such as IL6 and TNF α , and acute protein PCR levels or neutrophil/lymphocyte ratio, whose determination can be achieved in many laboratory settings. Nutrigenomics is the next step in personalized nutritional advice by applying emerging omics technologies to identify molecular markers of diet-related diseases and to decipher mechanisms concerning interindividual variability in response to food. Thus, depending on the diet, gene expression is modified in specific genes, which could be the target for Personalized Nutrition.

Results: Precision Nutrition is considered a powerful tool to face inflammation and metabolic syndrome-associated morbidities. The development of new therapies based on the modification of lifestyles, such as caloric restriction, and the contribution of anti-inflammatory dietary components such as plant proteins, omega-3 fatty acids, fiber, and antioxidants, are proposed as strategies that can help to relieve and possibly reverse the inflammatory state.

Conclusions: Recent research in this scientific area, as occurred in the METAINFLAMACION project, tries to understand the molecular immune-inflammatory mechanisms involved and to describe new inflammation biomarkers to assess the response to different nutritional patterns as well as to feature the role of

anti-inflammatory diets that could be prescribed to manage the inflammation processes in Obesity, Diabetes, Liver Steatosis, Metabolic Syndrome and Systemic Autoimmune Diseases.

Conflict of Interest: No conflict of interest

Keywords: Nutrigenomics, Inflammation, Precision nutrition, Metabolic syndrome, Systemic autoimmune diseases.

CT7

Environmental Factors Associated with School Children's Excess of Weight in Communities of Costa Rica

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Introduction: Childhood obesity is a public health problem in Costa Rica and its prevalence has shown rapid growth. The food and physical activity environment play a crucial role in the lifestyle of school-age children and their families, and it must be considered when designing public health nutrition interventions.

Objectives: To understand how the spatial distribution of places of purchase and sale of food as well as for physical activity and recreation sites can influence the prevalence of childhood obesity in La Unión County, Costa Rica.

Methods: A mapping of the location of food sales places in 8 districts, the presence of patents in them, and the distances traveled by schoolchildren from the districts of San Juan and Concepción were measured using geographic information systems and the relationship with the nutritional status of 297 school children were also evaluated. A total of 241 families were surveyed at their homes. The survey included environmental and sociodemographic variables.

Results: 338 food acquisition points located mainly in the Tres Ríos district were identified at very short distances from the educational centers. For the students of Concepción District, the distances traveled to school decrease significantly as the overweight in schoolchildren increases. The number of locations for physical activity reported by the families of schoolchildren with the lowest prevalence of overweight doubled the one reported by families of schoolchildren with a higher prevalence of overweight.

Conclusions: There is an important growth of places for sale and distribution of food that are located at distances no greater than 250 meters from educational centers, which increases the probability of accessing the food that is sold there which in most cases is of low nutritional value and high energy density. As excess weight increases in schoolchildren, they report shorter distances traveled to school, which adds a greater risk in this population associated with reduced physical activity. The main difference in the environment is given by the availability of places for the practice of physical activity, which also coincides with the fact that the families of school children with a higher prevalence of overweight show lower schooling and lower income.

Conflict of Interest: I declare no conflict of interest in any matter.

Keywords: Childhood Obesity, Food environment, Spatial analysis, Costa Rica, Schoolchildren.

CT8

Dietary Consumption: Guided by a Focus of Nutrient Adequacy or Selection of Foodstuffs?

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The title of this presentation poses a false dichotomy, as one obviously should be concerned for both the delivery of essential nutrients and a healthful nature of the food selection – but proportionally and simultaneously! The evolution of public policy is trending toward an unbalanced situation. This is best expressed in the subtitle: “Nutrients, the forgotten aspect in the contemporary connotation of “nutrition” Nutrition was inextricably bound to nutrients in the pre-World War II era of experimental nutrition. Emerging from the war, UN agencies such as FAO, WHO, and PAHO in our hemisphere began to focus on the human dimensions of nutrient deficiencies, including those of energy, protein, vitamin A, iron, and iodine as public health concerns. Success in providing access to dietary energy, however, added a new dimension to the nutritional panorama, characterized as “nutrition transition” by Popkin in 1994. The framework for assessing human consumption patterns in terms of risk of non-communicable disease was codified in 1996 by Willett in the first edition of “Nutritional Epidemiology.” So, over the last three decades, when issues of eating have been addressed, a broadening array of concerns have joined that of nutrient insufficiency, often under the “guise” and “heading” of “nutrition/nutritional.” The breadth of the connotation expanded also in 1996 at the World Food Summit in its definition of “Food Security”: “sufficient, safe, and nutritious food that meets their food preferences and dietary needs”. Here the terms “food”, “nutritious” and “dietary needs” came into interplay. The US Department of Agriculture later provided a derivative definition for “Nutrient Security”: “Nutrition security means all Americans have consistent access to the safe, healthy, affordable foods essential to optimal health and well-being. Nutrition security builds on food security by focusing on how the quality of our diets can help reduce diet-related diseases.” The definition is lacking any “nutrient” focus, whereas diet quality and diet-related diseases are emergent. Adverse and unintended policy consequences may occur if “nutrition” becomes synonymous with “diet” or simply with “what is consumed” and devoid of its original relationship to the adequacy of essential nutrients.

Conflict of Interest: No conflict of interest

CT9

Functional Foods as Key Regulators of Gut Microbiota in the SARS-CoV-2 Infection

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Introduction: The recent health emergency caused by the COVID-19 pandemic has led the scientific community to study the mechanisms involved in the defense system and the response to

SARS-CoV-2 infection. The immune system is stimulated by intestinal bacteria, regulating the response against invading pathogens such as viruses. Thus, gut microbiota plays an important role in the complex defense system, and it has been seen that bacterial diversity is conditioned by different factors such as diet. Recently, functional foods have stood out for their impact on health due to their biological properties such as immune modulation.

Objective: To analyze the role of functional foods as key regulators of gut microbiota in response to SARS-CoV-2 infection.

Methods: This review includes the current knowledge of the role of gut microbiota in maintaining immune balance and preventing inflammation. Therefore, information from experimental studies that analyze the prebiotic and probiotic effects of functional foods and the mechanisms involved in the immune system through the modulation of gut microbiota is included.

Results: Probiotics can reduce inflammatory immune response and suppressing T cells clonal expansion. In addition, phenolic compounds, and different dietary fibers such as fructooligosaccharides act as prebiotics, reshaping gut microbiota and metabolites. In this sense, prospective clinical trials including functional foods with immunomodulatory properties through gut microbiota are necessary to prevent or treat SARS-CoV-2 infection.

Conclusions: Today, there is evidence of the positive health effects of functional foods modulating gut microbiota. These changes in bacterial diversity and relative abundance, as metabolites, lead to the regulation of inflammatory processes and enhance the immune system. In this sense, although the effects have not been demonstrated in patients with COVID-19, there is evidence that functional foods act against different infections by improving the immune system. However, more clinical studies are necessary for better understanding due to the complexity of the host response to functional foods.

Conflict of Interest: The author declares no conflict of interest.

Keywords: COVID-19, Bacterial diversity, Fiber, Polyphenols, Probiotics.

CT10

Immunomodulatory Properties of Human Milk

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Introduction: Human breast milk (HM) constitutes a vehicle of communication between the maternal and infant immune systems, regulating the immune, metabolic, and microbiological systems of the infant.

Objectives: To review components with immunomodulatory properties of HM.

Development: HM is a mixture of interacting components, of variable characteristics according to the infant's condition and

lactation period, supporting immunomodulation and microbiota development, regulating the balance between tolerance and inflammatory response, and promoting intestinal health.

The neonatal intestinal immune system is based on passively acquired maternal antibodies, particularly secretory immunoglobulin A (sIgA), which supports the development of immune tolerance.

Cytokines that modulate the immune system come from the mammary gland and secondarily from HM leukocytes and adipocytes (adipokines), which exert metabolic programming effects favoring lean body mass.

Growth factors and hormones include epidermal growth factor (EGF), insulin, prolactin, cortisol, thyroid hormones, leptin and erythropoietin. EGF protects against the development of necrotizing enterocolitis (NEC) and HM stem cells release hepatocyte growth factor, which promotes organogenesis.

Lactoferrin is key to the innate immune response with antimicrobial and anti-inflammatory actions, prebiotic properties, and in conjunction with lysozyme enhances the antibacterial effect.

Nucleotides and fatty acids contribute by activating macrophages through the production of immunomodulatory factors.

It contains cells, including stem cells (hBSC), epithelial progenitors, mature epithelial cells, and leukocytes, and especially lactocytes and myoepithelial cells. Leukocytes mediate active immunity and develop immunocompetence by phagocytosis, secretion of cytokines, immunoglobulins, and antigen presentation. In addition, extracellular vesicles transport exosomes and proteins critical in cell signaling.

The HM glycobiome comprises oligosaccharides (HMOs), glycoproteins and glycolipids. HMOs modulate the microbiota, act as prebiotics by selecting beneficial bacteria, improve intestinal barrier function and nutrient absorption.

The intestinal microbiome originates from the maternal microbiome, transferred during birth, lactation and skin-to-skin contact and its constitution is influenced by the interaction between the infant microbiome and that present in HM, modulated by bioactive components of HM and HMOs. It contributes to modulate the infant immune system through its metabolic activity.

Conclusions: The clinical implications of this immunomodulation have immediate repercussions, such as the prevention of NEC in preterm infants (dose-dependent, related to IgAs, lactoferrin and HMOs), to later problems such as atopy-associated pathology (atopic dermatitis, wheezing/asthma, allergic rhinitis, and cow's milk protein allergy) and that related to immune-mediated inflammation, such as type 1 diabetes and obesity. Education of the neonatal immune system through HM has lifelong implications.

Conflicts of Interest: I have received consulting and speaking fees for Abbott Chile and Abbott Ecuador, Axon Pharma, CocaCola Chile, Danone-Nutricia, Nestlé Peru, Novonordisk, Sanulac and Takeda.

Keywords: Human milk, HMO, Glycobiome, Microbiome, stem cells.

Symposium Sessions

S01.1

Micronutrients and COVID-19

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The immune system is a complex system of cellular and molecular components aiming to defend the organism against the attack of any antigen (foreign organisms and substances). Micronutrients are essential components that cooperate in several pathways of the immune system. Both vitamin and mineral deficits can be deleterious to fight against the multi-organ failure caused by SARS-CoV2. Indeed, the most important micronutrients involved in protecting the organism against viruses are those with antioxidant capacity, such as vitamins (A, C, D, E, B6, B12, folic acid) and minerals (iron, zinc, copper, selenium, and magnesium). Therefore, individuals suffering from any situation of malnutrition, such as eating disorders, obesity, or inflammatory diseases derived from obesity, have a high risk of suffering from an infection, and in particular, of being attacked by SARS-CoV2. Among the most prevalent micronutrient deficits, vitamin D has a high impact at a global level. The supplementation of vitamin D has been shown to reduce the pro-inflammatory cytokine storm developed in patients with COVID-19, but also to enhance the anti-inflammatory cytokine expression by macrophages. Scientific evidence about the role of vitamin C on the immune system has shown antioxidant properties. Indeed, according to a Cochrane systematic review, the recommended dose of vitamin C should be between 1 and 2 g/day in order to reduce the duration and severity of the common cold. In addition, in several clinical trials, supplementation with very high doses of vitamin C has been chosen to treat COVID-19 patients admitted to ICUs. However, high doses must not be orally administered, since gastrointestinal disorders or kidney failure can be developed. Zinc is a trace element that is closely related to immune function. Zinc deficiency found in patients with COVID-19 has been reported to be associated with a worse prognosis of the disease. Indeed, serum zinc levels seem to be an interesting biomarker to include in the assessment of patients infected with SARS-CoV2. In summary, a balanced and healthy nutritional status is essential to maintain micronutrient levels at a normal range in order to achieve a strong and functional immune system capable to avoid the COVID-19 consequences.

S01.2

Vitamin D in Childhood and Adolescent Obesity

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Introduction: Vitamin D (vitD) adequate concentration is essential for growth, development, and health. It plays a relevant role in the regulation of calcium levels and bone metabolism. VitD insufficiency is associated with a wide range of chronic diseases and conditions, including obesity, and several types of cancers. Suboptimal vitD status has also been associated with increasing severity of metabolic dysregulation (insulin resistance, hyperlipidemia, liver disease, and hypertension) in children and adults with obesity. In the last years, the prevalence of overweight and obesity in Spanish children and adolescents were highly increased. Therefore, it is critical the identification of associated factors and risk groups related to hypovitaminosis D.

Objectives: to review and evaluate the association between obesity, insulin resistance (IR), cardiometabolic risk factors, and vitamin D in children. Therefore, to understand the underlying contribution of suboptimal vitD status to the metabolic dysregulation disorders in childhood obesity.

Methods: we have characterized serum 25-hydroxyvitamin D (25(OH)D status in 471 children and adolescents and analyzed in correlation to gender, pubertal period, age, and Body Mass Index (BMI). An additional cohort of 76 children from the PUBMEP study, aged 4-12 years were evaluated longitudinally from prepubertal to pubertal stages. Anthropometric measurements and selected cardiometabolic risk biomarkers, such as plasma glucose, blood lipids, insulin, adiponectin, leptin, and blood pressure, and serum 25(OH)D were determined. Children were categorized by obesity degree and IR status combined before and after puberty.

Results: An inverse linear effect of BMI and age on 25(OH)D concentrations was observed in children, 39.6 % of vitD levels variability was explained by BMI. During puberty, the increase in triacylglycerols, insulin, and HOMA-IR and the decrease in QUICKI were significantly associated with the reduction in 25(OH)D after adjustment by BMI-z, sex, and pubertal stage. Otherwise, prepubertal non-IR children with overweight/obesity that became IR during puberty showed a significant decrease in 25(OH)D and HDL-c, and an increase in waist circumference and triacylglycerol concentrations over time.

Conclusions: The results from our studies suggest that adiposity assessed by BMI impacts vitD status and changes in IR seem to be associated with an effect on 25(OH)D levels during puberty, especially in children with overweight.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Cardiometabolic risk factors, Child, Insulin resistance, Obesity, Puberty, Vitamin D.

S01.3

New Sources of Vitamin D and E Supplementation during Pregnancy

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Introduction: Low dietary intake of both vitamins D and E is a global public health issue. RRR- α -tocopherol (RRR- α T) is the only naturally occurring vitamin E stereoisomer, but the synthetic vitamin E (S- α T), commonly consumed, is a racemic mixture of all eight stereoisomers. On another hand, Calcifediol (25-OH-D3) is the vitamin D metabolite that crosses the placenta; oral 25-OH-D3 improved serum 25-OH-D3 compared to vitamin D3 in non-pregnant subjects, although no studies are available in pregnant women.

Objectives: We evaluated the availability of oral 25-OH-D3 compared to classic vitamin D3 as well as natural vs. synthetic vitamin E during pregnancy, as well as, their levels in the fetus and their effect on metabolism-related proteins.

Methods: Twenty female rats per group received supplementation of 0.75 IU/kg of vitamin E ((RRR- α T (NVE) or S- α T (SVE)) as well as 25 μ g/kg of vitamin D3 or 25-OH-D3, respectively, for seven weeks (including pregnancy). At delivery, the levels of vitamins were analyzed in maternal and fetal plasma as well as key proteins related to their metabolism and function.

Results: Natural vitamin E (NVE) supplementation increased the proportion of RRR- α T and promoted higher antioxidant activity in fetal plasma at birth. Calcifediol (25-OH-D3) provided better vitamin D availability for both mother and fetus when administered during pregnancy compared to vitamin D.

Conclusions: The present results highlight new sources of both vitamin D and E with higher benefits than classic vitamin forms during pregnancy.

Funding: This study received funding from Abbott Nutrition S.L. The funders had no role in the collection, analyses, or data interpretation.

Keywords: Vitamin D, Vitamin E, Pregnancy, Supplements, Fetus.

S02.1

Introduction to Design and Sustainability of Interventions in Food and Nutrition Education (FNE) in Latin America

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Objectives: To present a general framework and background about Food and Nutrition Education interventions based on the eco-social model and experiences centered on the teacher.

Methods: Based on the eco-social model and a literature review, were identified elements used for design in interventions

in FNE, as well as barriers and facilitators that teachers present to implement actions in FNE

Results: With an ecosocial approach, interventions in FNE should consider at a personal level of the teacher, his or her skills and barriers to teaching FNE; at an interpersonal level, the resources that the school and work environment provide to the teacher; at an organizational level, the elements that school administrators and the school community facilitate the implementation of FNE actions, such as the importance and administration of teaching hours for FNE, with the faculty of curricular autonomy conferred to the teacher or the school, and the capacity of the school and teachers to organize and extend FNE activities to the family environment. On the other hand, at a community level, factors such as support from the municipality or government for schools that need to manage or improve infrastructure (such as sports fields, school gyms, or drinking fountains), or programs that promote FNE (such as school vegetables gardens or school feeding programs) should be considered; finally, at a regulatory level, should be considered class hours regulations and teaching hours to address specific topics for to FNE or for to physical education class

Conclusions: The approach to FNE in the school should be carried out with a pedagogical approach and address health education content according to the sociocultural context and conditions of the food environment. Address in the diagnosis, design, and evaluation of interventions the barriers and facilitators of teachers to implement actions in FNE, assuming that these processes are long-term to achieve sustainability.

Conflict of Interest: we declare no conflict of interest of any matter.

Keywords: Ecosocial model, Food and nutrition education, Teachers.

S02.2

The Teacher as a Subject of Intervention: Key to the Success of the Actions in the Prevention of Childhood Obesity (Costa Rica)

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Introduction: The notion that teachers influence the feeding practices of their students is supported by the theories of Bronfenbrenner's Ecological Model and Bandura's Social Cognitive Theory, which suggest that significant adult figures (such as teachers) influence the behavior of the minor through role modeling, the practice of norms and social support. They also have a substantial influence on behavior, barriers, and facilitators that the teacher as a subject perceives.

Objectives: To present the conceptual and operational model of **Póngale Vida**[®], for the promotion of healthy eating and physical activity in primary school teachers in Costa Rica, from the perspective of different behavioral models and theories

Methods: A personal interview was applied to 37 teachers from a public school that included an evaluation of nutritional status as well as information about their lifestyle and the practice of physical activity. In addition, an instrument was applied to determine their

level of self-efficacy and their stage of change with respect to the consumption of fruits and vegetables and the practice of physical activity.

Barriers and facilitators to the regular practice of physical activity and the consumption of fruits and vegetables were identified through in-depth interviews. Emphasis was placed on the barriers and facilitators that occur in the family, work, and personal environments. Next, a model was designed to promote lifestyles changes where the Model of Stages of Change, the Model of Health Beliefs, the Ecological Model, and the Cognitive Social Theory were used as a basis.

Results: It was found that 62.1% of the participants were overweight according to BMI. The level of self-efficacy was low for the practice of physical activity and high for the consumption of fruits and vegetables. The contemplation stage prevailed for the practice of physical activity and the maintenance stage for the consumption of fruits and vegetables, with differences by age being observed. The main barriers identified are motivation, schedule, and workload, which prevent them from consuming fruits and vegetables and doing physical activity. The main facilitators identified were enthusiasm and family support.

The model that is presented is based on the strengthening of self-efficacy, and on the modification of barriers, and the development of behavior facilitators that improve the consumption of fruits and vegetables and the practice of physical activity.

It consists of three components: social skills and stress management, nutritional education, and physical activity, which must be developed in the educational center by a multidisciplinary team. Changes in the lifestyle of teachers are then expected so that they become positive models for schoolchildren.

Conclusions: Changes in the lifestyle of teachers might be achieved using this model, thus, it would contribute to improving their health as well as strengthen them as positive role models for schoolchildren obesity prevention. The model must include the personal, labor, and family barriers and facilitators and be developed preferably at school.

Conflict of Interest: we declare no conflict of interest of any matter.

Keywords: Teacher's health, Obesity prevention, Models for health behavior.

S02.3

Teachers as a Curriculum Mediator in Food and Nutrition Education: A Challenge to Ensure the Sustainability in Interventions

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Introduction: Foundations and pedagogical strategies could allow a progressive advancement of the student learning outcomes (SLO) in the school curriculum (SC) related to Food and Nutrition Education (FNE), and that allows implementation from the teaching context and from their pedagogical work, could help as strategies to sustain FNE interventions. Formative Projects (FP) like strategy, can be fulfilled these needs.

Objectives: To present the framework for an intervention in FNE based on the school curriculum and its relevance to the teacher's educational targets and its potential effectiveness in school learning and nutritional status.

Methods: As part of the multicomponent intervention for prevent childhood overweight and obesity, a maximum of 13 SLO were identified by school grade in the Mexican primary education curriculum, 2011 version, related to healthy eating and physical activity education, which were framed in a pedagogical theoretical foundation of Complex Thought and socio-formation and learning by competencies, and with the formative projects (FP) as a didactic strategy. Didactic plans based on FP were delivered to schools in the metropolitan area of Pachuca, Mexico. Before starting each learning unit during the school year. At the end of the school year, the achievement of SLO related to FNE at intervention and control schools was evaluated. In addition, interviews were conducted with the teachers of the intervention schools to determine the level of implementation of the training FP; this implementation was defined by a) the percentage of implementation of the (FP), b) the percentage of teacher involvement in the development of the FP; and c) the teacher's perception of the participation of the school community.

Results: 5 blocks of FPs were developed, recognizing the field of formation, subscribed to the subjects of natural sciences and civic and ethical formation; to which the AE were subscribed that were taken as a basis for the development of the generating questions of each FP; to solve these questions, didactic situations were developed, didactic sequences that were strengthened with the contents of the textbooks that are carried during the school cycle, and also material available in the school libraries or online was recommended. The percentage of achievement of SLO related to FNE at intervention schools was 85.2% and 94.2%, and 74.1% in the control school. Regarding the indicators of FP implementation, 65% of the teachers applied full implementation FP.

Conclusions: FP are a relevant didactic strategy to achieve SLO of the school curriculum and EAN and can contribute to greater achievement of SC in health feeding and physical activity. Teachers play a central role in the development of educational strategies at the schools; the challenge is to motivate their participation and offer alternatives to update them on strategies to promote nutritional health from the curriculum.

Conflict of Interest: we declare no conflict of interest in any matter.

Keywords: Teacher, School curriculum, Food and Nutrition education.

S02.4

School-Home Linkage to Overcome Obesity in Schoolchildren (Colombia)

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Introduction: This work has been funded by MINCIENCIAS, MINEDUCACIÓN, MINCIT e ICETEX, through the Scientific Ecosystem component of the Scientific Colombia Program

(Alliance NanoBioCancer Cod. FP44842-211-2018, Project No. 57803 Prevention).

Objectives: To recognize the importance of the family in the school-home linkage to prevent and overcome excess weight.

Methods: A diagnosis was made by consulting teachers and parents of schoolchildren aged 8 to 12 years, from two educational institutions (Armenia and Medellín-Colombia) through semi-structured surveys and focus groups in order to identify perceptions about the possible causes of the high proportion (34% on average) of students with excess weight and possible solution strategies that could be provided from home in partnership with the school. Content analysis was performed, and a categorical base was built using the constant comparison method.

Results: The results the teachers recognize that they exert a clear influence on their students because from them they learn not only knowledge through the basic subjects and themes but also attitudes, practices, values, and postures that they will hold in their different phases of the life cycle, however, they also recognize the greatest influence is exerted by the family.

Teachers mostly blame the practices of parents as being responsible for their children's overweight and obesity, in matters such as: giving them money to buy unhealthy food at the school store, sending them with lunch boxes full of snacks and soft drinks because they don't have time to prepare food for them, and worry little about what they eat and what they do excessively - watch television, video games, social networks on the Internet - when they are at home. They consider that some parents do not know about nutrition and how to treat their children because they believe that punishment or scolding is enough, and many do not attend parent meetings when they are summoned by the school to deal with matters of this type, although they recognize that many works, which makes it very difficult to reach meeting points to resolve the problem. For their part, most parents and caregivers also blame the educational institution for their children's excess weight, pointing first to the restaurant for the high contribution of flour and sugar in the snack, that the school feeding program offers daily. In addition to the above, parents point out that unhealthy food for students is sold in the school store. Many also recognize their lack of knowledge about how to properly feed their children, they think that their main problem is that they do not know how to vary their diet, and this is monotonous, with a lot of fats and flours, but they trust that the teachers in their courses will teach their children to eat well.

Conclusions: In situations as serious as the childhood obesity pandemic, teachers are an important reference for parents and caregivers of schoolchildren, so a conscious exercise of such influence is plausible in order to generate coherence between the school environment and the family. It is not enough to recognize the home environment as a shaper of life habits, considering not only the Parental Educational Style as a factor related to the nutritional status of the children but also its interaction with the conditions of the family food microenvironment and its community environment, which facilitate or hinder the problem of childhood obesity, so it is necessary to involve him as an agent of intervention and sustainability of school projects aimed at overcoming it. There is evidence, including from systematic reviews, that strongly states that multi-component interventions, including the home, school, and community setting in which schoolchildren live, improve their body mass index.

Conflict of Interest: we declare no conflict of interest in any matter.

Keywords: Obesity, Schoolchildren, Family, School.

S03.1

Stable Isotopes in the Measurement of Body Composition, Daily Energy Expenditure and Physical Activity

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Knowledge of body composition in humans has been expanded by the use and application of nuclear techniques, especially, stable isotopes. Complementary to anthropometry, the measurement of total body water using the deuterium oxide dilution technique and the use of specific hydration factors from birth to adulthood, have contributed to the compartmentalization of the body. Hence, we can now divide the body into fat mass and fat-free mass components. Further, the potential contribution of this knowledge to evaluate the impact of nutrition intervention programs in different age groups could be achieved in shorter periods. For instance, traditionally, the body mass index has been considered a measure of body adiposity. Nonetheless, it does not distinguish between fat mass and fat-free mass which are body compartments that change during growth. For instance, there can be effects on the variation in FM and FFM on BMI (Fomon, *Am J Clin Nutr* 1982). FFM can be measured by deuterium dilution, to develop the FM index (FMI) and FFM index (FFMI) that can be analysed using Hattori's body composition charts (Hattori, *Am J Hum Biol* 1997). On the other hand, the measurement of total body water with the 2 Compartment Model has been used for the validation of simple field methods such as bioimpedance analysis for many situations in which research institutions or health departments in developing countries do not have the necessary infrastructure for measuring stable isotopes.

In nutrition and physiology, another important research area is related to the measurement of free-living total energy expenditure (TEE), which is crucial for the determination of energy requirements in populations throughout the life cycle. The doubly labeled water (DLW) method that uses deuterium (^2H) and oxygen-18 (^{18}O) allows for the measurement of CO_2 , nonetheless, investigators must estimate the respiratory quotient (RQ) and isotopically fractionated water losses. Also, the use of indirect calorimetry for the measurement of resting metabolic rate (RMR) in the same subjects allows us to measure the subject's physical activity level (PAL) being equal to TEE/RMR and additionally by using the widely accepted assumption 10% for the thermic effect of food, activity energy expenditure can be estimated (Esparza, *Int J Obesity* 2000).

Conflict of Interest: No conflict of interest is declared

Keywords: Stable isotopes, Energy expenditure, Body composition, Physical activity.

S03.2

Assessing Dietary Requirements for Vitamin A in Young Children Using Modeling, Stable Isotope Data, and Theoretical Subjects

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Introduction: Dietary requirements for many nutrients, including vitamin A (VA), in infants and children, were established decades ago but even now, there is limited evidence to assess the adequacy of these recommendations.

Objectives: To integrate available research regarding the assessment of vitamin A status in children, the adequacy of current DRIs, and reported VA intakes required to maintain VA balance.

Methods: Using a mathematical relationship and model-based compartmental analysis, we estimated VA total body stores (TBS) as a function of age, based on estimates of VA intake and utilization (*Curr Dev Nutr* 2020;00:nzaa119). We also postulated 24 theoretical children with a wide range of known values for TBS and studied the best sampling times to accurately predict TBS using compartmental analysis to simulate the retinol isotope dilution (RID) method for the group and individuals (*J Nutr* 2021;151:3874–81).

Results: Results suggest that current dietary intake recommendations for vitamin A are adequate to maintain and build TBS in healthy children. To better estimate TBS in young children, we suggest sampling at 14 d postdose when VA status is unknown.

Conclusions: The use of stable isotope-labeled vitamin A for the RID combined with model-based compartmental analysis has increased our understanding of VA kinetics, metabolism, and how to assess its stores.

Conflict of Interest: The information here presented was published in *Curr Dev Nutr* 2020;00:nzaa119, and *J Nutr* 2021;151:3874–3881.

Keywords: Retinol isotope dilution, Vitamin A kinetics, Model-based compartmental analysis.

S03.3

Metabolic Labeling with Stable Isotopes in Nutrition Studies

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Introduction: In different health sciences disciplines is important to determine the metabolic pathways and amount of some molecules, to know how they are synthesized, or how their levels change due to different conditions. In nutrition research it is very

important to identify the efficiency of biotransformation processes. Stable isotopes as tracers have great advantages as they are innocuous in their use in biological models, including humans.

Objectives: The objective was to describe a study using stable-isotope labeled vitamin A (VA) conducted to evaluate the VA equivalence of intrinsically labeled ²H-labeled *Moringa oleifera* leaves, and to estimate the total body stores (TBS) of VA in children.

Methods: The study was approved by the Research Center for Food and Development Bioethics Committee (CE/002/2013) and by the School Health and Safety Department of the Sonoran Education Secretary. Moringa plants were grown for 5 weeks under aseptic conditions in hydroponic cultures; using a 32% deuterium oxide solution. The profile and concentration of carotenoids were performed using LC-MS. A porridge was prepared with 7 g of Moringa leaves, containing 1 mg of [²H] β-Carotene. The food was administered to 15 children (17–35 mo old) and they were given 1 mg [¹³C₁₀] retinyl acetate in corn oil. Serum samples were obtained to calculate the isotopic enrichment and from the incorporation data calculate the bioconversion factor of β-Carotene, as well as TBS.

Results: The relative bioefficacy of activity equivalents of β-carotene to retinol of moringa was 28%; The bioequivalence of VA was 3.3:1 by weight. Plasma retinol kinetics indicate a more rapid plasma onset and turnover in these children than in adults. Using a compartmental model, the population value for VA TBS was 823 μmol was estimated. *J Nutr* 2017;147:2356–63.

Conclusions: The innocuous metabolic labeling with deuterium [²H] and Carbon [¹³C], allowed to trace the β-carotene molecules and their bioconversion process within the metabolism of vitamin A in children.

Conflict of Interest: Data used for presentation at the symposium were previously published in *J Nutr* 2017;147:2356–63

Keywords: Vitamin A, β-Carotene, Bioconversion, Metabolism.

S04.1

Foods That Made Us Humans

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Aims/Summary: We will explore the history of hominids to establish the relevance of food (nutrients and non-nutrients) to the evolution of the hominid genus. In addition, we will establish the genetic and nutritional basis for the current distribution of macronutrients. The latter aspect is due to relatively recent developments in the last 10,000 to 8,000 years. In any case, we will establish the basis for why ketogenic diets and/or diets without some of the foods that made us human, such as milk, have no scientific basis.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Mediterranean diet, Pre-Hispanic diet, Nutrients.

S04.2

Foods and Bioactives from the Pre-Hispanic Diet: The Basis of the Mediterranean Diet?

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Aims/Summary: The pre-Hispanic diet is one of the healthiest and richest in bioactive compounds and uses non-aggressive thermal cooking techniques. Many of its foods are undoubtedly the basis of the Mediterranean diet. Foods such as peppers, tomatoes, and corn are basic, and their bioactive compounds are very relevant to understanding the benefits of the Mediterranean diet. There is no doubt that many of the metabolic diseases of the Mexican population would reverse if they returned to the pre-Hispanic diet as the mainstay of their diet, without contamination from the northern regions.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Mediterranean diet, Pre-Hispanic diet, Bioactive compounds.

S04.3

Foods and Bioactives of the Mediterranean Diet as a Source of Health

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Aims/Summary: There is no doubt that the Mediterranean diet is the healthiest diet on the planet. It is a lifestyle model in which other factors such as physical activity and sunshine come into play. In this presentation, we will analyze all the bioactive compounds and foods that are decisive in this diet. We will analyze these bioactive compounds from the point of view of the contribution of foods from Central America and native Europeans.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Mediterranean diet, Bioactive compounds.

S05.1

Maternal Nutrition Modulates Gut Microbiota in Male Offspring Rats

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Introduction: There is increasing evidence that gut microbiota in offspring is derived in part from maternal environment and

nutrition status. The gut microbiota contributes to various immune functions by participating in the regulation of innate and adaptive immune responses. Thus, it has been shown that gut microbiota is associated with regulatory T cells, as well as polysaccharides fermentation to short-chain fatty acids (SCFA), leading to changes in pH and the epithelial barrier function. Therefore, the maternal diet can condition the fetal immune system increasing the susceptibility to develop inflammatory and autoimmune disorders throughout life.

Objective: To determine the effect of maternal nutrition on gut microbiota shifts in male offspring rats.

Methods: Ten male pups from dams fed standard diet (C-C, n=10), and twenty-four from dams fed cafeteria diet in the pregestational period, and high-sucrose diet (HS-C, n=11), high-honey diet (Ho-C, n=8) and high-stevia diet (HSt-C, n=5) during gestation and lactation, were fed standard diet after weaning and body weight was recorded once a week for 26 weeks. Fecal samples from the breastfeeding and adulthood periods were collected and analyzed by sequencing the 16S rRNA V3-V4 region of gut microbiota.

Results: Maternal high-sucrose and high-honey diets induced less birth weight and body weight gain during breastfeeding and postweaning in male pups. Furthermore, high-sucrose and high-stevia diets increased glucose levels in adult male rats ($p < 0.05$), which in turn, were associated with the *Firmicutes/Bacteroidetes* index. In addition, male pups' bacterial diversity decreased in the breastfeeding period, nevertheless, in pups from dams fed a high-sucrose and high-honey diets could be restored. At the genus level, a maternal high-stevia diet significantly increased *Lactobacillus* and *Clostridium* (Phylum: *Firmicutes*). Otherwise, *Prevotella* genus, bacteria of the *Bacteroidetes* phylum, significantly decreased in HSt-C group compared to C-C group.

Conclusions: This study demonstrated a decreased bacterial diversity and changes in the abundance of bacteria of the *Firmicutes* and *Bacteroidetes* phyla in male pups from dams fed a cafeteria diet during the pregestational period and high-sweeteners diets during gestation and lactation. This indicates that maternal diet can induce gut dysbiosis, conditioning the health of pups.

Conflict of Interest: The author declares no conflict of interest.

Keywords: *Bacteroidetes*, *Firmicutes*, Fetal programming, Sweeteners, Cafeteria diet.

S05.2

Adipose Tissue Dysfunction as an Early Risk for Cardiovascular Phenotypes of Immunometabolic Origin

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Introduction: Interactions between macrophages and adipocytes are early molecular factors influencing adipose tissue (AT) dysfunction, resulting in insulin resistance (IR) and cardiovascular (CV) risk. The adiponectin/leptin ratio (ALR) is an emerging index that decreases with an increasing number of CV risk factors

reflecting the functionality of adipose tissue. The GEMM study (Genetics of Metabolic Diseases in Mexico) is a collaborative study of phenotypes of Immunometabolic (ImMet) origin related to the early risk of CV disease.

Objectives: Our aim was to characterize key contributors triggering the pathogenesis of AT dysfunction.

Methods: GEMM's study design characterizes dynamic phenotypes in fasting/postprandial (F/P) states in symptom-free (SF) volunteers. We studied their ImMet characteristics and compared the association a high vs. low ALR with their F/P insulin-glucose axis, lipid-lipoprotein metabolism, and systemic inflammatory markers.

Results: A relevant pattern of negative associations between a decreased ALR and markers of systemic low-grade metaflammation and postprandial hyperinsulinemic, triglyceride, and GLP-1 curves were found.

Conclusions: Our GEMM's F/P study design has the potential to characterize early CV risk detection in support of precision medicine in SF individuals. Our data reinforce the central, early role of AT dysfunction in the pathogenesis of IR and CV/ImMet disorders.

Keywords: Adipose tissue dysfunction, Symptom-free volunteers, Immunometabolic phenotypes, Fasting/postprandial study design, GEMM study.

S05.3

Etiopathogenesis of Autoimmunity in Obesity and the Potential of Diet to Reshape the Gut Microbiota and Lymphocyte Profile for Disease Management

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Introduction: Autoimmune diseases are characterized by the presence of hyperactive immune cells and aberrant antibody responses to self-antigens. In addition to genetic factors, it is becoming clear that nutrition and microbiota play a major role in their etiopathogenesis. Furthermore, accumulating evidence suggests that obesity negatively influences immunologic self-tolerance through changes in the mechanisms underlying the generation of regulatory T cells and contributes to the rise observed in the prevalence of autoimmune diseases in the last decades.

Objectives: Expanding our knowledge on the molecular and cellular mechanisms underlying the association of obesity with autoimmune diseases will provide new insights that can be used to develop improved therapeutic strategies. This contribution presents the available information on the modification of the microbiota, cytokine production, and lymphocyte differentiation by diets, nutrients, and probiotics as well as their potential impact on disease severity in obese patients.

Methods: This seminar review current knowledge regarding clinical, experimental, and pathophysiological data on the relationship between obesity, adipokines, microbiome, diet, and autoimmune conditions. In addition, it discusses the mechanisms involved in the promotion of autoimmunity in obese patients and

their potential modulation at the molecular level through diet, nutrients, and probiotics.

Results: The pathological changes that occur within adipose tissue, microbiota, and the immune system contributes to autoimmune disease etiopathogenesis during obesity. Nutritional patterns collectively termed the *Western diet* including high intake of fat, sugar, salt, protein, and cholesterol, as well as frequent consumption of processed foods, not only promote obesity but also induce dysbiosis, inflammation, and lymphocyte Th17 expansion which altogether negatively influence the inflammatory processes worsening the course of autoimmune diseases. In contrast, a growing body of evidence indicates that plant-based diets can positively impact autoimmune patients. Studies have shown that fiber, polyphenols, unsaturated fatty acids, and the low-calorie content of plant-based foods help to improve gut bacteria composition, promote the generation of regulatory T cells and decrease body weight and the production of inflammatory mediators. Dietary and microbiota-derived metabolites positively shape cytokine and lymphocyte profiles by their influence on molecular sensors such as the Toll-like receptors, Histone deacetylases, G protein-coupled receptors, Aryl hydrocarbon receptor, Peroxisome proliferator-activated receptors, Cyclooxygenase and Lipoxygenases. In addition, clinical studies have shown that the administration of single nutrients such as flavonoids, stilbenes, omega-3 fatty acids, vitamin D, and probiotics modulate immune function and reduce the severity of autoimmune diseases.

Conclusions: Obesity appears to be a major environmental factor contributing to the onset and progression of autoimmune diseases. Targeting the mechanisms responsible for the connection between obesity and autoimmunity would lead to improved dietary and nutraceutical approaches for disease prevention and management.

Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Keywords: Obesity, Autoimmunity, Diet, Microbiome, Inflammation.

S06.1

The Benefits of Mexico's Functional Foods: The Case of Metabolic Syndrome

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Introduction: Metabolic syndrome (MetS) is a serious health problem over the world; thus, the aim of the present work was to develop a lifestyle intervention to decrease the dysbiosis of gut microbiota and reduce the biochemical abnormalities of MetS.

Methods: The prevalence of MetS was evaluated in 1065 subjects of Mexico City, Mexico, and the gut microbiota in a subsample. Subjects with MetS were selected for a pragmatic study based on a lifestyle intervention with a low-saturated-fat diet, reduced-energy intake, with functional foods and physical activity, and a second group was selected for a randomized control placebo study to assess the gut microbiota after the dietary intervention.

Results: Prevalence of MetS was 53%, and the higher the body mass index, the higher the gut microbiota dysbiosis. The higher the Homeostatic Model Assessment for Insulin Resistance, the lower the high-density lipoprotein cholesterol concentration. The pragmatic study revealed that after 15 days on a low-saturated fat diet, there was a 24% reduction in serum triglycerides; and after a 75-day lifestyle intervention, MetS was reduced by 44.8%, with a reduction in low-density lipoprotein cholesterol, small low-density lipoprotein particles, glucose intolerance, lipopolysaccharide, and branched-chain amino acid. The randomized control-placebo study showed that after the lifestyle intervention, there was a decrease in the dysbiosis of the gut microbiota associated with a reduction in the *Prevotella*/ *Bacteroides* ratio and an increase in the abundance of *Akkermansia muciniphila* and *Faecalibacterium prausnitzii*.

Conclusions: A lifestyle intervention significantly decreased MetS components, small low-density lipoprotein particle concentration, gut microbiota dysbiosis, and metabolic endotoxemia, reducing the risk of atherosclerosis.

Conflicts of Interest: There is no conflict of interest

Keywords: Functional foods, Lipoprotein, Metabolic endotoxemia, Metabolic syndrome, Gut microbiota.

S06.2

Dietary Intervention to Reduce Metabolic Abnormalities during Diabetes: Importance of the Gut Microbiota

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Introduction: Type 2 Diabetes (T2D) is a major health problem worldwide. It has been shown that subjects with T2D present dysbiosis in gut microbiota, these conditions indicate the need to strengthen and implement dietary strategies to contain this serious public health problem and help reverse gut dysbiosis.

Objectives: To evaluate the difference in the gut microbiota between the population of healthy subjects versus subjects with T2D and then to study the effects of a functional food-based dietary intervention on gut microbiota and biochemical parameters in patients with T2D.

Methods: First cross-sectional study was carried out to compare the diversity and composition of the gut microbiota. Then a placebo-controlled, randomized, double-blind study was carried out that included 81 patients with T2D divided into two treatment groups: one following a reduced-energy diet with a dietary portfolio (DP) comprising high-fiber, polyphenol-rich, and vegetable-protein functional foods; the other taking a placebo (P). The primary outcome was the effect of the DP on gut microbiota. Secondary endpoints were biochemical parameters, lipopolysaccharide, glycosylated hemoglobin (HbA1c), and free fatty acids (FFAs).

Results: Patients with T2D exhibited gut dysbiosis characterized by an increase in *Prevotella copri* compared to healthy subjects. Dietary intervention with functional foods significantly

modified gut microbiota compared with P by increasing alpha diversity and modifying the abundance of specific bacteria. There was a decrease in *P. copri* and increases in *Faecalibacterium prausnitzii* and *Akkermansia muciniphila*, two bacterial species known to have anti-inflammatory effects. The DP group also exhibited significant reductions in areas under the curve for glucose, total and LDL cholesterol, FFAs, HbA1c ($P < 0.05$), triglycerides, and CRP, and an increase in antioxidant activity ($P < 0.01$) vs. the P group.

Conclusions: Long-term adherence to a high-fiber, polyphenol-enriched, and vegetable-protein-based diet provides benefits for the composition of gut microbiota and may offer potential therapies for improvement of glycaemic control.

Conflict of Interest: None.

Keywords: Type 2 diabetes, Functional foods, Gut microbiota.

S06.3

The Importance of Water Intake in a Country with Obesity

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Introduction: The high prevalence of overweight and obesity in the general population is a public health concern in many countries, including Mexico. Unhealthy eating and drinking habits, among other life-style factors, contribute substantially to this pervasive condition. Understanding current drinking practices may help to identify areas of opportunity to improve healthy choices.

Objectives: To highlight the importance of adequate water intake by the population.

Methods: Desk review of the most recent (2018-19) National Nutrition Survey in Mexico to document anthropometric status of the general population. Desk review of a national fluid-consumption survey (2016) including children, adolescents, and adults using a self-reported, 24-hr, 7-day survey. Review of selected published experiences on potential ways to influence drinking habits in the population.

Results: About 36% of children 5-11 years old; 38% of adolescents 12-19 years old; and 75% of adults in Mexico presented overweight/obesity. A large proportion (62-82%) of Mexican population reported drinking less fluids/day than the amount recommended according to their age/sex group. Sugar sweetened beverages represented the most consumed fluid; 69-82 % of the population consumed more than one cup (250 ml) of sugar sweetened beverages per day; in contrast, only 32-49% of the population consumed less than one cup (250 ml)/day of water. Selection of different beverages is influenced by different factors including personal choices, peer pressure, and social marketing. There is evidence to support that drinking habits may be acquired early in life and persist into adulthood.

Conclusions: Promotion of healthy choices for fluid consumption represents one potential area of opportunity to improve health status among the Mexican population.

Conflict of Interest: The author is member of the scientific advisory board on fluid consumption for Danone Nutricia Research.

Keywords: Fluid consumption, Water intake, Overweight and Obesity, Healthy lifestyles, Mexico.

S08.1

Professional Training Challenges for the Dietitian Nutritionist

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The Dietitian Nutritionist (DN) as an alimentation and nutrition professional, faces a changing and challenging world which demands the urgent capability of being contextualized in response to the needs of the contemporary world, beyond the perspective of nutritionism. In order to identify the different topics, perspectives and areas to be developed by the DN in response to this reality, the academic nodes and training axes that make up the undergraduate program of nutrition and dietetics at the University of Antioquia were consulted about the challenges that, from their expertise, are identified as priorities in the training process. The results showed the importance of working on paradigm shifts that assume the transformation of how the study of the food and nutrition process is currently approached, which has evolved from focusing especially on biochemical, biological and clinical aspects that separate nutrition from alimentation, to understanding that this relationship includes other interconnected elements in complex networks that involve psychological, sociological, political, economic and environmental aspects, without limiting all the interconnections, but with a much deeper commitment such as the promotion of a healthy and sustainable alimentation that transcends the dish to commit with global health. Emphasis was also placed on the ability to generate, participate and interact with the different educational, informational and communicational technological media, with the purpose of establishing and maintaining appropriate interaction strategies. Also, the need to train critical thinking professionals, able to constantly learn, dynamic in terms of problems and questions, with a research and problem-solving capacity to deal with situations that may arise in their field of professional specialty was strongly emphasized. Finally, the value of promoting a humanistic education of the DN in harmony with the world from the ethics of the common good is highlighted. In conclusion, taking on the challenge of professional training of the DN implies becoming aware of the need to expand into various areas of work, which requires leadership, flexibility, and adaptability to the fluctuating contexts of professional work.

Keywords: Nutrition and dietetics, Feeding, Challenges, professional training.

S08.2

University Extension: Link with Society and Means for the Social Appropriation of Knowledge

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University extension is the university's missionary function that favors reciprocal relations with society. Community interaction is articulated with knowledge production to address the environment's needs and thus promote the social appropriation of knowledge, territorial development and life quality improvement. The presentation is intended to show how the extension program of the Nutrition and Dietetics School of the University of Antioquia faces the requirements to confront the challenges in alimentation and human nutrition. The extension program consists of three units: the promotion and prevention unit, the advisory and consulting unit and the environmental relations unit, which, with different actions, promote institutional, sectoral, business and community dialogue that seek alternative solutions that respond to social needs in alimentation and nutrition. For the nutrition and dietetics school, the exercise of university extension is a dynamic and changing process, which recognizes the changes and challenges that emerge and that have a direct impact on nutrition and health status of populations, such as population growth, urbanization and aging, climate change, conflicts within and between countries, natural disasters, poverty, inequality and food insecurity, changes in food systems, food loss and waste, among many others. Therefore, the School's extension permanently seeks to transcend the speech and develop reflective and participatory actions in order to achieve real changes in the community, which maintain or improve the nutritional status in the face of global changes and trends. As a conclusion, university extension expresses the permanent and direct relationship of the University with society, operating in a double sense: projection of the Institution in society and that of society in the Institution, which must be in permanent harmony with a dynamic changing world.

Keywords: Society, Social appropriation, Community, Changes, Challenges.

S08.3

Postgraduate Programs in Response to the Challenges Regarding Alimentation and Nutrition

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Postgraduate studies are key factors in scientific and technological production and, consequently, in countries development. Postgraduate program's role is fundamental when training professionals and academics to generate knowledge and contribute to the economic and social development of each country. Despite the great efforts made in Latin America in the past decades in comparison with its counterparts of the United States and Europe,

there is a significant delay in scientific production and in its low impact, as well as in the limited position at the forefront of the main university rankings. Postgraduate training policies from the States and teaching qualification plans from the universities should be continuous, progressive and strengthened in order to reduce the gap in relation to the world's benchmarks. The objective will be to analyze the diverse challenges that should be assumed from the postgraduate programs in alimentation and nutrition in order to contribute to knowledge progress that will allow a better life quality for the inhabitants of the region. The programs' internationalization, mobility, networking, e-learning, bilingualism and the open science strategy, as part of the University of Antioquia's policies, can contribute to this aim. In addition, it has allowed the Nutrition and Dietetics School to be a pioneer in the country in the development and offer of postgraduate programs at the Master's and Doctoral level, being the PhD the only one in the country in the field of human nutrition and alimentation, which are fundamental for its growth and projection in research and academic interactions with national and international institutions. Therefore, it is important to work together to have postgraduate networks in the area of alimentation and nutrition where quality processes for mobility, recognition, double degrees and program homologation are encouraged.

Keywords: Advanced professional training, Research and development, Nutrition sciences, Educational evaluation, Educational management.

S10.1

The Role of Gut and Mucosal Microbiota on Rheumatoid Arthritis

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Introduction: Rheumatoid arthritis (RA) is a systemic autoimmune disease that leads to progressive joint destruction and disability. Gut microbiota has profound effects on the immune system and increasing clinical and molecular studies have linked mucosal dysbiosis with autoimmune diseases such as rheumatoid arthritis.

Objectives: To analyze the molecular mechanisms by which gut microbiota and its metabolites contribute to RA development or severity and discuss the emerging evidence of how microbiota modulation by different strategies may be used for both the prevention and therapeutic management of RA patients.

Methods: Experimental and clinical studies focusing on gut microbiota in RA as well as clinical trials of gut microbiota modulation in RA patients published in the last 15 years were searched in the NCBI PubMed database and systematically analyzed to discuss the available information of the role of gut microbiota in RA.

Results: Gut microbiota alterations are detected in pre-clinical, early and established stages of RA and contribute to the RA autoimmune response by these mechanisms: 1) post-translational modification of host proteins; 2) molecular mimicry between bacterial and host epitopes; 3) immune system polarization towards inflammatory phenotypes; 4) induction of intestinal permeability. Therapeutic strategies based on gut microbiota modulation may

be useful for preclinical, early or established RA stages, as well as for treatment of disease comorbidities. These include the use of probiotics such as *L. casei* and *L. rhamnosus* and there is modest evidence of their anti-inflammatory effects in RA. Dietary interventions may have beneficial effects by reducing inflammatory biomarkers and dysbiosis of the patients, although studies are still lacking. No data regarding the effects of fecal microbiota transplantation in RA have been reported.

Conclusions: Modulation of gut microbiota is a promising approach to prevent and/or reduce severity symptoms in autoimmune diseases such as RA and represents an area of immense research opportunity for nutritionists.

Conflict of Interest: None to declare by the author.

Keywords: Microbiota, Dietary interventions, Autoimmunity, Probiotics.

S10.2

The Gut Microbiota and Its Implication in the Development of Cardiovascular Diseases

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Introduction: The intestinal microbiota importance in human health and disease is being highlighted by numerous studies worldwide. Lately, gut dysbiosis has been recognized as a significant element to be studied in the pathogenesis of cardiovascular diseases. Modified intestinal microbiota composition has been defined in detail in cardiovascular diseases, such as atherosclerosis, hypertension, heart failure, myocardial infarction, and arrhythmia. In addition, several metabolites (short-chain fatty acids (SCFA), trimethylamine N-oxide (TMAO), and secondary bile acids) have been associated with cardiovascular disease prevention, treatment, development, and prognosis.

Objectives: Here, we briefly discuss how different variables such as dietary and physical activity habits influence host-microbiota and atherogenesis, also the potential mechanisms of intestinal microbiota influence and prevalence of those bacterial genera in host blood pressure, vascular tone, and hypertension development.

Results: Nutritional status has a robust influence on intestinal microbiota modeling, to such an extent that specific diets such as those high in fats or sugars might lead to variations in the microbial population that, eventually, might facilitate the cardiovascular diseases development. Physical exercise is also studied as a factor that alters the intestinal microbiota composition and functional capacity. Recent meta-analyses have recognized that elevated TMAO blood levels are associated with increased cardiovascular disease risks and all-cause mortality, nevertheless, some criticism exists about the TMAO and cardiovascular diseases link because diets based on fish could contain high concentrations of TMAO and trimethylamine. A possible relationship between *Actinobacillus actinomycetemcomitans* present in the oral cavity and both coronary heart disease and stroke has been defined after several studies. Butyrate is one of the three most important SCFAs, and several

studies have shown that it may have effects on cardiovascular function. Interindividual variability regarding the efficacy of certain nutrients in optimizing an individual's health and the identification of factors that give to an individual's response to diet, as well as developing methods of personalizing dietary references, are shown to be critical to understanding the relationship between intestinal microbiota and cardiovascular diseases.

Conclusions: A better understanding of the interactions between the patient intestinal microbiota and the reaction to treatments will be vital for the upgrading of cardiovascular disease therapies and the improvement of novel methodologies targeting the microbiota in cardiovascular diseases.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Cardiovascular diseases, Gut microbiota, Microbiome.

S10.3

Microbiota and Breast Cancer: The Dual Role of Microbes

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Introduction: The microbes that inhabit our gut are capable of producing a series of metabolites that protect host homeostasis but, in situations of dysbiosis (i.e. an altered microbiota), they can also produce molecules with deleterious effects. In recent years, numerous studies have highlighted the dual role of the gut microbiota in the preservation of host health and the development of different pathologies, being cancer one of the most studied.

In this concern, breast cancer is the most commonly diagnosed cancer in women and the second leading cause of death in this collective. Diet, sedentary lifestyle, and obesity are modifiable risk factors that also have a high impact on the intestinal microbiota. In fact, it is being estimated that modification of these habits could contribute to preventing the appearance of cancer by at least 30%.

Bearing this in mind, it is necessary to evaluate which alterations of the microbiota are associated with pathophysiological conditions and how to counteract them to restore intestinal homeostasis. Moreover, we need to have the appropriate knowledge and tools to maintain a healthy intestinal ecosystem to prevent the onset and development of diseases related to dysbiosis in general and breast cancer in particular.

Objective: We aim to highlight the relationship between gut dysbiosis and breast cancer as well as discuss future directions and different approaches to counteract dysbiosis and their consequences.

Results: The microbiota of women with breast cancer is different from that of healthy women and is related to modifiable risk factors such as body mass index and adherence to adherence to dietary patterns.

Conclusions: Strategies for the management of some modifiable breast cancer risk factors and the maintenance of a balanced microbiota are mandatory. Research in this field is essential and has a long way to go given the large number of factors that can cause intestinal dysbiosis, the variety of related pathologies and the heterogeneity of the population involved.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Breast cancer, Microbiota, Microbiome, Diet.

S11.1

Impact of the COVID-19 Pandemic on Eating Habits, Physical Activity, and Body Weight in Uruguay

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The COVID-19 pandemic had a significant impact on people's lives. In Uruguay, the government appealed for a voluntary lockdown in order to prevent the spread of the virus. Most people stayed at home and started studying/working in a remote mode. In addition, some activities that involved crowds were suspended, as is the case with gyms. This situation had an impact on people's lifestyles. We wanted to know how the pandemic influenced eating habits and physical activities (PA) and the respective impact on body weight (BW). We carried out two investigations. The first one aimed to know the effect of lifestyle changes due to the pandemic on BW of patients that attended Nutrition polyclinics during the first semester of 2021. We collected data from 255 patients: 82% adults, 87% from Montevideo. Consultations due to BW gain in the pandemic were 47% in adults and 64% in children/adolescents. 73% of the adults gained weight: 54% increased up to 10% and 36% between 10% and 20%. The most mentioned causes attributed to BW gained were increased food intake and decreased physical activity both in adults and children. The food groups most reported for the increased intake were cereals and bakery in adults, plus soft drinks and processed meats in children. Of the adults who gained weight, 84% and 82%, respectively, decreased their PA and/or increased their time spent sitting. A significant difference was observed with respect to those who did not gain weight and maintained or increased their PA. The second research was carried out among the working staff of the only public university in the country: Universidad de la República. We carried out an online survey to know how their lifestyle had been affected during the pandemic. 876 workers answered the survey, 62% women, 46% worked remotely and 34% worked in a hybrid mode. 55% of the workers gained weight, 43% up to 10%. Increased appetite was reported by 38% of workers. Homemade foods and ultra-processed products were the most reported increased intake foods. Increased interaction with screens and nocturnal awakenings were the most reported changes related to sleep and rest. As a country with high morbidity from non-communicable diseases, these results are worrying.

Conflict of Interest: No conflict to declare.

Keywords: COVID-19, Lifestyle, Body weight, Nutrition polyclinics, University workers.

S11.2

Effects of the COVID-19 Pandemic on Food Security in Colombian Households

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Introduction: The confinement measures due to the COVID-19 pandemic have economic repercussions in the countries of Latin America and affect dimensions of availability and access to food. Currently there is evidence of an increase in food insecurity and poverty. The restrictive measures revealed supply problems, configuring risks of shortages and price increases. In Colombia, the National Department of Statistics reported that the poorest households went from eating 3 to 2 meals a day. The studies carried out indicate an increase in the severity of the experience of hunger.

Objectives: To analyze the effects of the COVID-19 pandemic on household food security in 11 capital cities of Colombia.

Methods: Cross-sectional descriptive observational study. Target population: Registered households with a population above 18 years of age that had an active telephone line. Instruments and surveys: Telephone interviews were carried out through a questionnaire designed by the researchers, that included each household's socio-demographic conditions, a measurement of their food insecurity experience utilizing the first eight questions of the harmonized ECLSA (Latin American and Caribbean Food Security Scale) (last 30 days), eight prioritized questions from the CSI (Coping Strategy Index) and the household water insecurity experiences Scale (HWISE).

Results: The prevalence of insecurity was 71.6%. Mild food insecurity was 31.6%, moderate 26.0% and severe 14.1%. Higher proportions of food insecurity were found in households headed by women (74.6%) than by men (62.4%). 64.3% (CI 59.1-69.2) of households carried out some strategy to cope with food insecurity, the most recurrent was consuming lower quality or cheaper food. 16.0% of households were found to be water insecure (CI 12.7-20.0).

Conclusions: The most conclusive finding of the study is the overall increase in food insecurity and the use of coping strategies by households, particularly in the lower strata of the population of the eleven Colombian cities studied. The number of households with food insecurity is increasing, especially at moderate and severe levels, and the latter even doubled. Food and water insecurity, which were expected to worsen in the pandemic, have a greater impact on households headed by women. This is why actions are urgently needed to mitigate the effects on this population, as a priority.

Conflict of Interest: The authors hereby declare that they have no actual or potential conflicts of interest of a financial or personal nature with persons or organizations that could exercise an adverse influence on the research.

Keywords: Food and Nutrition security, Coping strategies, Water security, Colombia.

S11.3

How to Face the Difficulties of Access Dimensions in Food Insecurity as a Result of the COVID-19 Pandemic? A Chilean Experience

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Introduction: The COVID-19 pandemic brought consequences to the countries, one of these was the increase in food insecurity as a result of the measures taken to control the pandemic, among other reasons.

Objective: To describe the governmental and non-governmental measure to guarantee the access to food in Chile during the pandemic of COVID-19

Methods: A qualitative narrative study. The sources of information were government websites, the digital newspaper and meetings with stakeholders and government ministry workers.

Results: The measures implemented focused on reducing the impact of the pandemic on families who saw their economic income decrease through subsidies and delivery of food baskets.

Conclusion: It is necessary to measure the impact the measures implemented for reduced the insecurity food produce for the pandemic of COVID-19. The majority of measures governmental and non-governmental are focused to better the food access through monetary transfer and boxes of food.

Conflict of Interest: No conflict to declare.

Keywords: Food insecurity, Food, Public health policies, COVID-19.

S11.4

The Role of Vitamin D in COVID-19: Evidence and Challenges

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Introduction: In the framework of the COVID-19 pandemic, vitamin D has attracted attention due to its relationship with the improvement of innate cellular and adaptive immunity in viral infections.

Objective: To identify the potential immunomodulatory effect of vitamin D on the prevention of severity of COVID-19, the

association of vitamin D and diet quality in patients with COVID-19, and the effect of vitamin D supplementation in patients with COVID-19.

Methods: A literature review was developed, an observational study was carried out on 40 patients positive for SARS-CoV-2, and an intervention study was implemented, where 22 patients received supplementation of 10,000 IU of vitamin D per 14 days, and 20 patients were included in the control group.

Results: The studies in the review showed an association between vitamin D deficiency and a worse prognosis for COVID-19. In the observational study, it was identified that 80% of the patients had insufficient vitamin D levels; in addition, patients with 25(OH)D sufficiency had better food intake quality. Finally, in the intervention study, vitamin D supplementation achieved sufficient blood levels; furthermore, on the seventh and fourteenth days of follow-up, the supplemented group presented fewer symptoms than those non-supplemented.

Conclusion: The immunomodulatory effects of vitamin D seem to be related to the lower severity of COVID-19. Therefore, vitamin D supplementation could significantly benefit the Mexican population.

Conflict of Interest: The authors declare no conflict of interests

Keywords: Vitamin D, COVID-19, Viral infections, Immune response.

S12

Food Insecurity: Impact of the Pandemic and Implications for Immunity

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Introduction: Malnutrition due to lack or excess of nutrients continues to be a serious public health problem in Latin America. Despite the efforts of the public sector, in most countries in the region the rates of obesity, in conjunction with micronutrient deficiencies, remain alarming. The effects of the pandemic and the consequences on immunity are—among others—important issues to explore.

Objectives: This symposium aims to discuss the change of food insecurity in Latin America before and during the pandemic, highlight the Nutrition-Immunity relationship, and share lessons on existing barriers and possible solutions.

Methods: The state of food insecurity in the region and how the pandemic has aggravated the situation for the most vulnerable population will be presented.

The role of macro and micronutrients in human metabolism and how they cannot fail to have a very significant impact on the immune response will be exposed.

The symposium will share existing and potential solutions to combat food and nutrition insecurity, barriers to achieving this, and lessons learned from decades-old measures in the region.

Conclusions: We expect to show that good nutrition is essential for the development of an individual's defenses against infections, including those caused by the SARS-CoV-2 virus. People with

malnutrition have weaker immune systems, which puts them at greater risk of severe illness from COVID-19. At the same time, an unhealthy diet causes obesity and diabetes, both strongly linked to the most severe manifestations of the disease, including an increased risk of hospitalization and death. The importance of Nutrition Intervention Programs to avert these health effects is crucial.

Conflict of Interest: Héctor Cori works for DSM Nutritional Products, a producer of vitamins, vitamin-mineral premixes and other nutrients.

Keywords: Vitamins, Micronutrients, Pandemic, Food Insecurity, Immunity, Nutrition.

S13.1

Genetic Variants Associated with the Development of Childhood Obesity

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Introduction: Obesity has become a noiseless pandemic associated with high morbimortality. Twin, adoption and family studies have suggested that BMI is 60% to 80% heritable. However, the candidate genes studies do not achieve to explain more than 5% of the heritability, leading to a phenomenon known as “missing heritability”. A promising hypothesis proposes that genomics data generated by genome-wide association studies (GWAS) could be used to acknowledge biomarkers with clinical application. Currently, the recent advances in Machine Learning are promoting the generation of predictive models based on the use of genetic risk scores. The implementation of validated models enhances healthcare improving the quality of life of these children who might avoid suffering metabolic disturbances in the future.

Objectives: We present the most relevant results from the GENOBOX and PUBMEP projects that aim to evaluate the association between genetic variants and genetic risk scores in children with obesity and insulin resistance (IR) undergoing pubertal development.

Methods: The GENOBOX study recruited a total population of 1699 children and adolescents (878 girls) aged 2-18 years. Subjects were assigned to experimental groups according to their obesity status (513 normal-weight, 412 overweight, and 774 children with obesity). The PUBMEP is a longitudinal study conducted on 138 Spanish children (71 girls) from which 99 were normal-weight controls and 24 were children with obesity or overweight. Genotyping of 1500 candidate SNPs was performed by the Illumina GoldenGate Assay (Illumina Inc., San Diego, CA).

Results: Our analyses reported small effect sizes of genetic variants in *FTO*, *LEPR*, *TNMD* and *NPY* genes that are associated with obesity and metabolic syndrome features in Spanish children. We have also performed analyses of genetic variants based on genetic

risk scores whose results have been useful in the generation of predictive models to assess obesity development.

Conclusions: In the future, genetic risk scores could be key in the implementation of predictive tools of childhood obesity in the healthcare system.

Conflict of Interest: The authors declare no conflict of interests.

Keywords: Obesity, Children, Candidate genes studies, Genetic risk score, Genetic variants, Genomics.

S13.2

New Findings in the Epigenetics of Childhood and Adolescent Obesity and Its Comorbidities

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Introduction: Obesity is a prevalent health problem affecting modern societies. Family and twin studies have suggested that obesity is 40% to 70% heritable, yet genome-wide association studies (GWAS) for BMI have identified only a small fraction of the implied genetic substrate for human obesity. There is increasing evidence for the role of epigenetic factors in the development of obesity. Epigenetics is defined as heritable modifications in the expression of genes that cannot be explained by changes in the ADN sequence. Epigenetic changes are modulated by environmental exposure (including nutrition and physical activity), so that epigenetics is presented as a possible factor involved in the development of diseases such as obesity. Currently the epigenome-wide association studies (EWAS) are characterized by analyzing thousands or millions of CpGs in a certain number of individuals.

Objectives: We present the most relevant results from the GENOBOX and PUBMEP projects that aims to evaluate the association between whole-genome DNA methylation in children with obesity and insulin resistance (IR) undergoing pubertal development.

Methods: The GENOBOX study recruited a total population of 1699 children and adolescents (878 girls) aged 2-18 years. Subjects were assigned to experimental groups according to their obesity status (513 normal-weight, 412 overweight, and 774 children with obesity). The PUBMEP is a longitudinal study conducted on 138 Spanish children (71 girls) from which 99 were normal-weight controls and 24 were children with obesity or overweight. Blood whole-genome DNA methylation levels were evaluated in all subjects before and after puberty entrance.

Results: Our analyses reported changes in the DNA methylation status of 3190 CpG sites across the genome associated with childhood obesity or IR. A thorough investigation of results revealed the implication of key metabolic genes previously associated with obesity and diabetes (*ABCG1*, *ADCY5*, *ADIPOQ*, *CPT1A*,

FTO, *LEPR*, *HIF3A*), but also promising new genes as prognosis markers (*VASN* and *ESR1*).

Conclusions: Further inter-omics validation approaches for these new loci could consolidate their utility as predictive risk markers.

Conflict of Interest: The authors declare no conflict of interests.

Keywords: Obesity, Children, Genetic, Epigenetic, ADN methylation.

S13.3

New Biomarkers Associated with the Development of Insulin Resistance in Children with Obesity

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Introduction: Puberty is a time of metabolic and hormonal changes, and it is associated with a reduced insulin sensitivity that recovers at puberty completion in only some children, but not in all. Our research group has demonstrated that insulin resistance represents the core in the pathophysiological development of metabolic syndrome in children with obesity.

Objectives: We present the most relevant new biomarkers in blood, and signaling pathways in adipose tissue responsible for the initiation of local and subsequent systemic insulin resistance in children with obesity as results from the GENOBOX and PUBMEP projects

Methods: The study population is a sub-cohort of the PUBMEP (puberty and metabolic risk in children with obesity) research project, consisting of a longitudinal population of 90 pre- and pubertal children with overweight, obesity and normal weight (53 girls). All subjects were classified into experimental groups according to their sex, obesity, and insulin resistance status. They counted on anthropometry, glucose, and lipid metabolism, inflammation, and cardiovascular biomarkers as well as S100A4 and Isthmin 1 (ISM1) serum levels measured. Moreover, a cross-sectional population of 31 children between 6 and 12 years old were recruited. 15 of them were obese and 15 normal-weight at prepubertal age.

Results: We reported that S100A4, a metastasis-associated protein that may be a promising marker for obesity and metabolic status in adults and adolescent populations, is associated with insulin resistance and visceral adipose tissue (VAT) dysfunction in prepubertal populations and we showed how the change in plasma S100A4 levels accompanies longitudinal trajectories of insulin resistance in children during pubertal development. Moreover, we proposed epigenetic changes in two methylation sites and an altered S100A4 VAT expression as plausible molecular

mechanisms underlying this disturbance in obesity. Higher serum levels of ISM1 were observed in boys with obesity when compared with normal-weight, and overweight. ISM1 serum levels were positively associated with BMI Z-score and fat mass, and negatively with myeloperoxidase (MPO) in boys. Nevertheless, we did not find associations between ISM1 serum levels and metabolic outcomes in girls, indicating a putative sexual dimorphism. DNA methylation levels in two-enhancer-related CpG sites of ISM1 (cg03304641 and cg14269097) were associated with serum levels of ISM1 in children.

Conclusion: we report new biomarkers robustly associated with obesity and insulin resistance development in children.

Conflict of Interest: The authors declare no conflict of interests.

Keywords: Obesity, Children, Insulin resistance, Biomarkers, Isthmin 1, s100a4.

S14.1

Challenges and Proposals for Professional Training Standards for Nutritionists in Mexico

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Introduction: The quality of nutrition and dietetic education is an ongoing process. It is important to promote the threshold competence and to understand what the nutrition profession can do in the face of social challenges. Professional standing could improve if everyone had the same minimum level of competence. There is a common set of skills and knowledge that all practitioners around the world must have. In recent years, various initiatives have emerged to establish quality standards in the training of nutritionists. There is no consensus on whether practitioners in different countries need the same set of skills. Then the competency standards must be flexible enough to be able to be applied to many different types of work and skill sets.

Objectives: To propose standards in the professional training of nutrition graduates contextualized to the social, environmental and health needs of this century.

Methods: Studies on education, nutrition, skills assessment, standards of Practice, standards of professional performance, academy quality and evidence supporting new trends in nutritional practice were selected. The studies presented in this review were identified through searches of the PubMed/Medline, EMBASE, Cochrane Library databases and technical documents issued by ICDA, CIENUT and CONCAPREN.

Results: The standards should be used as a key reference for a variety of interested people/groups or organizations (stakeholders) and purposes: for higher education institutions, for internal and external evaluation, for employers, for students, for patients, clients, other health professionals, government and other stakeholders, and for the dietetics workforce. The International Confederation of Dietetic Associations has defined standards as those minimum competences that any dietetics practitioner should demonstrate at the point of entry to the profession and will act as

a framework for their continued professional development throughout their professional life. The *Colegio Mexicano de Nutriólogos*, as a member of this international association, has been participating in the Consensus about this matter, as well with other organizations, such as *Comité Internacional para la Elaboración de Consensos y Estandarización en Nutriología* (CIENUT). In Mexico we have a reference framework from CONCAPREN (the national accreditation body for educational programs in nutrition). Beyond consensus, we will address the different education standards and some challenges, such as, the need to maintain flexibility without lowering standards, flexibility in wording of standards to account for variations in practice, the convenience of an international regulatory framework without replacing any existing regulations, using competency to describe the specific behaviours that lead to a person being classified as competent, the new standards according to the global agenda.

Conclusions: There is no doubt that the education of dietitians-nutritionists worldwide has continued to improve. The majority of countries now meeting the standard of a bachelor's degree with a supervised practice of 500 hours. Our proposals are based in the importance of national accreditation processes and the definition of the professional fields of the nutritionist. These act as quality improvement processes leading to positive changes in education programs, incorporating content such as standardized languages for recording the nutrition care process, distance learning and digital education, many forms of social media as a means of general communication and consultations with clients, blogs, nutrition apps, tele-nutrition, entrepreneurship, content on sustainability foods, and innovation, among many others.

Conflict of Interest: The author is a member of the Board of Directors of the International Confederation of Dietetic Association

Keywords: Quality standards, Nutritionist education, Accreditation process.

S14.2

Generation of Nutrition and Food Policies and Programs in a Social, Safe and Sustainable Environment

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Introduction: Globally, 2 billion people are overweight or obese, while 860 million are hungry. The continued disproportionate increase in population not only aggravates health problems and access to food but also leads to important effects on the environment, sustainable development, and the conservation of resources for future generations. Currently, the food system produces 30% of greenhouse gases, and agriculture uses 70% of water for human consumption, producing up to 38% of planet degradation. This permanent loss of biodiversity, the effects on the ecosystem, and health and food problems have been the reason for the sustainable food systems development. For this reason, as part of the containment measures, the United Nations Organization adopted the

2030 agenda containing 17 sustainable development goals (SDG), were nutrition and health present important actions in search of sustainability.

Objective: To know the challenges that public health faces in the creation of; issues, policies and programs that provide a solution to the needs of this century.

Methods: Studies on food security, sustainable nutrition, public policies, public health, and nutrition in populations were selected. The studies presented in this review were identified through searches in PubMed/Medline, EMBASE, and Cochrane Library databases.

Results: Currently, the global development of different political strategies and food programs contributes to the generation of sustainable practices. This review presents the historical evolution from the green revolution to food security as currently defined. The elements that make up sustainable food security are identified and explained, where the social, economic, and ecological converge to achieve a balance for the future. Nutrition and the role of sustainable diets are explained with its five fundamental elements: health, environment, culture, economy and equity. All of the above, within the context of the SDGs and social and economic aspects of success stories for reducing food insecurity.

Conclusions: Every day the world has a greater challenge in the generation of nutritious and sustainable food products that respond to population growth, inequality and environmental impact. Actions to improve the health and nutrition of the world population, without affecting the environment and future generations, continue to be a global challenge. There are still few countries that have integrated sustainable nutrition in their food guides, the reduction of food waste and incorporation of recycling, among other measures.

Conflict of Interest: No conflicts of interest

Keywords: Food security, Nutrition in populations, Public health, Public policies, Sustainable nutrition.

S14.3

Challenges and Opportunities of Nutritional Intervention in a Context of Sustainability and Functionality

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Introduction: Global changes in society and the increase in the prevalence of chronic non-communicable diseases have led to the search for new therapeutic strategies in accordance with the scientific advances of the 21st century. Nutrition, beyond its conventional approach, has gained greater impact from the publication of the human genome and the knowledge of the effect of food components on genes, giving rise to the development of functional foods and a new approach to nutriology known as functional nutrition.

Objectives: To describe the challenges of health care in the generation of effective, sustainable and safe nutritional interventions.

Methods: Studies on sustainability, nutrition, planetary diet, metabolic disease and evidence supporting new trends in the nutritional intervention were selected. The studies presented in this review were identified through searches of the PubMed/Medline, EMBASE and Cochrane Library databases.

Results: In recent years, society has experienced multiple economic, political and food changes that have affected not only the quality of life of the population but also the environment. In the search for strategies that safeguard future generations, the United Nations Organization proposed 2015 the Sustainable Development Goals (SDG), whose goals include actions to eradicate poverty, promote prosperity and well-being for all, protect the environment and fight climate change. From the 20th century, with the publication of the human genome, nutrition, and the vision of the disease, took a different dimension in its therapeutics. The previously called chronic non-communicable diseases (NCDs), such as obesity, diabetes, hypertension, dyslipidaemia, and cancer, were referred to as more than one disease, which is why they are now known as a complex disease. Likewise, with the beginning of the 21st century and taking as a reference the role of nutrients on the genome, a new era in food and nutrition sciences became present with greater intensity, recognizing the interaction between genes and nutrients and their impact on physiology of an organism. The foregoing gave rise to nutritional genomics with two large areas of study: Nutrigenomics, a science that studies the role of nutrients on gene modulation, and Nutrigenetics, a science that studies the response of the human genome to the nutrients and phytochemicals of the food. At the same time, Japan developed in the 80s, the so-called functional foods, which are developed as a necessity to reduce the high prevalence of chronic diseases. Over time, a wide variety of chemical substances with biological activity have been identified in food, whose scientific evidence shows the role of nutrition in the design of new therapeutic strategies. Scientific advancement leads to nutrition and its intervention methods to evolve. In this way, the nutritionist must generate new intervention methods based on current knowledge of the disease; with this, the nutritional therapy of the 21st century is built under a functional approach, which considers the role of genes and the cellular microenvironment.

Conclusions: Scientific evidence and the current political and economic context demand new sustainable and social nutritional intervention strategies, with a focus on the microenvironmental components of the disease. The global adoption of healthy diets based on sustainable food systems would safeguard the planet and health, contributing to the achievement of the goals proposed by the SDGs; For this reason, it is essential for the nutritionist to align himself with intervention strategies at the individual and population level that include a diet that optimizes health and the environment.

Conflict of Interest: No conflicts of interest

Keywords: Bioactive compounds, Functional nutrition, Metabolic disease, Nutritionist, Planetary diet.

S16.1

Risk and Nutritional Diagnosis at Birth in Mexican Children

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Introduction: From the 16th week of gestation, the main variations in the growth of the fetus are presented, influenced by genetic and environmental factors; where nutrition, oxygen availability and maternal size are determining factors. The problem is that insufficient birth weight and length have short and long adverse effects.

Objectives: Assess the risks associated with nutritional status at birth in Mexican children.

Methods: Cross-sectional descriptive study. Data from 1,907,341 alive Mexican newborns in 2017 were analyzed. The percentiles for weight and length were estimated in the INTERGROWTH-21st platform. In a sample of newborns evaluated, the risks associated with the prevalence of weight and length at birth were identified.

Results: In México differences in the prevalence's of small (SGA) and large (LGA) for the gestational age by sex and age were recorded ($p < 0.01$). The entities with the highest prevalence of SGA were Estado de México and Yucatán (10.4%); Sonora (16.8%) and Baja California Sur of LGA (16.8%). Maternal social characteristics as age (teenage), civil status and no health service were associated with a higher risk to give birth SGA neonates. On the other hand, the greatest risk for being LGA was registered for neonates with mothers that were aged ≥ 35 years and married (OR adjusted= 2.18 and 1.22, $p < 0.01$, respectively).

Conclusions: In Mexican newborns, SGA and LGA were the main nutritional problems observed, especially in male neonates. Maternal age and marital status were associated with a major risk of being an SGA or LGA newborn.

Conflict of Interest: The author declare that they have no conflict of interest.

Keywords: Newborn, Mexico, Malnutrition, Birth weight.

S16.2

Prevention of Malnutrition through Nutrimenty in the First 1000 Days of Life

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Introduction: In this work we will describe the primary preventive actions in the first 100 days of life and the reflection of the 100 days that preceded them, in this period it is captured by the Nutrimenty system that confirms its pregnancy condition and

includes it in the attachment program. to the prenatal pediatric control, in which the evidence of the nutritional status is recorded and the delivery of the package of preventive measures for malnutrition begins. In the first place, the risk group is established by nutrimenty and the first pillar is delivered, which begins with the intake of fish oil, for which the mother is trained in the appropriate cooking techniques to obtain, consume, and preserve it, avoiding its waste and ensuring an adequate intake of DHA. As a second pillar microbiota. As the third hydration pillar, the fourth pillar is related to exposure to UV ultraviolet rays at the right times and times. The fifth pillar is related to the hours of sleep. The sixth pillar is related to the prevention of accidents, the package is completed by personalizing the nutritional requirements of the binomial, establishing a virtuous circle of quality in primary prevention to intervene early and generate evidence that shows that we are on the way to achieving the goals of reducing low birth weight and delayed linear growth at 1000 days of life.

Objectives: Present evidence of the behavior of the risk groups established by the Nutrimenty system in the first 1000 days of life.

Methods: 328 data of children measured during the years 2010-2017 were analyzed, a cross-analysis of height/age Z-score and BMI/age with Nutrimenty was made and the prevalences by year and risk groups of the Z-score means with Kruskal Wallis, the prevalences of the groups 8,6,4 considered low risk and 1.7 high risk were constructed.

Results: The prevalences for the years 2010-2017 for risk group 8 (tall height/normal weight) were as follows: 2010 P= 0%, 2011 P= 3.45%, 2012 P= 1.92%, 2013 P=2.17%, 2014 P =2.17%, 2015 P=5%, 2016 P= 0% AND 2017 P=0%. The prevalences for risk group 6 (normal height/normal weight) in 2010 P= 47.06%, 2011 P= 48.28%, 2012 P= 48.08%, 2013 P= 54.35%, 2014 P= 54.35%, 2015 P= 55 %, 2016 P= 47.50%, 2017 P= 46.34%. Prevalence for risk group 4 (short stature/normal weight) in 2010 P= 11.76%, 2011 P= 10.34%, 2012 P= 7.69%, 2013 P= 8.70%, 2014 P=13.04%, 2015 P=10 %, 2016 P= 17.50%, 2017 P= 9.76%. Group risk1 2010-2013 P= 2.36%, 2014-2017 P=2.47%. Group risk7 2010-2013 P=4.60%, 2014-2017 P=1.79%. We compare the two averages every 4 years and find differences of -1.9%, which despite showing us a decline, still requires multiple efforts to reach the goal in 2025.

Conclusions: Nutrimenty allows early intervention with primary prevention measures for malnutrition, generating evidence of improvement in the referred risk group.

Conflict of Interest: We do not present any conflict of interest.

Keywords: Nutrimenty, Risk groups, Primary prevention, Early intervention, Crossed variables.

S16.3

Programming of Growth and Excess Weight in Spanish Children

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Introduction: Several early-life factors have been identified in the literature (pre-pregnancy overweight/obesity, smoking during pregnancy, excess gestational weight gain, prematurity, high and

low birth weight, not being breastfed and rapid early infant weight gain) as risk factors of overweight/obesity at scholar age.

Objectives: To explore early-life factors and their cumulative and longitudinal effects on later programming of trajectories to excess body weight at 6-7 y old, and how social vulnerabilities modulate it.

Methods: Growth trajectories, family and sociocultural characteristics, pre and postnatal risk factors of obesity and feeding practices were examined in children from the CALINA study, Aragón, Spain. Repeated measures analyses were conducted to assess excess body weight and RWG (infant Rapid Weight Gain). Analyses were performed to assess the potential contribution of each variable to BMI z-scores and overweight/obesity development.

Results: Rapid infant weight gain, maternal overweight/obesity, paternal overweight/obesity, Latin American/Roma origin and smoking during pregnancy remained significant after adjusting for confounders. A higher number of early-life risk factors accumulated was associated with overweight/obesity at age 6y but not at age 2y and 4y. BMI and weight z-scores trajectories were significantly higher in the RWG group and in the formula-fed group. No significant differences were found regarding height. Infant feeding practices did not mediate the association between RWG and BMI z-score but were associated with BMI at 6y.

Conclusions: Among early life factors, rapid infant weight gain and smoking during pregnancy are significant global predictors of overweight/obesity during childhood after adjusting for confounders. Sociocultural and family habits are also important predicting later excess body weight. Those children with a higher number of early risk factors had elevated odds for obesity later in life suggesting cumulative effects.

Conflict of Interest: The author declare that they have no conflict of interest.

Keywords: Overweight, Early life factors, Sociocultural, Feeding, Growth.

S17.1

Introduction: History and Design of the INCAP Longitudinal Study and the COHORTS Collaboration

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Introduction: Cohort studies from developing countries have contributed new findings about how early life shapes future development.

Objectives: To describe the design and selected impact results of the INCAP Longitudinal study, one of five cohorts included in the COHORTS collaboration.

Methods: The Institute of Nutrition of Central America and Panama (INCAP) longitudinal study of 1969 to 1977 was a community randomized trial in which 2 pairs of matched villages received either a protein-rich gruel (atole) or a nonprotein, low-energy drink (fresco). Both contained equal amounts of micronutrients by volume. The design dates from a time when protein was seen as the main dietary deficiency, but the design precludes

attributing impact to only protein. Many follow-up studies have been carried out since 1990 to the present. The COHORTS collaboration combines data from 4 other long-run birth cohorts from Brazil, the Philippines, India and South Africa, which were all observational.

Results: Exposure to the atole compared to fresco was associated with improved physical growth at 3 years of age but not from 3 to 7 years. Consumption of atole was greater than of fresco. Total diets in atole villages were greater from 15 to 36 months in protein, energy, and micronutrients, making attribution of impact to a specific nutrient impossible. The atole improved linear growth (total body length, atm length) and head circumference but only in the first three years. Impact on mental development was less evident. Subsequent follow up studies in adolescents and adults has shown clear impact of the atole on schooling, reading, and wages and annual incomes, but only if provided in the first 1000 days. Analyses from COHORTS support these conclusions and show how linear growth in early life but not later is associated with adult human capital.

Conclusions: A nutrition intervention during early life improved childhood linear growth and adult human capital.

Conflict of Interest: None

Keywords: Nutrition interventions, Birth cohorts, First 1000 days, Growth, Human capital.

S17.2

Impact of Early Nutrition on Cardiometabolic Health in Adult Life and Associated Physiological Mechanisms

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Introduction: There has been increased interest in the hypothesis that undernutrition in early life predisposes to cardiometabolic disease risk in adulthood. The INCAP Longitudinal Study can support elucidating whether improvements in nutrition can prevent this increased risk.

Objective: To describe the main findings on obesity and body composition across five waves of field work (1988-1989, 1991-1994, 1998-1999, 2002-2004, 2015-2017) and on cardiometabolic health across three waves (1998-1999, 2002-2004, 2015-2017).

Methods: We reviewed all peer-reviewed published articles available from the INCAP Longitudinal Study related to obesity, body composition and cardiometabolic disease outcomes in adulthood, as well as their relationship with improved early life nutrition.

Results: Body weight and body fat increased considerably in adulthood, especially among women with sedentary occupations. Adiposity and weight in adulthood were strongly predicted by weight gain after the first 1000 days of life. On the other hand, exposure to improved nutrition in early life reduced diabetes risk by approximately 50% but increased the risk of overweight and obesity. Among women, leptin mediated 35% of the association

between early-life nutrition and adult fasting glucose. Obesity, diabetes, hypertension, and metabolic syndrome were associated with lower metabolic flexibility, defined as the metabolomic feature peak areas at 2hr post-challenge, relative to fasting.

Conclusions: Improved early life nutrition cut diabetes risk in half, partially mediated by leptin in women. Future research will aid in clarifying the underlying mechanisms that drive the opposite associations among diabetes and obesity with early life nutrition.

Keywords: Obesity, Cardiometabolic health, Guatemala, Diabetes, Leptin, Body composition.

S17.3

Maternal and Reproductive Factors Associated to Long-Term Adiposity

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Introduction: Women are at increased risk of obesity in comparison with men. Parity and timing of parity has been associated with both short- and long-term weight gain in women.

Objectives: To describe the main findings of the association between parity and timing of parity and maternal change in body mass index (BMI) along the life-course.

Methods: Evidence come from studies that prospectively assessed the association of parity and long-term weight change in 75,421 women from the Mexican Teachers' Cohort and the association between age at childbirth and maternal change in BMI in 778 women from the INCAP Longitudinal Study. Several multi-variable regression models were fit to assess these associations.

Results: Parous women (≥ 4 children) gained 2.81 kg more (95% CI [2.52, 3.10]) than did nulliparous women. Women who had one, two, or three or more children between 1988 and 89 and 2002-04 had 0.90 (kg/m², 95% CI: -0.55, 2.35), 2.39 (kg/m², 95% CI: 1.09, 3.70) and 2.54 (kg/m², 95% CI: 1.26, 3.82) higher BMI, respectively, than women who did not give birth in the same period.

Conclusions: Findings suggest that parity alters weight-gain trajectory in women and that women who had three or more children during early adulthood gained more weight compared to women who had no children in the same period. In contrast, women who had children earlier or later in their reproductive lives did not gain additional weight compared to those who did not have children during that period. Findings suggest that childbirth can have different associations with BMI based on when it occurs during the reproductive period. These findings are important in the prevention of excessive weight gain through reproductive years and their future health implications.

Conflict of Interest: None.

Keywords: Parity, BMI, Adiposity, Childbirth, Timing.

S17.4

Early Nutrition and Adult Intellectual Functioning and Mental Health

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Introduction: There is limited evidence about the long-term impact of nutrition in early childhood on adult IQ, schooling, and mental health.

Objectives: To present recent findings from the INCAP Follow-up study in Guatemala and the COHORTS Collaboration on such outcomes.

Methods: The INCAP longitudinal study of 1969 to 1977 was a community randomized trial in which 2 pairs of matched villages received either a protein-rich gruel (atole) or a nonprotein, low-energy drink (fresco). The COHORTS collaboration adds cohorts from 4 countries to carry out pooled analyses of the several follow-up studies available. In Guatemala, adult IQ was measured using the Raven's Progressive measures and mental distress with the WHO SRQ-20. Similar or equivalent measures were used in the other cohorts.

Results: Exposure to the atole compared to fresco was associated with improved linear growth at 3 years of age but not from 3 to 7 years. Childhood impact on preschool child development was inconclusive but, surprisingly, quite evident later. For example, in the first follow up study, when the participants were adolescents and young adults, exposure to atole, but only in the 2-3 years, was found to improve numeracy, reading, and generally knowledge. In a later follow-up, when all had completed schooling, the atole was found to improve years of schooling and IQ as well. Another analyses, using data collected in 2017-18, when participants were 40-57 yrs. old, shows that the atole reduced the risk of mental distress by about 60%. Analyses from COHORTS support that it is the period of the first 1000 days that matters. In two recent publications, one an article in the 2022 Lancet series on adolescent, show that linear growth up to 2 yrs of life, but not at any other later period, is associated with adult IQ and schooling.

Conclusions: Better nutrition in early life is critical for building adult human capital.

Conflict of Interest: None

Keywords: Nutrition interventions, Cohorts, First 1000 days, Growth, Human capital.

S18.1

Food Patterns of a Continental Country: The Specificities of Northeast Brazil

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Introduction: Dietary patterns represent the set of foods consumed by a given population. Thus, they are influenced by socio-cultural, affective, economic, and political aspects, which is even more striking in a country of continental dimensions like Brazil.

Objectives: To present the different dietary patterns found in Brazil, with emphasis on the patterns of the Brazilian northeast.

Methods: Review the different Brazilian dietary patterns described in the literature and demonstrate the patterns identified in Ceará in different age and physiological groups.

Results: The country has shown changing patterns with foods like rice and beans reduced and foods like snacks and fast food increasing. However, additional patterns to the “traditional” or “Brazilian” pattern are still identified, which are the regional patterns and, therefore, it is important to identify/study the characteristics of each region, such as the Northeast, with diets that show the use tubers, rice and beans, bakery products, and coffee.

Conclusions: Regional products have been reduced in many studies, which makes it urgent to rescue the local food culture and adjust the specific nutritional conditions of this population.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Dietary patterns, Brazilian food, Regional diet.

S18.2

Associations between Socioeconomic Indicators, Body Composition, Lifestyle Behaviors and Dietary Patterns Between Europe and Brazil

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Introduction: Dietary patterns (DP) are influenced by cultural, socioeconomic, home-environment, lifestyle, and personal preferences. Also, dietary patterns influence several body composition indicators.

Objectives: To overview the current situation of the current links between personal, social and lifestyle factors on DP in Brazilian and European populations, taking special considerations to socioeconomic status and also body composition indicators.

Methods: Data from a couple of Brazilian cohorts, the ELANA study and the Household Budget Survey, and the European HELENA study will be used. Review the current literature published, including identification of DP in both population groups, and also the associations with socioeconomic indicators, body composition indicators and other lifestyle behaviors (screen time and physical activity)

Results: In European and Brazilian adolescents, inversely association between Western DP has been associated with low or high secondary mother’s education level, respectively. Traditional DP was associated with high secondary and university mother’s education level, respectively. Analysis the combination of lifestyle behaviors, regression analysis showed that those characterized by high sugar sweetened beverages (SSB) consumption in European boys; high screen time, and high screen time plus high physical activity (PA) in Brazilian boys; and high PA, and high SSB and fruit and vegetables consumption in Brazilian girls, were positively associated with different body fat composition indicators.

Conclusions: The overall knowledge of the impact of DP and its determinant is essential in order to perform specific dietary intervention that should be focused on the target population group, especially in adolescents taking into consideration their characteristics.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Dietary patterns, Socioeconomic status, Body composition, Lifestyle, Adolescents, Europe, Brazil.

S18.3

Mediterranean Diet and Genetic Factors as Determinants of Obesity and Metabolic Syndrome in European Children and Adolescents

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Introduction: Obesity and metabolic syndrome (MetS) during childhood and adolescence are multifactorial diseases influenced by genetic and environmental factors. The Mediterranean diet (MD) seems to modulate genetic predisposition to obesity or MetS. Several genetic variants have been shown to have an impact on the benefits that MD exerts on obesity or MetS in adults.

Objectives: To describe and analyze the impact of genetic factors in reducing the risk of obesity or MetS through MD, as well as to explore the modulating effect of MD in the genetic susceptibility related to obesity and MetS in young Europeans.

Methods: The focus was on assessing studies considering gene-MD interaction effects and its relationship with body composition and/or biochemical parameters: Body Mass Index, Waist Circumference or any of the MetS components (HOMA or glucose levels, HDL/Total cholesterol, systolic or diastolic blood pressure) in European children and adolescents (0-18 years old). In addition, a systematic search was performed to identify and describe those studies within the intended search criteria.

Results: From the limited evidence found on gene-MD interaction studies in European youth, a study showed that the influence of high MD adherence on adiposity and MetS was only observed with a limited number of risk alleles; the gene-MD interplay showed sex-specific differences, being higher in females.

Conclusions: The gene-MD interaction studies in European youth are scarcely analyzed. The influence of high MD adherence on adiposity and MetS was observed in adolescents with lower genetic risk to obesity. The integration of omic sciences and personalized nutrition, considering MD, could be a key element in future research.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Mediterranean diet, Adolescents, Obesity, Metabolic syndrome, Genetics, Interaction.

S19.1

Moving towards more Nutritious, Affordable and Sustainable Food Systems

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The September 2021 United Nations Food Systems Summit (UNFSS) emphasized the essentiality of dramatic changes to food systems globally in order to meet some, if not all of the Sustainable Development Goals. A sustainable transformation of food systems requires achieving a system that is good for the environment, good for people, and good for society.

There are unintended consequences of modern food systems that have not been historically captured in calculations of the costs and benefits of various types of food systems. The UNFSS highlighted the potential of understanding the true value of food through a true cost accounting of food approach (TCA). A TCA approach can identify what some have called “Hidden Costs” or the negative externalities that inflict costs on the environment and health. A distinctive feature of TCA is that it captures both the true costs and true benefits of food system changes. Although a TCA strategy is in its infant stages, its use has an enormous potential in facilitating a transition to more sustainable, healthy food systems. A TCA approach can be one tool that will enable governments to identify and implement actions to effectively maximize the positive environmental and health impacts of policies and programs for transforming food systems.

The presentation will cover a framework that will address the impacts of food systems on nutrition and health at each stage of the food supply from farm to fork. There will be a discussion of how costs, benefits and transfers would add up to compute the net contribution of each part of a food system. The implications for a better understanding of the true value of food for policy and program formulation will be discussed.

S19.2

Effective Strategies for Nutritious and Affordable Diets

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Implicit in the constantly updating international definition of “food security” is that diets will be nutritious and affordable. At one level, however, the food-security definition can be regarded as somewhat of an idealistic platitude or slogan; as such, it must be parsed and dissected to understand its true feasibility. That is the purpose here. In the initial approach, we must understand the inner connotations, while acknowledging the complexity of stakeholders. Furthermore, the effort here will be a synthetic analysis of the title-topic, namely with the simultaneous attributes of a diet’s providing all of the nutrients needed by every age-group and condition in societies, while being affordable within the resources available to households to invest in food and beverages. At first

glance, the simultaneous satisfaction would depend upon having sufficient income and commitment of valid nutrition knowledge; but neither of these can be a guaranteed assumption for most of the world’s population.

The scenario is full of moveable and intercalated parts including demographic expansion and environmental degradation. Global climate change is impacted by food production including greenhouse gas (methane) generation from livestock and paddy-rice production and demand on fresh water, while it impacts food acquisition in terms of pest proliferation, fish-stock migration and saltwater incursion from sea-level rise. The background situation is that habitual diets generally satisfy energy needs, but do not concurrently provide the recommended micronutrients. The density of nutrients in foods is the determinant. But consuming nutrient-rich foods, namely animal-sourced foods, is constrained by their higher-costs and adverse environmental impact. Plant-diets remain innately less expensive and more eco-friendly, while being less nutrient-dense on aggregate.

Solutions would be universally favored by slowed demographic expansion, and reduction of food-wastage at all stages. Thereafter, application of novel technologies and situational rationalization are at the center of solving the simultaneous equation of affordability and nutrient-adequacy. Transport demands are reduced by decentralized production, whereas efficiency is enhanced by concentration. Other such trade-offs must be weighed in addressing the lowering of costs. On the technological front, all forms of nutrient enhancement, both food-fortification and bio-fortification, must be mobilized to assure nutrient adequacy.

S19.3

Leveraging Food Technology and Innovation to Deliver Tasty and Healthy Foods

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The Constitution of the World Health Organization of the United Nations defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1947). This definition leads to the concept of alimentation or “the process by which humans procure, prepare, share, enjoy and digest their foods” (Aguilera, 2020). Hence, technology and innovation Healthy foods are not necessarily synonymous with healthy alimentation and lifestyles. This presentation will delve into the main issues related to how food technology integrates knowledge from various disciplines to design healthy and sustainable products, redesign traditional products, utilize novel food sources, and innovate on plant-based foods and matrices to feed a healthy microbiota. It will be argued that major impacts of food technology and innovation originate at the interfaces with environmental, socio-cultural and physiological domains.

Conflict of Interest: None

Keywords: Alimentation, Health and wellbeing, Rational design, Food matrix.

S20.1

Vitamin D and the Immunoinflammatory Process in COVID-19

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Introduction: Vitamin D has a close relation with all portions of the immune system, its receptor may be expressed in almost every cell, particularly in immune cells. It is involved in the modulation of multiple cell types, such as macrophages, T and B lymphocytes, dendritic cells. On the other hand, the SARS-CoV-2 infection induces an atypical inflammatory response with the excessive production of inflammatory cytokines. Thus, it has been proposed that vitamin D may help in the modulation of the immune system, helping patients control the inflammatory response in the disease.

Objectives: To analyze the relationship between vitamin D, inflammation, and COVID-19.

Methods: Literature was reviewed through PubMed from April 2020 to June 2022.

Results: Several observational and epidemiological studies have been conducted with respect to Vitamin D sufficiency or deficiency and the outcome of COVID-19. Vitamin D may be protective against respiratory infections, particularly COVID-19. Vitamin D deficiency (<10ng/mL) was found associated to worse prognosis in young individuals, especially males. A meta-analysis showed that vitamin D does not affect the risk of infection, but rather the severity and mortality rates, with a higher risk of invasive mechanical ventilation and death. A vitamin D supplementation in old age increased survival and clinical outcomes in COVID-19 infection. There is not enough clinical evidence of the effect of vitamin D supplementation, but most studies recommend daily doses and the need to undertake clinical trials.

Conclusions: Most of the literature points to the fact that vitamin D sufficiency may help patients to avoid critical conditions related to COVID-19 infection as well as its fatal consequences.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Vitamin D, Inflammation, Immune system, COVID-19.

S20.2

Vitamin C and Its Role in COVID-19

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Introduction: COVID-19 is a disease caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and up to June of 2022 it had infected more than 540 million people with over 6.3 million deaths worldwide.

Since COVID-19 first appeared, the search for its cure also started. Several treatments were introduced with conflicting results. Among those treatments, some substances were used (hydroxychloroquine, ivermectin) that were potentially harmful with no clear Results. Other treatments shortly followed including those with no evidence for its use (colchicine, azithromycin, oleandrin), while other recent treatments show promising results like antivirals (remdesivir, paxlovid, sabizabutin), anti-inflammatory drugs (baricitinib, dexamethasone) and some monoclonal antibodies. The use of high doses of several nutrients including omega-3 fatty acids, and vitamins D and C has also been attempted with conflicting results.

Objectives: This review will summarize the current knowledge about the treatment for COVID-19, particularly with specific nutrients like vitamin C.

Methods: A systematic search of clinical studies about the use of high doses of vitamin C to patients with COVID-19

Results: According to the WHO, the best way to prevent new COVID-19 infections includes vaccination, sanitary measures (masks, washing of hands) and healthy lifestyles including avoid gaining weight, good eating habits, regular physical activities and so on. An increase in the consumption of food sources of vitamin C (citrous fruits, leafy vegetables) does not correlate with reduced rates of COVID-19 infection. On the other hand, the administration of high doses of vitamin C to COVID-19 patients results in some beneficial effects in clinical outcomes such as a reduction in the length of hospital stay, re-admission rate, admission to intensive care, need for advanced oxygen support, and mortality. These results were not supported by significant changes in immune parameters, which indicated an unexplained effect for vitamin C.

Conclusions: Although the administration of high doses of vitamin C to COVID-19 patients is generally well-tolerated with no adverse effects, its lack of effectiveness in reducing the rate of infection to SARS-CoV-2, does not support its use in these patients.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Vitamin C, COVID-19, Nutrition, Immunity.

S20.3

Association of Zinc Deficiency with Worse Prognosis of COVID-19

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Introduction: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has been defined as a systemic disease with a high variety of outcomes, since it may be asymptomatic or being the base of multiple inflammatory pathologies related to different organs. SARS-CoV2 attack has been much more harmful in those frail individuals due to a situation of malnutrition or chronic disease, such as elderly people, infants and pregnant women. This is the reason why the nutritional status has been shown to be key to tackle the damaged consequences of this virus. Zinc is included into those essential micronutrients that are involved in the

regulation of the immune function. Indeed, zinc deficiency affects health through the deterioration of the immune system.

Objectives: To analyze the scientific evidence of the association of zinc deficiency with the prognosis of COVID-19.

Methods: Original papers and reviews published from 2020 to 2022 have been reviewed in this study.

Results: Several trials have been performed to assess the consequences of the zinc supplementation in populations from developing countries, showing a favourable outcome reducing the duration of infections and especially those provoked by viruses. Particularly, a strong correlation between low levels of serum zinc and COVID-19 severity has been found. Therefore, the assessment of zinc levels in the general population, but especially in the elderly, could be a very important biomarker to detect possible zinc deficits and avoid then poor immune system function.

Conclusions: Serum zinc levels must be taken into account when analyzing micronutrient levels since there must be adjusted to homeostasis in order to avoid zinc deficiency and achieve a better status of the immune system, capable to react against the SARS-CoV-2 attack.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Zinc, Biomarker, Immune system, COVID-19.

S21.2

Microbiota, Probiotics and Prebiotics in Food Allergies. Impact of Restrictive Diets

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The prevalence of allergic diseases has increased in recent years, mainly food allergies. The dysbiosis of the gastrointestinal microbiota could be associated with the development of immune system and a large number of pathologies, including allergies.

Altered microbiota leads to decreased diversity, significant loss of symbiotic bacteria, and pathogen overgrowth. It could be generated by environmental factors such as the route of birth, breastfeeding or artificial milk, lifestyle, physical activity and exposure and/or consumption of antibiotics and diet. Another factor that could affect the composition of the microbiota is restrictive diets, which can be recommended for the treatment of different pathologies. They should be used after a correct diagnosis, prior medical prescription and with rigorous monitoring. The use of these diets without adequate monitoring and medical examination may involve the risk of nutritional deficiencies, and possibly a decrease in the functionality of the intestinal microbiota.

There are different pathological processes, such as irritable bowel syndrome (IBS), celiac disease or neurological disorders (ND) in which the use of specific dietary regimens such as diets low in oligosaccharides, disaccharides and bottom fermentation polyols (FODMAPs), gluten-free (GFD), ketogenic diets (KD) are considered therapeutic.

In our review, we conclude that, in the withdrawal of gluten from the diet, studies have shown that the intestinal microbiota is different in healthy individuals than in those with GFD and not treated. In relation to the reduction of FODMAPs in the diet, a change in the intestinal microbiota is observed that produces a decrease in symptoms in children with IBS. Regarding the ketogenic diet, a decrease in microbial diversity was observed, but also an improvement in the general pattern of the intestinal microbiota, thus improving the symptoms of children with epilepsy.

Although more studies are needed to confirm and/or extend these findings, the restoration or modulation of the microbiota with prebiotics and probiotics represents an opportunity for the prevention and/or management of these diseases in the short, medium, and long term.

S21.3

Role of Microbiota in Obesity

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Introduction: The intestinal microbiota may represent a target for action in the treatment of obesity, given its functions on intestinal inflammation, metabolism, and adipose tissue and liver functions, among others.

Microbiota and obesity: It is not clear whether being born or colonized during the first years of life with a microbiota similar to that of obesity in adults is the main trigger for the development of obesity, or whether the appearance of intestinal dysbiosis due to an unbalanced diet, together with other factors (emotional stress, sedentary lifestyle), in adulthood may have a greater impact on the establishment of obesity. Although there is great controversy about the intestinal dysbiosis characteristic of obesity, the studies carried out show the existence of an alteration in the Firmicutes/Bacteroidetes ratio, high levels of bacterial genera such as *Lactobacillus* and lower levels of anti-inflammatory bacterial species such as *Akkermansia muciniphila* and *Faecalibacterium prausnitzii*.

Personalized Nutrition: Personalized treatment through nutritional education for the practice of probiotic- and prebiotic-rich diets, which promote the restoration of bacterial balance, as well as psychological therapy, have been related to improvements in lifestyle habits and mental, metabolic, and cardiovascular health in patients with obesity.

Conclusions: Further studies are needed to shed light on the role of gut microbiota in the risk of developing overweight or obesity and possible modulation with probiotics, prebiotics and symbiotic. However, at present it is a promising line of research in the fight against this pandemic.

Conflict of Interest: I have no conflict of interest

Keywords: Microbiota, Probiotics, Prebiotics, Obesity.

S22.1

Nutritional Labeling to Obesity Prevention: Changes in Offer and Nutrient Composition Beverage Consumed by Mexican Schoolchildren

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Introduction: The nutritional labeling on pre-packaged foods and beverages is a public policy implemented in several Latin American countries, which aims to inform the consumer so that they select the “healthier” option for their consumption and the industry reduces the amount of critical nutrients from its products, helping to prevent obesity and the development of chronic diseases.

Objectives: To evaluate the change of the nutritional labeling (NOM-051) on the offer and nutritional composition of prepackaged non-alcoholic beverages in Mexico and the consumption in a sample of schoolchildren in before and after implementation.

Methods: Longitudinal observational study with pre-post evaluation of the first phase of implementation of nutritional labeling in Mexico (NOM-051). A nutritional composition base was prepared for 790 pre-packaged beverages available in the Mexican market in the pre-implementation stage of NOM-051. A pre-post comparison was made of beverage offerings, critical nutrient content (sodium, energy, sugars, saturated and trans fats), warning labels (GDA vs. “Excess of”), type and quantity of non-caloric sweeteners and reformulation of beverages. In a sample of 200 schoolchildren, the pre-post comparison of the consumption of the quantity of beverages, types of beverages and consumption of critical nutrients was carried out. Pre- and post-implementation comparisons were made with the McNemar test, Stata 14 was used and $p < 0.05$ value was accepted as significant.

Results: Of the total beverages identified in the pre-implementation stage ($n=790$), only 82% were recovered in the post-implementation stage, because they were not available in the market, because they changed their name or were reformulated. In the pre-implementation stage, the water, the flavored water, and milk provided 73% of the total amount of liquids consumed by schoolchildren, without significant changes in the post stage. The most important change was observed in the consumption of juices and nectars, going from 14.2 Kcal to 37.4 Kcal ($p < 0.001$); and no significant changes were observed in the consumption of soft drinks (35.5 vs 34.7 Kcal) and milk (144.3 vs 147.2 kcal). The contribution of total daily calorie intake from beverages was estimated at less than 5% for schoolchildren, with no significant changes in the pre-post comparison.

Conclusions: In a first phase of implementation of nutritional labeling in Mexico for pre-packaged beverages, changes were observed in the denomination of products and a low reformulation to avoid warning labels. Higher consumption of juices and nectars was recorded, without significant changes in the consumption of soft drinks and milk in schoolchildren. More time is required to observe important changes in the offer and nutritional composition of beverages.

Conflict of Interest: we declare no conflict of interest of any matter.

Keywords: Nutritional labeling, Non-caloric sweeteners, Schoolchildren.

S22.2

Mediterranean Lifestyle and Physical Activity Intervention for the Pediatric Obesity Prevention. Preliminary Results, MELIPOP Study

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Introduction: The high prevalence of childhood obesity in Spain requires the implementation of preventive strategies.

Objectives: The aim was to evaluate an intervention based on Mediterranean lifestyle and the regular practice of physical activity to reduce the incidence of pediatric obesity and improve the physical fitness in children aged 3 to 6 years

Methods: MELIPOP is a randomized controlled trial carried out in 3 Spanish cities. The intervention group performed 2 weekly guided sessions of 60 minutes of moderate or vigorous physical exercise (aerobic and muscle and bone strengthening activities). In addition, they are encouraged to practice extracurricular sports activities in order to achieve a daily practice of 60 minutes of moderate-vigorous physical activity and undergoing a Mediterranean eating pattern.

Results: 88 Spanish preschool children (intervention=47 vs control=41) were included in preliminary results after one year of intervention. It was observed an improve in horizontal jump ($p=0.004$) and a higher time reached in course navette ($p=0.017$) in favour to intervention group. There were no differences in grip strength neither body composition.

Conclusions: The MELIPOP intervention program successfully promoted to improve physical fitness in children. It might contribute to reducing the risk of obesity and its long-term complications.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Fitness, Lifestyle, Physical activity, Exercise, Mediterranean.

S22.3

Chic@s en Acción: Creciendo Sanos

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Introduction: Obesity prevention programmes often have had only limited or short-term effects. In particular socially vulnerable groups, who are affected most, have not been reached successfully. If the known modifiable risk factors were effectively changed in a favourable direction and if this was achieved in the early life course and in the most affected population sub-groups, the burden of obesity and its related cardio-metabolic disorders could be reduced.

Objectives: GrowH! will take advantage of the most recent longitudinal research results on risk factors and novel participatory intervention approaches in youth to develop and test better targeted and more effective primary prevention strategies.

Methods: GrowH! is a collaborative research project of the Joint Programming Initiative on a Healthy Diet for a Healthy Life (JPI HDHL), involving 6 partners research institutions based in Belgium, Germany, the Netherlands and Spain, and 2 collaborating institutes based in Belgium and Canada. As part of the GrowH! study, the sub-study Chic@s en Acción Zaragoza: Growing up healthy! the point of view in aspects related to health such as nutrition and physical activity of the boys and girls of Zaragoza and 2) launch the activities created by the boys and girls to improve the health of children.

Results: In this context, we adapted the Participatory Action Research protocol that was implemented in the Kids in Action project (2016-2019) to be transferred to the Zaragoza context through a detailed practical protocol. Adaptations of this protocol have been based on 1) lessons learned from the Kids in Action project; 2) insights from recent literature/work in this field; and 3) contextual factors specific to the Spanish context. The result was a practical protocol for the Chic@s en Acción project in Zaragoza: Growing up healthy! which has been running since November 2021.

Conclusions: This communication presents some of the adaptations made to the PAR protocol and shows the follow-up of the application process of the adapted PAR protocol through a critical reflection on the participatory meetings held with children aged 9-11 in Zaragoza.

Conflict of Interest: The authors no declare conflict of interest

Keywords: Obesity, Prevention, Youth Participatory Action Research (YPAR), Children, Adolescents.

S23. 1

Aflatoxins: The Relationship with Liver Cancer and the Implications for Central America and Mexico

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Introduction: During the 60 years since the first scientific reports about a relation between aflatoxin exposure and adverse health consequences, both in animals and humans, there has been a remarkable number of basic, clinical and population science studies characterizing the impact of this mycotoxin on diseases such as liver cancer.

Objectives: To describe the role of aflatoxins in the occurrence of liver cancer and project its implications for Central America and Mexico.

Methods: A wide number of studies have described the impact of this mycotoxin on liver cancer, particularly HCC. While there have been many case-control and prospective cohort studies of liver cancer risk over the years, there have been remarkably few investigations focused on liver cancer in many regions around the world, including Latin America.

Results: Extensive evidence confirms that contamination of the food supply by aflatoxin puts a chronically exposed population at increased risk of developing HCC. Ongoing efforts in Central America and Mexico will help to determine the impact of these mycotoxins in the region.

Conclusion: Public health-based prevention strategies should be implemented to reduce the impact of these mycotoxins on human health.

S23.2

Risk Factors for Liver Disease in Guatemala: Evidence and Future Directions

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Introduction: Non-alcoholic Fatty Liver Disease (NAFLD) is the most common form of chronic liver disease worldwide and has become an increasingly important risk factor for liver cancer. Globally, liver cancer is the sixth most commonly occurring cancer and the second largest contributor to cancer mortality. There are limited data on NAFLD and its relationship to liver cancer among the general population of Guatemala or of other Central American countries.

Objectives: To generate and report the evidence of liver disease and its risk factors in Guatemala

Methods: Several observational studies and sub-analyses among adult Guatemalans have been conducted since 2016. These projects include a cross-sectional study evaluating the prevalence and distribution of risk factors for NAFLD and a case-control study evaluating risk factors for the most common type of liver cancer, hepatocellular carcinoma (HCC).

Results: Studies have revealed the presence of several risk factors for HCC in Guatemala, including widespread aflatoxin B₁ exposure and a high prevalence of NAFLD, particularly among women. An ongoing case-control study will help to elucidate the relationship between these risk factors and the occurrence of HCC.

Conclusions: Liver disease, including HCC, is a major challenge for Guatemala and adjacent countries. Research efforts in all the region should continue to inform decision making.

Conflict of Interest: none

Keywords: NAFLD, Liver disease, Liver cancer, Guatemala, Epidemiology.

S23.3

Liver Cancer in Mexico, Current State and Opportunities

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Introduction: Liver cancer is the fourth cause of cancer death in Mexico. Hepatitis B and C virus seroprevalences are low and an uncharacteristic HCC mortality pattern has been observed, in which men and women are equally affected. There is increasing concern that aflatoxin, a frequent contaminant of maize, and fatty liver disease may play important roles in liver cancer etiology in Mexico. Liver cancer is also exerting significant burden in the US-Mexico border. Understanding the distribution of established and novel risk factors in Mexico becomes a priority as the burden of liver cancer increases.

Objectives: To present results on the epidemiology of liver cancer and liver cancer risk factor distribution in Mexico; introduce recent research initiatives; and articulate public health needs for liver cancer prevention.

Methods: Results on the epidemiology of liver cancer mortality and incidence in Mexico will be presented. Based on data from Mexico's National Health and Nutrition Survey, we will present the distribution of risk factors in a representative sample of the population. We will show estimates on the proportion of liver cancer cases from a convenience sample where aflatoxin played an etiologic role. We will present results and future research initiatives from a liver cancer research network, which will serve as a basis to advance liver cancer research in Mexico and the region.

Results: The burden of liver cancer in Mexico is significant and variations in the distribution of established risk factors relative to other populations may reflect differences in cancer etiology. Aflatoxin appears to have an important role in liver cancer etiology in Mexico. There are significant opportunities to study liver cancer etiology in Mexico to advance public health in Mexico and beyond.

Conclusions: Understanding liver cancer etiology in Mexico can be achieved through local and international collaborations and research results can have immediate and significant public health impact.

Conflict of Interest: None.

Keywords: Liver cancer, Mexico, Dietary contaminants, Aflatoxin.

S24.1

Integration of Sustainable Food Systems within the Curriculum Training of Nutrition Education: An Analysis of the Universities Belonging to the Mexican Association of Members of Faculties and Schools of Nutrition (AMMFEN)

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Introduction: The World Health Organization Agenda 2030 proposes 17 Sustainable Development Goals (SDGs), to free humanity from poverty and ensure a healthy and sustainable planet for future generations, and all are related (directly or indirectly) to nutrition, so that promoting the acquisition of competencies related to sustainability in nutrition professionals (NP) can be one of the most effective approaches that contribute to achieving the SDGs.

Objective: Identify the current and prospective integration of contents and activities related to sustainable food systems within the training curriculum of undergraduate nutrition programs belonging to the AMMFEN.

Methods: The identification of the integration of content and actions related to sustainability within the nutrition training curriculum was explored through an online form applied to program directors. The survey was designed based on a review of the literature. Items were grouped into the following categories: sustainability topics currently included in the curriculum, sustainability topics in the future curriculum, and incorporation of students into research or academic activities related to sustainability.

Results: 32 universities (82%) answered the survey. Although 90.6% (n=29) of them include food sustainability topics in at least one subject, most of them predominantly focused on reviewing topics such as food systems (90.6%), food insecurity (81.3%), politics, economics, and health determinants (78.1%), and the food impact in the environment (71.9%); Among the least included topics health-related equity (46.9%), water systems (37.5%), and the food deserts and oases (12.5%). Among the main academic activities identified are outreach activities within “World Food Day” as well as community work projects. Only 46.1% (n=18) of the schools reported that the students are involved in research projects related to these topics.

Conclusions: A large proportion of the universities reported including sustainability themes in at least one subject, nevertheless, most of these do not provide students with the tools to acquire knowledge and skills aimed at promoting sustainable diets from a more holistic perspective. It is necessary to generate strategies to

promote the incorporation of obligatory subjects and extracurricular activities that favors NP to have a more effective impact in reducing the impact of diets on the environment and the reduction of hunger.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Training, Sustainability, Nutrition professionals AMMFEN, México.

S24.2

Mapping Challenges and Barriers to Incorporating Sustainability in Undergraduate Nutrition Programs in Mexico

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Introduction: The World Health Organization Agenda 2030 on Sustainable Development proposes 17 Sustainable Development Goals (SDGs), the second SDG: “end hunger, achieve food security and improved nutrition, and promote sustainable agriculture”, includes indicators that directly or indirectly affect issues related to nutrition and sustainable food. Consequently, Nutrition Professionals (NP) must fully understand the food system to help create comprehensive interventions that promote good-quality diets for larger populations at lower environmental costs, thus training requires the development of skills related to the promotion of food security and access to good-quality food while helping to prevent and address the double burden of malnutrition.

Objective: Analyze the barriers to incorporating sustainability in undergraduate nutrition programs to identify opportunities to train nutrition professionals in sustainable diets.

Methods: The integration of content and actions on sustainability within the nutrition training curriculum was explored through an online form to university directors. The survey included items related to barriers identified to incorporating sustainability topics or subjects in undergraduate nutrition programs.

Results: Out of the 39 universities that are part of the Mexican Association of Members of Faculties and Schools of Nutrition (AMMFEN), 82% (n=32) answered the poll, from these, 65.6% (n=21) are public, while the rest 34.4% (n=11) are private. Currently, 62.5% (n=) of the schools are in a redesigned study plan, and 80% (n=) of them are planning to include topics related to food sustainability. The main identified barriers to including sustainability-related topics in the programs were: the absence of internal diagnostics (50%), lack of teachers with this knowledge (46.9%), skew towards the clinical area formation (34.4%), lack of areas for

practicing or doing activities related to the food sustainability (31.3%), institutional policies of actualization of nutrition plans and/or curricular redesign (28.1%), and 6.2%(n=) not identify any barriers.

Conclusions: The main barriers identified to incorporating sustainability topics into the curriculum in programs that belong to AMMFEN were the absence of internal diagnostics and the lack of teachers with this knowledge. Therefore, it is necessary to promote the identification of opportunities in each program to approach food sustainability and to strengthen the training of teachers in this area.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Sustainability, Barriers, Undergraduate nutrition, AMMFEN, Mexico.

S24.3

New 2022 Mexican Food-based Dietary Guidelines: The Role of Nutritionists in Promoting Healthy and Sustainable Diets

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Introduction: Food-based dietary guidelines (FBDG) establish a basis for public food and nutrition, health and agricultural policies and nutrition education programmes to foster healthy dietary patterns and lifestyles. FBDG were updated given the need to include sustainability and to initiate the transformation of the food system into one that can offer healthy and sustainable diets to the population. Nutritionists use a scientific and food-based approach to evaluate individual's eating habits and to create a personalized dietary plan. Thus, have a main role in improving health and nutrition.

Objectives: To promote healthy and sustainable diets as part of the nutritionists' role.

Methods: The new FBDG were developed following the recommendations of the Food and Agriculture Organization of the United Nations. As part of the new FBDG, a technical document was prepared for nutritionists and health care professionals with practical information to be used during dietary counselling in health promotion and the treatment of prevention of disease in hospitals, private practice, or other health care facilities.

Results: Nutritionists are an important group of actors for the use and dissemination of the new FBDG as an educational tool. They are considered a credible source of information. The new FBDG are aligned with international recommendations for nutrient intakes, the promotion of healthy and sustainable diets as well as the prevention of all forms of malnutrition and of non-communicable diseases. Whether helping people achieve health and weight loss goals, encourage healthier dietary habits, implement behavioral change modifications and dietary approaches, or suggest ways to improve lifestyles, the nutritionists' practice welcomes an opportunity to promote healthy and sustainable diets with the FBDG aid. These would help achieve human nutrition

and environmental sustainability aims by reducing greenhouse gas emissions and other environmental impacts, such as land and freshwater use, food waste and garbage from packaging, containers, among others. Diet sustainability can be improved by substituting food items from the meat/sugar/fat/alcohol food groups with fruit, vegetables, and starches. In return, food systems transformation would be enhanced, and natural resources would be used responsibly.

Conclusions: Nutritionists can benefit from using FBDG for the promotion of healthy and sustainable diets.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Food-based dietary guidelines, Healthy diets, Sustainability, Policies, Mexico.

S25.1

Self-efficacy and Nutritional Practices in Mexico: A Perspective from Recent Interventions

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Introduction: Recent surveys report suboptimal levels of fruits and vegetables intake and an inadequate consumption of food with high content of energy, sugar, and fat in Mexican population. Mexican researchers work to reverse the negative effects of malnutrition and design interventions to improve health status, especially in children and adolescents.

Objectives: Describe and evaluate the results from the latest nutritional interventions targeted to school aged children, adolescents and their communities published in the period from 2018 to 2022.

Methods: A sensitive search was conducted using the terms "nutrition intervention" "nutrition program" "Mexico" in databases like Science Direct, Google Scholar, Pubmed and Research Gate. It was included studies in English and Spanish. The studies were analyzed to evaluate the methods to develop the intervention, and the results in terms of change in nutrition knowledge and self-efficacy, change in nutritional practices, change in nutritional status and lessons learned.

Results: This review presents the results of the programs: PEOA (2018), *Programa de Acción en el Contexto Escolar* (2018), *Sabe* (2018), *HIMFG* (2018), *PAHEPI* (2019), *Aprende con Reyhan* (2019), *a program to promote fruit and vegetable consumption* (2019), *Niño Sano Adulto Sano* (2019), and *a program to risk factors for the development of non-communicable diseases* (2022). Design and methods are heterogeneous among the studies, however, some key points are consistently reported: at the beginning of the intervention unhealthy dietary patterns are present; low parent participation is common; women play a central role in family-based interventions, as well as teachers in school-based interventions; self-efficacy is improve trough knowledge; although biomarkers are difficult to change and be measured, is an important indicator of efficacy; all the interventions somehow achieve positive changes. Finally, it is shown a reduction of published

results of interventions in the period during 2020 and 2021, probably by consequence of the COVID pandemic.

Conclusions: Current evidence is heterogeneous and inconclusive about significant changes in nutritional practices and nutritional status in Mexican children and adolescents, however the latest published results could be the base of better practices to improve the efficacy of interventions.

Conflict of Interest: The author has no conflict of interest to declare.

Keywords: Nutritional program, Self-efficacy, Nutritional practices, Mexico, Nutrition status.

S25.2

Systemic Oxidative Stress as a Key Point in the Treatment of Chronic-metabolic Diseases

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Introduction: In recent years, the oxidative stress study in the field of medicine has taken great interest, given its relevance in the development of various diseases. Based on the current nutritional knowledge and available scientific evidence on oxidative stress and the oxidative-reductive alterations at the systemic level that derive, present review describes the relationship between cellular redox imbalance and its systemic implications in the health-disease process, as a targeting in the proposal of a new diagnostic approach based on the biochemical and systemic alterations, linked to the chronic pro-oxidative state. The oxidative stress recognition, not only as an etiological factor but as a complex entity that by itself can lead to the development of diseases such as those of metabolic origin, it will be a public policy strategy that would reduce the incidence of this group of diseases.

Objectives: To analyse the role of systemic oxidative stress in the development of metabolic biochemical alterations that lead to chronic disease

Methods: Review where studies on oxidative stress, inflammation, dysbiosis, metabolic disease and evidence supporting new trends in nutritional intervention were selected. The studies presented in this review were identified through searches of the PubMed/Medline, EMBASE, and Cochrane Library databases

Results: The adequate cellular functioning depends on the homeostasis of the oxidative processes, responsible for providing energy and intermediary metabolites to the cell, necessary for its growth, development, survival, and adaptability. Oxidative processes disturbance is the cellular alterations source, which culminates in inflammatory processes. The oxidative processes alteration can be caused by an exacerbated increase or decrease in the agent's elimination that promotes oxidation. Reductive oxidation reactions involve the electrons exchange, where the oxidant substance presents electrochemical instability, in the absence of one or more electrons. The imbalance between the reactive oxygen species (ROS) and reactive nitrogen species (RNS) production and neutralization generates oxidative damage on cellular structures. The systemic propagation of ROS and RNS is a cause of organic alteration in tissues. The exacerbated ROS accumulation and its

systemic dissemination generate an oxidative environment linked to oxido-reductive alterations of other tissues, which is why the oxidative stress chronicity has important implications in the health-disease process. Likewise, the macrophages activation and tissue damage in organs such as liver, kidney, enterocyte, encephalon, among others, it's associated with the metabolic diseases development that would be linked to systemic oxidative stress. In this context, the oxidative stress initially triggered in the mitochondria, has chronized and spread to other organs, leading to a disease systemic state and the development chronic-metabolic disease.

Conclusions: Systemic oxidative stress is an important trigger in the development of chronic metabolic diseases. The concept of systemic oxidative disease, beyond a definition, is a proposal for the development of models of the therapeutic intervention for diseases that have oxidative stress as a physiopathological basis. The adoption of this model and the generation of public policies for the timely detection and treatment of oxidative stress could be an important ally in reducing mortality due to chronic noncommunicable diseases.

Conflict of Interest: No conflicts of interest

Keywords: Obesity, Free radical, Public health, Western diet.

S26.1

Nutritional Behaviour and Growth Pattern of Portuguese Infants and Toddlers (0-36 Months). The Alert of EPACI Portugal

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Introduction: Early feeding behaviour and growth pattern have a critical role in future health and eating habits. EPACI Portugal 2012 is a cross-sectional study with a retrospective component of a national representative sample. The aim was to assess growth, nutritional pattern, and nutritional status of Portuguese infants and toddlers (0-36 months).

Materials and Methods: Early feeding practices and anthropometric data were collected, and nutritional status was characterized (WHO criteria) (n=2 009; 52.6% male). 3-days food diaries were completed by parents/caregivers of 853 children. Usual intake of energy, macro, and micronutrients was obtained, adjusting for intraindividual day-to-day variability (SPADE). The nutritional adequacy was evaluated using Dietary Reference Values (EFSA).

Results and Discussion: About 1/3 of Portuguese mothers are overweight/obese before pregnancy and from these 50% increase their pregnancy weight above recommendations. Pre-pregnancy and current mothers' BMI are significantly associated with children's risk of being overweight at all ages. More than 90% of children initiated breastfeeding, 20% were exclusively breastfed for six months and 20% were breastfed at 12 months. Exclusive breastfeeding was determined by maternal pre-pregnancy BMI (HR 1.01;

95% CI 1.00, 1.03) and newborn low- birthweight (HR 1.61; 95% CI 1.21, 2.15). About 90% initiated complementary feeding between four-six months and 10% introduced cow's milk before 12 months. After introducing the family diet, 83.2% and 61.6% of the toddlers have already consumed nectars and sweet desserts. Almost half of the toddlers consume more energy than recommended. The median daily protein intake was 4.7g/kg/day, dairy contributed 35.4%, mainly milk (15.1%). About 9% and 90% of the children ate less than the recommended carbohydrates and fat, respectively. Around 36% ate less fibre than the recommended AI and the median total sugar intake was 22.7% of total energy. An inadequacy prevalence for vitamin A (35.7%) was observed, and almost 80% of the children had an excessive consumption of sodium. About one-third showed a BMI z-score >1.

Conclusions: Portuguese women at fertile age show a high prevalence of pre-pregnancy overweight. The prevalence of exclusive breastfeeding at 6 months is low but the introduction of complementary feeding is in line with recommendations. With the transition into the family diet, a nutritional inadequacy by excess protein and sodium and a deficit in vitamin A and fat were observed. There is a high prevalence of Portuguese toddlers at-risk of being overweight.

S26.2

Early Programming of Obesity, from Fetal Life to 12 Postnatal Months: The State of the Art

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Obesity is a current, practically universal public health problem. The 'first 1000 days of life, between conception and 24 postnatal months, is a sensitive period for the development of mechanisms that predispose to obesity programming. This review focuses on the periods involving fetal life and the first 12 postnatal months.

Human and animal studies revealed that both fetal undernutrition and overnutrition can predispose to obesity through different mechanisms. Among those underlying fetal undernutrition, epigenetics predominate, which represents the interaction with genotype variation at an early stage of development characterized by plasticity, altering the future ability to interact with the environment. Other pathways involved in fetal undernutrition include permanent structural changes to key organs and tissues with disruption of cellular proliferation and differentiation, long-lasting dysregulation of orexigenic and anorexigenic peptides increasing postnatal appetite, long-lasting dysregulation of endocrine expression including insulin resistance, and placental dysregulation, particularly the reduction of 11 β -hydroxysteroid dehydrogenase-2 activity and exposure of fetal tissues to high glucocorticoids levels.

In the case of maternal overnutrition, independent factors predisposing to offspring obesity and excess adiposity include pre-pregnancy obesity, excessive gestational weight gain, and gestational diabetes, some of the pathways mediated by oxidative stress and epigenetic chromatin remodeling.

After birth, evidence exists that breastfeeding has a protective effect against obesity, possibly with a dose-dependent effect. On the contrary, excess intake of cow's milk protein, namely from infant formulas, is an independent factor for obesity programming. Other factors include too early initiation of complementary feeding and improper intake of sugars and energy-dense foods and snacks. Although human innate taste preferences are driven by an attraction to sweet and salty tastes, amniotic fluid and breastmilk provide a vehicle through which infants can learn to prefer the tastes and flavors of different healthy foods. The early adiposity rebound, characterized by early acceleration of body mass index, is a major factor associated with late obesity.

Health professionals are committed to recognizing predisposing factors of obesity, both in pregnancy and in the first year of life as well as to intervene, from a nutritional point of view, to counteract preventable causes.

S26.3

The Role of Gut Microbiota in the Early Programming of Obesity. From Scientific Knowledge to Practical Prevention

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Human microbiota (MB) is defined as all microorganisms (bacteria, archaea, eukaryotic microorganisms, and viruses) that inhabit the human body; its genome and its products or metabolites are called a microbiome (terms used interchangeably). Knowledge of the species of microorganisms that make up MB and their impact on health and disease has increased considerably in recent years.

The establishment and modulation of the composition and function of human MB begin even before birth and plays a fundamental role in the normal functioning of the host, from energy metabolism, blood pressure control, glucose homeostasis, coagulation, and even behavior. It has important metabolic functions, highlighting the synthesis of essential vitamins, the synthesis of branched amino acids, as well as the synthesis of neurochemicals that can affect the central nervous system and peripheral. Metabolic functions include anaerobic fermentation of non-digestible dietary components into bioactive compounds such as short-chain fatty acids (e.g. butyric, propionic, and acetic acids) with an active role in intestinal mucosal barrier function, anti-inflammatory, and antiproliferative properties. Through the production of metabolites, neurotransmitters, and immune signaling molecules, intestinal MB influences reach other distant organs, such as the CNS (i.e. gut-brain axis), liver, and lung (i.e. gut-lung axis), impacting homeostasis.

Hundreds of intrinsic and environmental factors influence MB, including neonatal factors, diet, tobacco, hormonal factors and host genetics, disease, and medication. In addition to antimicrobials, many other drugs have already been associated with changes in microbial composition (eg PPIs, statins). Dysbiosis (change in microbial composition) can be unfavorable and associated with the development of various diseases such as obesity and diabetes, cancer, and neuropsychiatric diseases. Dysbiotic MB has

been strongly associated with an increase in immune-mediated diseases (e.g. autoimmunity), according to the “hygiene theory”. Genetic predisposition, environment, and intrinsic characteristics of the microbiome determine which commensals are beneficial or become pathobionts in a given context. Given these complexities of the MB-host interaction, preventive or therapeutic measures aimed at MB must be personalized. Many strategies have been developed to restore the intestinal ecosystem and treat many diseases and including nutritional modulation, use of probiotics and symbiotics, fecal transplantation, and phage therapy.

S28.1

Measurement of Food Environment in Rural and Low-income Communities as a Risk Factor of Childhood Obesity

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Food environment (FE) is defined as the physical, economic, political and sociocultural factors that determine food selection as well as food intake in a specific population. It is known to include food stores, such as convenience stores (CS), local markets, supermarkets, and also includes food establishments such as restaurants and food stands. In Mexico and the rest of Latin America, one major contributor to the FE is the presence of small neighborhood CS, which are widely available particularly in rural and low-income communities. It is now recognized that FE plays an important role in the development of childhood obesity. However, most of the research on the relationship between FE and obesity has been done in developed countries, and there is a lack of information in low- and middle-income countries, where the prevalence of childhood obesity is one of the highest in the world. One way to measure FE includes determining the density (number of stores in a particular radio) and proximity (distance) of food establishments and food stores surrounding households, schools, workplaces, among others. In order to do this, geolocation information of the food establishments and food stores, and also of the households, schools and/or workplaces in a specific ratio is collected and then uploaded to a geographic information system (GIS) database. In addition to density and proximity, it is also important to consider measuring food availability within the establishments and stores. This can be done by measuring the shelf-length of different food categories, such as processed foods or non-processed foods. It can also be measured by categorizing the food establishments based on the foods that are mainly sold (ie: establishments that sell mainly processed foods, such as CS, or establishments that sell mainly non-processed foods, such as those that sell only fruits and vegetables). Thus, measuring and understanding FE should be key in developing strategies that specifically promote healthy eating, and will contribute to prevent childhood obesity in rural and low-income communities.

Conflict of Interest: The author declares no conflict of interest

Keywords: Childhood obesity, Food environment, Geographical information systems.

S28.2

Overview of Obesity in Mexico

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Obesity is one of the most prevalent chronic diseases in the world and with the highest number of comorbidities. Approximately 1400 million adults worldwide are overweighted and 500 million are already obese. The prevalence of childhood obesity has tripled in the last three decades. Mexico is among the five countries in Latin America with the highest prevalence of overweight and obesity. Overweight and obesity are present in 75.2% of adults over 19 years of age, 38.4% of adolescents under 19 years of age and 35.6% of children between 5 and 11 years of age. Obesity has direct implications in the development of chronic non-communicable diseases, such as diabetes, hypertension, cardiac disorders, and some types of cancer. Both diabetes and heart disease are highly prevalent and among the main causes of death in Mexico. The economic cost for non-communicable diseases cares in Mexico in 2019 was 32.37 billion dollars, similar to that of Spain (35.38 MMD). In addition to its comorbidities, obesity also has economic implications. Recent studies carried out in countries with a high prevalence of obesity, including Mexico, showed that people with obesity have higher absenteeism and lower work performance, as well as an increase in psychosocial diseases such as depression, anxiety and stress, among others. Should obesity continue on the rise, the world could experience the worst health crisis due to its impact on health and the economy, and low- and middle-income countries will be the most affected. Since the origin of obesity is multifactorial, prevention and treatment of obesity should include public health policies that include multidisciplinary networks.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Obesity, Economic impact, Chronic diseases, Mexico.

S28.3

Factors that Contribute to the Social Contagion of Obesity

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Obesity has its origin in human lifestyle changes across time. Such lifestyle modifications differ among the countries' economic development stage, the individual socioeconomic status (SES) and the social standards that correspond to different social contexts. The income level of each country is associated with the prevalence of obesity, and the changes of that prevalence over the years. In addition, the different SES within each country is also associated with obesity and its comorbidities, where people in the higher economic positions are less affected by the food environment changes and have different social norms. The main mediators of this

association are the lower cost of high-energy-density foods, the social norms and sociocultural values in lower SES groups that accepts weight excess, and the biological consequences of food insecurity and economic stress. The sociocultural context of individuals provides a beliefs and values' system that shape the behavior of social groups in different ways. Specifically, the symbols of health and the body shape social norms across life-stages are associated with certain perceptions and attitudes that precedes behaviors related with an unfavorable lifestyle. In addition, global social changes have modified the women's role in society. Her active participation in the economic activities have raised barriers to a healthy lifestyle, such as time shortage to cook, which has led to a higher consumption of ready to eat and highly processed foods. The socioeconomic and sociocultural factors exert control over the individual choices related to health and lifestyle. Health professionals should understand the deep causes of the habits and behaviors, in order to propose healthy choices that are not in conflict with the social norms and values' system of individuals.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Obesity, Behavior, Sociocultural factors, Food insecurity.

S28.4

Consideration of Socio Cultural Context is Crucial when Giving Recommendations for Prevention and Treatment of Obesity

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Obesity is a major health and economic problem for most countries of the world and individuals experiencing obesity have a drive to treat or reduce. Several international organizations have given general recommendations to prevent obesity or to treat when obesity is affecting individuals. The Red para el Tratamiento y Prevención de la Obesidad (REDTPO) was formed 6 years ago by a multidisciplinary group of scientists dedicated to study and develop strategies to prevent and cure obesity. We have put together a set of recommendations which are fully described in a book entitled *Obesidad: Origen y Tratamiento* (Obesity: Origen and Treatment). In synthesis these recommendations are: 1. Recognize that overweight and obesity are health problems associated with other diseases. 2. Measure and identify the existence of obesity periodically. 3. Recognize that in order to lose weight those with obesity need to change eating and physical activity habits. 4. Eat an important variety of food, increasing vegetables, legumes, and fruits, and reduce high fat foods. 5. Reduce or avoid high sugar soda and processed juices and drink water in place. 6. Reduce the consumption of high fat processed meats, salty snacks, pastries, desserts, and candies. 7. Eat until you feel satisfied, not until you are completely full. Hunger sensation will soon disappear. 8. Choose methods of cooking such as boiling or roasting, avoid too much oil, lard or butter to cook. 9. Reduce leisure time you dedicate to sedentary activities such as watching TV or digital screens to less than 2 hours a day. 10. Start a gradual program of

aerobic exercise to reach at least 150 minutes per week of strenuous activity 11. Maintain a positive attitude to life and reduce stress situations, enjoy your existence, and appreciate having a healthy lifestyle. The relevance of these recommendations in an international arena and the necessary factors to be considered in order to have successful programs are further discussed.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Obesity, Prevention, Treatment, Recommendations.

S31.1

Metabolic Alterations Associated with Childhood Obesity

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Introduction: Metabolic syndrome (MetS) is a cluster of clinical and metabolic alterations related to the risk of cardiovascular diseases (CVD). Metabolic changes occurring during puberty, especially in children with overweight and obesity, can influence the risk of developing chronic diseases, especially CVD.

Objectives: We present the most relevant results from the GENOBOX and PUBMEP projects that aim to evaluate the metabolic alterations associated with childhood obesity.

Methods: The GENOBOX study recruited a total population of 1699 children and adolescents (878 girls) aged 2-18 years. Subjects were assigned to experimental groups according to their obesity status (513 normal-weight, 412 overweight, and 774 children with obesity). The PUBMEP is a longitudinal study based on the follow-up until puberty of a cohort of 191 prepubertal Spanish boys and girls without congenital, chronic, or inflammatory diseases; undernutrition; or intake of any drug that could alter blood glucose, blood pressure, or lipid metabolism. The following parameters were used to determine the presence of MetS: obesity, hypertension, homeostasis model assessment of insulin resistance (HOMA IR), hypertriglyceridemia, and low HDL-c.

Results: A total of 75.5% of participants stayed in the same BMI category from prepuberty to puberty, whereas 6.3% increased by at least one category. The prevalence of MetS was 9.1% (prepubertal stage) and 11.9% (pubertal stage). The risk of presenting alterations in puberty for systolic blood pressure (SBP), plasma triacylglycerols, HDL cholesterol (HDL-c), and HOMA-IR was significantly higher in those participants who had the same alterations in prepuberty. MetS prevalence in puberty was predicted by sex and levels of HOMA-IR, BMI-z, and waist circumference in the prepubertal stage, in the whole sample; in puberty, the predictors were levels of HOMA-IR, BMI-z, and diastolic blood pressure in participants with obesity. Two fast-and-frugal decision trees were built to predict the risk of MetS in puberty based on prepuberty HOMA-IR (cutoff 2.5), SBP (cutoff 106 mm of Hg), and TAG (cutoff 53 mg/dl).

Conclusion: Controlling obesity and cardiometabolic risk factors, especially HOMA-IR and blood pressure, in children during the prepubertal stage appears critical to preventing pubertal MetS effectively.

Conflict of Interest: None

Keywords: Obesity, Metabolic syndrome, Childhood, Cardiovascular disease.

S31.2

Dietary Patterns and Their Association with Body Composition and Markers of Cardiovascular Risk

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Introduction: Diet is a key factor for obesity development; however, limited data are available on dietary cluster analysis in children with obesity.

Objectives: We present the most relevant results from the GENOBOX project that aim to assess the associations between dietary patterns and obesity and several cardiometabolic markers.

Methods: The GENOBOX study recruited a total population of 1699 children and adolescents (878 girls) aged 2-18 years. Subjects were assigned to experimental groups according to their obesity status (513 normal-weight, 412 overweight, and 774 children with obesity). Anthropometry, bioelectrical impedance, blood pressure and plasma biomarkers of oxidative stress, inflammation and endothelial damage were determined in 674 Caucasian children, aged 5-16, with normal or excess weight. Using a food frequency questionnaire and cluster analysis, two consistent dietary patterns were shown, labeled as health conscious (HC) and sweet and processed (SP).

Results: The HC pattern included a greater proportion of participants with overweight/obesity than the SP cluster (80.1% vs. 63.8%). However, children with obesity within the HC cluster, showed less abdominal fat, through waist to hip (0.93 vs. 0.94) and waist to height (0.61 vs. 0.63) indexes ($p < 0.01$). Univariate general models showed several additional differences in cardiometabolic risk biomarkers in the global and stratified analyses, with a healthier profile being observed mainly in the HC cluster. However, multivariate models questioned these findings and pointed out the need for further studies in this field.

Conclusion: our findings support the benefits of a healthy diet and highlight the importance of dietary patterns in the cardiometabolic risk assessment of children with overweight/obesity, beyond weight control.

Conflict of Interest: None

Keywords: Obesity, Dietary patterns, Childhood, Cardiovascular disease.

S31.3

Impact of Physical Activity on Cardiovascular Health in Children

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Introduction: Currently, childhood obesity continues to be one of the major public health problems in our country. The benefits attributed to physical activity are included in the WHO physical activity and sedentary behavior guidelines, which specifically recommend the practice of at least 60 minutes a day of moderate-vigorous physical activity together with a time limitation sedentary. However, the descriptions about the practice of physical activity objectively through accelerometry are scarce.

Objectives: Describe how is the practice of physical activity and sedentary time measured by accelerometry in a group of children studying changes from childhood to adolescence and the differences in the practice of PA by sex, body mass index also considering biomarkers of oxidative stress and cardiometabolic risk.

Methods: the GENOBOX project is a multicenter study carried out in three Spanish cities with 1444 participating children and adolescents, and valid accelerometry data in 513. The practice of physical activity and differences by sex, pubertal stage and body mass index will be assessed. The relationships between the practice of physical activity and different parameters that evaluate oxidative stress and different biomarkers of cardiometabolic risk (adipokines, pro-inflammatory cytokines and endothelial damage molecules) are also analyzed.

Results: During the transition from childhood (prepubertal stage) to adolescence (pubertal stage) there is a general decrease in physical activity along with an increase in sedentary time. This decrease is more pronounced in men than in women, although the former remains more active than women in both periods. A greater practice of moderate and vigorous physical activity together with less sedentary time are related to a decrease in urinary biomarkers of oxidative stress and, therefore, with a better redox profile. If a lower BMI is added, it is associated with a decrease in the plasma concentration of biomarkers of cardiometabolic risk.

Conclusions: The data presented in this work support the recommendations published by the WHO and even suggest the possible health benefit of stricter physical activity goals and limitation of sedentary time. On the contrary, the adequacy of these children to the recommendations issued by the WHO is very low.

Conflict of Interest: None

Keywords: Physical activity, Accelerometry, Childhood, Cardiovascular disease.

S32.1

Is Healthy Food Really More Expensive? An Analysis in Argentina, Brazil, Spain, and Portugal

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Introduction: Socio-economic disparities in diet quality can be explained by the higher cost of healthy diets. Studies mainly from Anglo-Saxon countries have shown that the cost of healthy diets is higher than those of unhealthy diets.

Objectives: To present an estimate of the minimum cost of a healthy basket in Argentina, Brazil, Spain, and Portugal, as well as to calculate the percentage that a healthy diet represents over the minimum wage.

Methods: Food consumption, purchase, and prices were obtained from National Household Budget Surveys and National Dietary Surveys of Argentina, Brazil, Portugal and Spain as well as from a supermarket chain across all the countries. Households were aggregated into strata considering geographic and economic characteristics. Prices were adjusted for July 2021 using official inflation rates. Healthy food baskets were defined for each stratum using linear programming using two different objective functions: i) minimize the cost; and ii) minimize the deviation from the current food intakes (excluding most ultra-processed foods). Food prices were stratum-specific, and the food baskets should be based on the food repertoire and quantities reported in each stratum. In addition, both models should provide 1700 kcal and at least 300 grams of fruit and vegetables per adult per day.

Results: In Argentina in July 2021, the cost of a healthy food basket per person per day reported by the official statistics was 312.86 Argentine Pesos (ARS) equivalent at that time to 3.12 USD or 2.64 euros. The mean cost for a daily diet in Brazil was 10.78 Brazilian Reals (BRL), equivalent at that time to 2.07 US dollar (USD) or 1.75 euros. In Portugal, the mean cost for a daily diet was 3.04 euros (3.58 USD) and in Spain 3.80 euros, equivalent at that time to 4.48 USD. Taking into account that in July 2021 the minimum wage per month in Argentina was 27.216 ARS (297,1 euros), 1.100 BRL (172,6 euros) in Brazil, 775,8 euros in Portugal, and 1.108 euros in Spain, a healthy basket represented 26.65%, 30.41%, 11.75% and 10,28% of the minimum wage in these countries, respectively at that time.

Conclusions: The cost of healthy food baskets varies from country to country, with Brazil making the highest effort and Spain making the least effort to maintain a healthy diet. When the food preference constraints are relaxed, cheaper diets are possible. In a context of high inflation and particularly in food, this difference between products of diverse nutritional quality increases the risk

of unhealthy consumption in substitution of vegetables, fruits, nuts, and healthy oils. The incentive to consume other protein sources and seasonal foods, and the review of tax burden on food, can be tools with a positive impact on diet.

Conflict of Interest: None

Keywords: Vulnerable groups, Healthy diet, Affordable, Diet cost, Food basket.

S32.2

Cost of Healthy Food Baskets in Brazil

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Introduction: The cost of food baskets is an important indicator of the affordability of minimally healthy diets. The economic assessment of healthy food baskets should consider the variation in food preference and prices across the population.

Objectives: To estimate the cost of a healthy food basket in Brazil considering the variation in food preferences and prices across the country.

Methods: Food consumption, purchase, and prices were obtained from the Brazilian Household Budget Survey and National Dietary Survey (2017-2018). Households (n=55,970) were aggregated into strata (n=108) taking into account geographic and economic characteristics. Prices were adjusted for July/2021 using official inflation rates. Healthy food baskets were defined for each stratum using linear programming using two different objective functions: i) minimize the cost; and ii) minimize the deviation from the current food intakes (excluding most ultra-processed foods). Food prices were stratum-specific, and the food baskets should be based on the food repertoire and quantities reported in each stratum. In addition, both models should provide 1700kcal and at least 300g of fruit and vegetables per adult/day.

Results: Mean daily diet cost (person/day) over the 108 strata was BRL (Brazilian Reals) 10.78 (US\$ 2.07) in the lowest cost model, varying from BRL 9.72 (US\$ 1.86) to BRL 12.63 (US\$ 2.42) in the lower and higher income respectively. In the lowest distance model, the mean cost was BRL 13.02 (US\$ 2.50) varying from BRL 11.91 (US\$ 2.29) to BRL 15.08 (US\$ 2.90). Meats, fruit and vegetables, milk and dairy, and beans represented 34%, 24%, 12%, and 6% of the total cost, respectively.

Conclusions: The cost of healthy food baskets varies across the country. When the food preference constraints are relaxed, cheaper diets are possible.

Conflict of Interest: None.

Keywords: Diet cost, Food basket, Healthy food, Brazil.

S32.3

Cost of Healthy Food Baskets in Argentina

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Introduction: The cost of food baskets is an important indicator of the affordability of minimally healthy diets. The economic assessment of healthy food baskets (HFB) should consider the variation in food preference and prices across the population.

Objectives: To estimate the cost of a HFB in Argentina in relation to the basic food basket (BFB), and to survey experiences on consumption of the CBS in health indicators.

Methods: HFB was defined according to the recommendations of the Dietary Guidelines for the Argentine population (GAPA) and others from the literature specialized. The cost differences between the HFB and BFB were analyzed, as well as local experiences on the consumption of BFB exclusive in health indicators. The cut-off point for data collection was July 2021.

Results: while the BFB reported by the official statistics was 9,386.04 ARS/month (93.86 USD/75.08 EU), the HFB exceeded 45% of that cost. On the other hand, volunteers from an experimental study fed exclusively with CBA for three months, manifested weight loss and changes in body composition and mood.

Conclusions: In a context of high inflation and particularly in food, this difference between products of different nutritional quality increases the risk of unhealthy consumption in substitution of vegetables, fruits, legumes, or dairy products. The incentive to consume other protein sources and seasonal foods, added to the review of the high tax burden on food, can be a tool with a positive impact on the diet.

Conflict of Interest: None

Keywords: Diet cost, Food basket, Healthy food, Argentina.

S33.1

Chronic Diseases and the Challenge of Achieving Health Recommendations

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Diabetes and obesity have reached epidemic proportions and will continue to increase throughout the world, Sugar consumption is increasingly seen as a contributor to these epidemics and their associated cardiometabolic risks, Sugar promotes positive energy balance, thus body weight and fat gain, which also cause dysregulation of lipid and carbohydrate metabolism

The International Diabetes Federation (IDF) in its 2021 publication reported that:

- 73.6 million more adults are living with diabetes than in 2019
- 167.1 million adults with glucose intolerance more than in 2019
- 7.8 million more adults with diabetes than in 2019 without a diagnosis
- \$205.7 billion more is spent on diabetes than in 2019

- 133,000 more children and adolescents have type 1 diabetes than in 2019
- 700,000 pregnancies are affected by hyperglycemia more than in 2019
- Diabetes is estimated to have caused 2.5 million more deaths than in 2019

Regarding obesity, according to the World Health Organization (WHO):

- Obesity affects 650 million adults, 340 million youth and 39 million children worldwide.
- Mexico, Argentina and Peru are among the countries with the highest prevalence of obesity in their population.

In the Latin American Study of Nutrition and Health (ELANS) the energy intake and food sources of 8 Latin American countries were evaluated. It was observed that if the consumption of various food sources of sugar is added (mainly sugary drinks such as soft drinks, juices, flavored milk, etc.), doubles the recommendation of the World Health Organization (WHO) of no more than 10% of the total energy intake, with an average consumption of 134 g/day of sugar. Following a list of Latin American countries = average Kcal Contribution and WHO recommendation (10% of energy in Kcal; grams): Argentina= 2103Kcal (210,3; 52,575); Brazil= 1865Kcal (186,5; 46,625); Chile= 1780Kcal (178; 44,5); Peru= 2031Kcal (203,1; 50,775); Colombia= 2025Kcal (202,5; 50,625); Costa Rica= 1892Kcal (189,2; 47,3); Ecuador= 2110Kcal (211; 52,75); and Venezuela= 1887Kcal (188,7; 47,175).

Alternatives must be given to facilitate and promote that people can reduce their consumption of sugar, such as:

- Innovate and development of new products that meet taste requirements.
- Support with public policies that encourage the population to modify their lifestyle: less sugar, more exercise, self-care of health

Excessive sugar consumption is one of the most relevant health risk factors, so key strategies and viable lines of action need to be created to carry out comprehensive public health interventions to stop the progression of obesity and diabetes.

Conflicts of Interest: None

Keywords: Sugar, Diabetes, Obesity.

S33.2

New Nutritional Strategies for Reducing Sugar and Calorie Intake

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The World Health Organization recommends adults and children reduce their daily intake of free sugars to less than 10% of their total energy intake. A further reduction to below 5% or roughly 25 gr (5 teaspoons) per day would provide additional benefits. Free sugars refer to monosaccharides (such as glucose, fructose) and disaccharides (such as sucrose) added to food and drinks, and to sugars naturally present in honey, syrups and fruit juices. Scientific evidence shows, first, that adults who consume less sugars have lower body weight and, second, that increasing the amount of sugars in the diet is associated with a weight increase and also with an increased risk for developing type 2 diabetes,

cardiovascular disease, nonalcoholic fatty liver disease and nonalcoholic steatohepatitis.

Some of the strategies for reducing sugar intake among adults and children include the substitution of added sugar with non-caloric sweeteners, some types of fibers and, recently, with rare sugars. Rare sugars are defined as monosaccharides that are present in limited quantities in nature (honey, certain fruits, vegetables, and grains) that may present a unique alternative of sweeteners with both caloric and metabolic benefits. Consumption of rare sugar as a sweetener alternative has demonstrated several beneficial physiologic and cardiometabolic effects, including improved glycemic response and weight loss in human and animal models. There are over 40 different types of rare sugars; actually, the most studied ones are tagatose, isomaltulose, arabinose, trehalose, and more widely allulose.

Allulose is a C-3 epimer of fructose that has about 30% less of the sweetness of sucrose and a minimal caloric content (0.2 kcal/g). Is found in small amounts in maple syrup, dried fruit and brown sugar. About 70% of allulose is absorbed in the small intestine into the bloodstream but is excreted intact in urine, meaning allulose is absorbed but not metabolized in the body. The other 30% is transported to the large intestine, where it is not fermented and thus is excreted intact. Acute and long-term randomized controlled trials have examined the effect of allulose consumption on plasma glucose, insulin release and weight loss, showing benefit in both healthy populations and in individuals with type 2 diabetes. Recently the FDA excluded allulose from the “total sugars” and “added sugars” in the nutrition fact labels because is not metabolized, has almost no caloric value, and does not promote dental caries. Overall, as allulose is generally regarded as safe by the FDA, it could prove to be a viable sweetener alternative to sucrose and a good strategy for reducing sugar and calories intake.

Conflict of Interest: Consultant in health issues for the Tate & Lyle Center of Nutrition

Keywords: Sugar, Non-caloric sweeteners, Rare sugars, Allulose.

S33.3

Importance of Scientific Knowledge for Best Practices in Nutrition and Health

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The scientific advances achieved during the last two decades in the field of biosciences constitute a vehicle of opportunity to improve nutrition and health conditions in the world

The description of the human genome, the scope of the omic sciences, together with the gradual knowledge of the human microbiome, allow to ensure with sufficient precision, the mechanisms through which a nutrient influences the structural and functional characteristics of an individual and his health.

In 2021 estimates of the OECD (Organization for Economic Co-operation and Development) and the FAO (Food and Agriculture Organization), on the consumption of excessive amounts of sugar in the world and, particularly in the Americas,

places this phenomenon as a practice of high, constant, and growing prevalence in its population with an upward expectation for 2030.

The same document indicates that it is through the regular consumption of foods and beverages with a high sugar content that the risk and negative impact on the health of the population with this eating pattern is established.

In this setting of nutritional imbalances and risks, scientifically supported strategies that reduce the consumption of these products, promote physical activity, and facilitate nutritional, metabolic, and general systemic health control are an opportunity that must be applied.

Measures such as the implementation of tax on sweetened beverages applied in Mexico suggest a reduction of at least 4 percentage points in expenditure on these products. On the other hand, the use of warning labels on foods and beverages suggests a benefit by reducing the number of harmful ingredients in their composition.

Finally, and with a reasonable safety profile, the consumption of no-caloric sweeteners has been considered as a substitute for the excessive consumption of sugars, being able to establish a result in the energy balance that benefits the health of its consumers. In the context of the debate about the consumption of these products, systematic reviews and meta-analyses are described, which are the basis for their professionalized and ethical prescription, far from empiricism and from risk for the consumer.

S34.1

Legume Sprouts as a Source of DAO for the Dietary Management of Histamine Intolerance

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Oral supplementation with Di-amino oxidase (DAO) enzyme is a complementary strategy to the low-histamine diet in the dietary management of histamine intolerance, which help degrade histamine from food at the intestinal level. In the update of the official list of novel foods in 2017, the European Commission gave the green light to the marketing of this DAO enzyme supplements based on porcine kidney protein extract in all member states of the European Union. In addition to the enzyme of porcine origin, it has recently addressed the possibility of having new sources of this enzyme, specifically of plant origin. In this context, the germinated sprouts of certain edible legumes have pointed out as interesting sources of DAO enzyme with a high catalytic capacity to degrade histamine. From a commercial point of view, having a plant source of this enzyme would expand the target of this novel food for the vegetarian/vegan population, as well as religious restrictions on the consumption of pork products. In addition, obtaining DAO enzyme from legumes would be a practice in accordance with the current call for action of the Sustainable Development Goals.

According to recent results, the germination of some legumes is capable of increasing the DAO enzymatic capacity up to 250 times compared to ungerminated seeds. It has also been demonstrated that the germination for a period of 6 days in darkness provided the optimal environment to maximize the DAO activity of this plant-origin matrix. The absence of light may act as an adverse environmental condition, stimulating the expression of DAO activity, among other metabolic pathways. In addition, the control of other germination factors such as seed disinfection and temperature has also been shown to be important to obtaining legume sprouts with maximum DAO activity and ensuring a good rate of germination. In detail, lyophilized green pea and grass pea sprouts showed the greatest DAO activity, closely followed by the seedlings of lentils, soybeans, and chickpeas.

Overall, legume sprouts may be considered an interesting source of DAO that could be used as active ingredient in DAO supplements with interesting attributes from the point of view of productivity and sustainability.

Conflict of Interest: The authors declare no conflict of interest

Keywords: Legume sprouts, DAO, Dietary management, Histamine intolerance.

S34.2

Bioactive Compounds in *Moringa Oleifera*. Potential Antidiabetic Effects

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Introduction: *Moringa oleifera* Lam. [MO] is a tree grown in most tropical and subtropical areas which has been traditionally used as a food and as a natural remedy for medical conditions. MO leaves are nutritionally rich as they contain high protein levels and abundant fiber, potassium, calcium, magnesium, β -carotene, α -tocopherol and polyphenols. Other parts of the plant such as seeds and pods are also being characterized, as aqueous or alcoholic extracts or fractions, and investigated with different purposes. Bioactive compounds present in MO leaf in significant amounts include glucosinolates (glucomoringin), flavonoids (myricetin, quercetin and kaempferol) and phenolic acids (chlorogenic acid, caffeic acid, gallic acid), saponins and also relatively small amounts of phytates and oxalates. The high content of dietary antioxidants and bioactive compounds highly contribute to their health promoting effects, including the anti-hyperglycemic activity.

Objectives: To describe the state-of-the-art in the characterization of MO nutrient and phytochemical content and its potential effects, focusing in the MO leaf properties as an antidiabetic agent and particularly through the description of the results of a nutritional intervention study performed in prediabetic subjects by the Immunonutrition research group between 2018–2021.

Methods: Recent literature will be presented. The human intervention study explored as main outcome the glycemic control in prediabetic patients and as secondary outcomes the lipid and inflammatory profile, plasma antioxidant capacity, weight and

appetite control hormones and intestinal microbiota. A double-blind placebo-controlled, parallel group intervention study was conducted, with 65 patients (between 40 and 75 y.) finishing the study. 6 daily capsules of MO dry leaves powder (400 mg each) were consumed in the MO group (N=31) or 6 placebo capsules in the PLC group (N=34) during 12 weeks.

Results: Significant effects of small size were observed in glycemic control parameters (glycated hemoglobin and fasting blood glucose) by comparing the change observed in the MO versus the PLC group (P=0.026 and P=0.049, respectively). No significant effects were found in secondary outcomes; however, it would be worth exploring the results of a similar intervention in patients with a diagnosis of diabetes mellitus. Fifty eight percent versus 38% of patients improved HbA1c in the MO and PLC groups respectively. A decision tree statistical analysis of independent variables successfully explaining HbA1c improvement pointed out to TNF- α combined with glutamic-pyruvic transaminase (GPT) as predictor variables. Compliance was good and no adverse effects were observed.

Conclusions: There is positive evidence that MO supplementation may act as a natural anti-hyperglycemic agent, however, the scientific evidence grade is low so far. Individual characteristics and dose of MO are important when assessing effectiveness. Questions that need answer include identification of active components with their mechanism of action and whether from whole plant parts or as extracts or fractions. The study of the antidiabetic potential should be explored in different well-designed intervention studies with diabetic patients, at different stages of the disease, with and without oral antidiabetic medication, in insulin-dependent patients and also regarding the effects on different diabetes associated complications.

Conflict of Interest: None

Keywords: *Moringa oleifera*, Nutrients, Polyphenols, Glucosinolates, Prediabetes, Diabetes mellitus, Glycemic control.

S34.3

Polyamines in Food and Their Beneficial Effects on Health

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The polyamines putrescine, spermidine, and spermine are a ubiquitous group of molecules found in all living organisms. These compounds have several implications for human health, and in the early stages of life they contribute to intestinal maturation and the development of the immune system. Due to their antioxidant and anti-inflammatory effects, polyamines also play an important role in the prevention of chronic diseases such as cardiovascular diseases, obesity, and diabetes, and are associated with a longer life expectancy. In humans, food is the main exogenous source of polyamines, which are also available by endogenous synthesis. Although there are still no recommendations for their intake, it has been reported that the need for polyamines increases in stages of rapid cell growth, such as the neonatal or infant stage or during wound healing processes. During aging, the endogenous synthesis of

polyamines decreases, and therefore their dietary intake becomes more important.

According to recent results, the content and distribution profile of polyamines in foods is highly variable, being wheat germ, mushrooms, soybeans, cheeses and dry-fermented sausages the food products with the highest concentrations of polyamines. Human milk also contains polyamines, although in highly variable contents, with spermidine and spermine being the predominant polyamines. Likewise, it has also been shown that the presence of polyamines in human milk can be influenced by various factors related to the mother-child dyad and to the lactation process itself. Specifically, the levels of polyamines in human milk decrease throughout the lactation process and vary within a single feed (twice in hindmilk than in foremilk). In addition, the spermine content was slightly higher in the milk of mothers providing partial, rather than full, breastfeeding.

Overall, polyamines are relatively poorly understood bioactive components of food despite the fact that their beneficial physiological effects have been well studied, especially in the early stages of life, in aging and in the prevention of chronic diseases. Therefore, knowledge of the content and profile of polyamines in both food and human milk is an essential preliminary step to be able to propose recommendations for enriching the diet with these compounds.

Conflict of Interest: The authors declare no conflict of interest

Keywords: Polyamines, Food, Human milk, Human health.

S35

From Hydrolyzed Collagen to Bioactive Collagen Peptides with Scientific Support

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GELITA

Introduction: When we are born, our body produces the so called “protein of life”: collagen. From skin to cartilage, tendons, muscles, bones and more, it is present throughout the body; when we turn 25, we begin to lose 1 to 1.5% of its production annually as a natural consequence of aging. When we reach the age of 40, this deficit doubles and from now on, it will only continue to be lost if we do not look for solutions that help us to improve our quality of life from the inside out: Functional supplementation.

Bioactive Collagen Peptides, a breakthrough in science and technology.

To make up for this protein deficiency, the so called “hydrolyzed collagen” has been offered, in a context of much scientific and technical misinformation about it, with more faith than tangible and sustained benefits; what has been the result? Very low effectiveness in the body, to the extent of not even noticing the benefits. Since its collagen chain is cut with random non-specific enzymes, which have no functionality, specificity or scientific proof that currently has an interesting innovation for health and improvement in the quality of life: the “Bioactive Collagen Peptides.”

Objectives:

- Present with scientific evidence the innovation in collagen, Bioactive Collagen Peptides, specially designed to improve people's quality of life.
- Learn about Bioactive Collagen Peptides, a breakthrough in science and technology: Absorption and mode of action, stimulating the body to produce its collagen.
- Briefly learn about the clinical studies of each of the Collagen Bioactive Peptides that prove the positive effects of their functionality in specific doses for each of the different organs: skin, muscles, bones, joints, tendons, and ligaments.

Results: Bioactive Collagen Peptides, the most relevant evolution in collagens in recent years, guarantee positive changes even after the 6th week of constant consumption by stimulating your body to produce its collagen.

By cutting the collagen chain with specific enzymes, bioactive collagen peptides can work directly on the target organ to be optimized in precise doses and with rich scientific support that grows more and more every year. Thanks to such innovation backed by clinical studies, Bioactive Collagen Peptides stimulate body functions with health improvements and measurable results.

Conclusions: There are clinical studies for the different Bioactive Collagen Peptides proving the positive effects and functionality for skin, muscles, bones, cartilage, tendons, and ligaments. Each of them contributes to improve quality of life by having a healthy aging.

Conflict of Interest: N/A

Keywords: Collagen, Bioactive collagen peptides, Innovation, Technology, Scientific support, Benefits, Enzymes.

SP06.1

Objectives of FESNAD in the Celebration of the DNN

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The so called “Día Nacional de la Nutrición (DNN)” or National Nutrition Day was set up by the Spanish Federation of Nutrition, Food and Dietetics Societies (FESNAD) in 2002. The main aim is to inform and educate properly the general population. Since 2002, FESNAD has been celebrating this date on 28th May. Every year there is a different topic with independent slogans to cover a certain topic, focused on different groups of population or related to different groups of foods. Unfortunately, nowadays the information about general Nutrition and Nutritional Sciences is controversial, since there are many mistakes and misconceptions published in the social networks. This is the reason why the slogan chosen every year has to be capable enough to capture the interest of the population. Therefore, every year all the societies involved in FESNAD collaborate to work on the preparation of correct concepts and information related to a specific topic in a simple and effective way. Thus, the general population, independently of the social strata, can understand all the messages. These messages and materials are disseminated among different Institutions (schools, pharmacies, Universities, hospitals, etc.) in order to counteract the hoaxes found on the internet.

SP06.2**Educational Methods on National Nutrition Day***Leis, R.*

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Nowadays, the main causes of morbidity and mortality are cardiovascular diseases and cancer, which are closely related to life-style, diet, physical activity, inactivity (especially linked to the use and abuse of screens), and sleep. In addition, these unhealthy patterns start earlier and earlier in life, which makes difficult growing up healthy.

In Spain, the prevalence of obesity and its comorbidities is already high in childhood. Therefore, it is the “time to action”. The coordinated and joint action of the whole society is necessary. In this sense, the Spanish Federation of Nutrition, Food and Dietetics Societies (FESNAD) created in 2002, among other activities, the National Nutrition Day (DNN), aiming to implement strategies in order to promote different healthy foods, which are part of the Mediterranean and Atlantic diets. Since our population has been decreasing its adherence to these healthy diets in the last decades. These promotional campaigns are aimed at the entire life cycle, and especially at the most vulnerable groups, which correspond to the lowest socioeconomic and cultural levels.

Therefore, it is necessary to establish dissemination and awareness mechanisms with the following aims: 1) to achieve a cultural change to desirable and enjoyable traditional lifestyles, 2) to educate the general population as a whole to identify risk behaviors, and 3) to create a favorable climate for its implementation in the different environments where people live and grow. Thus, it is necessary to make progress in raising awareness and expanding the knowledge that citizens have about the causes and consequences of poor diets and lifestyles, and the need for them to be healthy from childhood. In the DNN, lectures are given to children and adolescents and to families at school, as well as in health centers, nursing homes and professional health faculties and schools related to lifestyles. Family and peer workshops are also held in which the choice of food is valued to develop a healthy diet, label reading, culinary preparation and the acquisition of food preferences, which will help achieve the objectives proposed. Initially, the methodology applied was lectures with audiovisual and poster support, and little by little multi-channel campaigns were introduced, with open surveys on the web prior to the DNN. The presentation is usually performed with the collaboration of the Spanish Agency for Food Safety and Nutrition (AESAN) during most actions and in 2022, the Ministry of Agriculture, Fisheries and Food, together with several government ministries from different Autonomous Communities cooperated in a joint action.

Conclusion: Since its inception, the DNN responds to the recent WHO 2022 report that recommends comprehensive actions with a population approach throughout the life cycle from pregnancy, with the aim of creating environments that promote health and sustainable development. DNN action also responds to the objectives and methodology contained in the National Strategic Plan for the Reduction of Childhood Obesity (2022–2030)

SP06.3**Population Groups of Interest in Health Education***Miguel Atanes, C.*

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The Mediterranean diet refers to a cultural, social, territorial and environmental concept that has been followed in countries of the Mediterranean basin for decades and has shown associated benefits for human health and sustainability. However, due to economic progress, changes in lifestyle and a greater availability of food are affecting the adherence to MD in our country.

Unhealthy eating habits affect the overall population with a higher impact on groups at high risk of nutritional deficiencies such as the elderly, infants and pregnant women. Therefore, since 2002 the Spanish Federation of Nutrition, Food and Dietetics Societies (FESNAD) has been carrying out annual initiatives, such as The National Nutrition Day (DNN), focused on those frail groups. To point out some examples of DNN campaigns, both editions in 2004 and 2013 were devoted to nutritional intervention in the elderly; in 2005, 2012 and 2014 the initiatives were focused on pediatric population; in 2008 the DNN emphasized the risks of miracle diets, throwing overboard the hoaxes referring to this topic. More recently, in 2015, the message of the campaign highlighted the importance of healthy eating during pregnancy and breastfeeding.

The DNN celebration highlights the benefits of nutritional care, aiming to promote a varied, balanced, moderate and sustainable diet at all stages of life and in all population groups. Nutritional care is essential to acquire motivation, skills and self-esteem as well as adopting healthy habits.

Conflict of Interest: None to be declared

Keywords: Healthy eating, Nutritional care, Population groups.

SP06.4**Food Groups of Interest for Health Education***Marcos, A.*

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During the five-year period (2016-2020) the Spanish Federation of Nutrition, Food and Dietetics Societies (FESNAD) set up a new concept of the National Nutrition Day (DNN) related to “Habits for the Whole Life” and particularly referring to the information about different food groups. In 2016 the slogan was “Hydration is also Health”, devoted to the consumption of water and its importance in our life every day at any age since water occupies between 50% and 70% of the body weight. Thus, from the recommended whole consumption of water (2 L for women and 2.5 L for men), at least 80% must come from water intake and the rest (up to 20%) must be provided by fruits, vegetables, juices, milk, soups and herbal infusions. The slogan in 2017 was “This year we take you to the garden”, with the intention to promote the consumption of vegetables and fruits, due to their important ingredients (vitamins,

minerals, fiber, antioxidants) and their great role in health and disease prevention. The DNN in 2018 chose the following slogan: "Pulses: your healthy option for the whole year". Pulses have a high protein quality, as well as a high fiber content, and they are an important source of vitamins and minerals. The slogan selected for 2019 was "Dairy: be clear". Unfortunately, due to misconception about the role of milk on health and new eating fashions, the consumption of milk has been reduced during the last decade with the risk of suffering from micronutrient deficiencies. Important to highlight that milk provides a very high-quality protein, as well as fat, lactose, calcium, phosphorus, potassium and vitamins A, D, B6 and B12. "Cereals: let's get to the point" was the slogan chosen in 2019. Since ancient times it served as a staple food for humans. Cereals provide easily assimilated energy. Whole grains are very rich in nutrients and provide insoluble fiber, essential fatty acids, vitamins, and minerals. They are part of a healthy Mediterranean diet. After 2020, following with the general concept of DNN (Habits for the Whole Life), the slogan for 2021 was "Mediterranean Diet in pandemic times", promoting foods and culinary techniques of the countries bordering the Mediterranean Sea, as intangible cultural heritage of humanity. Finally, during the current year (2022), the slogan selected for the celebration of the DNN was: "Fishing Health", focusing on the important composition of different types of fish, that are a source of protein of high biological value (more digestible than meat protein), polyunsaturated fatty acids (omega 3), vitamins (B group, A and D), as well as minerals (iodine, selenium, zinc, calcium, phosphorus, iron, copper). In summary, the aim of FESNAD is to educate the general population, and to facilitate the knowledge of the components of different foods as the key to encourage people to follow a healthy diet and eating.

SP07.1

Role of the Microbiota as the First Metal Detoxification Mechanism: An Approach from Environmental Nutrition and Food Safety

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Introduction: Exposure to environmental toxics in water, soil and air is increasing, with effects on the health of the population, especially in children and physiological states of greater vulnerability such as childhood and pregnancy. There is sufficient evidence of the benefits of people who have food and nutritional security (It is continuous and constant access to nutritious food) to preserve health or prevent diseases of a metabolic nature, given that an adequate diet is achieved (complete, varied, balanced, sufficient and innocuous) that impacts intestinal health due to the lack in the microbiota, which has a role in the first metal

detoxification mechanisms. In an era of the Sustainable Development Goals (Agenda 2015-2030), sustainable food becomes prevailing due to its relevance and contribution to the sustainability of natural resources and the health of the population by integrating, in addition to nutrition, social aspects, cultural, climate and environment, so the selection of local, regional foods are characteristics of a sustainable diet. Studies since 2005 in the State of Guanajuato, Mexico, in populations that are exposed to arsenic and fluoride in drinking water, have identified the role of maintaining certain foods that have been part of the traditional Mexican diet and locally produced such as quelites, legumes (beans, lentils), a wide variety of fruit and vegetables, rich in flavonoids, vitamins (A, D, E and B vitamins), which have been found to be associated with increased excretion of arsenic and fluorine. Environmental nutrition and food safety is the line of research implemented at the University of Guanajuato with the purpose of carrying out multidisciplinary research in the basic and clinical area, related to the problems of contamination in water and food of anthropogenic origin to contribute to the achievement of food and nutritional security. Since 2004 in the State of Guanajuato, two metals, arsenic, and fluoride, have been studied in drinking water, finding benefits had been observed in excretion with the supplementation of vitamins, minerals, quelites, as well as the promotion of an adequate nutritional status and in these determining the role of the microbiota turns out to be a mainstay.

Objectives: To derivate a comprehensive proposal for a sustainable nutritional and dietary approach on the toxicokinetic of the main contaminants in water and food, to reduce the negative effects on the health of marginalized and vulnerable populations, since abording the study of Environmental Nutrition and Food Safety.

Methods: A review in indexed journals, conferences, reports, or research in progress on the effects on the toxicokinetics of quelites and other Mexican foods on toxic metals addressing the role of the microbiota, food and nutritional security as well as nutritional status.

Results: The main Mexican plants and foods identified were quelites with a high nutritional value (Minerals, proteins, amino acids, antioxidant compounds); reduced the concentration of chemical contaminants in the supplemented participants and showed the ability to change the valencia of the main toxic metals; others were capulin, garambullo, prickly pear, nopal, chili as well as other foods from Latin America such as bananas and varieties of legumes. All with some biological property or benefit on toxic metals (Arsenic and fluorine mainly), considering inflammation, microbiome, and nutritional status.

Conclusions: The great biodiversity of medicinal and edible plants that exist in Mexico offers a great opportunity to continue studying their beneficial effects and treatment alternatives aimed at improving the health and nutrition of populations (toxic metals, inflammation, microbiome, and nutritional status), as has been the evidence with quelites and other Mexican foods.

Conflict of Interest: The author declares no conflict of interest.

Keywords: Environmental nutrition, Food safety, Sustainable diet, Quelites, Mexican foods, Toxic metals.

SP07.2**Anti-*Helicobacter pylori* Properties of Three Species of Mexican Quelites**

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Introduction: Quelites are comestible green plants that include tender herbs. Even though quelites have been consumed in Mexico since pre-Hispanic times, nowadays they are considered as neglected species despite their nutritional value. Besides their well-known use as food, some of these species have been traditionally recognized for having beneficial health properties, as is the case of their usage for the treatment of some gastrointestinal ailments.

Helicobacter pylori is the main etiological agent of gastritis, peptic ulcer and gastric cancer. It is estimated that more than half of world's population is infected by this bacterium that successfully infects the human stomach by using unique colonization strategies.

Objectives: To incentivize the reinsertion of these plants in the daily diet by demonstrating an added health-promoting value, the anti-*H. pylori* properties of three species of quelites, *Anoda cristata* (Alache), *Cnidoscolus aconitifolius* (Chaya) and *Crotalaria pumila* (Chepil), as well as the gastroprotective effect of the mucilage from Alache, were tested.

Methods: Aqueous and dichloromethane-methanol extracts were obtained from Alache, Chaya, and Chepil. All samples were assayed *in vitro* against *H. pylori* growth [by determining the Minimal Inhibitory Concentration (MIC)] and upon two of its colonization factors (adherence and urease activity). The gastroprotective effect of the mucilage extracted from the Alache was tested in an ethanol-induced gastric ulcer model in mice.

Results: Dichloromethane-methanol extracts from Chaya, Chepil and Alache, exert the best inhibitory effect on bacterial growth, with MIC's of 62.5, 125 and 250 µg/mL, respectively. All the extracts inhibit bacterial adhesion by 30 to 50%. None of them have effect on urease activity. The mucilage of the Alache possesses a good gastroprotective activity, >50%. Considering the biological activities found, these plants represent a promising source for a complementary therapy.

Conclusions: This work provides information about the anti-*H. pylori* potential of three edible quelites and provides the basis for further studies to establish whether their consumption in a daily diet could have an impact on the prevention and/or control of *H. pylori* associated diseases.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Quelites extracts, Anti-*Helicobacter pylori*, Adhesion, Gastroprotection.

SP07.3**Quelites: Nutritional Contribution to the Mexican Diet**

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Introduction: In some rural areas in Mexico, the consumption of some fruits and vegetables with high nutritional value can be complicated, limiting their access due to the costs that they can reach, and their availability. That is why quelites become a viable alternative to incorporate into the Mexican diet since they are wild plants that do not require specific or complicated care (fertilizers or pesticides), they are located in various regions of Mexico, and they are cheap and have exceptional nutritional properties. However, due to the continuous bombard consumers of most popular brands (ultra-processed foods), easy access, and hyper-palatability of ultra-processed products, they have contributed to the disuse of these edible species (quelites).

The various age groups in Mexico, with an emphasis on rural populations, have presented a great change in eating habits, this is confirmed by the elimination of the ingredients of the traditional diet (fruits, vegetables, and quelites), and substituting it for diets high in fat, sugar, salt and chemical additives, components that promote the appearance of obesity and its co-morbidities. On the other hand, in addition to the low consumption of quelites and other natural foods, no food has a composition that meets all the nutrients necessary to meet the daily demands of the body; in both cases, the preparation of mixtures or formulations based on easily accessible ingredients (wild edible plants) rich in vitamins, minerals, amino acids and other nutrients in various presentations (tablets, powders) become an economical alternative to promote the consumption of the quelites and obtain the benefits derived from its excellent nutritional value.

Objectives: Promote the consumption and incorporation of quelites in the diet raw, cooked, or through mixtures or other presentations, in order to take advantage of their nutritional value and contribute to the meeting daily requirements of essential macro and micronutrients of marginalized and vulnerable populations exposed to environmental contaminants.

Methods: Dissemination of research results obtained by the inter-institutional research team made up of researchers from the Universidad Autonoma del Estado de Hidalgo and other public institutions. Disclosure of information derived from searches in journals, conferences, or reports, regarding the nutritional properties of quelites.

Results: The quelites presented a high nutritional individual value and in a mixture. The mixtures were rich in chlorophyll, phenolic compounds, dietary fiber, macroelements, and amino acids; on the other hand, they present positive biological properties, such as promoting the excretion of contaminants.

Conclusions: The combination of the Mexican quelites leaves resulted in an improvement in the nutritional and functional properties of the powder mixtures and also provide positive biological effects in populations exposed to pollutants. The great diversity of wild edible plants, especially the quelites that exist in Mexico, is a variable to consider promoting their consumption and integrate them into the diet in raw form or as a freeze-dried mixture in

powder, tablets, or another presentation to improve health status and population nutrition.

Conflict of Interest: All authors declare that they have no conflicts of interest.

Keywords: Nutrients, Diet, Sustainable, Mixtures.

SP07.4

Effect of Bile Salt Concentration on the Behavior of Pathogenic Bacteria *Salmonella enterica*

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Introduction: Bile salts (or bile acids) are acidic compounds capable of denaturing proteins, damaging cell membranes, inducing oxidative stress that causes DNA damage, in addition to regulating the expression of genes related to the host's immune response. Likewise, it has been described that some bacterial species can adapt to bile acids through mechanisms related to the remodeling of the cell membrane and stress responses, favoring their infection process, through the formation of structures such as biofilm or gene expression regulation. Among these bacteria we found to *Salmonella enterica*.

The genus *Salmonella enterica* is the cause of acute or chronic diseases derived from virulence factors and the evasion of the host's immune response. In addition, in recent years it has been observed that *Salmonella enterica* could contribute to the development of neoplasms such as colon cancer, however the mechanism is not clear yet.

Objective: Evaluate the effect of bile salts on the behavior of *Salmonella enterica*

Materials and Methods: The behavior of different strains of *Salmonella enterica* at different concentrations of bile salts (sodium cholate and sodium cholate) was evaluated by means of growth curves, biofilm formation and the expression of the *OmpF*, *HilD* and *AvrA* genes.

Results: We found a difference in the growth of the *Salmonella enterica* strains evaluated. The growth of these strains also changes depending on the type of bile salt and the concentration at which it is cultured. For example, we found that *Salmonella typhimurium* had higher growth at 3% choleate concentration compared to 1% choleate and cholate concentrations where growth was like medium without bile salt supplementation. On the other hand, *Salmonella choleraesuis* is the highest growth was observed in 5% coleate, while in cholate and 1% sodium coleate, a growth like LB medium without bile salts was observed. Regarding biofilm formation, it was observed that *Salmonella typhimurium* biofilm formation was greater only in 3% cholate. In the case of *Salmonella choleraesuis*, the concentrations of 3% and 5% cholate produced the highest formation, while 3% choleate was similar to the formation of LB medium without bile salts. Finally, we did not find change in the gene expression of *avra*, *hild* and *ompF* at the end of the logarithmic growth phase of *Salmonella enterica* when the bacterium is culture in the presence of bile salts.

Conclusion: *Salmonella enterica* adapts to the concentration of bile salts, changing its growth and through biofilm formation.

Keywords: *Salmonella Enterica*, Pathogenic bacteria, Bile salts, Nutrition.

SP07.5

Breastfeeding, Healthy and Sustainable First Food and Its Role in Modulating the Effects of Air Pollution

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Introduction: Breast milk is the first food of the human being, it is nutritious, free, easily available, and friendly to the environment. Exclusive breastfeeding during the first months of life has repercussions throughout life and on the severity of atopic diseases, or diseases mediated by immune mechanisms, during adult life.

Objectives: To evaluate the modulatory role of breastfeeding on allergic diseases and lung function in children from two cities with different levels of air pollution.

Methods: We conducted a cross-sectional study nested in a cohort study, including children 6 to 12 years of age, asthmatic and non-asthmatic, living in two cities in Guanajuato with different levels of air pollution: Irapuato, a city with high levels of O₃ and Salamanca a city with high levels of PM_{2.5} and SO₂. The contaminant levels were provided by the Secretary of the Environment and Territorial Planning of the state of Guanajuato. Breastfeeding patterns and the frequency of respiratory symptoms were obtained through the ISAAC questionnaire. Pulmonary function was assessed by forced spirometry, with an EasyOne spirometer according to the ATRS / ERS 2005 quality criteria.

Results: We studied 378 boys and 376 girls from 6 to 12 years of age (9.2 ± 1.5 years). 83% received breast milk, 56.9% were exclusively breastfed, 27.6% received mixed feeding and 15.5% received a breast milk substitute. The duration of breastfeeding was 3.8 months (95% CI: 3.7-4.0) and the use of breast milk substitutes began at 3.6 months (95% CI: 3.4-3.7). Weaning started at an average of 3.6 months (95% CI: 3.7-3.7). We observed that 44.2% of the participants received weaning before 4 months of age and weaning occurred at 5.4 months (95% CI: 5.1-5.7). Allergic diseases were significantly more frequent in children without breast-feeding (10.9 vs 1.4%, OR=8.4, 95% CI: 3.5-19.9) and in those weaned before 4 months (6.1 vs 1.2%, OR=5.1, 95% CI: 1.6-15.0). Impaired lung function were more frequent in children without breast feeding (18.7 vs 8.1%, OR=2.4, 95% CI: 1.5-4.4), no

difference was observed between exclusive breast feeding and mixed feeding (OR= 0.89 , 95% CI: 0.4- 1.6), but there was a difference between exclusive breastfeeding and breast milk substitute (OR= 1.93, 95% CI: 1.1- 3.5) and between mixed feeding versus breast milk substitute (OR= 2.1, CI95%: 1.1- 4.3). In the multiple regression analysis, even adjusting for age and city of residence, the factors most associated with lung function were breastfeeding ($\beta=0.07$, $p=0.01$) and duration of breastfeeding ($\beta=0.1$, $p=0.001$).

Conclusions: Exclusive breastfeeding during the first months of life can be a modulating factor in the frequency and severity of allergic diseases and impaired lung function, even in the presence of air pollutants. In our series, the absence of breastfeeding represented an 8.4 higher risk of allergic disease and a 2.4 higher risk of impaired lung function.

Conflict of Interest: The authors declare that they have no competing interest.

Keywords: Breastfeeding, Allergic diseases, Lung function, Air pollution.

SP08.1

Challenges and Solutions Proposed by INCAP in Support of the Professional Practice in Human Nutrition Areas

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Introduction: Nutritional problems arising from deficiencies and excesses coexist in most countries. In low and middle-income regions, the social impacts on health systems to reduce malnutrition is a major issue. Models that address the structural, intermediate, and direct social determinants of malnutrition are key to the effective implementation of interventions. Although, interventions that improve diet and the food environment have a strong underpinning, behavior change in nutrition has an important role to play. These types of interventions are delivered through human capacity building. Yet, human capacity building programs face major challenges in the design, development, and diagnostic stages. Therefore, program developers need to drive comprehensive solutions to strengthen the systems that demand capacity building in services at the local level.

Objectives: To outline the challenges faced by capacity building programs in the professional exercise of human nutrition, as well as to propose initiatives for their strengthening, based on INCAP's experience.

Methods: Interviews were obtained from different stakeholders responsible for promoting and designing human capacity building programs in the field of human nutrition. The assessments were made to donors, managers of training programs and professionals that participated in trainings. The analysis was expressed in the form of a narrative addressing the challenges and potential initiatives of human capacity building programs in nutrition.

Results: There is great interest in human resources training programs that support the reduction of malnutrition. In the design of these programs the aspect of financing is still a challenge, access to technologies, sustainability, and information gap. During

development, the challenges are broad and structural such as unexpected emergency situations that affect the workload of staff in health systems and the retention of personnel. In the diagnostic phase, there was a lack of robust evaluations on the impact or contribution of these programs in reducing malnutrition. Among the initiatives, it was highlighted the generation of high-quality indicators that generate credibility with donors of the programs, the development of a comprehensive model of capacity building in a multisectoral and interdisciplinary approach (e.g., agriculture, education), among others.

Conclusions: Despite the major challenges of capacity building programs in the labor exercise, there is potential to spur comprehensive programs that address the different causes of malnutrition at different levels.

Conflict of Interest: We declare that we have no conflict of interest

Keywords: Capacity building, Challenges, Initiatives, Malnutrition.

SP08.2

Challenges and Solutions Proposed by FINUT to Support Research in Nutrition and Health

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The Ibero-American region, comprising Latin America, Spain, and Portugal is a heterogeneous region in terms of language, customs, and economy, but shares several challenges in the areas of Food, Nutrition, and Health. The State of Food Security and Nutrition in the World report released last July, states that “*low- and lower-middle-income economies bear the greatest burden of stunting, wasting low birthweight, and anemia cases while upper-middle- and high-income economies have the greatest burden of obesity cases*”. This confirms the need for specialized professionals in the region to develop research and interventions prior to the incorporation of policies to improve the nutritional and health status of the population.

The Ibero-American Nutrition Foundation (FINUT) was established in 2011. FINUT is a non-profit and financially self-supporting entity; our vision is to promote research and training, identify problems of public interest and provide scientific answers; and involve all stakeholders in our cause.

As a result of the constant work to raise funds FINUT has counted a significant number of professionals, academics, researchers, clinicians, and students in the above-mentioned areas as beneficiaries of our various specialized training activities, in the last 4 years, for example, 211 people have participated in our specialized online courses with a duration of 3-4 months. Last 2021 eight virtual events with >9,500 beneficiaries were conducted. In addition, we have been creating digital and visual tools for researchers in Dietetics and Human Nutrition.

Moreover, FINUT's educational work is carried out almost daily, summarizing and publishing in Spanish the scientific articles published in the most relevant scientific journals on the topics of interest through our website and social networks. To date, our website is visited by >16,000 people with >23,000 views per month; >14,000 people are subscribed to our newsletter, and >30,000 beneficiaries follow us on social networks.

Despite the progress that educational entities have made over the years, it is necessary to have the support of all stakeholders to create new training models, carry out joint activities and respond to the needs of specialized training and tools that professionals, academics, researchers, clinicians, and students in the areas of Food, Nutrition and Health have, all to support the fight against malnutrition in all its forms in the Ibero-American region.

Conflict of Interest: We declare that we have no conflict of interest

Keywords: Ibero-America, Malnutrition, Specialized training, Research tools.

SP10.1

The Origin of Linear Growth Retardation: Perspectives from Waterlow in 1972 to the Present

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The two major determinants of human linear growth are the availability of substrates (nutrient building blocks) and the guidance (regulation) provided by trophic and anti-trophic hormones. It is obvious looking at the human population that there is a wide diversity in stature among individuals, whereas males as a group are generally taller than females of a given life-stage. Historical height records show a marked secular trend from past centuries to the present. This variation in human stature was originally the domain of physical anthropologists until 50 years ago, when it was swept into focus of human nutritionists, Prof John Waterlow in London was the man wielding the broom. In a 1972 article entitled: "Classification and definition of protein-calorie malnutrition", he proposed that short-stature be called "stunting" and be considered a chronic form of protein-energy malnutrition. In the same essay, he defined "linear growth retardation" as the process by which an individual failed to grow to an appropriate stature. At the time, the cut-off criterion for diagnosis of stunting was a height/age status below the tenth percentile of the extant growth chart; today it is defined as below -2 SD of the W.H.O. standards. The rationale of Waterlow was initially accepted through dint of the author's reputation and prestige. But inconsistencies such as the fact that stunting occurs at birth and accelerates during the breast-feeding period brought questions. Over the years, five alternative theories as to the origin of stunting have been advanced. 1) chronic protein-energy malnutrition; 2) micronutrient deficiencies; 3) environmental infectious and inflammatory stress; 4) exposure to dietary

mycotoxins, specifically aflatoxin; and 5) intangible stresses as from social, economic, political and/or Emotional origins (SEPE). The former three hypotheses have been tested by intervention trials and the results remain inconclusive. An important observation in endemic stunting is that the shortening of the body is not symmetrical; the lower extremities are disproportionately short in relation to the upper body. Dysfunction around the epiphyseal growth plates is postulated as the mechanism for the short stature. This fact militates against nutrient deprivation mechanisms and in favor of hormonal disruptions.

SP10.2

Adverse Consequences of Stunting: Myths and Realities

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Over the past decade, stunting has become a global development objective. This focus has undoubtedly helped illustrate and communicate the consequences of undernutrition and providing incentives for policymakers and donors to develop and fund interventions, programs, and policies aimed at reducing the prevalence of stunting.

The global attention to stunting is based on the premise that interventions aimed at improving linear growth will subsequently lead to improvements in the correlates of linear growth retardation and stunting. Current evidence and understanding of mechanisms, however, does not support this causal thinking.

Our review of the literature demonstrated that stunting does not delay child development, reduce productivity and earnings, or lead to higher incidence of chronic diseases, or other commonly cited consequences of stunting. The source of these problems is a deficient environment. A deficient environment is one that can lead to, among other things, children receiving too little food or food without the necessary nutrients, or children being frequently plagued by illness.

It follows that addressing stunting alone will not automatically reduce the burden of problems like delayed child development, reduced earnings in adulthood, and chronic disease. Likewise, recovery from linear growth retardation or stunting (often referred to as "catch-up growth") will not automatically lead to improved (neurocognitive) development. Solving the problems of delays in child development, diminished productivity or earnings, or high susceptibility to chronic disease requires fixing the deficient environment.

In sum, stunting should be seen as a smoke alarm, i.e., a signal of a much larger problem. The attention of nutrition researchers, donors, and practitioners should not focus on turning off the alarm, but on extinguishing the fire, i.e., the deficient environment.

SP10.3

Social-Economic-Political-Emotional (SEPE) Factors Regulate Human Growth

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There is a recurring and seamless interaction between the biology of human development and the Social-Economic-Political-Emotional (SEPE) environment. This presentation reviews the role of SEPE factors in human growth, especially skeletal growth. The SEPE environment influences the quality of the material conditions for human biology and, simultaneously, human growth in height and other dimensions provide social and moral signals and information to community networks. SEPE factors are related to individual and group prestige, to social identity, and to ego and task motivation. These influence dominance or subordination of communities and the material and moral conditions of societies. Historical and contemporary examples of SEPE effects on skeletal size are presented for humans and other social vertebrates. In the human species, people of higher SEPE status are taller, people of lower SEPE status are broader. Hormonal regulation of SEPE status is likely, working through the hypothalamus and its neuroendocrine networks and epigenetic interactions between growth hormone/insulin-like growth factor-1 (GH/IGF-1) axis, the “stress hormones” cortisol, dopamine, norepinephrine, and epinephrine (adrenalin), and glucagon, bone-derived osteocalcin, and the mechanistic Target of Rapamycin Complex 1 (mTORC1) signaling pathway. SEPE factor regulation of human growth is a more comprehensive explanation for plasticity in height than traditional concepts such ‘net nutritional balance’, socioeconomic status, or simple-minded genetic determinism. People belonging to upper SEPE class communities, the elites, know that they are superior and are treated as such by the non-elites. The lower SEPE classes often live with stresses and fears from inequality, insecurity, and violence. The material and moral conditions for life operating through these community social networks provide positive stimulation for the elites and negative stimulation for the lower SEPE classes. These differences maintain the gradients in height between SEPE communities in human societies.

SP10.4

Sagittal Photography: Its Application to Evaluate Stunting and Body Proportions in Preschoolers and Elderly Adults

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Linear growth retardation is also referred to as “stunting” or “chronic undernutrition” is a height more than two standard deviations below the World Health Organization Child Growth Standards median for children under 5 years old (WHO, 2020). For adult women and men short stature is considered as height as less than 145 cm and 150 cm absolute cut-offs, respectively.

Evidence suggests that failure to grow in length and height is due to impaired elongation of the lower extremities’ long bones. Decomposing stature into its major components is proving to be a useful strategy to understand adverse and complex factors that influence growth.

CeSSIAM in Guatemala has an interest in the origins and biology of acquired linear growth retardation and has developed a methodology for using digital camera images as a practical and non-invasive tool to measure body proportions. Six studies have been carried out, 2 proof of concept studies for methodology development and 4 applied studies, 2 with preschoolers and 2 with older adults.

Proof of concept studies developed the method and insights in the optimization of technical variables such as focal length, uses of equidistant point and zooming to reduce impact error. Additionally, participants adequate posture and physical points for body measurement were also defined.

Applied studies required that sagittal photographs were taken in children and older adults in an erect posture with the Frankfort gaze standing on a low platform. The relative lengths of the trunk and the legs were evaluated using upper iliac crest, marked in the photograph with a colored tape, as middle body point and were measured in mm from pictures, allowing the generation of trunk-to-leg ratios. Inter and intra-rater reliability of measurements was also assessed.

Results inform that body segment lengths in normal-height and modestly and severe stunted Guatemalan preschoolers and older adults (with no mobility problems) can be assessed by this method. This alternative to sitting height for body proportions assessment in children and older adults suggests that photographic imaging represents an easily reproducible, lower invasive, and less confounded method.

SP10.5

Bone Density: Cross-Sectional Dimensions in Stunting

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Introduction: Growth and development are impaired in children that suffer from poor nutrition, repeated infection, and inadequate stimulation. This condition is called stunting and it has long-term consequences like decreased neurocognitive skills and increased risk of nutrition-related chronic diseases in adulthood. Bone development may be affected in stunted children resulting in increased bone stiffness that can lead to frailty in adulthood. Less is known about bone health, diet quality, and stunting among Guatemalan children.

Objective: To explore the association between stunting and bone density among Guatemalan preschool children.

Methods: We conducted a cross-sectional study involving 155 Indigenous children aged 2 to 5 years, living in Chichicastenango, Guatemala. We measured height and bone density (Speed of Sound (SoS) m/s using Sunlight MiniOmni Ultrasound Bone

Sonometer) thrice from dual-site measurement at the left distal radius and midshaft tibia.

Results: Over half of the children were stunted (53.5%) (height for age < -2 SD of the WHO Child Growth Standards). In general, boys that were growing adequately had significantly denser distal radius (3583.1 m/s ±167.9) than those that were stunted (3450.9 m/s ±212.8) (P 0.003). There was no difference in bone density of distal radius or midshaft tibia in girls with adequate growth compared to those with stunted growth. Bone density is higher in young children (aged 2-3 years) that are growing well, compared to their stunted peers. Age and stunting predict bone density among older children. Increased stunting was positively associated with higher bone density in older children (4-5 years old). Children that are not increasing in height as expected experience increased bone mineralization.

Conclusion: Our findings suggest that stunting is affecting bone size and structure, such that their bones may become stiff and fragile.

Disclosures/Conflicts of Interest: non-declared. Funding [Canadian Queen Elizabeth II Scholars]

Oral Presentations

Healthy Nutrition in the Life Cycle and Clinical Nutrition

O01

Physical Activity, a Strategy to Stare Physiological, Conductual and Metabolic Affectations Generated by the Excessive Consumption of Sacarosa in a Murinum Model

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Introduction: Continuous and excessive consumption of hypercaloric foods is associated with the development and maintenance of diseases, such as the case of sucrose. It is pertinent to generate strategies that allow counteracting the consequences of eating food and beverages that contain it; identifying that physical activity (PA) is ideal for this.

Objectives: Analyze the effects of performing PA at different intensities in rats that ingest a sucrose drink daily on food consumption, body composition, glucose level, lipid profile, fat mass, and lean mass.

Methods: Eighty-three-month-old Wistar rats (40 females and 40 males) were divided into four groups: one sedentary and three

active; exposed to three experimental phases: (1) Baseline; (2) F1, a sucrose drink was added to 8% w/v; and, (3) F2, the active subjects performed PA: low, moderate and high. At the end of each phase, a blood extraction was performed and at the end of the study, the fat mass and lean mass were obtained. The *p*-value was obtained using Student's T and Mann Whitney's U. ANOVA to compare the means of the variables of fat mass and magician mass.

Results: Consuming sucrose increases body weight, glucose, and lipid levels. Performing AF reduces the consumption of sucrose, however, how it occurs depends on the intensity at which it is performed and the sex of the subjects: the higher the intensity (PA), the lower consumption, which reduces and delays the affectations in body composition and some biochemical markers. In females, the effect occurs from its realization, independent of intensity; in males, the effect is significant from high intensity. In general, lower fat mass and higher lean mass at higher PA intensity.

Conclusions: PA is a means of adaptation to food disruptions; Although sometimes it does not reverse the affectation in the health indicators, it can delay the expression of the disease.

Conflict of Interest: There is no conflict of interest.

Keywords: Physical activity, Sucrose consumption, Eating behavior.

O02

Effect of Pasteurization and Freezing on IgA1 and IgA2 Subtypes Contained in Mature Breast Milk

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Introduction: Breast milk (BM) stored in BM banks is subjected to pasteurization and freezing, to preserve its nutritional and immunological properties; studies have shown that these processes do not significantly affect the nutritional content, However, immune cells are very sensitive to temperature processes and studies report different results regarding the maintenance of immunoglobulins after pasteurized and frozen.

Objectives: To determine the effect of pasteurization and freezing on the content of Ig A1 – Ig A2 in the LM.

Methodology: BF was collected from 10 mothers who had been breastfeeding for more than 30 days, the content of the Igs was read by the turbidimetry technique, with the Kappa SPAPLUS antiserum human IgAP Kit from Bindig Site, under the following experimental design: BF before being subjected to pasteurization and freezing, after pasteurization and freezing every 15 days for 2 months. Freezing was at -20°C.

Results: The total content on average of IgA found was 1598.5 mg/dL. The initial count of IgA1 and A2 were 651 mg/dL and 945.7 mg/dL, respectively, at the end of the freezing times, the content was 167.9 mg/dL and 132.8 mg/dL, respectively. In both IgAs, after the treatments, their contents decreased significantly (*p*<0.05), due to pasteurization and freezing.

Conclusion: Pasteurization and freezing affect the content of IgA 1 and 2 in LMM, which is not guaranteeing an immune-supported food for infants.

Conflict of Interest: The authors declare that we have no conflict of interest.

Keywords: Breast milk, Immunoglobulin, Pasteurization, Freezing, Turbidimetry.

O03

COVID-19 Effects on Weight, Feeding and Physical Activity on the Uruguayan Population between March 2020–June 2021

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Introduction: Current scientific evidence shows an increase of weight gain, food consumption, and decrease in physical activity associated with COVID-19.

Objective: To study the effects of COVID-19 in weight, feeding, and physical activity in the Uruguayan population between March 13th 2020 to June 10th 2021.

Methods: Cross-sectional study. A self-administered web survey was applied at two points, the first one between March 1st and December 2020 and the second between January and June 10th, 2021. The population was website users over 18th years old. The sample was weighted by sex, age, and educational level, to have a significant number of cases for each category. Effects on weight, eating habits, and physical activity by sex, geographic region and educational level were surveyed. The absolute and relative percentage frequencies are described, as well as their 95% confidence intervals. The association between categorical variables was evaluated using the Chi² square test, with a significance of 5%.

Results: The reported difference in weight gain was significant by educational level, being greater in the highest level: 30.4% in the higher and 25.1% in the lower one ($p < 0.004$). Women reported a higher weight gain than men at all educational levels ($p < 0.005$) and there was no difference by geographic region. The weight gain was significantly greater among those people who felt more anxious than before the pandemic, those who experienced greater sadness, and those who felt calmed down. Differences in food consumption were also found by educational level, being 10.1% in the low level and 17.1% in the highest one ($p < 0.004$). The decrease in physical activity was significant at all levels, being greater at the lowest one (0.001).

Conclusions: The pandemic caused by COVID-19 strongly affected weight gain, food consumption, and physical activity, all risk factors for non-communicable diseases.

Conflict of Interest: No conflicts of interest.

Keywords: COVID-19, Weight, Feeding, Physical activity.

O04

Milk Fat Globule Membrane Plus Milk Fat Increase Docosahexaenoic Acid Availability in Infant Formulas

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Introduction: Milk fat globule membrane (MFGM) has components with emulsifier properties that could affect the provision of substrates to the brain.

Objectives: We evaluated the effects of MFGM plus milk fat addition to infant formulas on docosahexaenoic acid (DHA) availability and gut development.

Methods: In Experiment 1, suckling piglets were divided into 3 groups: Group L1 (n=8): fed with a vegetal fat formula with palm oil; L2 (n=8): canola oil formula and L3 (n=8): formula with milk fat + canola oil + 1% Lacprodan (3% MFGM of total protein content). In Experiment 2, Group L4 (n=7): fed with canola oil + 1% Lacprodan (3% MFGM of total protein content) and Group L5 (n=5): formula with milk fat + canola oil + 2% Lacprodan (6% MFGM of total protein content). All formulas contained 0.2% DHA and 0.2% arachidonic acid (ARA).

Results: DHA was similar among the groups in both total fatty acids and plasma phospholipids (PL). However, 3% MFGM (L3) significantly increased the proportion of DHA and LC-PUFA n-3 in liver total fatty acids, jejunum, and also in jejunum PL with respect to the other formulas. There were no changes in gut histology, cell proliferation, apoptosis, or brain DHA content. In Experiment 2, a higher MFGM dose was used: Group L4: formula with canola oil + 3% protein MFGM; Group L5: canola oil + milk fat + 6% protein MFGM formula. Then, higher DHA was not only found in peripheral tissues of 6% MFGM (L5) piglets but also in plasma PL, while a similar trend was observed in cortex PL ($P = 0.123$).

Conclusions: In conclusion, MFGM plus milk fat may increase DHA availability in infant formulas which could contribute to their beneficial health effects.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: DHA, Infant formula, Milk fat globule membrane, Gut, Villous.

O05

Effect of Zinc Supplementation on Serum Concentrations of Free Fatty Acids in Patients with Type 2 Diabetes

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Introduction: Patients with type 2 diabetes (T2D) present accelerated rates of lipolysis with a high concentration of circulating free fatty acids (FFA) as a consequence of the deficit in the action and secretion of insulin that underlies the disease. High FFA is considered an etiological factor of insulin resistance and metabolic alterations, therefore, it is relevant to identify agents able to accomplish the role of insulin as a negative regulator of lipolysis. In this regard, zinc through its ability to inhibit protein tyrosine phosphatase 1B and activate phosphodiesterase 3B could exert this function.

Objective: To evaluate the effect of zinc supplementation on fasting serum FFA concentrations and to determine the predictors of FFA concentrations.

Methods: FFA concentrations were determined by enzymatic colorimetry and a multiple linear regression analysis was performed considering demographic, anthropometric, and metabolic variables of interest in 60 patients with T2D who were randomized to receive a placebo (n=30) or 30 mg/day of elemental zinc, provided as sulfate (n=30) for 24 months.

Results: A significant interaction was found between time and treatment, with lower FFA concentrations in the zinc group at month 24 (two-way repeated measures ANOVA, $p=0.034$). Through a multiple regression analysis, it was identified that the change in body mass index, gender, and zinc supplementation contributed as predictors of FFA at month 24, and together they explained 24.3% of the change in FFA concentrations ($R=0.493$, $R^2=0.243$, $p=0.001$).

Conclusions: Supplementation with 30 mg/day of zinc in patients with T2D had an effect on reducing fasting serum FFA concentration after 24 months of treatment. Male patients with T2D, who have a lower body weight gain and receive zinc supplementation, will have a lower FFA concentration after 24 months of treatment. These results support the benefits of zinc as an adjuvant in the T2D treatment.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Zinc, Type 2 diabetes, Lipolysis, Free fatty acids.

O06

Immunological Changes in Breast Milk of Overweight Women

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Introduction: Breastfeeding provides a wide range of benefits for the newborn that go beyond those related to nutrition. Benefits have been found in relation to the intestinal microbiota, the immune response, epigenetic effects, and survival in preterm newborns; even new therapeutic applications have been described. It is known that breast milk has several nutritional components and a great dynamic capacity for adaptation, it changes according to the needs of the newborn, the metabolic characteristics of the mother, and environmental factors including exposure to toxic substances and adverse factors. Obesity is a pro-inflammatory state associated with multiple chronic degenerative diseases. According to the WHO, the global prevalence in 2016 was 13%; however, in Mexico, the prevalence in women older than 20 years is 40.2%, exactly in the reproductive stage; this justifies the study of possible modifications or effects on the immunological characteristics of breast milk.

Objective: To conduct a systematic review of immunological changes in the breast milk of overweight women (body mass index -BMI- ≥ 25).

Methods: A systematic search was carried out through search platforms and specialized databases, such as Academic Google, PubMed, and Scopus, using thesauri in English and Spanish, and those articles published from January 2000 to December 2021, using thesauri in both, English and Spanish. Only those reports that included quantitative data on immunological components in the milk of normal weight and overweight women were considered. The PRISMA 2020 guides were used, and a total of 306 articles were reviewed, of which a total of 36 were included in the final review.

Results: An increase in certain immune cells and cytokines was observed as well as in the bacterial population and proteins with antibacterial action. Also, a decrease in growth factors was documented. Immunoglobulin concentrations did not show substantial changes.

Conclusions: Maternal overweight can alter the biochemical and immunological parameters of milk. Including the decrease of important growth factors such as TGF- β and IFG-1.

Conflict of Interest: The authors declare no competing interests.

Keywords: Breast feeding, Obesity, Immunology, Human milk.

O07

Iron Nutritional Status Using the Concentration of Hemoglobin, Ferritin and Other Indicators, in Children during Their First Year of Life

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Introduction: Iron deficiency and anemia from it are frequent in children under 5 years of age. However, studies on those under 1 year are scarce.

Objective: To describe iron nutritional state and compare according to the classification using the concentration of hemoglobin and ferritin vs. that obtained with other indicators, in children under 1 year of age.

Methods: Participating were 1300 healthy children, full term, weighing >2500 g at birth. From venous blood samples, serum ferritin (SF), zinc-protoporphyrin (PPZn), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and hemoglobin (Hb) were measured at 3, 6, 9, and 12 months of age. Iron nutritional status was classified as normal, iron deficiency (ID) and anemia, be it from iron deficiency (IDA) or from other causes (non-IDA). Kappa coefficient was used to evaluate the agreement between iron nutritional status classifications using different indicators.

Results: At 3, 6, 9, and 12 months of age using SF and Hb, 90.2%, 77%, 81.3%, and 81.2% of the participants had normal iron nutritional status. The prevalence of ID was 5.6%, 10.2%, 9.5% and 8.0%; that of anemia was 4.2, 12.8, 9.2, 10.8%, of which 2.2, 17.9, 18.5 and 20.9% was non-IDA. Using other indicators, the prevalence of ID and IDA increased. Using PPZn and SF, the prevalence of ID at 3, 6, 9 and 12 months of age was 21.5%, 26.2%, 26.2%; and 26.7%; and 23.8, 49.2, 59.7, and 44.4% of the anemia was classified as IDA. The degree of agreement in the classification of iron nutritional status using Hb, and SF vs. Hb, SF and other indicators, was lesser when PPZn was included.

Conclusions: At 3 months, 90% of infants presented normal iron nutritional status, from 6 months, 10% presented ID, and a similar percentage presented anemia. More than 50% of the anemia during the first year of life was classified as non-IDA.

Conflict of Interest: The authors have no conflicts of interest to declare.

Keywords: Infants, Iron status, Ferritin, Iron deficiency, Anemia.

O08

Relationship of Serum Leptin with the Number of Fungiform Papillae and Intensity of Sweet Taste Perception in Individuals with Normal Weight and Obesity

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Introduction: Leptin is an anorexigenic hormone, whose production is related to body composition and adiposity level. In addition, it has been implicated in the molecular mechanisms that regulate sweet taste perception.

Objectives: To analyze the levels of serum leptin and its relationship with the number of fungiform papillae (FP) and the intensity of sweet taste perception.

Methods: A cross-sectional-analytical study was made, conformed of 60 participants (30 with obesity and 30 with normal weight) with an age range of 25 to 45 years. Leptin levels were quantified with a sandwich ELISA kit; to identify the amount of FP, the Denver Protocol was carried out, and to evaluate the intensity of sweet taste perception, a semi-structured scale of a 10-point anchored line was used; Three sucrose concentrations (3%, 8%, 13%) were evaluated.

Results: Leptin levels were higher in subjects with obesity compared to normal weight ($p < 0.0001$). The amount of PF was lower in the obese group ($p < 0.0001$). BMI presented a moderate positive correlation with leptin levels ($r = 0.4819$ and $p < 0.001$) and a moderate negative correlation with the amount of FP ($r = -0.5228$ and $p < 0.001$). On the other hand, leptin levels presented a weak negative correlation with the amount of FP ($r = -0.3410$). No statistically significant relationships were identified between leptin levels and intensity of sweet taste perception.

Conclusions: In this research within the Mexican population, it is evident that the number of fungiform papillae is related to BMI and leptin levels.

Conflict of Interest: The author declares not to have a conflict of interest.

Keywords: Serum leptin, Sweet taste, *Fungiform papillae*.

O09

Role of Histamine and Other Amines in Food Exclusion from Low-Histamine Diets

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Introduction: The dietary management of histamine intolerance involves following a low-histamine diet that excludes foods associated with the onset of symptoms, a priori those that contain histamine. However, according to a recent critical review of different low-histamine diets, foods that are supposedly histamine-free but contain significant levels of other amines are also eliminated. A feasible explanation is that these amines, especially diamines, compete with histamine in the intestines for deamination by the enzyme diamine oxidase (DAO). The resulting delay in histamine metabolism results in enhanced absorption and triggers the appearance of symptoms.

Objectives: To study whether the presence of other biogenic amines interferes with the rate of histamine degradation by DAO.

Methods: In vitro enzyme assays were performed using histamine as a reaction substrate combined with different amounts of putrescine, cadaverine, tyramine, spermidine, and spermine. The tested substrate proportions (histamine: amine) were the following: 1:0.25, 1:1, 1:4, and 1:20. For each condition, three independent experiments were performed in duplicate.

Results: Putrescine and cadaverine delayed histamine degradation at all tested concentrations ($p < 0.05$) but had the greatest effect (up to 80% inhibition) when tested at levels 20-fold higher than those of histamine (28.16 ± 1.0 mU), both separately and in combination. The simultaneous presence of both diamines did not have an additional effect ($p > 0.05$). Tyramine, spermidine, and spermine significantly inhibited the rate of histamine degradation only at the highest concentration (1:20), reducing it by 32–45%.

Conclusions: It was shown that other biogenic amines interfere with the in vitro histamine degradation by DAO to a variable extent. These results could explain the susceptibility of histamine-intolerant individuals not only to histamine-rich foods, but also to those with high contents of other amines.

Conflict of Interest: The authors declare no conflict of interest

Keywords: Histamine, Histamine intolerance, Biogenic amines, Putrescine, Cadaverine, DAO, Low-histamine diets.

O10

Socioeconomic Status Influences the Cardiovascular Risk of Peruvian Immigrants in Chile

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Introduction: The current epidemiological-nutritional transition in western countries toward overnutrition has promoted the development of morbidity. This is a global cross-sectional epidemiological situation that makes it imperative to describe, understand, intervene, and solve nutritional problems, especially those related to vulnerable groups such as migrants.

Objectives: to determine the influence of socioeconomic status on cardiometabolic risk in Peruvian immigrants residing in Chile.

Methods: An analytical cross-sectional study. A probabilistic sample of 418 Peruvians residing in Chile. Nutritional status (NS) was determined. Waist circumference established cardiometabolic risk (CMR). The healthy eating index (HEI-2015) was obtained through food questionnaires. The socioeconomic status (SES) was categorized using the ADIMARK methodology (high, middle, and low). Descriptive statistics were used, and the chi-square test and Fisher's exact test were applied. A multiple logistic regression model was applied to determine the association between the variables (95% CI) and the model was fitted by the Hosmer-Lemeshow goodness of fit test. The significance level was $\alpha < 0.05$. The STATA 15.0 software was used.

Results: Differences were observed between NS, CMR, and HEI-2015 according to socioeconomic status ($p < 0.05$). The regression model indicated that belonging to the lowest socioeconomic category increased the risk of overweight by 1.18 times (95% CI 1.02-1.30) and fat mass (%FM) by 2.14 times (95% CI 1.66-2.93) compared with the highest SES. In addition, belonging to the middle and low socioeconomic categories increased CMR by 1.15 (95% CI 1.03-1.19) and 2.30 (95% CI 1.79-3.11) times, respectively. The HEI-2015 was not associated with socioeconomic status.

Conclusions: Peruvian immigrants in Chile have twice the risk or burden that can affect their NS and health. Theoretically, the migrant condition is a risk factor in itself, and this is coupled with the differences in CMR according to socioeconomic status. **Keywords:** Immigrants, Cardiometabolic risk, Socioeconomic status, Nutritional status.

Conflict of Interest: Authors mention that there is no conflict of interest in this study.

Keywords: Immigrants, Cardiometabolic risk, Socioeconomic status, Nutritional status.

O11

Association of rs1800497 ANKK1 and rs1799732 DRD2 Dopamine Polymorphisms with Weight Loss, Eating Behavior Hedonic Hunger, and Depressive Symptoms in Post-Bariatric Surgery (Post-BC)

Subjects

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Introduction: Actually, laparoscopic surgery of Roux-en-Y (RYGB) gastric bypass is the gold standard of the bariatric surgery already that conduces to higher weight loss than others process, furthermore, upgrade the metabolic variables and quality of life of patients achieving the comorbidities remission as hypertension and type 2 diabetes mellitus.

Objective: to study the associations of the ANKK1 rs1800497 and DRD2 rs1799732 gene polymorphisms with weight loss, eating behavior, hedonic hunger, and depressive symptoms in post-bariatric surgery (post-BC) subjects

Methods: We included 101 patients that suffered from BC from 2010 to 2021 annotated in database of the department of surgery of Hospital Regional de Alta Especialidad del Bajío, León Guanajuato México. We registered anthropometric measures and applied 3 questionnaires to evaluate eating behavior (TFEQ-R18), hedonic hunger, and depressive symptoms. We take a blood sample to evaluate biochemistry characteristics to typing the ANKK1 rs1800497 and DRD2 rs1799732 gene polymorphisms by way of allelic discrimination. We used descriptive statistics, multiple regression analysis, and logistic regression analysis.

Results: We find minor comorbidities frequency, higher loss weight long-term sustained, and higher frequency of rs1800497 ANKK1 polymorphism in Mexican populations. The total loss weight was 34.7 (22.9 - 48.9) Kg, Actual-BMI 33.8 (29-39) Kg/m², and percent excess weight loss (%EWL). The post-BC weight loss was associated negatively with actual triglycerides ($p=0.011$) y positively with the punctuation of TFEQ-R18 ($p=0.006$). The rs1799732 DRD2 does not show an association with the studied variables. Under the dominant model the rs1800497 ANKK1 shows a significant association with the punctuation of TFEQ-R18, it suggests that genotypes carriers with 1 or 2 alleles mutated show higher problems to manage eating behavior (OR = 1.08 (1.005 - 1.16; $p=0.031$)). In addition, we observed to elevated prevalence of depressive symptoms.

Conclusions: We observed an improvement in the metabolic and anthropometric parameters post-BC and higher loss weight long-term sustained. Carrier subjects of 1 or 2 alleles mutated in 1800497 ANKK1 polymorphism show higher problems to manage eating behavior and higher loss weight long-term sustained.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Obesity, Bariatric surgery, Loss weight long-term sustained, Behaviors hedonic, Symptoms depressive.

Nutritional Epidemiology and Public Health Challenges in Iberoamerica

O12

Comparative Analysis of Three Care Programs for Patients with Type 2 Diabetes Mellitus, Current in Mexico

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Introduction: The prevalence of Type 2 Diabetes Mellitus in Mexico has been difficult to notice in recent years, this implies a series of complications at a clinical, nutritional, sociodemographic, and economic level; After this situation, public institutions executed strategic programs of Primary Health Care to reduce the economic burden generated by the care and treatment of this condition, in this writing programs with access at the national level will be addressed, being that MIDE, CAIPaDi, and DiabetIMSS they are specific action projects that are executed as a tool of public policies that are strengthened in the National Strategy for the Prevention and Control of Overweight, Obesity, and Diabetes (ENPCSOD).

Objectives: To compare three current care models for patients with DM2 in Mexico, to determine which model is more effective for the Mexican population.

Methods: A non-experimental cross-sectional descriptive study was carried out. For the selection of articles, five inclusion criteria were used, including the use of MeSH words. A total of 86 articles were selected, 45 from government platforms and 41 from scientific platforms.

Results: The care model with the most effective strategies was CAIPaDi, since 80.6% of the population achieved HbA1c control, followed by the MIDE model with 50% of the population. The CAIPaDi model presents a reduced geostatistical area in comparison with MIDE and DiabetIMSS. The main barriers to adherence to treatment that were identified were sociological, psychological, and nutritional education.

Conclusions: The care programs for patients with DM2 are usually directed towards the metabolic control of the patient, focusing their attention mainly on pharmacological and nutritional therapy, which causes a lag in patient care and therefore in the health system, subtracting importance to management key implications, integrated at the policy level, including financial and legislative aspects of care and human resource development.

Conflict of Interest: The author has declared that no competing interests exist.

Keywords: Diabetes mellitus type 2, Managed care programs, Cost of disease, Social security, Health policies.

O13

Association between Excess Fat Mass, Adherence to the Mediterranean Diet and Gut Microbiota in Healthy Adults

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Introduction: Obesity is a global public health problem. Multiple factors are involved in its development, including the interaction between the gut microbiota and the host.

Objective: To explore the associations between the relative amount of fat mass, adherence to the Mediterranean diet, and the gut microbiota composition in healthy adults.

Methods: Two hundred and sixty-one healthy adults (51% men), between 25-45 years, with BMI between 18.5 and 35 kg/m², who participated in the observational ALMICROBHOL study were included. The body fat mass (BF) percentages obtained by bioimpedance (Tanita BC 601) were used for classification into two groups: normal (NBF; N= 172) and excess body fat (EBF; N= 89), according to the age-adjusted normal values of Gallagher et al. (2002) ($\leq 32\%$ for women; $\leq 20\%$ for men). The Mediterranean diet adherence (MDA) was categorized as low, medium, or high (L_MDA <7, M_MDA 8-9 and H_MDA >10; N =128, 99, and 34, respectively) using the 14-item MEDAS questionnaire. The microbiota composition was analyzed in stool samples by sequencing the V3+V4 regions of the 16S RNA gene (Illumina MiSeq). Categorical Principal Components Analysis (CATPCA) was used including the variables sex, BF, AMD and the five main bacterial phyla. CATPCA resulted in 48.1% explained variance, with the strongest relationship between sex and BF (EBF more likely in men), and between BF and MDA (EBF more likely in L_MDA). The relationships between the factors and the gut microbiota are weak, with the relationship between Firmicutes and EBF standing out (0.129) and, secondly, between Actinobacteria and MDA (-0.098), linking low adherence to the Mediterranean diet with higher Actinobacteria values. The correlations between phyla show significant relationships between Bacteroidetes and three other phyla, Proteobacteria (positive), Firmicutes, and Actinobacteria (both negative).

Conclusion: Firmicutes and Actinobacteria appear to be the most closely related phyla to body fat mass levels and adherence to the Mediterranean diet, respectively. This last result should be confirmed, and its relevance assessed in further studies.

Funding: The present work received funding from ERAB. Ref. EA14.44.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Mediterranean diet, Body fat, Gut microbiota.

O14

Association between High Consumption of Ultra-Processed Products and Adequacy of Energy and Micronutrients in Pregnant Women from the MAS-Lactancia Cohort in Mexico

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Introduction: The diet consumption which meets the recommendations during pregnancy has been associated with maternal-fetal health. Ultra-processed products (UPP) represent 30% of the total calories consumed by the general population in Mexico.

Objective: To estimate the association between the energy contribution of UPP consumption and the diet's adequacy during pregnancy.

Methods: Data from 777 women from the birth cohort MAS-Lactancia was collected using a 24-hour recall in the second and the third trimester of pregnancy. Each item reported in the participant's diet was classified according to NOVA Food Classification System (Group 1: minimally processed, group 2: culinary ingredients, group 3: processed food, and group 4: UPP). The contribution of UPPs to the diet's total energy was estimated and categorized into quartiles. The diet percentage of adequacy for energy, macro, and micronutrients was estimated following the recommendations from the Institute of Medicine (i.e. EAR). The association between adequacy percentage and the consumption of UPPs was estimated through fixed effects models adjusted for age, education, weeks of gestation, and socioeconomic level.

Results: The adequacy percentage in all quartiles was less than 100% for calcium, fiber, and vitamin E, and the rest of the macro and micronutrients were above 100%. Coefficients from the models are reported in percentage points (pp) of difference in the adequacy between the highest quartile of UPP consumption compared to the first quartile. Women in the highest quartile of UPP consumption had significantly higher adequacy for energy (b=13.6), carbohydrates (b=19.1), total fat (b=29.2), and sugar (b=33.3), and lower adequacy of protein (b=-18.1), fiber (b=-11.7), folate (b=-14.3), magnesium (b=-13.1), and vitamin C (b=-73.5), compared to those in the lowest quartile. No association was found for other micronutrients such as total iron, calcium, vitamin A, D, K, B₂, B₆, and niacin.

Conclusions: The study's results show that high consumption of UPP in pregnancy is associated with lower adequacy of some nutrients and higher adequacy of calories, sugar, and fat.

Conflict of Interest: There are no conflicts of interest on the part of the authors.

Keywords: Ultra-processed products, Adequacy, Pregnancy, NOVA 4, Diet.

O15

Association between the Adherence to Dietary Patterns and Chronic Inflammation in Emerging Adulthood

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Introduction: Chronic inflammation characterized by increased inflammatory markers is associated with different chronic diseases. Environmental factors such as diet may influence inflammation. The Western Dietary Pattern (WDP) has been positively associated with inflammation markers. The Mediterranean Dietary Pattern (MDP) has been associated with lower concentrations of proinflammatory cytokines and reduced mortality in Mediterranean regions. These findings have been described in adult populations, but the health status in emerging adulthood is largely unknown. Scientific evidence about the adherence to the MDP and health indicators in non-Mediterranean populations is limited and unclear.

Objectives: Evaluate the association between the adherence to MDP and WDP with serum concentrations of proinflammatory (IL-6, IL-8, IFN- γ , TNF- α , MCP-1) and anti-inflammatory (IL-10) cytokines in Mexican emerging adults.

Methods: A cross-sectional study design in 261 emerging adults. The dietary analysis was performed using data from the validated semiquantitative food consumption frequency questionnaire and the Nutritionist Pro Diet software. For the determination of MDP was used a tropicalized Mediterranean diet alternative score and the PDO was calculated using the unhealthy dietary pattern index. The indexes were validated in other populations. Multiplex Sandwich Immunoassay performed biological analysis of interleukins and MCP-1 on magnetic beads and a Sandwich ELISA assay; respectively. Statistical analyses were performed in SPSS software version 25.0.

Results: Thirty and thirty-one percent of the participants showed a high adherence to MDP and WDP, respectively. MDP adherence scores were negatively correlated with IL-6 and IFN- γ and the adherence to a WDP was positively correlated with IFN- γ ($p < 0.05$). Higher adherence to the MDP was associated with lower concentrations of proinflammatory markers such as IL-6 ($R^2 = 0.079$, CI -0.210, -0.024; $p = 0.014$) and IFN- γ ($R^2 = 0.052$, -0.188, -0.001; $p = 0.049$). No significant association was observed between WDP and cytokines.

Conclusions: Adherence to a tropicalized MDP was associated with lower inflammatory status in emerging adulthood and adherence to the WDP was correlated with greater inflammation.

Conflict of Interest: The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

Keywords: Dietary patterns, Inflammation, Inflammatory biomarkers, Cardiovascular disease.

O16

Consuming Sweetened Beverages at Early Age Limits the Ability to Inhibit Their Consumption during Adulthood

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Introduction: One of the main problems when changing eating habits is the difficulty that people have to stop consuming certain foods because if they do, the response reappears later. In animal models, the phenomenon of relapse is studied and is called response recovery and there are different types according to their reappearance mechanisms (i. e., renewal, and reinstatement). Factors that affect response recovery have been evaluated in animal models. This is relevant in the context applied in clinical interventions focused on modifying eating behavior. Early consumption of sweetened beverages (ECSB) may be a factor that affects response recovery.

Objectives: To analyze the effects of ECSB on response recovery in rats.

Methods: The sample consisted of 29 female rats assigned to 2 groups (experimental and control). The experimental groups were exposed to the ECSB during postnatal days 30 to 90. Afterward, an ABA contextual renewal protocol was performed, and reinstatement and its subsequent evaluation were added. Statistical analysis was performed with ANOVA and the LSD method.

Results: Higher levels of renewal in the context of the acquisition were observed in subjects exposed to ECSB compared to controls but it was not significant. In contrast, during reinstatement, subjects exposed to ECSB showed a greater number of responses in the acquisition context, $t(57) = -2.43$, $p = .018$. The control group also showed reinstatement but it was not significant, $t(57) = -1.18$, $p = .244$.

Conclusions: ECSB elicits higher levels of response recovery in rats. In humans, the onset, as well as the frequency and amount of consumption of sweetened beverages, could limit the ability to eliminate eating behaviors associated with their consumption. The promotion of food education, as well as strategies to limit access to sweetened beverages during childhood, could increase the chances of greater control in the consumption of foods high in fat or sugar during adulthood.

Conflict of Interest: We declare no conflict of interest.

Keywords: Sweetened beverages, Renewal, Reinstatement.

O17

Maternal Factors Associated with Exclusive Breastfeeding in Haitian Immigrant Women in Southern Chile

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Introduction: A lack of knowledge exists about the factors that affect exclusive breastfeeding (EB) practices in migrant populations, especially in Latin America. Reports on the rates of EB in immigrants are still scarce and contradictory. In Chile, there are no reports on the prevalence of EB in Haitian immigrants or on the conditioning factors.

Objectives: to determine the association between maternal factors and the prevalence of exclusive breastfeeding in Haitian immigrants in southern Chile.

Methods: This was an analytical and cross-sectional study with a probabilistic sample consisting of 173 Haitian women who gave informed consent. Sociodemographic and dietary-nutritional information was collected from all participants. Bivariate (Chi2) and multivariate (Odds ratio) inferential statistics were applied. All analyses were performed in the statistical program STATA 16.0 and the significance level was set at <0.05.

Results: The prevalence of exclusive breastfeeding at 6 months was 54.3%. Maternal factors associated with a lower prevalence of exclusive breastfeeding were non-legal permanent resident (OR=2.34; CI: 2.18-2.83), residence <12 months (OR=2.23; CI: 2.09-2.78), low breastfeeding knowledge (OR=1.96; CI: 1.81-2.27) and lower schooling (OR=1.78; CI: 1.61-2.11), while protective factors were maternal employment (OR=0.36; CI: 0.28-0.40), access to basic services (OR=0.32; CI: 0.22-0.48) and has Spanish proficiency (OR=0.29; CI: 0.20-0.51).

Conclusions: There is a low prevalence of exclusive breastfeeding in Haitian immigrant women living in southern Chile, actions focused on maternal risk factors should be undertaken to reverse this situation.

Conflict of Interest: Authors declare that there is no conflict of interest in this study.

Keywords: Exclusive breastfeeding, Haitian, Immigrants, Maternal factors.

O18

Epidemiological Approach to Investigate the Prevalence of Nutritional Status and Food Insecurity in the Elderly in Azuay, Ecuador

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Introduction: The older adult population is increasing rapidly in Ecuador and many other countries. Factors like food insecurity likely affect your well-being and health.

Objective: To determine the prevalence of food security and its association with the nutritional status of urban and rural older adults in the province of Azuay, Ecuador.

Methods: Cross-sectional study in a representative sample of 188 urban older adults and 212 older adults from the rural area of Azuay, was selected with EPIDAT v3.1 (95% confidence). The information was collected in the home of the participants who signed the informed consent. Household food security was assessed using the Latin American and Caribbean Food Security Scale. Nutritional status was defined according to the criteria of the World Health Organization. The data was analyzed in SPSS v15. Descriptive statistics were performed, and the Odds Ratio was used for associations with a 95% confidence interval and a p-value <0.05.

Results: The sample consisted of adults aged 65 and over, 60.2% female and 39.8% male. The average age was 77 years, 47% lived in urban areas and 53% in rural areas, 30.5% finished school and 37.8% did not finish school or did not attend school. Global malnutrition was 59.5% and 49.25% were considered overweight or obese. In general, 56.75% of the participants presented some level of food insecurity. Lack of education, residence in rural areas, and malnutrition were associated with food insecurity (OR= 2.73; OR=3.07; OR= 1.71 respectively).

Conclusions: Most people are overweight and food insecure, which over time could affect health and quality of life. It is necessary to create policies to protect the elderly through access to pensions that allow them to buy healthy and sufficient food.

Conflict of Interest: None.

Keywords: Food insecurity, Nutritional status, Older people, Older adult.

O19**The Pandemic Period Affected Dietary Patterns, Nutritional Status and Microbiota of Northwestern Mexican School-Children**

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Introduction: Non-healthy foodstuffs with high fat and sugar content were highly consumed by Mexican schoolchildren before the pandemic period, affecting the nutritional status and microbiota balance. During the pandemic period, children were principally at home with concurrent problems in the economy and food accessibility.

Objectives: To compare dietary patterns and their effect on the nutritional status and microbiota of schoolchildren in northwestern Mexico before and after the pandemic period.

Methods: Diet and anthropometry were evaluated in children of public schools, pre-pandemic (August to October 2017) and post-pandemic (February to April 2022). Three non-consecutive dietary 24 h recalls were applied, and dietary patterns were identified by principal components analysis. Z scores of BMI for age were calculated. *Bacteroides* spp. were quantified by qPCR.

Results: Participants were 160 children, 9.5±1.7 years old; 102 at pre-pandemic and 58 post-pandemic periods. Three dietary patterns were identified: Ultra-processed (UP), healthy (H), and poor (P). UP included sweetened drinks, chips, salty and sweet snacks; H was associated with fruits, vegetables, meat, poultry, fish, egg, and dairy products; and P was related to beans, wheat-containing foods, and sweetened drinks. Protein and fiber intake were lower ($p < 0.05$) in the UP pattern, while total fat was higher ($p < 0.05$) in UP pattern than in P, but similar to the H one ($p < 0.05$). At pre-pandemic period, the proportion of children in each pattern was comparable ($p > 0.05$) among UP, H and P (36.3%, 28.4%, 35.3%, respectively). At the post-pandemic period the proportion of children in each dietary pattern was modified; the UP decreased at 22.4%, while these in the P pattern significantly ($p < 0.05$) increased to 41.4%. Z-BMI for age was increased ($p < 0.05$) between pre-pandemic to post-pandemic periods, increasing the proportion of children with overweight and obesity from 7.3% to 29.3% in the P pattern. Children with UP pattern showed a higher ($p < 0.05$) *Bacteroides* proportion (9.0±6.7%) than those in the P (4.2±4.7%).

Conclusions: The schoolchildren dietary patterns and their nutritional status were negatively affected by the pandemic period; although the UP pattern decreased, the P one increased, which induced a high prevalence of overweight and obesity, with concomitant changes in the microbiota.

Conflict of Interest: authors declare no conflicts of interest.

Keywords: Dietary patterns, Pre- and Post-pandemic, Z-BMI, Microbiota.

O20**Nutritional Description of Stress Caused Binge Eating in Rats Exposed to a Cafeteria Diet**

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Introduction: The restriction of space generated stress in the subject, modifying their intake and food preference, in this regard, there is little evidence of its impact on the consumption of macronutrients when the subject is also on a Cafeteria Diet (CD).

Objectives: To nutritionally describe food consumption in stress-induced binge eating episodes in rats exposed to a cafeteria diet.

Methods: Experimental study with 16 3-month-old Wistar rats of both sexes. Equally distributed in a control group (C) and another with Space Restriction (R) (reduction of 30% of their usual box). Ad libitum diet of standard food (Chow) for rats will be provided for 5 days and Chow for 2 days and a DC (composed of chocolate coins, chokis type biscuits, and chips of the Sabritas brand) for six weeks. Shapiro Wilk normality test and Mann-Whitney U test were performed.

Results: Both groups C and R had a greater preference for the consumption of DC in contrast to Chow ($p = .000$), however, consumption was higher in group R with 83.36±24.87 kilocalories consumed in contrast to 74.81± 16.02 from group C in males and 67.82±18.36 and 62.19±15.62 respectively in females. On the other hand, there was a higher caloric intake of carbohydrates (42.24±11.22), followed by fats (22.24±19.09), and lower consumption of proteins (19.61±15.54) and fiber. (19.61±15.54). There was a significant difference ($p = .000$) in macronutrient intake between both groups and between DC and Chow.

Conclusions: The stress generated by the restriction of space modulated the selection of food, preferring the consumption of palatable foods. Although the increase in caloric intake in binge eating episodes has been identified, a level of macronutrients had not been evidenced, in this regard, the poor intake of proteins and fiber, key elements for the subject's well-being, is evidenced, so this Research shows the importance at a nutritional level of attending to two aspects; on the one hand, binge eating episodes and, on the other, the consequences that can be triggered in people who live in small spaces.

Conflict of Interest: No conflict of interest

Keywords: Space restriction, Cafeteria diet, Macronutrients, Eating behavior, Rats.

O21**Evaluation of Knowledge and Use of Nutritional Labeling in Packaged Food and/or Bottled Beverages Products among Adolescents and Adults in Antioquia in 2019**

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Introduction: Nutritional labeling (NL) is a fundamental component of the informative food environment and constitutes a health promotion tool whose purpose is to guide the consumers of packaged food and/or bottled beverages products (PFBBP) in their purchase decision.

Objectives: To document the knowledge, use, and perception of the available information in the current NL in the PFBBP, as well as its impact on the decision to purchase products.

Methods: The study was carried out based on the Food and Nutritional Profile of Antioquia (Perfil Alimentario y Nutricional de Antioquia - PANA) 2019. This study was population-based, descriptive, and cross-sectional, with a probabilistic, stratified, and multi-stage design that involved the NL subcomponent. Study population: person in charge of purchasing food at home and adolescents between 10-17 years old. A survey with eleven questions was used, accompanied by two model boxes as a didactic and facilitating strategy: one designed according to Colombian regulations and the other with front-of-package labeling that consisted of an octagonal warning message. Descriptive statistics were calculated using the R software.

Results: The 78.0% of those surveyed do not know how many calories they should consume per day. Although approximately 92.7% (95% CI 92.6-92.7) stated that they knew how to read and write, only 48.5% (95% CI 48.3-48.7) stated that they read the information on the PFBBP's packaging. Regarding which label they consult and use to decide the purchase, the most frequent response was the expiration date. Regarding the acceptance of the use of front-of-package labeling when the content of calories, sugar, salt, or fat was excessive (associated with risk of disease), acceptance was found in 95.8% of the respondents (CI 95% 94, 9-96.6).

Conclusions: The current NL in Colombia is not easy to read or use by the majority of the people surveyed in the PANA, therefore, it does not facilitate the purchase decision. The implementation of front-of-package labeling that is easy to read and comprehend, and free of conflicts of interest is a priority, following the recommendations of international organizations such as PAHO and WHO.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Nutritional labeling, Front-of-package labeling, Nutritional information.

O22**Association between Socioeconomic Disadvantages and the Accompaniment during Breakfast of European Adolescents: HELENA Study**

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Introduction: Those adolescents whose parents have a low socio-economic status are less likely to eat with their family members. However, there are other aspects of social vulnerabilities that have not been investigated previously.

Objectives: To analyse the association between the different socio-economic variables such as mother's education, family welfare, family structure, migrant status, and employment status and the adolescents' accompaniment during breakfast.

Methods: A sample of 1.173 adolescents from the HELENA study (Healthy Lifestyle in Europe by Nutrition in Adolescence), a cross-sectional and multi-centre study carried out in 10 European cities, was used. In the present data analysis, the information of the socio-economic disadvantages of adolescents (parental education, parental employment, family structure, and family's origin) were associated with the accompaniment during breakfast by the family, alone, with friends, or with other people. Generalised multinomial mixed models were used to relate social vulnerabilities and the young people's accompaniment during breakfast.

Results: Those adolescents who did not deliver the information about family structure, the adolescent's origin, and the employability of the parents, were associated with an increased likelihood of eating breakfast alone.

Conclusions: Socio-economic disadvantages are associated with the way in which European adolescents are accompanied while having breakfast. Vulnerable families should be provided with facilities P to improve the environment in which this meal is eaten.

Conflict of Interest: None

Keywords: Accompaniment, Breakfast, Adolescents, Social vulnerabilities.

O23

Comparative Analysis of the Concentrations of Non-Caloric Sweeteners in Food and Drinks in Chile during and at the End of the Implementation of the Nutrition Labeling Law 20,606

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Introduction: In Chile, The Food Labeling and Advertising Law (Law 20.606), which regulates the nutritional composition of foods and their advertising aimed at children, was gradually implemented, and imposed the application of warning stamps on the packaging of foods whose contents, such as sugar, exceed the limits. To avoid these stamps, companies have incorporated non-caloric sweeteners (ENCs).

Objectives: Compare the concentration of each ENCs contained in the products of the Chilean market, between the second and third stages of implementation of the law.

Methods: 15 supermarkets and product web pages were visited by Nutritionists to carry out a systematic search of the different categories of products and their ingredients.

Results: When comparing the 2nd and 3rd stages of the 815 foods with ENCs, 118 are cereals and 20 changed their concentration without significant differences in the supply of ENCs. Of the 235 dairy products, 72 changed their concentration and only differed significantly in the contribution of stevia 19.1 ± 9.0 vs 13.7 ± 11.8 mg/portion of consumption ($p=0.012$). Of the 24 processed fruits, 3 changed their composition, and 2 of them no longer have ENCs, without significant differences. Of the 311 non-alcoholic beverages, 51 changed their composition of ENCs, differing significantly in stevia (16.9 ± 10.6 vs 6.5 ± 5.9 mg/ in 100 ml; 34.7 ± 21.1 vs 13.4 ± 12.2 mg/ portion of consumption; $p=0.000$) and aspartame (26.4 ± 3.9 vs 30.8 ± 6.3 mg/in 100 ml, $p=0.026$, 53.1 ± 7.2 vs 64.9 ± 19.6 mg/consumption portion, $p=0.035$) respectively. And 127 of the sweets, 39 modified their composition, without significant differences.

Conclusions: The high number of products with stevia makes it very likely that children may exceed the acceptable daily intake (ADI). However, in the 3rd and final stage of the law there was a decrease in its concentration in dairy and non-alcoholic beverages, but an increase in aspartame in the latter group. It is a public health challenge to assess that the intake does not exceed the ADI, especially in children for whom many of these products are directed.

Conflict of Interest: The author(s) declare(s) that there is no conflict of interest regarding the publication. Financed by FONIS-SA18I0062, CONICYT Chile.

Keywords: Non-caloric sweeteners, Acceptable daily intake, Food labelling, Sucralose, Steviol glycosides.

Safe, Healthy, Sustainable and Social Food

O24

Family Composition and Food Insecurity among Indigenous Agricultural Workers of the "Na'Valí" Camps in Guanajuato Mexico

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Introduction: In Mexico, internal migration exists as the only option (1) for families from rural extreme poverty areas (2); Guanajuato is one of the receiving states of indigenous agricultural workers, which mainly came from the mountains of Guerrero; the Indigenous Development Center, Loyola A.C. implements camps called "Na'Valí" mainly to attend indigenous children in health, education and nutrition. Food security is defined as "Access at all times to food of sufficient quantity and quality" (3). Food insecurity (FI) is experienced from a moderate to severe degree (4), in groups with greater vulnerability (5).

Objectives: Identify the family composition based on the number of children and its relationship with the FI in families of indigenous agricultural workers of the "Na'Valí" Camps.

Methods: Descriptive cross-sectional study; convenience sample was collected to applied the food security survey of 18 items, previously validated for Mexican population (6), grammatical adaptations were made for this indigenous population; results were integrated into a database and analyzed with SPSS.

Results: 42 families with children of school-preschool age were included. 100% of the surveyed families experienced some degree of FI, 19% mild, 57% moderate and 24% severe. The average number of children per family was $3(\pm 1.98SD)$ minimum=1, maximum=8, the number of children in each family was positively associated with: worry that food would run out and not having money to buy more $p=0.019$; that the food purchased was not enough and they did not have money for more $p=0.005$ and that their children did not eat what they needed because they did not have money for food $p=0.001$.

Conclusions: High prevalence of FI is observed among this population, which is associated with family composition, is urgent for this population comprehensive health care, especially reproductive health and promotion of food security.

Conflict of Interest: None.

Keywords: Food insecurity, Indigenous agricultural workers, Family composition.

O25

Environmental Implications of Fitness Diets

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Introduction: Mexico and the world are going through a serious water shortage. This has been linked to inadequate diets related to obesity (i.e. high in ultra-processed and animal-based foods). Although 75% of the Mexican population is currently overweight or obese, a new trend towards the consumption of diets high in animal protein was recently identified, related to the development of physical activity to gain muscle, and reduce body fat levels. This type of lifestyle is known as Fitness. Its environmental implications have not been explored.

Objectives: To analyze the dietary pattern and dietary water footprint (DWF) of the Mexican population in relation to their body composition and physical activity.

Methods: A validated, and adapted Food Frequency Questionnaire (FFQ) was applied to 400 people from the Guadalajara Metropolitan Area. Its nutritional composition and nutritional adequacy were calculated. DWF was also estimated as an environmental indicator. Additionally, physical activity and body composition were evaluated. Comparative analyzes were performed in the STATA/V12 program, according to the levels of muscle mass, percentage of body fat, and physical activity.

Results: The DWF of the population with low levels of body fat was 7388.09 Liters/person/day (L/p/d), while that of the population with high levels was 804 L/p/d lower. The DWF of the population with high levels of muscle mass was 6739.87 L/p/d while the DWF of people with normal and low levels was up to 178 L/p/d lower. Both the population with low levels of body fat and high levels of muscle mass consume more protein ($p < 0.0001$), pork, and eggs ($p < 0.05$), compared to people with overweight or obesity, who consume more soft drinks ($p = 0.0043$). People who exercise with weights consume more eggs and fish ($p < 0.05$), generating a greater environmental impact.

Conclusions: Although inadequate diets linked to obesity are a major environmental problem, this study showed that new dietary patterns, which could improve body composition, can also have serious environmental implications.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Sustainable diets, Fitness diet, Water footprint.

O26

Essential Trace Elements, Iron Forms and Antioxidant Activity, in Affordable Cost Lamb Meat from Pastoral Ecosystems

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Background and objectives: Meat is a high valued food, being the main source of essential minerals, particularly, trace elements and bioavailable iron for vulnerable people such as children, pregnant females, and elders. Also, meat contributes with compounds with antioxidant activity necessary to avoid cognitive deterioration, mainly neutralising the free radicals in biological cells. Trace elements, iron, and zinc are showing increased deficiency in young and elders, in part due to lack or insufficient animal protein in the diet. Knowledge about accurate composition in these nutrients is required to design appropriate diets, from nutritional and economic strategies, contributing to eliminating anemia and mineral deficiency that affect important functions of young and elder persons. Previous work reported that pastoral systems produced highly valuable meat (Cabrera et al., 2019), and were sustainable for social and environmental purposes. In this investigation, three studies were carried up in lamb meat from locally adapted breed, from Northwest and Northeast regions with native pastoral conditions: -trace mineral content in *Longissimus thoracis* (LT) muscle; - the iron forms, including hem iron, total iron, and non-hem iron; - antioxidant activity (TPC) by Folin-Ciocalteu test, based on the transfer of one electron.

Methods: In LT muscle, Zn, Fe, Se, Cu, and Mn were determined (Cabrera et al., 2010), hem iron, non-hem iron (Ramos et al., 2012), and TPC (Pirotti et al., 2021). Data were analyzed through an ANOVA GLM, with breed and region as fixed effects and interactions, followed by Tukey-Kramer ($p < 0.05$; NCSS, 2019).

Results: Content in trace elements is high in lamb meat reared in pastures, but variations with breed and regions are observed. The contribution of 100 grams of any lamb breed meat or region to dietary selenium for children (4-8 years old) is relevant (30 % of RDA). For the same breed (Corriedale) meat from the Northeast was richer in total and hem iron than meat from the Northwest ($p < 0.05$). Antioxidant capacity is high and depends on the breed produced in similar systems, but region and type of dominant pasture influenced TPC.

Conclusions: Lamb meat from pastoral systems is a good source of trace minerals and antioxidants, particularly iron, zinc, and selenium.

Conflict of Interest: No.

Keywords: Trace elements, Antioxidants, Lamb meat, Pastoral systems.

O27

Microbiological Safety of Powdered Dairy Foods Intended for the Food and Nutrition of Elderly Adults

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Introduction: Food safety has a fundamental role to guarantee food throughout the food chain and especially in those most susceptible groups such as children, pregnant women, and the Elderly (E). The E due to changes in their purchasing power must make qualitative and quantitative nutritional changes in their diet, having to complement their nutritional needs with dairy foods available on the market or delivered by the health system.

Objective: To evaluate the microbiological safety of powdered dairy foods consumed by E.

Methodology: Cross-sectional analytical study that analyzed 81 samples of powdered dairy foods (PDF) for E from 2 commercial brands and 2 countries, obtained from supermarkets, pharmacies, and donations by users of a Health Service. Mesophilic aerobic bacteria (APC), Enterobacteriaceae (ENT), *Escherichia coli* (EC) were evaluated using the methodology described in the Chilean standards (NCh) NCh 2659 (2002) for APC, NCh 2676 (2002) for ENT and NCh2636:2001 for EC. *Salmonella* and *Cronobacter* spp were evaluated by NCh 2675-ISO 6572-2-2017 and Iversen et al. (2004). The analysis of the variables was carried out with the STATA 15.0 software and with an $\alpha=0.05$

Results: For APC, 50% of the PDF samples contained 100 CFU/g with a maximum of 1200 CFU/g. For ENT and EC medians were 10 and maximums were 900 and 480 CFU/g, respectively. According to regulations, only EC was rejected in 36% of PDF and ENT in 23%. Brand 1 was significantly higher in APC, ENT, and EC compared to Brand 2 ($p<0.05$). *Cronobacter sakazakii* (ST1) and *C. malonaticus* (ST60) were found in brand1 with 5% positivity.

Conclusions: Compliance for APC was acceptable, but not for ENT and EC. *C. sakazakii*, and *C. malonaticus* were found in brand 1, being a risk for the E that consume these foods. For this reason, it is necessary to have greater control in the elaboration of PDF and in the inspection by the health authority.

Conflict of Interest: We do not declare conflicts of interest

Keywords: Microbiological safety, Dairy products for older adults, *Cronobacter* spp.

O28

Plant-Derived DAO: Optimization of Enzymatic Activity in Chickpea and Lentil Sprouts

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Introduction: Legume sprouts have been proposed as a good plant source of the enzyme diamine oxidase (DAO). DAO is responsible for the degradation of dietary histamine in the intestines and its deficiency is thought to be the main cause of histamine intolerance. Oral supplementation with plant-derived DAO could be a novel strategy for the dietary treatment of histamine intolerance.

Objectives: The aim of this study was to study the influence of different germination-related factors on DAO activity in lentil and chickpea sprouts.

Methods: The DAO activity in freeze-dried lentil (*Lens culinaris* Medik.) and chickpea (*Cicer arietinum* L.) sprouts germinated in darkness was studied after applying different conditions of disinfection (NaClO at 70 and 100ppm for 5 and 15 minutes), temperature (4, 14, 22 and 30°C) and salinity (addition of NaCl at 50 and 100mM in the irrigation water). DAO activity was determined *in vitro* by quantifying the degree of histamine degradation over time using UHPLC-FL (Comas-Basté et al., 2019).

Results: Prior seed disinfection with NaClO did not affect the DAO activity of the sprouts, regardless of concentration and treatment time, and slightly increased the germination rate (up to 7%). Regarding the temperature of germination, maximum DAO activity in chickpeas was observed at 14°C (0.42 mU/mg extract), and in lentils at 30°C (0.40 mU/mg extract). Salt stress did not produce any improvement in DAO activity or germination, even reducing DAO activity at the highest NaCl doses.

Conclusions: The control of germination factors such as seed disinfection and temperature is key to obtaining legume sprouts with maximum DAO activity and ensuring a good rate of germination.

Conflict of Interest: No conflict of interest.

Keywords: Histamine, Diamine oxidase (DAO), Legumes, Lentils, Chickpeas, Histamine intolerance.

Food Safety in Brazilian Residences in the Context of COVID-19: An Extended Application of the Theory of Planned Behavior

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Introduction: Measures to combat COVID-19 contributed to the increase in food preparation and consumption in the residence, a high-risk environment for Foodborne Diseases (FBD). Investigating consumer behavior in this environment, through the Theory of Planned Behavior (TPB), can contribute to the reduction of FBD. The TPB is composed of four variables: intention, attitude, subjective norm, and perceived behavioral control (PBC) and allows the inclusion of other variables capable of influencing behavior.

Objectives: To investigate whether the TPB could predict the intention of Brazilians to handle food correctly during COVID-19.

Methods: Data were collected through a validated questionnaire, between October/2020 and January/2021. The theoretical basis was the “five keys to food safety”, the Brazilian legislation RDC216/2004, and COVID-19 prevention measures. The questionnaire was composed of 32 questions divided between knowledge, risk perception, and TCP. The data were analyzed by means of structural equation modeling by the partial least squares method (PLS-SEM). All ethical precepts were followed (n° 4.266.472).

Results: 1068 Brazilians participated. The structural equation model analysis showed that, in the TCP model, the intention presented a greater degree of influence on the attitude and the CCP. When extending TCP with knowledge and risk perception, it was possible to observe an increase in the degree of influence, due to direct and indirect positive effects on intention. Exposure to information contributes to increasing knowledge and risk perception, capable of shaping behavior.

Conclusions: The study presented evidence that the TCP model was able to predict the intention of Brazilians to handle food correctly during COVID-19. The inclusion of knowledge and risk perception variables increased the predictive power of the model. The questionnaire, in the process of validation for the Spanish language, will be applied in six Latin American countries (Argentina, Chile, Colombia, Ecuador, Mexico, and Venezuela).

Conflict of Interest: None declared.

Keywords: Food safety, Theory of planned behavior, Structural equation modeling.

Application of a Gelled Emulsion to Make Healthier Beef Burgers

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Introduction: Nowadays, consumers are increasingly interested and aware of the consumption of healthier foods, and meat products are no exception. The implication of saturated animal fats in some pathologies has focused the attention of industry and consumers on their substitution by gelled emulsions made with “healthy” oils.

Objectives: The objective of this work was to evaluate the effect of a gelled emulsion-EG based on maca flour (*Lepidium meyenii*), soybean oil-OS, and essential oil of chincho-EOC (*Tagetes elliptica*), as a partial substitute for pork backfat and to analyze its effect on the chemical composition, physicochemical properties, and cooking losses in beef burgers.

Methods: Four formulations were prepared: Control (C); beef 80%; pork backfat 20%; salt 1.5% and spices 1.3%; T₁ (50% pork backfat +50%EG); T₂ (T₁+0.5% AEC); T₃ (T₁+1.0%AEC). The composition (AOAC), CIELAB color, pH, texture profile-TPA, and % weight loss, shrinkage, and thickness increase of the samples after cooking (T= 68-72°C thermal center) were evaluated.

Results: The replacement of pork backfat by EG increased moisture content, and decreased fat and protein content (p<0.05); while for ash there were no differences in the formulations (T₁, T₂, and T₃) of the raw and cooked samples versus (C), respectively. For color, in all substitutions, the L* and b* coordinates were increased in raw burgers and the (a*) parameter in cooked burgers. The pH (p<0.05) decreased in samples with EG. Samples with EG decreased cooking and shrinkage losses (p>0.05). However, thickness increased for samples T₂ and T₃. Regarding texture, the addition of EG, decreased hardness (p<0.05) with respect to C, for elasticity there were no differences (p>0.05) between samples T₁ and T₂, but there were for T₃ with respect to C.

Conclusions: The use of emulsions gelled with OS and EOC as a partial substitute for pork backfat is a technologically viable alternative and does not affect its physicochemical and technological properties.

Conflict of Interest: The authors declared that they have no conflicts of interest in this work.

Keywords: Reformulation, Gelled emulsion, Physicochemical properties, Healthy hamburger.

Characterization and Evaluation of Antioxidant and Antimicrobial Capacity of Prepared Liquid Smoke-Loaded Chitosan Nanoparticles

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Introduction: Natural foods such as fish meat are an alternative for a healthy diet and to improve its useful life, the use of preservatives is appropriate. In this context, the application of food nanotechnology on areas that includes novel foods, feed chain, food contact materials and food/feed additives (EFSA, 2021) are emergent alternatives to enhance some food's properties such as its shelf life.

Objective: Therefore, the main goal of this research is to prepare and characterize chitosan nanoparticles loaded with liquid smoke (LS-CS/NPs) using triphenyl phosphate (TPP) as a cross-linking agent, for its application potential in the controlled release of this product in trout fillets (*Onchorhynchus Mykiss*) and improve its conservation; also, the optimization of the preparation conditions using response surface methodology.

Methodology: The nanoparticles were prepared by the ionic gelation method and were characterized by DLS, zeta potential, FT-IR, SEM, and EDS. The analysis of antioxidant activity of LS-CS/NPs was performed by the free radicals scavenging method (DPPH and ABTS) while the study of total phenolic content was conducted via the application of the Folin-Ciocalteu method with some modifications. The analysis of antimicrobial activity of the LS-CS/NPs was performed using the minimum inhibitory concentration method involving the growth of Gram-positive (*S. aureus* and *B. cereus*) and Gram-negative (*E. coli* and *Salmonella* spp) bacteria. The analysis of the controlled release of liquid smoke was conducted at 4 °C using the Korsmeyer-Peppas model, which means that its mechanism of release follows an abnormal behavior or non-Fick mechanism.

Results: The results obtained showed that the nanoparticles prepared using 2.418 mg.mL⁻¹ of initial concentration of acetic acid, 0.25 mg.mL⁻¹ of initial concentration of TPP, 0.583 mg.mL⁻¹ of initial concentration of liquid smoke and 1.5 mg.mL⁻¹ of initial concentration of chitosan; which had an average size of 205 nm and zeta potential of 45 mV, exhibited good antioxidant (%DPPH: 92.7% and %ABTS: 93%) and antibacterial activities,

with an efficient, gradual controlled release of liquid smoke (release rate = 0.042 min⁻¹).

Conclusion: Finally, material proposed could be applied for the preservation of foods such as trout fillets.

Keywords: Chitosan nanoparticles, Liquid smoke.

Methods and Tools in Nutrition

Effects of *Lactobacillus paracasei* CNCM I-4034 in an *in vitro* Model of Cervical Cancer

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Introduction: Cervical cancer represents a major public health problem as it ranks fourth in incidence in women worldwide. The main triggering factor is a persistent infection caused by the human papillomavirus. In addition, an imbalance of the vaginal microbiota (dysbiosis) favors the appearance of this pathology. It has been observed that the *Lactobacillus* genus has a protective effect against this infection. Thus, the use of *Lactobacillus* could be beneficial to counteract this dysbiosis and its consequences. On the other hand, our group has demonstrated that the probiotic *Lactobacillus paracasei* CNCM-I4034 decreases the production of proinflammatory cytokines in the presence of *Salmonella typhi* and presents other immunomodulatory and hepatoprotective effects.

Objective: To evaluate the effect of *Lactobacillus paracasei* CNCM I-4034 in an *in vitro* model of cervical cancer.

Methods: A HeLa cell culture was used as a model of cervical cancer where pathophysiological and inflammatory conditions were mimicked by the addition of lipopolysaccharide (LPS) and interleukin (IL)-1 β . Cell viability was determined after probiotic addition for 4, 8, and 24 hours using two methodologies: 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and Crystal Violet. By Western blot, the activation level of Akt (as a cell survival signal) and NF κ B (as an inflammatory signal) proteins was measured. In addition, the concentrations of proinflammatory (IL-8, and IL-6) and anti-inflammatory (IL-10) cytokines in the culture medium were measured.

Results: *L. paracasei* CNCM I-4034 presented a dual effect on the markers of inflammation and cell viability studied. This duality was observed in the presence or absence of LPS and IL-1 β . While, in an inflammatory setting, the addition of the probiotic induced

NFκB activation in the absence of LPS and IL-1β it inhibited Akt activation and decreased the production of the proinflammatory cytokines IL-6 and IL-8.

Conclusions: Our results suggest that *L. paracasei* strain CNCM I-4034 modulates survival and inflammatory processes in HeLa cells.

Conflict of Interest: None.

Keywords: Akt, Cervical cancer, HeLa cells, IL-1β, *Lactobacillus paracasei* CNCM I-4034, LPS, Microbiota, NFκB.

O33

A Childhood Obesity Risk for Local Areas: The Case of Chile

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Introduction: In Chile, the prevalence of childhood obesity is high and is associated with lower socioeconomic levels (SES). Since the improvement of SES is a long process, we determined which risk factors can be intervened at the local level (districts), to reduce childhood obesity in a shorter period.

Objective: Develop a summary index (IROBIC) by which districts can be ranked based on a) global risk of childhood obesity; and b) risk associated with each of the dimensions that make up IROBIC.

Methodology: To elaborate IROBIC, we used 2019 data from official open access sources of 78 districts located in Valparaiso and Santiago, which account for 50.8% of the total population. The selection of local indicators considered its concept, relevance, coherence, and consistency of the data as well as the correlation with the prevalence of childhood obesity to be greater than 0.10. The indicators were standardized for each district and grouped into four dimensions (Health; Socioeconomic; Community Environment; Educational Environment) forming a single index for each dimension, through principal component analysis (PCA). The weights of each dimension were obtained with the coefficient of determination of a simple linear regression between the prevalence of childhood obesity and the standardized indicator, as a regressor variable. The coefficient of disparity between the 10 districts with the highest and lowest IROBIC was also determined.

Results: The four Dimensions include 16 indicators. The highest correlation of the indicators with the prevalence of childhood obesity was $r=0.72$ for % of mothers with low schooling and the lowest $r=0.11$, for % of children from female-headed households, both from the socioeconomic dimension. The weights of each dimension were 0.23 for Health and Community Environment, 0.24 for Educational Environment, and 0.30 for Socioeconomic. The coefficient of disparity was 2.54. Each district can be ranked according to IROBIC and each dimension.

Conclusion: IROBIC is useful for comparing districts in relation to their global risk of childhood obesity and that of each dimension. This allows us to prioritize the type of intervention that can be implemented at the local level to reduce childhood obesity.

Keywords: Index, Risk, Childhood obesity, Chile.

O34

Epigenetic Alterations in the Estrogen Receptor Accompany the Development of Obesity-Associated Insulin Resistance during Sexual Maturation

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Introduction: Puberty is a period in which a series of metabolic and hormonal changes occur that lead to the physiological development of insulin resistance (IR). Conversely, there is evidence that this physiological IR tends not to resolve in obese individuals, which may lead to increased cardiometabolic risk.

Objectives: To understand the molecular and biological processes underlying the development of IR at puberty, and the additional impact of obesity on them.

Methods: Longitudinal design based on the follow-up until sexual maturation of a cohort of Spanish prepubertal children. The study population is composed of 139 children organized in a longitudinal approach of 90 subjects (47 girls) and two cross-sectional approaches of 99 (52 girls) and 130 (71 girls) subjects for the prepubertal and pubertal stages, respectively. The children were assigned into experimental groups according to their obesity and IR status before and after the onset of puberty. DNA samples were extracted from blood cells for GWAS and EWAS analysis. In 44 children at the pubertal stage, RNA samples from blood cells were collected for RNAseq analysis.

Results: We identified novel blood multi-omics signatures (mapping the ESR1 locus) significantly associated with IR in children with obesity, at both the pre-pubertal and pubertal stages. These signatures involve both DNAm-SNPs interactions (mQTLs) and DNAm-RNAm interactions (eQTLs). Interestingly, the ESR1 gene is a genetic region encoding the estrogen receptor-α (ER-α), a transcription factor involved in the regulation of energy homeostasis.

Conclusions: This is the first longitudinal multi-omic approach for the study of IR and obesity during puberty. Our results identify new molecular mechanisms that point to sex hormones as responsible for the development of IR in subjects with obesity. Genes such as ESR1 and others highlighted in our study could constitute a battery of promising new omics biomarkers for metabolic alterations in children.

Conflict of Interest: None to disclose.

Keywords: Multi-omics, ESR1, Estrogens, Insulin resistance, Childhood, Puberty.

O35

Relationship between Dysfunctional Eating Patterns and Ghrelin-Reactive Antibodies in Mexican Women

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Introduction: The experience of stress has been related to dysfunctional patterns of food intake, which include: cognitive restraint, disinhibition, and emotional intake, especially in women. These dysfunctional patterns are related to changes in body weight and the development of pathologies. Ghrelin is an orexigenic hormone that stimulates food intake and can modulate eating behaviors. It has been observed that ghrelin-reactive antibodies could protect the transport of the hormone, delay its degradation and preserve its functional activity.

Objective: To evaluate the relationship of autoantibodies directed to ghrelin, with perceived stress, dysfunctional patterns of food intake, and body composition parameters in women from western Mexico.

Methods: Cross-sectional study, with two groups of women classified according to body fat percentage: normal (n=40) and very high (n=42). The Spanish version of the three-factor eating questionnaire-R18 was used to determine dysfunctional eating patterns; perceived stress was measured with the perceived stress scale-10. ELISA assays were performed to measure ghrelin-reactive IgG autoantibodies. Body composition was obtained by bioimpedance.

Results: Eighty-two young Mexican women (21±2 years) participated in the study. Ghrelin-reactive IgG antibodies correlated positively with weight, BMI, and waist and hip circumference in women with high-fat percentages. Perceived stress was positively correlated with emotional intake (r=0.43, p<0.0001) and disinhibition (r=0.35, p=0.001), and a negative correlation was found between IgG-ghrelin immune complexes and disinhibition to intake (r=-0.32, p=0.03).

Conclusions: This exploratory research shows the potential role of ghrelin-reactive IgG antibodies in relation to body composition and emotional eating in women.

Conflict of Interest: The authors have no conflict of interest.

Keywords: Ghrelin, Autoantibodies, Perceived stress, Emotional eating.

O36

RS324420 Variant in *FAAH* Gene of Endocannabinoid System: Relationship with Body Composition, Stress and Dysfunctional intake Patterns in a Population from Western Mexico

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Introduction: The endocannabinoid system regulates food intake, stress, and emotions. The enzyme fatty acid amide hydrolyase (FAAH) is responsible for degrading anandamide after activation of the CB1 receptor. In the European population, the A allele of the *FAAH* gene was associated with a better anthropometric and body composition profile, but its relationship with stress and dysfunctional patterns of food intake (including cognitive restraint, disinhibition, and emotional intake), may be implicated in obesity, is unknown.

Objective: To evaluate the association of the rs324420 variant in *FAAH* gene with body composition, stress, and dysfunctional intake patterns in a population from western Mexico.

Methods: 186 participants from western Mexico (3-generation ancestry) were included. Stress was determined using the EP-10 perceived stress scale and dysfunctional eating patterns with the three-factor eating questionnaire R-18. DNA extraction was performed from whole blood and genotypes were identified by qPCR and TaqMan probes (Catalog 4351379). The D'Agostino & Pearson normality test and the unpaired Student's t-test or Mann-Whitney test were applied. The chi-square test was also performed, and Hardy-Weinberg gene balance was determined (p=0.987).

Results: The analysis was performed based on the following *FAAH* genotypes: CC (n=76) and CA+AA (n=110). The CC genotype was related to higher body weight (71.66 ±17.73 vs 67.40 ± 17.72, p=0.0424), BMI (25.92 ± 5.64 vs 24.61 ± 5.41, p=0.05) and fat percentage (35.60 ± 9.64 vs 33.00 ± 9.24, p= 0.0325) compared to CA + AA genotypes. In the analysis by sex, the CC genotype was related to a higher weight in females (p=0.235). The CA + AA genotypes group, presented higher stress scores (18.48 ± 6.62 vs 16.39 ± 7.44, p=0.0231). No relationship was found between *FAAH* genotypes with dysfunctional intake patterns.

Conclusions: The A allele in *FAAH* gene of the endocannabinoid system was related to lower BMI, body weight, and fat mass, but with a higher stress score in the western Mexican population.

Conflict of Interest: The authors have no conflict of interest.

Keywords: SNP, *FAAH*, Endocannabinoid system, Stress, Body composition.

O37

Polygenic Risk Score and Its Relationship with Alterations in Pre and Postprandial Metabolism of Triglycerides in Apparently Healthy Individuals

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Introduction: Cardiometabolic risk can be characterized through postprandial levels of triglycerides (TG), which may be influenced by genetic factors despite consuming the same diets rich in saturated fats, characteristic of the Mexican population. Recently, the polygenic risk profile (PRS) has emerged as a great tool to identify individuals with high genetic risk, even in the early stages of disease onset. However, in our country, no studies have been reported that bring together the history of genetic risk through PRS, together with the pre and postprandial metabolism of triglycerides, so this is the first report.

Objectives: To identify variants associated with the risk of developing hypertriglyceridemia and to determine the usefulness of the PRS to discriminate individuals at risk through pre- and postprandial metabolism of triglycerides.

Methods: Identify risk variants for hypertriglyceridemia from 1000 individuals. With these variants, the PRS for pre and postprandial TG were performed in 100 apparently healthy individuals.

Results: In the 1000 individuals, 53 risk variants for TG were found. The construction of the PRS allowed discrimination between individuals with and without hypertriglyceridemia with a value of 0.74 (0.70-0.77). Individuals with high PRS presented higher pre- and postprandial TG levels, even when divided by age group and gender ($p < 0.05$).

Conclusions: The PRS is a very powerful tool for the identification of individuals with high and low genetic risk of pre- and postprandial hypertriglyceridemia, which shows its potential clinical application and allows dietary interventions with greater precision and even as possible markers for population screening.

Conflict of Interest: The authors declare that we have no conflict of interest in relation to the work that we present here.

Keywords: Postprandial metabolism, Triglycerides, PRS, Precision nutrition.

O38

Total Antioxidant Capacity in Pregnant Women with Gestational Diabetes and Hypertensive Disease

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Introduction: Excess body weight (EBW) at the beginning of pregnancy increases the levels of free radicals due to chronic low-grade inflammation, favoring oxidative stress, which represents a risk factor associated with the development of gestational diabetes (GD) and hypertensive disease of pregnancy. According to the ENSANUT 2018, in Mexico 76.7% of women suffer from EBW, data that suggest that the chances of starting a pregnancy with EBW are potentially greater, as is the number of complications associated with this condition.

Objectives: To evaluate the total antioxidant capacity in pregnant women with gestational diabetes and hypertensive disease.

Methods: An observational, prospective, comparative and longitudinal study was carried out in pregnant women aged 18 to 35 years, with less than 14 weeks of gestation, without a history of gestational complications, who underwent anthropometric and clinical measurements. The total antioxidant capacity (TAC) was evaluated using the Cell Biolabs Oxiselect™ Total Antioxidant Capacity commercial kit. These parameters were determined in plasma using spectrophotometric techniques.

Results: The study was made up of 34 women, the average age was 23.4 years (95% CI: 21.9 – 24.9). 72.7% of overweight women and 50% of obese women developed medical complications ($p = 0.001$). When CAT was compared in women with excess body weight who developed GD and hypertensive pregnancy disease, it was observed that they had an average CAT of 841.4 μM and in those who had normal weight and did not develop complications, the average was 1040.6 μM ($p = 0.0096$).

Conclusion: Excess body weight is associated with the development of complications such as gestational diabetes and hypertensive disease, the total antioxidant capacity was lower in women with excess body weight and who developed gestational diabetes and hypertensive disease of pregnancy compared to normal weight women without complications.

Conflict of Interest: The authors have no conflicts of interest to declare.

Keywords: Oxidative stress, Pregnancy, Preeclampsia, Gestational diabetes, Overweight. Obesity, Antioxidants.

O39

Transcriptional Modifications in *Drosophila Melanogaster* Brain due to a Diet Enriched with Palmitic Acid and Fructose

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Introduction: One of the main problems associated with the increase in processed food consumption is the high intake of palmitic acid and fructose, which along with sedentarism had provoked metabolic derangements, such as metabolic syndrome (MetS). MetS can cause multiple alterations of tissues, organs, and particularly the cardiovascular system. Recently, MetS has been associated with impairment in the central nervous system (CNS), such as cognitive impairment and Alzheimer's disease; however, the physiopathology that relates CNS and MetS is still poorly known. Transcriptional profiling from specific tissues allows the identification of metabolic derangement; in order to do so, it is necessary to use a model such as *Drosophila melanogaster*, which is particularly useful as it contains all the organs, tissues, and analogous systems associated with metabolic diseases in humans.

Objectives: To determine the transcriptional expression patterns related to a diet enriched with palmitic acid and fructose in *Drosophila melanogaster* larvae brain.

Methods: *Drosophila melanogaster* larvae were cultured and fed with a diet enriched in palmitic acid (2%) and fructose (2%) (MD), and those were fed with a standard diet (ND). From those larvae the brains were isolated, then total RNA was extracted and later sequenced to construct the transcriptional profiling.

Results: From the transcriptional profiling and the analysis of differential expression between MD and ND groups, 68 transcripts were found in MD and 261 transcripts in ND; from 8548 transcripts shared from both diets. 297 transcripts were upregulated and 968 downregulated in MD, which participates in important metabolic pathways, such as oxidative phosphorylation, spliceosome, sphingolipids metabolism, and drug metabolism.

Conclusions: A diet enriched with palmitic acid and fructose promotes changes in transcripts expression patterns, modifying metabolic pathways of the central nervous system that could be related to the appearance and development of the metabolic syndrome.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Metabolic syndrome, Fructose, Palmitic acid, Central nervous system, *Drosophila melanogaster*.

Poster Presentations

Healthy Nutrition in the Life Cycle and Clinical Nutrition

P001

Relationship between the Healthy Eating Index and Nutritional Status of Patients with Hemodialysis at Laurent Centro de Hemodiálisis E.I.R.L.

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Introduction: In 2015, the World Health Organization (WHO) reported that chronic kidney disease (CKD) affects almost 10% of the world population, with the main causes being diabetes, hypertension, and obesity; diseases that until now have not been controlled in Latin American countries and it is unlikely that they will be able to do so in the future.

Objectives: To determine the relationship between the healthy eating index (HEI) and nutritional status (NE) of patients with hemodialysis from Laurent Centro de Hemodiálisis E.I.R.L. Cajamarca, Peru.

Methods: The study was a cross-sectional, descriptive one that used questionnaires such as frequency of food consumption and recall of food consumption in 24 hours to know the HEI. Likewise, for the nutritional status, the nutritional evaluation form and values of the biochemical analyses were used. In addition, information was collected on the socioeconomic status of the patients. It had as independent and dependent variables the HEI and the NE respectively. The variables were calculated using the X^2 statistical test with a confidence level of 95%.

Results: Data from 32 patients were analyzed and it was found that 62,5% were adults; 68,8% were male; 75% of the antecedents were the primary causes: Diabetes mellitus type 2 and Hypertension; 62,5% had regular basic education; 62,5% do not work; 71,9% they are part of the social health insurance (SIS); 43,8% lived in their own home; 84,4% had the three basic services in their homes and 43.8% had a time of illness of 1 to 2 years. On the other hand, 96.9% had a healthy eating index value of bad and 50% had a nutritional status value of mild malnutrition.

Conclusions: No relationship was found between the healthy eating index and the nutritional status of hemodialysis patients.

Conflict of Interest: None to declare

Keywords: Healthy eating index, Diet, Healthy, Nutritional status, Renal dialysis, Hemodialysis.

P002**Influence of Magnesium Chloride with Stevia on Glucose Biochemistry in Patients with Type 2 Diabetes**

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Objectives: To evaluate the influence of magnesium chloride, oral Stevia, and whether it improves insulin sensitivity and metabolic control on biochemical glucose parameters, glucose insulin sensitivity as well as metabolic control on glucose biochemical parameters, glycosylated hemoglobin, and insulin in subjects with type 2 diabetes.

Research Design and Methods: This study was a randomized, double-blind, placebo-controlled clinical trial, double-blind, placebo-controlled clinical trial. A total of 63 subjects with type 2 diabetes and decreased serum magnesium serum magnesium (serum magnesium levels ≤ 1.82 mg/l) treated with glibenclamide received 1.8 g MgCl₂ 0.5 g Stevia, 1/2 lemon juice in half a glass of water daily for 14 weeks. Exclusion criteria: chronic diarrhea, alcoholism, the use of diuretics diuretic use, and reduced renal function. The homeostasis assessment model was used for insulin resistance as a parameter of insulin sensitivity. homeostasis model was used for insulin resistance as a parameter of insulin sensitivity, glucose and HbA_{1c} as parameters of metabolic control.

Results: At the end of the study, subjects receiving magnesium supplementation showed significantly higher serum magnesium concentration (0.89 ± 0.10 vs. 0.68 , $P = 0.02$) and lower HOMA-IR index (4.9 ± 1.1 vs. 8.0 ± 1.3 , $P = 0.005$), fasting glucose levels (108 ± 2.4 vs. 150.3 ± 2.1 g/L, $P = 0.01$) and HbA_{1c} (8.2 ± 2.4 vs. 10.9 ± 3.3 %, $P = 0.04$) than control subjects.

Conclusions: Oral supplementation with MgCl₂ solution, Stevia, and lemon juice restores serum MgCl₂ levels to normal, intervening in the regulation, improving insulin sensitivity in insulin-mediated cellular glucose uptake and metabolic control in type 2 diabetic patients with decreased serum magnesium levels.

Keywords: Type 2 diabetes mellitus, Insulin, Glycosylated hemoglobin, Magnesium.

P003**Characteristics of Monounsaturated Fatty Acids in Breast Milk: Comparison between Honduras, Guatemala, Mexico, and Spain**

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Introduction: Most attention in the field of dietary fatty acids (FAs) is focused on the class of polyunsaturated acids (PUFAs) especially the omega-3 and 6 families. There are several monounsaturated acids (MUFAs) that can be synthesized or consumed from food and that are part of the diets of infants through the consumption of breast milk.

Objectives: To compare the behavior of monounsaturated fatty acids in breast milk during the second month of lactation of lactating women, in four different geographical locations.

Methods: With a common protocol, 25 samples of human milk from women in the second month of lactation were collected and dried on cardboard cards in four sites: Guatemala (G); Honduras (H); México (M); and Spain (S). Samples of breast milk were dried on PerkinElmer®226 five-spot RUO cards and FAs quantified at Lipid Technologies LLC Laboratory in Minnesota, USA. The abundance of individual or classes FAs was expressed with reference to the amount of total fat as 100% (grams per 100 grams).

Results: The analysis quantified 34 FAs from C-14 to C-24; of which, 12 were MUFAs. These included: 14:1; 15:1; 16:1w5; 16:1w7; 17:1; 18:1w9; 18:1w7; 18:1w5; 20:1w9; 22:1w9; and 24:1. In descending order, the median weight percent of total MUFAs by site were: 44.63 (S); 43.07(H); 42.81 (M); and 37.90 (G). In all instances, 18:1w9 (oleic acid) was the dominant MUFA, comprising 80-90% of the class. The second most abundant MUFA was 16:1w7 (palmiteoleic acid). The ratios of median 16:1w7/ median 18:1w9 were: 0.136 (G); 0.088 (H); 0.063 (M); and 0.050 (S). The Spearman rho values for associations of 16:1w7 (y-axis) and 18:1w9 within sites ranged from -0.063 to 0.248.

Conclusions: Unlike the 15 PUFAs, which demonstrate more quantitative diversity and heterogeneity, MUFAs biology is basically encompassed by only two FAs. It is, however, of interest to explore geographic differences in the profiles of MUFAs in maternal milk.

Conflict of Interest: There are no conflicts of interest.

Keywords: Breast milk, MUFAs, FAs.

P004

Inquiry into Geographic Associations of Habitual Fish Consumption and Average Abundance of Long-Chain Polyunsaturated Omega-3 Fatty Acids across Villages of Lake Atitlan in Guatemala

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Introduction: The levels of long-chain polyunsaturated fatty acids of the Omega-3 series (LC-PUFA-w3) in fish are generally inversely associated with water temperatures. Guatemala's Lake Atitlán is a profoundly deep crater lake, with colder temperatures than the marine waters on its Caribbean or Pacific coasts. Prior surveys here show Omega-3 fatty acids (FAs) in human milk to be higher in lake-dwelling women, as compared to those of the seashores, when analyzed on a population-sample basis.

Objective: To determine whether self-reported frequency of fish by a convenience sample of women of lakeside villages of Atitlán were associated geographically with the median abundance of LC-PUFA-w3 in the breast milk of nursing women from the corresponding sites.

Methods: Samples of breast milk were dried on PerkinElmer® 226 five-spot RUO, and FAs quantified at Lipid Technologies LLC, Minnesota, USA in 12 women per lakeside village: San Antonio Palopó (SA); San Lucas Tolimán (SL); and Santiago Atitlán (SO). Abundance of eicosapentaenoic acid (EPA); docosapentaenoic acid (DPA); docosahexaenoic acid (DHA) was the focus. Separately, the frequency of fish consumption in the previous week was reported by from 12 to 16 women residents of the same villages. Since we did not have values for both variables in the same individuals, we made recourse to an ecological analysis of median community fish intake versus median community milk FA abundance. We consider of interest as a "trend" any consistency of harmonious progression – lowest-lowest; middle-middle; and highest-highest – for the respective variable medians.

Results: Median EPA abundance varied from 0.1–0.3, that for DPA from 0.10–0.11, that for DHA from 0.16–0.18, and that for Omega-3 index from 1.51–1.68. Of the 36 women studied, six reported no fish consumption in the previous week, whereas 30 related eating fish from 1–7 times over the prior week. Median weekly fish intakes were: 0.5 (SA); 2.0 (SL); and 5.5 (SO). For none of the four Omega-3 variables was there a harmonic trend progression across the ascending fish intakes.

Conclusion: Within our constraints of sample-sizes and composite variables, no inference of association of fish consumption and LC-PUFA-w3 in breast milk was detected.

Conflict of Interest: I have no conflict of interest.

Keywords: Omega-3, Fatty acids, Fish, Guatemala.

P005

Characteristics of Saturated Fatty Acids in Breast Milk: Comparison between Honduras, Guatemala, Mexico, and Spain

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Introduction: Most attention in the field of dietary fatty acids (FAs) is focused on the class of polyunsaturated acids (PUFAs) which include the omega-3 and 6 families. Saturated fatty acids (SFAs) come mainly from animal and dairy fats. Considerable levels of SFA can be found in some tropical oils, especially palm and coconut oils. Breast milk provides mainly saturated (palmitic acid) and monounsaturated (oleic acid) fatty acids.

Objectives: To compare the behavior of saturated fatty acids in breast milk during the second month of lactation of lactating women, in four different geographical locations.

Methods: With a common protocol, 25 samples of human milk from women in the second month of lactation were collected and dried on cardboard cards in four sites: Guatemala (G); Honduras (H); México (M); and Spain (S). Samples of breast milk were dried on PerkinElmer®226 five-spot RUO cards and FAs quantified at Lipid Technologies LLC Laboratory in Minnesota, USA. The abundance of individual or in classes FAs was expressed with reference to the amount of total fat as 100% (grams per 100 grams).

Results: The analysis quantified 34 FAs from C-14 to C-24; of which, 8 were SFAs. These included: 12:0 (lauric acid); 14:0 (myristic acid); 15:0 (pentadecyl acid); 16:0 (palmitic acid); 18:0 (stearic acid); 20:0 (arachidic acid); 22:0 (behenic acid); and 24:0 (lignoceric acid). Regardless of geography, the SFA profile was dominated by three fatty acids: 14:0; 16:0; and 18:0 which constitute more than 98% of SFA; as expected, 18:0 was predominant. From the results obtained, was found abundance <0.1 of the other five SFA. In descending order, the median relative abundance (%) of SFAs by site were: 41.48 (H); 37.01(G); 32.05 (M); and 29.57 (S). The corresponding median value in wt(%) for 18:0 was: 5.31 (S); 4.90 (H); 4.58 (M); and 3.82 (G).

Conclusions: We found geographical differences in SFA profiles. As in expressions of relative abundance is reciprocal, part of the dominance of SFA in Honduras is explained by the scarcity of PUFA.

Conflict of Interest: There are no conflicts of interest.

Keywords: Breast milk, SFAs, FAs.

P006

Knowledge, Attitudes, Barriers and Facilitators about Breastfeeding Practice and Interventions to Promote It in the Workplace among Adults of Guanajuato

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Introduction: The breastfeeding practice is influenced by social, economic, and cultural factors. The context of a lactating woman, especially in educational spaces or workplaces, as well as the barriers and facilitators perceived by them, are relevant to continue or stop the breastfeeding practice.

Objectives: To identify the knowledge, attitudes, barriers and facilitators about breastfeeding practice and interventions to promote it in the workplace among adults in the Guanajuato state.

Methods: Observational, descriptive, cross-sectional and prospective study. Inclusion criteria: people of any gender, over 18 years of age, voluntary participation, who had access to a mobile device or computer with internet to answer the form (Google forms). Informed consent was sent by electronic form and after acceptance, the participants answered the Iowa Infant Feeding and Attitude Scale (IIFAS) adaptation to the Mexican population, questions about barriers and facilitators for breastfeeding, and interventions to promote breastfeeding practice in the workplace or school. Descriptive statistics were performed.

Results: 55 adults participated in the study: 74.5% were women, average age of 31.56 + 12.43 years. In breastfeeding practice: 58.2% with exclusive or mixed breastfeeding, 5.5% formula and 41.8% with none of the above. In knowledge and attitude toward breastfeeding: 74.55% reflect a neutral attitude. The main barrier was: the milk does not come out (23.8%), followed by lack of information (20%), and the main facilitator was good accommodation and position of the baby (36.3%). In interventions that contributed to promoting and supporting Breastfeeding practice: the most frequent were maternity leave policies (57.8%). 61.5% of participants reported that in the workplace or school there are no spaces designated for breastfeeding and 26.9% do not know if these spaces exist in their environment.

Conclusions: The adult participants in the study showed a neutral attitude towards breastfeeding and the lack of information was one of the most frequent barriers to this practice. Interventions that promote breastfeeding at work or school remain limited.

Conflicts of Interest: The authors of this work declare that they have no conflict of interest of any kind.

Keywords: Breastfeeding practice, Knowledge, Attitudes, Barriers, Facilitators.

P007

Chrononutrition and Relationship with Excess Weight in Adults: Literature Review

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Introduction: Metabolic regulation is given by the circadian system within the suprachiasmatic nucleus, which is regulated every 24 hours by the light/dark cycle. The transcription factors CLOCK and BMAL1 regulate the expression of several clock genes. This circadian system organizes energy homeostasis such as food intake, fat accumulation and caloric expenditure, the disruption of circadian clocks leads to metabolic disorders, including obesity.

Objectives: Carry out a bibliographic review of the current evidence on chrononutrition and its relationship with the development of obesity.

Methods: Forty-five articles were included, searching indexed journals and databases using keywords, including works in Spanish or English, published between 2010 and 2021. Pediatric articles, works on cancer patients and autoimmune diseases were excluded.

Results: Disruptors such as changes in sleep and eating schedules cause alterations in metabolic pathways, appetite hormones such as leptin/ghrelin, leading to the development of obesity. Time-restricted feeding is proposed as a strategy for the resynchronization of the circadian system, limiting the feeding window per day and fasting during the remaining hours of the day, seeking weight loss, improved sleep pattern and altered metabolic pathways.

Conclusions: Time-restricted feeding shows weight reduction, whether it is due to reduced intake or limitation of the daily feeding window is unclear. Further studies are required to assess the role of food in regulating clocks.

Conflict of Interest: I do not declare conflicts of interest

Keywords: Chrononutrition, Chronodisruption, Circadian rhythm, Clock genes, Obesity, Meal timing.

P008

Characterization of the Nutritional Status of Young Adults with Metabolically Discordant Phenotypes Who Attend a Private Nutritional Consultation

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Introduction: The study of metabolic disease has gained importance in individuals with obesity due to the classic paradigm “the higher the weight, the higher the prevalence of the metabolic disease.” Metabolic alterations vary between individuals, such as the metabolically discordant phenotypes: metabolically healthy obese (MHO) and metabolically unhealthy normal weight (MUNW), which, compared to their same altered and healthy weight category, respectively, present different cardiometabolic

risk factors. Most studies on these phenotypes correspond to foreign populations, and research on Mexicans is scarce.

Objectives: To characterize young adults with metabolically discordant phenotypes.

Methods: Non-experimental, cross-sectional study. Anthropometric, biochemical, clinical, dietary, and lifestyle variables were evaluated in 123 subjects (21–35 years old), categorized into four phenotypes: MHO, metabolically unhealthy obese (MUO), metabolically healthy normal weight/non-obese (MHNW/MHNO) and metabolically unhealthy normal weight/non-obese (MUNW/MUNO). Confidence intervals were calculated at 95%.

Results: Participants were categorized into MHO 19%, MUO 22%, MHNW/MHNO 29%, and MUNW/MUNO 30%. Waist circumference, glucose, total cholesterol, triglycerides, HbA1c, and HOMA-IR, were significantly higher in MUO and HDL-c lower than in MHO. MUO consumed fewer vegetables, water, and more cereals with sugar and sugar-added beverages than MHO. Glucose, triglycerides, HOMA-IR, systolic and diastolic blood pressure in MUNW/MUNO were significantly higher and HDL-c lower than MHNW/MHNO. MUNW/MUNO consumed fewer fruits, vegetables, legumes, milk, and more cereals with sugar, saturated/trans fats, and sugar-added beverages than MHNW/MHNO. MHO and MHNW/MHNO had a higher physical activity level than MUO and MUNW/MUNO. MHNW/MHNO and MUNW/MUNO had better sleep duration than MHO and MUO. MHO consumed fewer cigarettes than MUO. The normal weight consumed less alcohol than the obese.

Conclusions: The metabolically discordant phenotypes in the Mexican population presented significant differences between healthy and metabolically altered normal weight/non-obese and obese individuals. The conducted extensive characterization is not observed in previous studies and influences individuals' phenotypic and metabolic categorization so that it will mark a benchmark for various lines of research in the Mexican population.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Metabolic disease, Phenotype, Obesity, Normal weight, Metabolic health.

P009

Relationship of Cardiometabolic Risk Factors with the Breastfeeding Duration in Young Adults with Metabolically Discordant Phenotypes Who Attend a Private Nutritional Consultation

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Introduction: There is evidence that breastfeeding duration is related to a decreased risk of suffering from cardiometabolic diseases in adulthood. Metabolic alterations vary widely between individuals; for example, the discordant phenotypes such as metabolically healthy obese (MHO) and metabolically unhealthy normal weight (MUNW), whose variables involved in their

development have been a source of controversy. The characterization of these phenotypes reviewed in the literature has not considered breastfeeding duration as a variable that could be related to cardiometabolic risk factors (CMRF) in this population.

Objectives: To determine the relationship between cardiometabolic risk factors and breastfeeding duration in young adults with metabolically discordant phenotypes.

Methods: Non-experimental, cross-sectional study. Anthropometric, biochemical, clinical, dietary, and lifestyle variables of 123 patients were analyzed through a questionnaire that included breastfeeding duration; they were categorized into four metabolic phenotypes: MHO, metabolically unhealthy obese (MUO), metabolically healthy normal weight/non-obese (MHNW/MHNO) and metabolically unhealthy normal weight/non-obese (MUNW/MUNO). Statistical analysis: Chi-square, Fisher's statistic, and logistic regression.

Results: The 123 subjects were categorized into MHO 19%, MUO 22%, MHNW/MHNO 29%, and MUNW/MUNO 30%. When comparing CMRF, it was observed that waist circumference, glucose, total cholesterol, triglycerides, HbA1c, and HOMA-IR were significantly higher in MUO and lower HDL-c than in MHO; glucose, triglycerides, HOMA-IR, systolic and diastolic blood pressure in MUNW/MUNO were significantly higher and HDL-c lower than in MHNW/MHNO. No significant association was found between CMRF and the breastfeeding duration; however, a tendency could be observed that the longer the breastfeeding time, the lower the probability of altered total cholesterol ($p = 0.099$) and triglycerides ($p = 0.062$).

Conclusions: There was no significant association between the CMRF and breastfeeding duration. There is probably a tendency between the breastfeeding duration and a lower probability of altered total cholesterol and triglycerides in the adult stage that promotes the protective potential of breastfeeding in the development of chronic diseases.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Breastfeeding, Cardiometabolic risk, Phenotype, Metabolic health.

P010

Caffeinated Drink Consumption among Uruguayan College Students

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Introduction: Caffeine is a psychostimulant compound found in many commonly consumed caffeinated drinks in Uruguay.

Objectives: To estimate caffeine consumption levels, main caffeinated drink sources, and caffeine content knowledge among Uruguayan college students.

Methods: Cross-sectional study (August to October 2021) including 3381 students of both sexes (18–71 years). Data was collected through an online self-administered survey, including a caffeinated drink frequency questionnaire (coffee, tea, yerba mate infusion, cola drinks, chocolate beverages, energy drinks).

Caffeine content was obtained from USDA, EFSA, and local product information. Caffeine knowledge content and reasons for consumption were also gathered. Descriptive statistics and non-parametric tests were performed with a 95% confidence interval.

Results: Average daily caffeine intake was 507(200-908) mg/day [7.7 (3.1-13.8) mg/kg]. A small proportion of students (0.6%) reported not consuming habitually any caffeinated drinks. Six out of ten students reported consumption levels over the recommended maximum daily intake (>400 mg/day); females had higher levels of non-safe intake (>5,7 mg/kg/day) ($p<0.05$). Students aged 35-49 years reported the highest caffeine intake [725 (446-1083) mg/day] and non-safe intake levels ($p<0.05$). Students from Natural, Physical, and Exact Science fields presented higher safer consumption levels. Main source of caffeine was coffee [158 (27-481) mg/day], followed by yerba mate infusion [114 (0-414) mg/day]. The most frequent consumption reasons reported were: taste, to stay awake, and to increase concentration and alertness. Eight out of ten students have poor caffeine content knowledge of beverages. An association between a good knowledge of caffeine content of drinks with safer caffeine consumption levels was found ($p<0.05$).

Conclusions: In our study, caffeine consumption was highly prevalent among college students. A large proportion of them exceeded the recommended maximum daily caffeine intake and showed an altered perception of the caffeine content of beverages.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Caffeine, Drinks, University students, Knowledge.

P011

Feeding Practices and Its Association with Appetitive Traits and Rapid Weight Gain in Infants

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Introduction: Different weight trajectories have been described between the use of breast milk and formula in infants. Rapid weight gain (RWG) during the first months of life has been described as an important risk factor for the development of childhood obesity. Appetitive traits are also involved in the risk of later overweight and obesity.

Objective: To analyze if breastfeeding practices are associated with appetitive traits and rapid weight gain in the first months of life.

Methods: A cross-sectional analysis of a prospective cohort study was conducted on 95 appropriate for gestational age term infants of 3-4 months. Type of feeding (exclusive breastfeeding, formula, or partial breastfeeding), duration of exclusive breastfeeding, use of bottle feeding (regardless of the content), and formula at birth were evaluated. Appetitive traits were assessed with the Baby Eating Behavior Questionnaire (BEBQ) which measures food approach (enjoyment of food and food responsiveness) and

food avoidance (satiety responsiveness and slowness in eating) traits. RWG was considered as a change $\geq +0.67$ SDS in weight/age Z score from birth to 3-4 months. T-student test and ANOVA were used for the comparison between groups. Odds ratios (OR) and 95% confidence intervals (CI) were computed by using unconditional logistic regression models.

Results: Higher scores in slowness in eating were significantly associated with exclusive breastfeeding ($p=0.002$), duration of exclusive breastfeeding ≥ 4 months ($p=0.014$), and no use of bottle feeding ($p<0.001$). Lower enjoyment of food was found in those who did not receive formula at birth ($p=0.002$). RWG was associated with the use of formula at birth ($p=0.046$) and with lower scores on the enjoyment of food ($p=0.027$). However, logistic regression models showed that slowness in eating [OR= 0.26 (95% CI: 0.09-0.72; $p=0.010$)] was the only significant predictor for RWG at 3-4 months.

Conclusions: Slowness in eating is a protective factor for RWG in the first months of life. Even though breastfeeding practices were not associated directly with RWG they appear to be associated with slowness in eating.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Breast feeding, Bottle feeding, Appetite, Weight gain, Infant.

P012

Does Sugar Intake Gives Energy? Effects of Its Consumption to Different Concentrations on Physical Activity

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Introduction: Sugar intake is considered to have a stimulating effect on physical activity (PA); identifying progressive increases in the level of this as the body consumes this nutrient, attributing the effect to its stimulating properties. However, considering that the higher the caloric intake, there's also greater metabolic effort to process the nutrient; then, is it possible that, in higher concentrations of sucrose, the effect of its consumption stops being stimulating for PA and becomes a depressant?

Objectives: Analyze the effects of different concentrations of sucrose on the level of physical activity in a murine model.

Methods: Twelve three-month-old Wistar rats were exposed to 30 minutes of voluntary AF during three 30-day phases, divided into three groups exposed to three different concentrations of sucrose in drinks: 4%, 8%, and 12%. An experimental ABA design was implemented: In conditions A there was no sucrose drink and in condition B it was added to the diet. ANOVA was used to compare the means.

Results: There were no significant differences, however, the concentration at 8% was the one that increased the level of physical activity the most (39.56% vs 25.19% of the group 4% and

31.49 % of group 12 %). Even when the drink was withdrawn, this group maintained a higher level than the other two groups.

Conclusions: In the concentrations implemented in the present investigation they have no depressing effect on running behavior, but it seems that its exposure continues if it can generate unstable records in the execution of the activity. Furthermore, from the effect observed in the group of 12 %, it is plausible to consider for future studies whether a decrease in the level of physical activity is obtained at higher concentrations.

Conflict of Interest: There is no conflict of interest.

Keywords: Physical activity level, Sugar intake, Eating behavior.

P013

Functional Feasibility Study of a Donated Milk Bank in a Third Level Hospital

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Introduction: The particular benefits of breast milk (BM) for premature and term infants have been well-described in the medical literature. BM provides important nutrients, digestive enzymes, immune and growth factors, and hormones that make it a standard of clinical care. Thus, donated breast milk (DBM) is being encouraged to be the food of choice when mother's milk is not available for several reasons.

Objectives: To analyse the functional viability of a new donated breast milk bank (DBMM) at the Reina Sofía University Hospital (HURS) in Córdoba (Spain) through a supply and demand study. Likewise, compare the data reported with the real situation after its implementation.

Methods: A prospective longitudinal observational study was carried out. For the supply study, all women who gave birth to a healthy newborn in a period of time were interviewed. To estimate the demand for DBM, the amount of milk (breast or formula) prescribed to children who might be beneficiaries of a DBMM was collected daily for two periods of time.

Results: 391 women were included in the offer study, of which 287 (73.4%) had an initial willingness to donate after hospital discharge. After 9 months of breastfeeding, the number of mothers willing to donate fell to 55 (14.1%). Of the children likely to be DBM recipients, 34 could have benefited during the 4 months in which the data were reported, needing to be fed from 1-55 days, requiring a total volume of 179.3L of DBM among all. After the opening of the DBMM up to 4 months later, 25 women donated milk, with a total volume of 54.1L. During the same period, 7 children were fed with DBM requiring a total volume of 28.5L.

Conclusions: The feasibility study showed that the creation of a DBMM at the HURS was possible and necessary. The creation of DBMM is being a priority in hospital neonatal units to improve the health of newborns.

Conflict of Interest: Authors have not conflict of interest

Keywords: Breastfeeding, Donor milk, Milk bank, Premature.

P014

Evaluation of the Number of Seizures in Patients with Drug-Resistant Epilepsy by Implementing the Ketogenic Diet as a Nutritional Treatment

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Introduction: Epilepsy is a disorder of the central nervous system characterized by spontaneous seizures caused by an abnormal increase and synchronization of neuronal electrical activity (1). It's a neurological disease that is controlled with antiepileptic drugs. However, approximately 25% of epilepsies are refractory to treatment (2). The neurons in the area where the seizure starts present electrical activity characterized by prolonged paroxysmal discharges due to the blockage of GABA-mediated inhibitory neurotransmission (3). As nutritional therapy, a high-fat, low-carbohydrate ketogenic diet (KD) is implemented in patients in order to mimic the beneficial effects of fasting in seizure control. The KD stabilizes the neuronal membrane, making it more resistant to epileptic seizures (4).

Objectives: To analyze the effect on the number of seizures after implementing a ketogenic diet for 9 weeks in adult patients with drug-resistant epilepsy.

Methods: A clinical study was designed with eligible adult patients between 18 and 60 years old with drug-resistant epilepsy. They were randomly assigned for 9 weeks to a ketogenic diet (intervention group) or standard diet (control group). The primary endpoint was the change in the number of seizures from baseline to the end of the intervention period.

Results: Decrease in the number of seizures over time as repeated measures ANOVA yielded an effect of group $F(1,3) = 9.67$, $p < 0.01$, an effect of time $F(1,3) = 13.34$, $p < 0.0001$. When the repeated measures ANOVA was performed on each group separately, it was observed that there were only differences in the experimental group $F(14,42) = 15.54$, $p < 0.0001$.

Conclusions: The ketogenic diet shows a significant decrease in the number of weekly seizures in patients, so it turns out to be a cost-effective treatment for the patients.

Conflict of Interest: The authors have no conflicts of interest to declare

Keywords: Ketogenic diet, Drug-resistant epilepsy, Nutritional treatment.

P015

Sex Differences in Biochemical and Histopathological Indicators Associated with Nonalcoholic Fatty Liver Disease in C57BL6/N Mice on a High Sucrose Diet

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Introduction: Non-alcoholic fatty liver disease (NAFLD) is considered the hepatic component of the metabolic syndrome since it is related to comorbidities such as obesity, insulin resistance, and dyslipidemia. Sucrose intake has recently received attention as a risk factor for NAFLD and metabolic syndrome. In turn, these factors can be influenced by the characteristics of the individual, such as their sex.

Objective: Evaluate the effect of a high sucrose diet on biochemical and histopathological indicators related to NAFLD in male and female C57bl/6N mice.

Methods: Forty male and female C57bl/6N mice were randomly divided into four experimental groups: a Control male group (CMG) and females (CFG) were fed with a standard diet and water, as well as a sucrose male group (SMG) and female (SFG) that received standard diet and a 50% sucrose solution. After 20 weeks, serum was used to measure biochemical variables (glucose, total cholesterol, HDL cholesterol, triglycerides) and liver tissue for hepatic triglyceride measurement and histopathological analysis. Liver tissues were sectioned and stained with hematoxylin and eosin. The samples were examined by light microscopy to analyze liver damage. Non-alcoholic steatohepatitis (NASH) grade was determined according to the histological scoring system proposed by the NASH clinical research network.

Results: A high sucrose diet caused higher values of total cholesterol, HDL, and glucose in male and female mice. Regarding serum triglycerides, the SFG group had a lower concentration than hepatic triglycerides, suggesting a possible migration of lipids to the liver. The histopathological analysis determined moderate to high NAFLD in females (SFG), while males (SMG) showed mild to moderate NAFLD.

Conclusions: A high sucrose diet contributes to NAFLD development in male and female C57bl6/n mice, with greater progression to NASH observed in females.

Conflict of Interest: There is no conflict of interest.

Keywords: Non-alcoholic fatty liver, Sucrose, Strain C57bl/6N, Males and females.

P016

Impact of Baby-Led Weaning on Nutritional Status of Infant Children: A Systematic Review

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Introduction: The baby-led weaning (BLW) method proposes a respectful approach to complementary feeding, allowing infants to self-feed, and potentially preventing excessive weight gain while promoting normal growth of the child.

Objectives: To examine the current evidence of the impact of BLW on the infants' Nutritional Status (NS) in contrast to the traditional method (TM).

Methods: A systematic review was conducted to identify the effects of the feeding method on weight, height, BMI, choking risk, and iron and zinc intake and status, also considering the baby-led introduction of solids (BLISS) method. An electronic search was conducted in PubMed, BVS, Google Scholar, Cochrane, EBSCO, and MEDES including publications over the last 5 years, in Spanish and English. Only those with 2b level of evidence or above, according to the Oxford CEBM Levels of Evidence, were selected. 13 articles were finally included in this review (7 randomized clinical trials, 1 descriptive study, and 5 cross-sectional studies).

Results: 2 studies found no differences in NS, 2 found less overweight and less underweight with BLW. 3 studies found no difference in iron intake and 2 in iron status, while 1 found greater iron deficiency with BLW. 2 studies found no difference in zinc intake and 1 in zinc status. 2 found no association between the feeding method and the rate of weight gain and growth, while 1 study found that, with the TM, children presented greater weight gain. 3 studies found no difference in choking episodes, but 1 found more choking with BLW. According to another study, when using the BLISS method, children choked more at 6 months, but less at 8 months than children fed with the TM.

Conclusions: The evidence on the safety of BLW and its implications in the child's NS is still scarce, however, the available data suggest that it could protect against overweight and obesity and that it's safe to use, especially if adequate education is provided to caregivers to avoid nutritional deficiencies and choking.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Complementary feeding, Nutritional status, Iron and zinc deficiencies, Anemia, BLW.

P017

Metabolic Syndrome and Insulin Resistance in Obese Schoolchildren in the City of Jovita, Argentina

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Introduction: Childhood obesity is a global phenomenon, especially in developing countries and in the Region of the Americas it is higher compared to other regions. Metabolic Syndrome (MS) describes cardiovascular risk factors related to metabolic, vascular, inflammatory, fibrinolytic and coagulation abnormalities. Insulin Resistance (IR) has been recognized for decades as a cardinal feature in the development of Diabetes Mellitus 2 (DMII) and has been associated with MS.

Objective: To establish the association between obesity in schoolchildren with risk factors that contribute to MS and an insulin resistance measurement index (SPISE).

Methods: Cross-sectional descriptive study in a representative sample of 714 schoolchildren from the city of Jovita, Argentina. Obesity was defined when the z-score of Body Mass Index for Age (BMI/E) was $> 2DS$, according to the World Health Organization. The presence of risk factors that constitute MS was diagnosed if 3 of the following conditions were present: glycemia ≥ 100 mg/dL, triglycerides ≥ 100 mg/dL, HDL-cholesterol ≤ 40 mg/dL, systolic or diastolic blood pressure > 90 th percentile and waist circumference ≥ 90 th percentile. The index used to measure insulin resistance was Single Point Insulin Sensitivity Estimator (SPISE), it was analyzed continuously because there is no consensual cut-off point for children.

Results: 15.9% of the children were obese, with no sex differences (16.3% in men and 15.6% in women). The prevalence of MS was 1.8%, and almost all (12 in 13 children) were obese (Fisher's exact test=0.000) and without sex differences. Statistically significant differences were found in the SPISE index, with a lower mean among obese children ($p=0.000$).

Conclusions: Obesity in schoolchildren would be associated with risk factors that contribute to MS. Obesity in schoolchildren is associated with a lower SPISE value. There were no differences by sex in the prevalence of cardiometabolic risk factors, except for low HDL-cholesterol that is higher in girls.

P018

Effect of Physical Exercise at 75% of Maximum Oxygen Volume on IL-6 and IL-10 Expression in Mice with Sucrose-Induced Nonalcoholic Fatty Liver

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Introduction: A high sucrose diet led to the accumulation of fatty acids in hepatocytes and increases inflammation levels. These alterations in the liver develop the non-alcoholic fatty liver disease (NAFLD). It is a disease with a high prevalence worldwide, ranging between 1.8% and 46% in the general population. Previous studies have shown the beneficial effect of exercise on inflammatory markers; however, the molecular mechanisms are still being studied.

Objectives: To evaluate the effect of physical exercise at 75% of maximum oxygen volume (VO₂max) on IL-6 and IL-10 expression genes in mice with sucrose-induced non-alcoholic fatty liver.

Methods: NAFLD was induced with 50% sucrose solution for 20 weeks in the C57BL/6N strain mice. Subsequently, the mice were grouped into a) Control without exercise, b) Control with exercise, c) NAFLD without exercise, d) NAFLD with exercise. The exercise group mice were trained on a motorized treadmill for 8 weeks at a speed of 12 m/min for 60 min, 5 times per week, reaching 75% VO₂max. The RNA extraction was performed from liver tissue and the gene expression was using *TaqMan* probes (*ThermoFisher*) in a real-time PCR instrument (LightCycle[®]96_Roche) using the $2^{-\Delta\Delta Cq}$ relative quantification method. Statistical analyzes were performed using SPSS v.25 software and a $p < 0.05$ value was considered statistically significant.

Results: Exercised NAFLD-induced mice significantly decreased 64% IL-6 levels compared to the NAFLD without exercise group ($p=0.022$). On the other hand, no changes were observed in IL-10 levels ($p=0.445$); however, a negative correlation was found between IL-6 and IL-10 levels in the group of mice who performed exercise protocol ($r=-0.577$). $p=0.024$.

Conclusions: Physical exercise at 75% of VO₂max decreased inflammatory markers in NAFLD-induced mice and showed a negative correlation with anti-inflammatory markers. Therefore, these results highlight the importance of physical exercise as part of NAFLD management.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Exercise, Inflammation, Non-alcoholic fatty liver.

P019**Effect of a Ketogenic Diet on Heart Rate Variability in Resistance-Trained Women**

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Introduction: Heart rate variability (HRV) is used to assess vegetative activity, where higher values are associated with cardiovascular health. Excessive caloric intake and pro-inflammatory status might negatively impact the HRV as it has been shown in populations with obesity, type 2 diabetes, cardiovascular disease, and neurodegenerative diseases. The Ketogenic diet (KD) has shown benefits in outcomes related to cardiovascular risk (e.g., obesity, elevated blood pressure, and dyslipidemias); however, its effect on HRV has been little explored.

Objectives: This study aimed to evaluate the effect of a hypercaloric KD on HRV in resistance-trained women.

Methods: Twenty females completed this study (age = 27.5 ± 4.0 years; BMI = 22.87 ± 2.8 kg·m²) and performed an 8-week resistance training (RT) program after three weeks of familiarization. Participants were randomly assigned to non-ketogenic diet (n=10, NKD) and ketogenic diet (n= 10, KD) groups. The RR interval data were recorded using a v800 Polar HRM (Barcelona, Spain) at a sampling frequency of 1000 Hz in accordance with the manufacturer's guidelines. The device was placed by adjusting the band with the sensor in the upper part of the thorax and the participants were instructed to remain relaxed and without speaking in the supine position for a period of 10 minutes. Raw unfiltered RR data was exported from the Polar Flow web service and analyzed using the software Polar FlowSync version 4 for Mac.

Results: Regarding HRV parameters, we only found significant changes in the standard deviation of successive differences (SDSD) in KD (8.0 ± 6.7 ms, P=0.004, effect size [ES]=0.79) but not in NKD (-3.4±28.1 ms, P=0.710, ES=-0.12). On the other hand, we only found differences between groups in average RR interval in favor of the KD group: -7.46, 95.0 %CI -13.1 – -2.15, P=0.021; ES=-1.08.

Conclusions: A 8-week hyperenergetic KD in conjunction with an RT program can improve HRV in resistance-trained women. Controlled clinical trials are required to assess the efficacy of KD, compared to traditional isocaloric diets, on HRV and its implications for cardiovascular health or risk.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Ketosis, Low-carb, Heart rate, Autonomic nervous system, Acute myocardial infarction.

P020**Influence of the Consumption of Chilean Maqui on the Glycemic Control of Adults Diagnosed with Diabetes Mellitus 1**

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Introduction: Diabetes Mellitus 1 (DM1) is a chronic autoimmune disease characterized by the presence of hyperglycemia and ketoacidosis, where the relationship between insulin administration and diet is essential. There are foods with a high content of antioxidants, and polyphenols, related to the regulation of the glycemic and insulin response. Maqui is a Chilean berry rich in anthocyanins. Evidence suggests that its antioxidant effect could modulate the postprandial response.

Objectives: To analyze the effect on the postprandial glycemic response after eating a maqui breakfast in adults with DM1.

Methods: Prospective, single-blind, randomized clinical trial. Approved by the Pharmacy Bioethics Committee of the University of Valparaíso. Adults with normal BMI, diagnosed with DM1 > 6 months, and insulin therapy were included. Subjects with other pathologies and/or use of medications that affect glycemia and/or with glycosylated hemoglobin >9% were excluded. Sample of 8 subjects, divided into 2 groups. Group 1 received a breakfast of 50 g of carbohydrates composed of oatmeal and yogurt, and Group 2 the same plus 5 g of maqui. Glycemia was measured at 0, 30, 60, and 90 minutes. Statistical analysis of the comparison of glycemia obtained with the SPSS program was performed. To calculate the contribution of antioxidants between breakfasts, the FRAP method was used.

Results: Significant differences were found between the glycemia of the groups at minute 60', with group 2 being lower. There were no significant differences at 00', 30' and 90 minutes; however, more stable glycemia was observed in group 2. As for the number of antioxidants, the sample with maqui had 390.319 µmol Trolox/g and breakfast without 0.045.

Conclusions: The differences found in glycemic response could be a product of the effect of maqui polyphenols. In addition, although it was not significant in the entire curve, a trend was observed in the stabilization of glycemia in the maqui group. it would be interesting and necessary to replicate the study in more participants.

Conflict of Interest: No conflicts of interest.

Keywords: Diabetes I, Glycemia, Maqui, Antioxidant.

P021

Maternal *Stevia rebaudiana* Intakes during Pregnancy and Lactation Modulates Gut Microbiota in Male Offspring Rats

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Introduction: Maternal environment and nutritional status impact the microbiome early in life, programming offspring to develop disease in adulthood.

Objectives: To determine the effect of maternal high-Stevia (*Stevia rebaudiana*) intake during pregnancy and lactation on early-life and adult gut microbiota in male offspring rats.

Methods: Ten male pups from dams fed cafeteria diet in pre-gestational period and standard diet (Caf-C) or high *S. rebaudiana* (Caf-S) diet during gestation and lactation were fed standard diet after weaning. Body weight was recorded once a week. Fecal samples were collected at week 3 and 26 old for gut microbiota analysis by sequencing the 16S rRNA v3-v4 region.

Results: No significant differences were found in the weight gain between Caf-S and Caf-C groups (346.21 ± 71.63 and 317.36 ± 31.28 , respectively) ($p > 0.05$). At the phylum level, the relative abundance (%) of *Firmicutes* was significantly lower ($17.45 \pm 3.49\%$; $p < 0.05$) while *Bacteroidetes* was significantly higher ($73.11 \pm 4.17\%$; $p < 0.001$) in the breastfeeding period in Caf-S group compared to Caf-C ($26.97 \pm 5.90\%$ and $57.39 \pm 5.96\%$, respectively). However, the relative abundance of *Bacilli* class ($3.29 \pm 2.40\%$), *Lactobacillales* order ($2.96 \pm 2.27\%$), and *Lactobacillus* genus ($4.86 \pm 4.03\%$) of *Firmicutes* phylum was significantly higher in Caf-S group compared with Caf-C group (0.62 ± 0.77 , 0.55 ± 0.81 y 0.87 ± 1.36 , respectively) ($p < 0.05$). In addition, it was observed a significant increase in *Clostridiaceae* family and *Clostridium* genus (Phylum: *Firmicutes*) throughout life in Caf-S group ($p < 0.05$).

Conclusions: Maternal High-Stevia (*S. rebaudiana*) intake during pregnancy and lactation induced intestinal dysbiosis by modulating the relative abundance of *Firmicutes* and *Bacteroidetes* in early life and the *Clostridium* and *Lactobacillus* genus of *Firmicutes* phylum in adulthood.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Steviol glycosides, Microbiota, Fetal programming, *Firmicutes*, *Clostridium*, *Lactobacillus*.

P022

Development of Blenderized Formulas for Enteral Use, Nutritionally Suitable for Intensive Care Unit Patients in Private Clinics in Quito, Ecuador

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Introduction: Hospital malnutrition is a global problem that affects the health industry. Its early detection is essential, especially in Intensive Care Units, to provide effective nutritional support, which is often through enteral nutrition. The low amounts allocated in Ecuador for medicines and food can compromise the quality of patients' diets due to the high costs of commercial supplements. For this reason, blenderized formulas are a viable, safe, economical and nutritionally appropriate option.

Objective: Develop a low-cost and nutritionally appropriate blenderized formula for enteral tube feeding for patients in the Intensive Care Unit in Ecuador.

Methodology: The project carried out was of an exploratory descriptive nature. The study sample corresponded to the elaboration of four blenderized formulas. Costs were calculated based on the price granted by Secretaría Técnica de Fijación de Precios de Medicamentos of Ecuador (USD 12 per 400g of enteral formula). Food composition tables were used to determine nutritional composition. Stability, homogeneity and viscosity were evaluated by visual inspection.

Results: The blenderized enteral formulas elaborated were: basal, astringent, hyperproteic and hypercaloric, with a final volume of around one liter. The basal and astringent formulations presented an approximate energy density of 1 kcal/ml and the hyperproteic and hypercaloric formulas of 1.5 kcal/ml, with a carbohydrate:fat:protein macronutrient distribution of 55:30:15 in the basal and astringent formulas, of 50:30:20 in the hyperproteic and 50:35:15 in the hypercaloric. In addition, a significant content of fiber, polyunsaturated fatty acids and relevant micronutrients such as thiamin, vitamin A, zinc, potassium, iron and calcium were obtained. All the formulas had nutritional adequacy within the range of 90-110%, reaching a final price per liter of USD 1.06, USD 1.36, USD 3.51 and USD 2.02 for the basal, astringent, hyperproteic and hypercaloric formulas, respectively.

Conclusions: Four blenderized formulas were elaborated that had an adequate nutritional composition, lower cost compared to commercial formulas, homogeneous consistency and stable flow through a gastrostomy.

Conflict of Interest: There are no conflicts of interest.

Keywords: Enteral nutrition, Blenderized formulas, Commercial formulas, Costs, Nutritional composition.

P023

Cardiovascular Risk by Anthropometric Indices Is Associated with Excess Adiposity in Children

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Introduction: Several anthropometric indices and cardiovascular risk markers existing in the literature have already been analyzed in children, but there is still no consensus on their use in outpatient and hospital clinical practice.

Objective: To assess cardiovascular risk through anthropometric indices and its relationship with nutritional status in children.

Methodology: A cross-sectional and retrospective study in female children, aged between 4 and 10 years. The following were measured: weight, height, arm circumference (AC) and waist circumference (WC). To estimate the percentage of total body fat (%BF) triceps (TSF) and subscapular (SSF) skinfold thicknesses and bioelectrical impedance (BIA) were performed. The following anthropometric indices were calculated: Body Mass Index (BMI), Body Roundness Index (BRI), the Body Shape Index (ABSI) and Conicity Index (CI). Student's t-test and simple and multiple linear regression were used to verify relationships between the indices and anthropometry.

Results: 83 girls participated in the study with a mean age of 8.41(±1.12) years. It was observed that 52 (62.65%), 46 (56.10%) and 66 (80.49%) of the children had excess adiposity according to BMI/age, AC and TSF, respectively. Excess body fat was found in 42 (51.22%) of the group evaluated according to skinfolds and in 32 (58.18%) according to BIA. However, a lower percentage of children (16; 19.51%) had cardiovascular risk according to WC. Significantly higher BRI values were found when children had cardiovascular risk assessed by WC and excess body fat by all analyzed anthropometric variables (BMI/age, AC, TSF, %BF) (< 0.001). Such direct associations remained significant in age-adjusted models (P<0.001). However, CI had a positive correlation only with WC. No associations were found between ABSI and the variables analyzed.

Conclusion: Among the cardiovascular risk indices analyzed, the BRI showed the best performance, proving to be a promising index for the evaluation of children. However, further studies covering a greater number of children are needed to consider this finding.

Conflict of Interest: The authors report no conflicts of interest.

Keywords: Pediatrics, Puberty, Precocious, Obesity, Heart disease risk factors.

P024

Comprehensive Evaluation of the Perception of the Nutritional Status, Diet and Disease of Adult Patients Intermitted in Hematology at a Reference Hospital. Approach of the Patient, the Doctor, and the Nutritionist

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Introduction: To make the best decisions about the diagnosis and treatment of each patient, it is important to work as a team and make a comprehensive evaluation, in which the patient must be involved, to optimize treatment, reduce the risk of malnutrition and improve the prognosis against disease

Objectives: To evaluate the perception of the nutritional status, diet and illness of adult patients who attend the Hematology Unit of the Central Hospital of the Social Security Institute (HC-IPS) hospitalized during the months of December 2020 to April 2021, from the approach of the patient, the doctor and the nutritionist

Methods: A descriptive research was designed, in which the perception from the point of view of the patient (n=46), the nutritionist (n=16) and the doctor (n=9) was evaluated through an interview based on the questionnaire. adapted from Gómez et al (2008) which was scored using an ascending positive Likert scale and the medical and nutritional records of the patients were used to record the demographic, clinical and anthropometric data. The research protocol was approved by the Research Department of the Faculty of Medical Sciences and the Ethics Committee of the IPS.

Results: The mean age of the patients was 56.9±18.4 years; 56.5% were female. The average BMI was overweight (26.9±4kg/m²), 47.8% reported having lost weight and the average loss was 15.4±13.7Kg. According to the average score, patients perceive that their nutritional status and the severity of their health "remains the same" (3.91±0.94 points and 3.72±0.93 points, respectively), while they do consider that their diet has changed. seen "Affected" (4.07±0.83 points); while the perception of nutritionists and doctors was similar to each other; They consider that the disease "greatly affects" the nutritional status, health and diet.

Conclusions: The patients perceived that their disease does not affect their nutritional status or their health, although they perceive that it does affect their diet somewhat; however, treating doctors and nutritionists agree that the disease greatly affects the variables.

Conflict of Interest: DCNN is part of the IPS nutritionist staff, it was in charge of data collection but not of processing the results to reduce any type of bias.

Keywords: Perception, Nutritional status, Diet, Hematology oncology.

P025

Risk of Feedback Syndrome in Adult Patients with Artificial Nutritional Support Intermittent in the Intensive Care Unit of a Reference Hospital during the 2019–2020 Period

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Introduction: Refeeding syndrome (RS) is a potentially lethal condition that usually occurs in patients who restart their diet after prolonged fasting periods or in patients with malnutrition. Certain conditions upon patient admission to the Intensive Care Unit (ICU) could be at risk of developing refeeding syndrome in order to improve clinical outcomes or prevent RS.

Objectives: To identify the frequency of risk factors for refeeding syndrome in adult patients with artificial nutritional support admitted to the ICU of the Central Hospital of the Social Security Institute (HC-IPS) in the period from January 2019 to December 2020.

Methods: Cross-sectional observational study, demographic, clinical, biochemical, anthropometric data, support indication, and energy intake for 10 days were extracted from the clinical and nutritional records. As risk factors for RS, the body mass index was evaluated; weight loss; adequacy of intake ($\geq 70\%$), complications, and use of medications. The research protocol was approved by the Research Department of the Faculty of Medical Sciences and the Ethics Committee of the IPS.

Results: 59.4% were male patients. The average BMI was $28.8 \pm 5.6 \text{ kg/m}^2$. On average, they start nutritional support after 2 days; 17.8% presented complications related to it. The average adequacy of the support indication during the 10 days of follow-up was 68.2 ± 16.5 (6.40–120%). Regarding the other factors evaluated, it can be mentioned that 23.9% have insufficient energy supply followed by 17.8% who have support complications; these were the most frequent risk factors for feedback syndrome. The average biochemical data was $3.8 \pm 2.1 \text{ mg/dL}$ (Phosphorus); $4.3 \pm 4.6 \text{ mg/dL}$ (Potassium) and $2 \pm 0.5 \text{ mg/dL}$ (Magnesium).

Conclusions: Hospitalized patients have a low frequency of RS risk factors and a low-risk level of RS according to the Rendón-Rodríguez parameters.

Conflict of Interest: NYRS is part of the IPS nutritionist staff, it was in charge of data collection but not of the processing of the results to reduce any type of bias

Keywords: Refeeding síndrome, ICU, Risk factors.

P026

Association of Phase Angle and Sarcopenia in an Uruguayan Older Population

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Introduction: Bioimpedance analysis (BIA) is a simple non-invasive method to assess body composition, and gives other valuable information such as phase angle (PA). PA usefulness for assessing sarcopenia in older adults is under debate.

Objective: To explore the association of a selected PA cut-off point with sarcopenia and its components in an Uruguayan older population.

Methods: A cross-sectional study in 90 community-dwelling, non-disabled subjects (70 women), aged ≥ 65 years from IAEA RLA6/073 Project, assisted in Hospital de Clínicas, Montevideo, Uruguay. PA was evaluated by BIA at a single operating frequency of 50kHz. Sarcopenia was considered according to the International Sarcopenia Consensus (2019). Muscle strength was assessed by hand-grip strength, appendicular skeletal muscle mass using a fan-beam X-ray densitometer, then normalized to height (ASMMI), and physical performance by gait speed. Probable sarcopenia was identified by low strength, the diagnosis was confirmed by low muscle mass or speed and if three criteria are met, sarcopenia was considered severe. Sarcopenic (S) patients were identified when they had sarcopenia confirmed or sarcopenia severe. Low PA was considered $\leq 4.1^\circ$. Association between sarcopenia components and PA was shown as an odds ratio (OR). PA sensitivity, specificity, and positive predictive value (PPV) were calculated with S as a gold standard. For all statistical measures, 95% significance level was used.

Results: mean age was 74 years (min 65; max 89, DS 5,1), mean body mass index 27,5 (min 17,5; max 39,5, DS 4,5) and mean PA 5.317° (min 1,7; max 7,8, DS 1,11). For sarcopenia components, low muscle strength was found in 23 subjects (25.5%), low ASMMI in 19 (21.1%) and low gait speed in 4 (4.4%), and no significant association was found with PA. 8 subjects (8.8%) had S and apparent prevalence with PA was 12,2%. Sensitivity of the selected PA cut-off point was 25%, specificity 89% and PPV 0.18%.

Conclusions: in the population studied, the selected PA cut-off point cannot be used as a sarcopenia marker. No association was found between PA and sarcopenia components. Larger local studies to explore other PA cut-off points are required.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Older adults, Sarcopenia, Phase angle, Bioimpedance analysis.

P027

Satisfaction and Consumption of the Hospital Menu in Patients Intermittent in the Medical Clinic of a Reference Hospital

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Introduction: Inadequate food intake is a risk factor for hospital malnutrition (DH). DH is highly frequent among hospitalized patients; for this reason, the hospital menu must guarantee adequate energy and nutritional intake that meets the patient's requirements, satisfying the organoleptic expectations and increasing the probability of greater consumption of the complete dish.

Objective: To evaluate the level of satisfaction and consumption of the hospital menu according to a visual and hedonic scale in adult patients hospitalized in the month of August 2021 in the Medical Clinic services of the Central Hospital of the Social Security Institute (HC-IPS).

Methods: Descriptive observational study in which 85 patients admitted to a medical clinic participated. Through an interview, data were obtained on the characteristics of the menu, satisfaction with the organoleptic characteristics using a Likert scale and the visual scale of non-consumption proposed by Calleja. The work was approved by the Research Directorate of the FCM-UNA and the Research Committee of the Central Hospital of the Social Security Institute.

Results: The average age of the patients was 56±18 years, 57.6% were women. The average satisfaction of the organoleptic characteristics was 3.33±0.61 points for breakfast (I neither like nor dislike), for lunch and dinner it was 2.95±0.66 and 2.90±0.61 points, respectively (I don't like it). It was observed that breakfast presented the score of the highest plate consumed (4.38±0.94 points) corresponding to "I leave 1/4 of the plate" and the menu with the lowest consumption was lunch with a score of (3.57±1.11 points) which corresponds to "I leave 1/2 of the plate. The score of the general perception of the menu is 3.09±0.59 points, which corresponds to "Somewhat adequate"

Conclusion: The patients are not satisfied with the organoleptic characteristics of the dishes corresponding to lunch and dinner; consumption is half or less than half of the plate, especially in main meals. It is necessary to improve the indicators of satisfaction and consumption of the hospital's food service.

Conflict of Interest: MJEG is part of the hospital nutritionist staff, he was in charge of data collection but not of the processing of the results to reduce any type of bias in the interpretation of results.

Keywords: Satisfaction, Menu, Intake, Inpatients.

P028

Risk of Malnutrition and Its Associated Factors in Hospitalized Geriatric Patients with Neurological Diseases: A Retrospective Cohort Study

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Introduction: In older adults with neurological diseases, the presence of malnutrition has been associated with the development of geriatric syndromes, worsening in the quality of life, and an increase in morbidity and mortality.

Objectives: To determine the association of malnutrition risk using the Malnutrition Universal Screening Tool (MUST) with mortality and length of stay (LOS) in elderly with neurological diseases. As well as the association of clinical, socioeconomic variables and support networks with the risk of malnutrition, mortality, and LOS.

Methods: A retrospective cohort study was conducted in a tertiary referral neurological hospital. All patients over 60 years of age admitted to neurology, neurosurgery, and psychiatry departments from January 2017 to December 2018 were included, to whom the MUST tool was applied at admission. The clinical results were followed a maximum of 6 months after admission and until hospital discharge.

Results: A total of 765 patients were included in the analysis. MUST screening classified 9.5% of participants (n=73) with moderate risk and 24.7% (n=189) with high risk. The high risk of malnutrition was associated with a LOS >14 days (OR 4.4 95%CI; 2.8-68) and increased mortality (OR 9.1 95%CI; 4.8-17.2); while a moderate risk only with a LOS >14 days (OR 2.05; IC95% 1.1-3.6). The Charlson index (OR1.24; 95% CI 1.02-1.52), to be economically dependent (OR 1.8; 95% CI 1.13-3.17) and living in rural areas (OR 2.0; 95% CI 1.13-3.5) were associated with the presence of a MUST with a high score but not with mortality and hospital stay. No association was found with other variables such as socioeconomic level, support network, type of housing, or polypharmacy with risk of malnutrition, mortality, and LOS.

Conclusions: In geriatric patients with neurological diseases, the moderate and high risk of malnutrition measured with the MUST tool is associated with an increase in LOS and mortality. Factors such as the Charlson index, economic dependence, and residence area are associated with an increased risk of malnutrition.

Conflict of Interest: None.

Keywords: Elderly, Malnutrition, Neurology, Neurosurgery.

P029

Breastfeeding Practices in Mexico during the COVID-19 Pandemic

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Introduction: Breastfeeding is a practice with multiple recognized benefits for both mother and infant. However, numerous circumstances attributable to the health of the infant, the mother, or external circumstances, can negatively affect breastfeeding. In particular, the COVID-19 pandemic could involve several conditions that could affect good breastfeeding practices, both because of the implications of a health emergency and its effects on physical and mental health.

Objectives: To identify breastfeeding practices during the COVID-19 pandemic in México and evaluate its effect on the mental health of breastfeeding women.

Methods: From January to June 2021, Mexican mothers over 18 years of age and with an infant under 12 months were invited through social networks and direct contact to participate by answering an online survey related to breastfeeding practices and mental health and socioeconomic data. Participation was voluntary and with informed consent. Data were analyzed statistically by descriptive methods.

Results: 803 women responded to the survey, with a mean age of 29.9 ± 5.1 years. Seventy percent of infants younger than six months were breastfed, while 83.3% of infants older than six months received complementary feeding. 92.9% of mothers did not change their feeding plan from what they had planned to do due to the pandemic. However, 97.4% mentioned some degree of alteration in their mood and mental health.

Conclusions: These findings indicate that the pandemic did not negatively affect infant feeding practices despite a possible alteration in mothers' moods. It is crucial to reinforce breastfeeding during periods of vulnerability and attend to the mental health of breastfeeding mothers.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: COVID-19, Breastfeeding, Mental health, Online survey.

P030

Food Beliefs and Practices toward the Cure or Prevention of COVID-19 in Adults

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Introduction: Health beliefs constitute a subjective assessment that a person makes about their well-being, safety and health. Since the appearance of COVID-19 and especially before the development of vaccines, the population has sought food for curative or preventive purposes; this could bring benefits to personal well-being, however, the consumption of unknown products or in excess can have serious consequences or harmful effects on health.

Objectives: To describe the beliefs and feeding practices towards the cure or prevention of COVID 19 in adults from Nuevo León, Mexico.

Methods: Descriptive cross-sectional study in adults, between 20 and 59 years old, with different levels of schooling. A self-aplicable survey was carried out both online and in person. For data analysis, descriptive statistics and chi-square tests were performed using SPSS version 21.

Results: 444 participants (45.7% men, 54.3% women) with a mean age of 32.54 ± 11.55 years. 28.8% had basic education studies, 29.1% upper secondary and 42.1% higher education. Regarding beliefs, 18.2% believe that there is some food that helps cure or prevent COVID-19 and also about drinks 16.2%. In relation to beliefs in food and beverages, there were no significant differences ($p > 0.05$). In the practices linked to beliefs, preventively, 15.3% consumed some food and 15.8% some drink; with a significant difference by sex both in the consumption of food ($p=0.032$) and drinks ($p=0.036$). By education groups, no significant differences were obtained ($p=0.926$). The most consumed foods were fruits (orange, pineapple, kiwi) 43.7% and vegetables (lemon, spinach, celery) 20%, and different types of infusions (ginger tea, lemon, chamomile) 51.7%

Conclusions: A sector of the population has been led according to some beliefs about certain foods and beverages to cure or prevent the spread of COVID-19; this with significant differences between men and women; women tend more to use and consumption of food products for prophylactic and medicinal purposes without the influence of the level of schooling.

Conflict of Interest: Absence of conflict of interest.

Keywords: Beliefs, Food practices, COVID-19.

P031**Development of a Metabolic Syndrome and NAFLD Experimental Model through a High-Fat and Fructose Diet**

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Introduction: Metabolic syndrome (MS) and nonalcoholic fatty liver disease (NAFLD) are comorbidities linked to obesity, being MS the main risk factor for NAFLD. The latter can range from hepatic steatosis to non-alcoholic steatohepatitis (NASH) and hepatic fibrosis, which may lead to cirrhosis and hepatocellular carcinogenesis. High levels of fat and fructose in the diet (HFHFr) have been related to the increased incidence of the above-mentioned diseases. Studies in animal models represent a valuable tool to understand the pathophysiological processes associated with these diseases.

Objectives: The aim of this work was to induce SM and NAFLD in Sprague Dawley rats in order to develop an experimental model for the study of these pathologies.

Methods: Two experimental groups, one fed a normocaloric and the other fed an HFHFr diet for 12 weeks. Subsequently, different parameters like body weight, basal metabolic expenditure, insulin resistance, lipid metabolism, and liver morphology were measured.

Results: After the dietetic interventions were conducted, the results of each variable were compared between the experimental group fed the HFHFr diet (E) and the control normocaloric group (C), and in this order we found:

- Higher body weight showed significant differences from the 2nd week of the experiment.
- A greater amount of body fat.
- Higher values of atherogenic index and plasma triglycerides.
- Decreased metabolic rate.
- The higher area under the curve values for the oral glucose tolerance test.

Conclusions: The tested high-energy diet that provides high levels of fat and fructose is adequate for the development of a diet-induced experimental model of obesity and NAFLD, due to its relationship with certain liver and metabolic alterations as a characteristic of MS.

Conflict of Interest: The authors whose names are listed certify that they have NO affiliations with or involvement in any organization or entity with any financial interest.

Keywords: NAFLD, Metabolic syndrome, Insulin resistance, Fat, Fructose.

P032**Nutritional Care Priorities in Mexican Newborns**

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Introduction: In Mexico, it is necessary to identify and address nutritional problems in newborns, such as low birth weight (LBW), macrosomia, small for gestational age (SGA), and large for gestational age (LGA), to reduce the risk of short- and long-term complications.

Objectives: To identify the main nutritional problems at birth in Mexican children and prioritize their attention in order to reduce associated risks in the short and long term.

Methods: With data on weight, length, sex, and gestational age at birth registered in the database of the Information Subsystem on Births in Mexico, the nutritional status of 1,907,341 live newborns in 2017 was evaluated. The anthropometric data of the children were entered into the INTERGROWTH 21st Newborn Size software to obtain percentiles and perform the nutritional diagnoses of SGA and GEG. LBW (<2500 g) and macrosomia (>4000 g) were also evaluated. Once the problems were identified, each one of them was prioritized, using the GEVER method, which includes the dimension of severity, extension, vulnerability, evolution over time, and local impact.

Results: The highest prevalence in newborns in Mexico was GEG (8.7%), followed by SGA with 7.4%, both problems registered a lower prevalence than those in Canada (2018) with 9.5% and 9.1%, respectively. LBW presented a prevalence of 6.3%, similar data were reported in Chile in 2015 (6.2%). When prioritizing the problems that need to be addressed in newborns in Mexico, it was found that the SGAs (36 points) recorded the highest score according to the GEVER method, followed by the GEGs (34 points).

Conclusion: Being born large for gestational age is the main nutritional problem identified in Mexican children, however, SGAs turned out to be the first prioritized problem to be addressed, due to short- and long-term adverse effects.

Conflict of Interest: No conflict of interest.

Keywords: Newborn, Nutritional status, Nutritional disorders, Health priorities.

P033

Patients Admitted to the ICU Diagnosed with COVID-19 Who Received Nutritional Support and Vitamin C in a Private Hospital between the Period of 2020–2021

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Introduction: Vitamin C or ascorbic acid is a water-soluble micronutrient that has an antioxidant role in the human body and takes place in many metabolic processes. During the Covid-19 pandemic, there have been numerous studies with possible benefits of vitamin C supplementation for hospitalized patients diagnosed with Covid-19. Possible benefits could be perceived in the matter of mortality reduction and the possibility of preventing concomitant infections.

Objectives: To characterize patients admitted in the ICU diagnosed with Covid-19 that received nutritional support and Vitamin C supplementation from September 2020 to June 2021 in a private hospital.

Methods: Transversal study in which clinical and nutritional records from 200 patients admitted to the ICU that received supplementation of 1g/day (63%; n=126) and did not receive one (37%; n=74); as well as nutritional support (Oral [OS], Enteral [ES] and Parenteral [PS]) were observed. Demographic and clinical data were analyzed. The present study was approved by the ICU medical staff from the Hospital. Descriptive statistics were employed to present the Results:

Results: 61,5 % were male patients. The average age group was 65±14 years old and the average stay in the ICU was 12±9 days; 64% of patients required mechanical respiratory assistance (MRA) and 29,5 % of patients in the ICU were deceased. 66,5 % received enteral nutrition support and 32% oral nutrition support. 24,6% of the patients that were supplemented with vitamin C deceased compared to 37,8% of the ones that were not supplemented (Chi2 p=0,048); the time of stay in the ICU was slightly higher in supplemented patients (1,4d±1,2 days; t test p=0,303). 62,7% of the patients supplemented with vitamin C required MRA compared to the 66,2% that were not supplemented (Chi2 p=0,617).

Conclusions: Patients that received 1 gram of Vitamin C during their hospital stay in the ICU reported a minor frequency of mortality and respiratory assistance.

Conflict of Interest: MLIS, AFDV, DEICF, and EISF are part of the medical staff at the Santa Julia hospital.

Keywords: Vitamin C, Covid-19, Nutritional support.

P034

Frequency of Non-transmissible Chronic Diseases in Hospitalized Patients with COVID-19 at the ICU from a Private Hospital. Period of 2020–2021

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Introduction: Non-transmissible chronic diseases (NCD) such as obesity (Ob), diabetes mellitus (DM), arterial hypertension (PAH) and chronic obstructive pulmonary disease (COPD) are increasing on a global scale of numbers, and they take a big part in public health matter. During the Covid-19 pandemic, there have been implications that people with one or more of the NCD were particularly affected for being part of the group at risk of developing a more serious course of illness.

Objectives: Determine the frequency of non-transmissible chronic diseases in hospitalized patients diagnosed with Covid-19 admitted to the ICU from a private hospital from September 2020 to June 2021.

Methods: Transversal study. 200 clinical and nutritional records from ICU patients diagnosed with Covid-19 were observed. Demographic, clinical, and anthropometric data were analyzed. The present study was approved by the ICU medical staff from the Hospital. Descriptive statistics were utilized to present the Results:

Results: 61,5% were male patients. The average age group was 65±14 years old and the time of ICU stay was 12±9 days. Average BMI in <60 years old patients was 34,5±8,5kg/m² (Obesity) and in ≥60years old patients (65,5% n=131) the average was 29,6±5,6kg/m² (Overweight). The frequency of NCD was the following: 40,5% PAH; 36,5 % Obesity; 24 % Overweight; 23 % DM and 5,5 % COPD. There has been found that a major percentage of overweight and diabetic patients required mechanical respiratory assistance (MRA), 69,4 % and 69,6 % respectively; thus, higher mobility in COPD, DM, PAH patients were observed. 45,45%; 34,78%; 32,23%; 32,1% respectively.

Conclusions: It was found that from the total of hospitalized patients, a majority of them were overweight; needed more mechanical respiratory assistance and presented an increase of mortality rate in NCD patients.

Conflict of Interest: MLIS, AFDV, DEICF, EISF are part of the medical staff at the Santa Julia hospital.

Palabras Claves: Non-transmissible chronic diseases, Covid-19, Intensive care unit.

P035**Nutritional Screening on Admission in Internal Patients with Different Types of Cancer in a Reference Oncology Institute**

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Introduction: Cancer patients have a high risk of malnutrition due to the characteristics of the underlying disease and the treatments applied. Nutritional screening seeks to identify malnourished patients or patients at risk of malnutrition and promptly initiate the recovery of nutritional status.

Objectives: Characterize the risk of malnutrition upon admission of patients with different types of cancer admitted to the National Cancer Institute (INCAN) in 2021.

Methods: Descriptive study in which 2337 data obtained by the nutrition department of INCAN with respect to nutritional evaluation by different methods of nutritional screening at admission were analyzed. Biochemical parameters total lymphocyte count (LTR), albumin (Ab); weight variation and the risk of malnutrition using the Gomez screening; In addition, demographic and clinical data were evaluated. Descriptive statistics were used for the presentation of Results:

Results: The mean age of the patients was 53±19 years; 50.7% were male. The most frequent cancers were classified as: lower digestive tract (19.8%); hematologic (16%) and cervix (12.7%). The median hospitalization was 5(p25 2-p7510). At admission, patients present an average RTL dosage (n=1825) 1320±875ml (moderate malnutrition); Ab (n=79) 3.15±0.8g/dl (Mild malnutrition); the median weight change (n=1268) was 12.3(p25 6.7-p7527.6) (severe weight loss). 92.7% are at risk of malnutrition according to the Gómez screening (n=1826). The RTL was lower in cancers of the upper digestive tract and associated glands; Ab dosage was lower in adjoining and gynecological glands, and weight loss was greater in adjoining glands and in the lower and upper digestive tract.

Conclusions: Almost all patients were at risk of malnutrition, and a high percentage of malnutrition and weight loss was observed in patients at the time of admission, coinciding with the literature and demonstrating the importance of early nutritional support at the time of hospitalization.

Conflict of Interest: The INCAN health team was in charge of data collection and digitization, but not of the processing of the results to reduce any type of bias and interpretation.

Keywords: Nutritional evaluation, Cancer, Inpatients, Hospitalization.

P036**Grip Strength on Admission in Patients Intermitted with Different Types of Cancer in a Reference Oncology Institute**

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Introduction: Grip strength (FA) is an indicator of muscle mass. Low AF is related to higher mortality, morbidity, complications, hospital stay, poorer response to treatment, and others, hence the importance of its evaluation at hospital admission in cancer patients.

Objectives: Characterize the composition of muscle mass by dynamometry in patients admitted to the National Cancer Institute (INCAN) at the time of admission.

Methods: A descriptive study in which 200 data obtained by the nutrition department at the time of hospital admission of adult cancer patients to INCAN were analyzed. Demographic, clinical and anthropometric data were analyzed. Pressure force was evaluated in triplicate with dynamometry as an indicator of muscle mass; a decreased grip strength was considered <30Kg in men and <20Kg in women. Descriptive statistics were used for the presentation of results

Results: The mean age of the patients was 55.5±14.2 years; 52.5% were male. The most frequent cancers were classified as: the lower digestive tract (29.5%); upper digestive tract (17.0%) and cervix (13%). At admission, the patients presented a median weight change (n=187) of 14.40% (p25 8.8-p75 22.10) (severe weight loss); All patients were at risk of malnutrition according to the Gómez screening. The average muscle strength in men was 20.3±9.9kg and in women 12.1±5.6kg, both parameters considered "decreased". Decreased AF in men was 84.8% and in women it is 93.7% AF is similar when differentiating by type of cancer in men and women, except for those women with breast cancer was even lower than the rest.

Conclusions: Cancer patients have decreased grip strength which could have negative consequences on their health and treatment.

Conflict of Interest: The INCAN health team was in charge of data collection and digitization, but not of the processing of the results to reduce any type of bias and interpretation.

Keywords: Grip strength, Cancer, Inpatients, Hospitalization.

P037

Polymorphisms rs9282541-ABCA1 and rs1801282-PPAR Gamma Genes and Their Relationship with Serum Lipid Profile in Adult Women from Northeastern Mexico

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Introduction: Genetic polymorphisms can be used as biomarkers for the early diagnosis of cardiovascular diseases (CVD). Among the polymorphisms related to these alterations, some described in the ABCA1 and PPAR gamma genes, are associated with different conditions: high serum lipid levels, adipogenesis, obesity, and insulin sensitivity. Such associations are described today, for European populations.

Objective: To evaluate the association between rs9282541-ABCA1 and rs1801282-PPAR gamma polymorphisms with serum lipid levels in a population of adult Mexican women.

Methods: 242 women (18 and 50 years of age), residents of Monterrey, Nuevo León and México, were included in this study. After signing informed consent, the women underwent anthropometric and body composition measurements; fasting blood was also used to determine the serum lipid profile and to DNA extraction, following standardized protocols. Genotyping was performed by Real-Time PCR using TaqMan probes. Linear regression was used to analyze the association between the mentioned variables.

Results: The median age of the total population was 25 years; the median fat mass (percentage) was 39.4% and 50.8% of participants had decreased serum HDL levels (<50 mg/dL). With respect to the genetic analysis, we found that minor allele frequency was 0.059 and 0.098 for rs1801282-G and rs9282541-A polymorphisms, respectively. The linear regression analysis shown negative associations of rs9282541-ABCA1 with weight ($p = 0.041$), percentage of fat ($p = 0.020$), triglycerides ($p = 0.045$), HDL ($p = 0.028$) and VLDL ($p = 0.045$). No statistically significant associations were observed with rs1805192-PPAR gamma.

Conclusions: In women from northeastern Mexico there is a high proportion of subjects with metabolic alterations. The rs9282541-ABCA1 could be used as a biomarker of alterations related to the lipid profile; however, studies that replicate these findings are required.

Conflict of Interest: The authors declare that they have no conflict of interests

Keywords: Polymorphisms, ABCA1, PPAR gamma, HDL.

P038

Intake and Adequacy of Macro and Micronutrients in First-Time College Students

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Introduction: An adequate intake of macro and micronutrients has been associated with a better state of health; therefore, it is important to evaluate the intake of nutrients during the different stages of people's lives as it allows for identifying possible nutritional imbalances. A population that has become relevant to be studied are university students because it has been shown that their eating habits acquired at this stage are maintained during adulthood, however, they are a population at high risk of inadequate nutrient intake because they tend to skip mealtimes, buy low quality food or restrict the consumption of certain types of food as a result of the changes experienced during this period.

Objectives: To evaluate and compare the intake of macro and micronutrients with the daily requirements established for the Mexican population in first-time university students at three different times during the first semester.

Methods: A longitudinal observational descriptive study was performed on 35 first-semester medical students. Macro and micronutrient intakes were obtained from R24 reminders during three moments in the semester, analyzed with Nutrimind software, and compared with the daily nutrient intake recommendations for the Mexican population.

Results: It was identified that women and men had intakes of carbohydrates ($M = \geq 50\%$ and $H = \geq 70\%$) and proteins ($M = \geq 35\%$ and $H = \geq 25\%$) higher than the RDI and lipids ($\geq 20\%$) in the men's group, however, no statistically significant differences in macro-nutrient intake were found between the three stages. Micronutrient intake in both groups was inadequate as they presented high vitamin intake ($M = > 100\%$ and $H = > 20\%$) and poor mineral intake (M and $H = \leq 70\%$) in the semester.

Conclusions: The results showed that there is an inadequate intake and if it continues this way it can become a serious problem having important consequences on their health in the long term. Strategies must be implemented to help students improve their nutrition to complete their requirements.

Conflict of Interest: None

Keywords: Intake, Nutrients, RDI, Students.

P039

Risk Factors for Obesity in Schoolchildren in a Public School in Quindío, Colombia

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Introduction: Obesity is a chronic, non-communicable disease, very frequent and a trigger for other diseases; it is multi-causal, mainly derived from unhealthy lifestyles, such as little physical activity and inadequate nutrition. It is important to make diagnoses to prevent it from school age.

Objectives: To identify risk factors for obesity in schoolchildren in a public educational institution.

Methods: Quantitative, descriptive, longitudinal study. A survey on eating habits and physical activity was conducted among 150 students in fourth, fifth, and sixth grades, after signing informed consent and assent forms. The data obtained were analyzed using the SPSS program V25.

Results: Schoolchildren 150, from 9 to 16 years old, 53% male and 47% female. 13.3% perceive that it has a lot of weight, being greater in girls (7.3%). 68% perform moderate physical activity, of this percentage, 47.3% do it one hour a week. 30% four or more times and 22.7% between two and three times during the last week. 32% of schoolchildren devote most or all of their free time to activities that require little physical exertion. 36% eat three meals a day, corresponding to breakfast, lunch, and dinner, while 63.3% eat four to six meals a day, with 54% of them eating the “in-between meals” the most. They buy packaged products at the school store, 41.7%. 74% receive school snacks, of which 51.3% receive them every day. 7.2% of these do not consume it at school and prefer to take it home, and 2.1% repeat snacks. 54% of schoolchildren who receive snacks also buy them at the school store.

Conclusions: The high consumption of packaged products purchased at the school store, together with the simultaneous intake of snacks and purchases at the store, as well as the habit of between-meal snacking and low physical activity, become the main risk factors for obesity in students. So educational interventions are needed at school and at home to prevent obesity and treat those who suffer from it.

Conflict of Interest: This work has been funded by Minciencias, through the Scientific Ecosystem component of the Scientific Colombia Program. (NanoBioCancer Alliance Cod. FP44842-211-2018, Project No. 58703).

Keywords: Obesity, Physical activity, Nutrition, Noncommunicable chronic diseases, Children and adolescents.

P040

Approaches to the Analysis of the Relationship between Maternal Anguish and Diet Quality in Mexican Schoolchildren during the COVID-19 Pandemic

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Introduction: Maternal anguish (MA) increased during the COVID-19 pandemic. Diet quality (DQ) is determined by environmental, cultural, social, emotional, and psychological circumstances. Motherhood is an understudied social-nutritional indicator that reflects household food practices and is associated with the nutritional status of children.

Objective: To analyze the relationship between mothers' MA and DQ in school-aged children during the COVID-19 contingency.

Methods: Cross-sectional, exploratory study. A remote survey was administered via Google Forms, including the COVID-19 Peritraumatic Distress Index (CPDI) to assess MA. Habitual family food consumption was obtained by a food frequency questionnaire. DQ was assessed using the Healthy Eating Index (HEI).

Results: From a total of 267 families, all mothers were assessed for MA, and 223 children for DQ. Ninety-seven percent of mothers lived with MA during the COVID-19 contingency. Mothers of children in the lowest quartile of the HEI had the highest MA. MA was inversely related to schoolchildren's DQ ($r=-0.14$, $p=0.036$).

Conclusions: During the COVID-19 pandemic, low DQ of these children was associated with higher MA. Population-based interventions to improve DC in schoolchildren should include strategies to improve the mental health of mothers.

Keywords: Maternal anguish, Diet quality, Mothers, Schoolchildren, COVID-19.

P041

Analysis of Characteristics, Costs, Food Intake and Satisfaction of Patients Receiving Neutropenic Diet

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Introduction: Feeding plays a therapeutic role in the hospitalized patient, being this an integral part of the recovery process. However, the modification of food in aspects such as preparation, variety and quantity, can negatively impact the real food intake of

patients. It has been documented that patients on a strict neutro-
penic diet have a lower food intake than those on more flexible
diets.

Objectives: To analyze the management of characteristics,
costs, food intake and satisfaction in patients receiving a neutro-
penic diet in 5 hospital and clinical food services in the city of
Medellín.

Methods: Quantitative, descriptive, and cross-sectional study
with exploratory elements. 5 hospitals of high complexity level in
Medellín were included, in which the characteristics of the neutro-
penic diet, costs, food intake and satisfaction were evaluated.

Results: In 100% (5/5) of the institutions, the neutro-
penic diet was characterized by being divided into 5 feeding times, with the
inclusion of some food groups with some level of modification or
restriction, as in the case of foods of animal origin (meat, dairy
products, cheese, and eggs), fruits and vegetables, water and other
beverages.

Compared to the normal diet, the neutro-
penic diet did not represent differences in cost in 60% (3/5) of the institutions. Regarding
the food intake, 69% (16/23) of the patients reported a consump-
tion of the food offered equal or higher than 75%; no patient
reported insufficient intakes (less than or equal to 25%). Most of
the patients, 82% (19/23) have an overall positive assessment of the
services provided by the hospital food service.

Conclusions: The preliminary data from this study show that
current neutro-
penic patterns are increasingly more flexible in
terms of types of food and preparations; which positively impacts
patient acceptance and costs for the food service.

Conflict of Interest: The authors state that they have no con-
flict of interest with the development of the project or with the par-
ties involved in the study.

Keywords: Hospital Food Service, Diet therapy, Neutropenia,
Nutrition, Food and diet.

P042

Evaluation of Circadian Rhythm and Cardiovascular Risk Factors in Young Mexican Adults

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Introduction: Metabolic syndrome (MS) is defined as the pres-
ence of 3 of 5 metabolic risk factors, it promotes the development
of diseases such as diabetes mellitus 2 (DM2) and cardiovascular
diseases (CVD). The circadian rhythm is an endogenous time
measurement system, genes and proteins participate and there are
adjusted by the light-dark cycles, this process allows multiple
organisms to maintain themselves in physiological terms. Studies
link the circadian clock machinery with metabolic dysfunctions.
Therefore, the concept of “circadian syndrome” has recently been
proposed, which includes the role of the circadian system in the
diagnostic components of metabolic syndrome.

Objectives: To determine alterations in the circadian rhythm
and to evaluate its relationship with the components of the meta-
bolic syndrome in young adults.

Methods: A cross-sectional study was conducted with 96
young men and women over 18 years of age. Weight, height, waist
and hip circumference, and body composition were determined.
A blood sample was taken after 12-h fast to determine levels of
glucose, total cholesterol, HDL, LDL, triglycerides, and insulin.
The HOMA-IR index was calculated to determine insulin resis-
tance. Sleep and eating habits were evaluated, including mealtimes
for breakfast, lunch, and dinner.

Results: A prevalence of MS of 19% was found in the study
population, the most predominant component was low HDL
(72%) and high triglycerides ≥ 150 mg/dL (30%). The time of going
to bed was negatively associated with HDL levels, according to
mealtimes, breakfast time was negatively associated with the
HOMA-IR index.

Conclusions: These results provide a contribution to the study
of the etiology of MS and a clinical platform for the prevention and
intervention of a variety of non-communicable diseases.

Conflict of Interest: The authors have no conflicts of interest
to declare.

Keywords: Circadian rhythm, Metabolic syndrome, Young
people.

P043

Assessment of the Nutritional Status and Level of Physical Activity in Children with a Diagnosis of Oncology

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Introduction: The assessment of nutritional status is essential
in pediatric oncologic patients, because if it deteriorates there are
more complications. In addition, physical activity is protective
against the occurrence of cancer, and it has been observed that it
can reduce mortality in relapses; that is why the nutritional status
and physical activity of cancer patients should be assessed at the
time of diagnosis and during treatment.

Objectives: To Assess the nutritional status and level of physi-
cal activity of pediatric patients diagnosed with cancer.

Methods: Cross-sectional study, where the nutritional status
was assessed with z-score of the indicator: body mass index for age
(BMI/E) and the level of physical activity (PA) was determined
with the questionnaires: Physical Activity Questionnaire for Older
Children (PAQ-C) and Adolescents (PAQ-A). The statistical anal-
ysis used for quantitative variables was Student's *t* test for indepen-
dent samples, and Chi² test to compare proportions.

Results: 141 children with a mean age of 10.8 ± 3.9 years were included, 51.1% were men, according to the type of tumor 65.2% were leukemias and 34.8% were solid tumors; 75.9% were outpatients and 24.1% were hospitalized. 45.4% had a normal nutritional status, 12.1% had mild acute malnutrition, 2.8% had moderate malnutrition and 6.4% had severe malnutrition, 27% were overweight and 6.4% were children with obesity. Regarding the PA level, 89.4% of the children had a low level and only 10.6% had a moderate level. When analyzing the PA level by diagnostic stratum, 85.9% of leukemias had a low level, and 95.9% of solid tumors had a low level; and when analyzing it by type of patient, 88.8% of the outpatients had a low level and only 11.2% had a moderate level, compared to hospitalized patients, 91.2% had a low level of PA and 8.8% a moderate level.

Conclusions: Most of the patients (89.4%) had a low PA level and 54.6% of the population presented malnutrition.

Conflict of Interest: There is no conflict of interest on the part of the authors.

Keywords: Physical activity, Oncology, Children, Nutrition.

P044

Dietary Intake and Docosahexaenoic Acid Levels in Membrane Erythrocytes of Pregnant Women

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Introduction: Docosahexaenoic acid (DHA) plays an important role in infant growth and development, especially during the first postnatal months when there is a period of rapid brain growth. Accumulation of DHA in the brain during the fetal stage depends mainly on dietary sources, therefore, infant DHA stores are largely determined by the mother's dietary DHA supply.

Objectives: To evaluate the dietary intake and levels of docosahexaenoic acid in the erythrocyte membrane of pregnant women.

Methods: A cross-sectional, comparative, and observational study was carried out in pregnant women who were in the age range of 18 to 35 years, with less than 14 weeks of gestation, who were evaluated for dietary intake and levels of DHA in the membrane of erythrocyte Blood samples underwent quantitative

analysis of fatty acid composition by gas chromatography, while for dietary assessment 3 24-hour recalls were analyzed in Nutritionist Pro™ Diet Analysis Software.

Results: According to the dietary intake, the women obtained a consumption of 0.095g/day (95% CI: 0.039 - 0.150) of DHA and in the erythrocyte membrane the concentration of DHA was observed to be a mean of 1.5% (95% CI: 1.012 - 1.991), when dietary intake and the concentration of DHA in the erythrocyte membrane were correlated, a higher concentration dependent on higher dietary intake of DHA was observed, this relationship was 56% ($p=0.02$).

Conclusion: According to the results, a positive correlation was observed between dietary intake and erythrocyte membrane DHA concentration in pregnant women, however, both dietary and erythrocyte membrane concentrations are low, in accordance with the recommended daily intake.

Conflict of Interest: The authors have no conflicts of interest to declare.

Keywords: Polyunsaturated fatty acids, Pregnancy, Diet, Eating habits.

P045

Impact of Lipid Metabolism on Inflammatory Cytokines in Panama Adults

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Introduction: In the Health and Nutrition Survey of Panama 2019 (ENSPA, 2019) a prevalence of hypercholesterolemia at 39%, hypertriglyceridemia at 38%, 35% with HDL cholesterol below protective values and 22% elevated LDL was observed. These values accompany the increased prevalence of chronic diseases, expressed through immunological alterations associated with increased secretion of proinflammatory cytokines, generating cardiovascular risk and decreasing quality of life.

General objective: To evaluate the relationship of the inflammatory process according to the metabolic alteration of blood lipids in adults from Panama.

Methods: Pilot, analytical, cross-sectional, quantitative study. 41 adults of 43% men and 57% women between 30 and 69 years old, from Panama and Western Panama, signed consent through non-probabilistic convenience sampling. People with gestational diabetes and inflammatory, autoimmune, intestinal, immunosuppressed, and antibiotic treatment were excluded. Interleukin 6 (IL6) and 1 (IL1), Tumor Necrosis Factor alpha (TNF alpha), and C-Reactive Protein (CRP) levels were evaluated by real-time mRNA expression. The lipid profile was evaluated by enzymatic, colorimetric method, the endpoint with Tindler reaction (Cholesterol (cholesterol), HDL Cholesterol (HDLc), LDL cholesterol (LDLc), Triglycerides (Tg) and atherogenic index (IAt). Chi2 and Spearman's correlation.

Results: 67%, 3%, 36%, and 39% respectively presented values of TNF, CRP, IL1b and IL6b indicating high inflammation. 61% and 64% had Tg and IAt above normal. 30% had

hypercholesterolemia 36% had cHDL below the recommended level and 50% had cLDL above it. A significant relationship (at 10%/5%) was found between Tgs and TNF alpha levels (54% with inflammation and Tg above normal $p=0.059$), with the levels of IL1 (43% with inflammation and elevated Tg $p=0.038$) and IL6 (40% with inflammation and elevated Tg $p=0.037$).

Conclusions: The lipid level is altered in more than $\frac{1}{4}$ of the population, generating an increase in inflammatory cytokines. A relationship was found between the inflammatory process and blood triglyceride levels.

Conflict of Interest: The study was carried out without conflict of interest.

Keywords: Cytokines, Blood lipids, Inflammation, Chronic diseases.

P046

Cognitive Frailty, Food Insecurity and Quality of Food Consumption in Older Adults in Two Regions of Mexico

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Introduction: Worldwide, people have a life expectancy ≥ 60 years of age, understood as a public health success. However, there are challenges with the gradual loss of capabilities that, when not detected early, would contribute to lower well-being and quality of life in older adults (OA).

Accelerated deterioration increases with the economic precariousness that OA tend to maintain, which makes it difficult to access a healthy diet, and therefore live with food insecurity (FI). There are nutritional factors associated with the presence of cognitive frailty (frailty + mild cognitive impairment).

Objective: To characterize OA residents in two Mexican regions, based on cognitive frailty (CF) in relation to FI and quality of food consumption (QFC).

Method: Exploratory study, cross-sectional and comparative design. Non-probabilistic sample, made up of OA from the northern (La Paz, BCS) and western (Ciudad Guzmán, JAL) regions of Mexico. After obtaining consent and evaluating the criteria, 43 AM (63%, Ciudad Guzmán) who completed the study were included. Through the application of questionnaires, a clinical evaluation was made, identification of levels of CF and QFC, and the degree of frailty and cognition. The data analyzes were made using descriptive and correlational statistics.

Results: In sociodemographic, clinical, lifestyle and FI variables, there were no significant differences between the OA of both regions. The QFC was lower in OA of Ciudad Guzmán, mediated by reduced intake of fish, high intake of polyunsaturated fats and red meat vs OA of La Paz. There was a higher prevalence of CF in OA de Guzmán (90.9%) vs La Paz (9.1%). When comparing OA with CF vs OA without CF (regardless of geographical area), there was a greater tendency for FI; less trend in consumption of fruits, fats and white meats ($p>0.05$) and inadequate consumption of vegetables, fish and preparations outside the home ($p<0.05$).

Conclusions: A relationship between CF with lower QFC in the participating OA is suggested, mediated by adequate intakes of preparations outside the home, vegetables, and fish, the latter favored in La Paz, a coastal town in Mexico. It seems that FI occurs regardless of the geographical area of the evaluated OA.

Conflicts of Interest: There is no conflict of interest.

Keywords: Cognitive frailty, Food insecurity, Quality of food consumption, Older adults.

P047

The Consumption of Ultra-Processed Foods and Its Relationship with SFRP5 Protein Levels and Metabolic Syndrome in School-Aged Children

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Introduction: In Mexico, 33.2% of children suffer from overweight or obesity. One of the related factors may be the consumption of Ultra Processed Foods (UPF), these foods are industrial preparations with high content of additives, high energy density, and high content of fats, sugars, and sodium. The anti-inflammatory adipokine SFRP5 is altered in models of obesity, and type 2 diabetes and decreased in patients with high-fat diets.

Objective: To evaluate the relationship between Ultra Processed Foods (UPF) and SFRP5 protein levels in school children.

Methods: 196 children from 7 public schools of the SEP were evaluated. Questionnaires of general data, vital signs, food preferences, anthropometry, dietary assessment, sleep hours, and frequency of UPF consumption were applied. A 3ml fasting blood sample was taken for lipid profile and glucose determination by conventional methods; as well as for subsequent quantification of SFRP5 protein by ELISA.

Results: 16% of the children presented overweight and 25% obesity, these children presented a significantly higher percentage of acanthosis nigricans ($\text{Chi}^2=31.9$, $p<0.0001$). High Z values for BMI were associated with elevated triglyceride levels ($R=0.32$, $p<0.05$); soft drink consumption was positively associated with waist circumference ($R=0.23$, $p<0.05$) and abdominal circumference ($R=0.022$, $p<0.05$). When evaluating the relationship between UPF consumption and SFRP5 adipokine levels and correcting for age in a regression model, UPF consumption in children aged 11 to 12 years was inversely associated with SFRP5 adipokine levels (adjusted $R=0.84$, $p<0.05$).

Conclusions: Children who are obese or overweight present acanthosis nigricans; the higher the Z value for BMI, the higher the triglyceride levels; soft drink consumption in these children significantly determines their body composition. The consumption of UPF is higher in children aged 11 years and older and high consumption of these significantly decreases the levels of the adipokine SFRP5, which may predispose to a higher risk of later metabolic alterations.

Conflict of Interest: none.

Keywords: SFRP5 adipokine, School children, Ultra processed foods.

P048

Correlation of Oxidant/Antioxidant Biomarkers with Sucrose Consumption in Women with Gestational Diabetes

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Introduction: Gestational diabetes (GD) is defined as a metabolic disorder due to resistance or decreased sensitivity to the action of insulin, which produces maternal hyperglycemia diagnosed during pregnancy. Simple carbohydrates such as sucrose are the macronutrients that have the greatest impact on blood glucose. Various factors such as diet can influence an imbalance between oxidants such as reactive oxygen species (ROS) and antioxidants. Redox imbalance can further aggravate insulin resistance in GD and have potentially deleterious effects on the health of the maternal-fetal binomial in the short and long term.

Objectives: Correlate between oxidant/antioxidant biomarkers with sucrose consumption in pregnant women with GD.

Methods: This analytical, prospective, cross-sectional and correlational study was performed with 21 clinically healthy pregnant women from the control group without gestational diabetes (CGWGD) and 21 with gestational diabetes diagnosis of (GDDG), between the ages of 18 and 41, and 22 at 34 weeks of gestation. A pre-gestational BMI < 30, who signed the informed consent, a clinical history questionnaire, the 24-hour Reminder (R-24), body weight, height, capillary glucose, glycaemia, total cholesterol, triglycerides, catalase, superoxide dismutase (SOD) and total antioxidant capacity (TAC) are obtained using the serum.

Results: Sucrose consumption/day was significantly higher ($p < 0.028$) in the CGWGD. There is a positive correlation between the consumption of sucrose and the blood glucose levels of the groups ($p < 0.012$). Statistical significance correlation ($p < 0.029$) was found for sucrose consumption in GDDG with CAT, with kcal/day ($P < 0.002$), with HCO ($P < 0.003$) and with proteins ($p < 0.008$).

Conclusions: The consumption of sucrose influences the total antioxidant capacity (TAC) in women with GD.

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this abstract.

Keywords: Gestational diabetes, Sucrose, Oxidative stress, Antioxidant, Diet.

P049

Relationship between the Bone Diameters and Adiposity Adjusted by Gender, Age and Nutritional Status in Children and Adolescents

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Introduction: Skeletal dimensions may play an important role in the magnitude of individual adiposity. Some authors have proposed that the dimensions of bone structures have a direct correlation with the amount of body fat in adolescents and adults; however, in studies carried out on schoolchildren, this hypothesis is not confirmed.

Objective: Evaluate the relationship between bone diameters and adiposity in schoolchildren and adolescents.

Material and Methods: This cross-sectional study was carried out in 341 students 6-12 years old; 51.3% were females. Anthropometry: weight, height; bone diameters (elbow, wrist, biacromial, bicristal, bitrochanteric, and femoral); and skinfolds (triceps, subscapular, thigh and calf). Adiposity was calculated by Slaughter's equation. Statistics: t-test for independent samples, one-way ANOVA, Pearson's correlations and multiple linear regressions. A written informed consent letter was requested.

Results: Mean age was 111.2 ± 22.8 months, 51.3% were girls. Significant differences were found in the elbow, biacromial, bitrochanteric, and femoral bone diameters by gender. The comparison of six bone diameters according to age groups resulted in significant differences ($p < 0.001$) with higher values in the group of 9 to 12 years. Adiposity showed no statistical difference by gender. Children with greater adiposity had higher values of the six bone diameters. The bicristal and bitrochanteric diameters showed a stronger correlation with adiposity ($r = 0.76$ and $r = 0.75$, respectively) and the determination coefficient, R^2 , was 0.57 and 0.56, respectively as independent variables. In a multiple regression model, the value increased to 0.66 with the inclusion of bicristal and biacromial diameters and age as intervening variables in girls. In boys, the value increased to 0.70 with bitrochanteric diameter and age, and to 0.72 with bicristal diameter and age. Increase of prediction with age as the intervening variable was 9% in girls and 15% in boys.

Conclusions: The correlation of skeletal diameters with body fat percentage in both sexes was demonstrated. The results suggest that bicristal and bitrochanteric diameters should be considered in the evaluation of adiposity and in the diagnosis of overweight and obesity, especially in those children and adolescents with bone diameters values higher than reference values for age.

Conflict interest: The authors report no conflict of interest.

Keywords: Bones breadth, Adiposity, Nutritional status, Childhood, Adolescents.

P050**Adherence to the Mediterranean Diet during an Intervention for the Prevention of Childhood Obesity: Preliminary Results from the MELIPOP Study**

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Introduction: Eating habits are created early in life and maintained throughout adulthood. The adoption of a Mediterranean lifestyle could prevent the onset of obesity and its co-morbidities.

Objectives: To assess the efficacy of an intervention based on the promotion of a Mediterranean dietary pattern and regular physical activity, compared to a control group, on adherence to the Mediterranean dietary pattern 12 months after the start of the intervention.

Methods: The MELIPOP study is a randomised clinical trial conducted in Cordoba, Santiago de Compostela, and Zaragoza. A total of 293 children aged 3-6 years were contacted. After a run-in period, baseline measurements were performed in 162 children, who were subsequently randomised. To date, 66 children have been followed up for 12 months in the usual care control group and 57 in the Mediterranean lifestyle intervention group. Adherence to the Mediterranean diet was assessed using an 18-item questionnaire adapted from the PREDIMED study; the child's eating pattern was considered adherent when the score was ≥ 14 and non-adherent when the score was ≤ 13 points. Imputations of the scores were performed. Chi-square tests were used to assess changes in the Mediterranean eating pattern. All analyses were performed in SPSS.

Results: Baseline adherence was similar in both sexes. 40.9% of participants assigned to the intervention group showed an improvement in adherence ($N=27$, $p=0.023$). Similarly, 8 children in the control group improved their eating pattern ($p \leq 0.001$) after 1 year of participation. Differences in adherence to the Mediterranean diet between groups were also statistically significant ($p \leq 0.001$).

Conclusions: Preliminary results of the intervention study based on a Mediterranean eating pattern together with regular physical activity show improvement after early intervention in children and their families.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Obesity, Childhood, Mediterranean diet, Adherence, Physical activity.

P051**Does the Type of Breastfeeding and Polyamine Content in Human Milk Influence Infant Anthropometric Parameters?**

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Introduction: Food choices during the first months of life are decisive for infant growth. Polyamines are involved in cell proliferation and differentiation, and their metabolism is reported to play an important role in adipogenesis. In addition, it should highlight that human milk is the first source of polyamines for infants.

Objective: The aim of this work was to study whether the type of breastfeeding received and the polyamine intake from human milk influences infant anthropometric parameters.

Methods: A cohort of 78 healthy full-term infants who were breastfed fully ($n=55$) or partially ($n=23$) was followed during the first four months of life. Anthropometric measurements were performed at 2 and 4 months, when human milk samples were collected for polyamine content analysis by UHPLC-FL (Latorre-Moratalla et al., 2009). To estimate polyamine intake, a daily consumption of 800 ml of human milk was assumed in fully breastfed infants, and 400 ml of human milk plus 400 ml of infant formula in those who were partially breastfed.

Results: Compared to partially breastfed infants, those who were fully breastfed had a better anthropometric profile ($p < 0.05$) and a significantly higher polyamine intake (up to 53% higher). Only two of the 15 anthropometric indicators evaluated (tricipital skinfold and mid-arm circumference) showed an inverse association with polyamine content in human milk and its intake ($p < 0.05$).

Conclusions: The growth and body composition of infants differed according to the type of breastfeeding received. The weak association found between polyamine intake and anthropometric parameters precludes reaching a conclusion about the correlation between these factors.

Conflict of Interest: We declare no conflict of interest

Keywords: Polyamines, Human milk, Breastfeeding, Infant growth.

P052

Dysbiosis of the Intestinal Microbiota in Patients with Histamine Intolerance

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Introduction: Histamine intolerance arises from an inadequate degradation of dietary histamine in the intestines due to impaired activity of the enzyme diamine oxidase (DAO) and the subsequent increase in histamine absorption. It has recently been proposed that alterations in the intestinal microbiota could be an underlying cause of this food intolerance.

Objectives: The aim of this study was to characterize the composition of the intestinal microbiota of patients with symptoms of histamine intolerance and compare it with that of healthy individuals.

Methods: The composition of the intestinal microbiota of 12 patients with histamine intolerance and 14 healthy individuals (control) was studied by sequencing bacterial 16S rRNA genes (V3-V4 region) and performing a similarity search against the EzBioCloud database.

Results: Individuals with histamine intolerance had an altered gut microbiota composition compared to the control group, with a significantly higher abundance of histamine-producing bacteria, including members of the *Staphylococcus* and *Proteus* genera, several genera belonging to the *Enterobacteriaceae* family, and the species *Clostridium perfringens* and *Enterococcus faecalis*. A greater prevalence of this type of bacteria would favor the accumulation of histamine in the intestine, its subsequent absorption, and the appearance of adverse effects related to histamine intolerance. In addition, the histamine intolerance group also showed a significantly lower relative abundance of *Prevotellaceae*, *Ruminococcus*, *Faecalibacterium*, and *Faecalibacterium prausnitzii*, bacteria frequently associated with good gut health.

Conclusions: Dysbiosis of the intestinal microbiota was observed in patients with histamine intolerance compared to healthy individuals, characterized mainly by a greater abundance of histamine-producing bacteria. Dysbiosis can also cause inflammation of the intestinal mucosa, a condition that would impair the functionality of the DAO enzyme.

Conflict of Interest: No conflict of interest.

Keywords: Histamine, Histamine intolerance, Diamine oxidase (DAO), Intestinal microbiota, Intestinal dysbiosis, Histamine-producing bacteria.

P053

Association of Body Mass Index with Disease Progression in Multiple Sclerosis Patients

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Introduction: The role of nutrition and dietary habits in the onset, course, and progression of multiple sclerosis (MS) has been evaluated by current evidence-based research. However, the influence of body mass index (BMI) on the disability status of MS patients has been barely addressed.

Objectives: This study aimed to evaluate the association between body mass index and the disability status of patients presenting relapsing-remitting (RR), and progressive (PR) MS forms according to their age and gender.

Methods: This work used a cross-sectional observational design. Demographic data (age and sex), clinical variables (MS type, duration of the disease), and anthropometric measurements (weight and height) were collected at the beginning of the study. The Expanded Disability Status Scale (EDSS) was used to evaluate neurological impairment. This study is a continuation of a placebo-controlled nutritional intervention that evaluated the effectiveness of antioxidant dietary supplementation on inflammatory markers of patients with different clinical subtypes of multiple sclerosis.

Results: A total of 35 participants were classified according to MS presentations in relapsing-remitting (n=14; 6 females), and progressive (n=21; 14 females) groups. The mean age of the participants was 47.50 ± 7.81 and 51.18 ± 9.72 years for RR and PR MS presentations, respectively. BMI values were within ordinary ranges in both groups, 24.35 ± 4.07 (p<0.01) and 23.72 ± 3.48 (p<0.01). EDSS mean scores were superior for the PR group (7, p<0.01) in comparison to the RR group (5, p<0.01) whilst significant statistical differences were found between groups (p<0.00). There were no statistically significant differences in BMI and EDSS values associated with demographic data, age, and sex. The comparison between BMI means scores and the EDSS disability scores produced positive and moderate associations (r=0.367, p=0.092) in the PR group.

Conclusions: The results showed that the body mass index and disability status were not associated with the demographic characteristics of patients. The neurological disability was correlated with higher BMI values in patients suffering the progressive forms of multiple sclerosis. These findings suggest that there is insufficient evidence to determine the influence of body mass index on the disability status and disease progression of multiple sclerosis patients.

Conflict of Interest: The authors declare no conflicts of interest associated with this publication.

Keywords: Body Mass Index, Disability status, Multiple sclerosis, Malnutrition, Disease progression.

P054

Prevalence of Food Insecurity in Vulnerable Households in the Colombian Caribbean in Times of COVID-19

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Introduction: According to the National Survey of nutrition (2015), 54.2% of the Colombian population were in food insecurity: 31.9% mild, 13.8% moderate and 8.5% severe. The COVID-19 pandemic generated repercussions on food value chains from a comprehensive and broad perspective. In the face of the COVID-19 pandemic, governments undertook actions to contain the spread of the virus, prevent mortality and meet the needs of the population. With the pandemic, there was job loss and a decrease in income, mainly among workers in the informal sector and poor communities.

Objectives: Determine the prevalence of food insecurity in vulnerable households in the Colombian Caribbean in times of COVID- 19.

Methods: Descriptive cross-sectional study, conducted between April 2020 and November 2021, on 364 vulnerable households in the Colombian Caribbean, selected by It was carried non-probabilistic and non-random sampling was carried out, having as criteria the ease of access, the availability of people to be part of the sample in municipalities of the Colombian Caribbean, to conduct brief telephone surveys to know sociodemographic data, and measure Food Safety using the Food Insecurity Experience Scale (FIES).

Results: 20,05% of the sample was found in food safety; while 79,95% presented food insecurity: mild 28,85 %, moderate 26,92 % and 24,18 % severe; 80,1% worried about not having enough food to eat, 59,07 % did not consume a variety of foods, 60,71 did not eat healthy foods due to lack of money. Regarding occupation, only 24% of the population stated that they were formally employed, 31% were employed as independent workers, 13% were engaged in various trades and 32% of the population were unemployed and were students or housewives. a house that received no income

The strength of association of these variables was demonstrated using ODDS RATIO and confidence intervals, with p: 0.000 values according to chi-square test.

Conclusions: The prevalence and severity of food insecurity for these families increased not only because of the COVID-19 pandemic but also because of their precarious income situation, reflected in the loss of access to healthy and nutritious food, diversity, quality, and amount of food consumed.

Conflict of Interest: The authors belong to the Metropolitan University

Keywords: Food insecurity, COVID 19, Vulnerable households.

P055

Calcium and Vitamin D: Relationship between Consumption and Excess Weight in Urban Costa Rican Population

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Introduction: Nutrition-related risk factors for obesity are broad, including energy intake and diet composition. The deficiency of micronutrients such as calcium and hormonal precursors such as 25-hydroxyvitamin D have been associated with an increased risk of obesity in various populations.

Objective: To determine the relationship between the consumption of vitamin D and calcium with anthropometric factors of excess weight in Costa Rican people included in the Latin American Study of Nutrition and Health (ELANS).

Methods: The 798 Costa Rican participants in the study (ELANS) were used for this analysis. The distribution of calcium and vitamin D intake was determined according to body mass index (BMI) and waist circumference. Linear and logistic regression models were performed, including socioeconomic, demographic, physical activity, and nutritional variables and their relationship with BMI.

Results: More than 98% of the participants presented an inadequate intake of calcium and vitamin D according to the recommendations for their age. Males, those with a higher socioeconomic level and physical activity, without excess weight and without abdominal obesity had higher net consumption of calcium and vitamin D. People under 49 years of age had lower calcium intake than people between 50 to 65 years (p=0.033). In addition, it was identified that the lower the waist circumference, the calcium and vitamin D consumption increases, however, these differences are significant only for vitamin D. BMI was negatively associated with physical activity and positively with age. There was no association with the other demographic or nutritional variables. Calcium or vitamin D intake was not associated with excess weight.

Conclusions: The consumption of calcium and vitamin D is deficient in the Costa Rican urban population, this situation being more marked in people with higher BMI and age.

Conflict of Interest: Does not exist.

Keywords: Vitamin D, Calcium, Micronutrients consumption, Excess weight, Obesity.

P056

Consumption of Processed and Ultra-Processed Foods and Its Relationship with Nutritional Status in Students at a Public University in South-Central Chile, during the COVID-19 Confinement

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Background: Between 2000 and 2013, the consumption of processed and ultra-processed foods in Latin America and the Caribbean has reported a growth in sales of up to 27%. The evidence indicates that the prevalence of consumption is higher in young adults. As a result of the COVID-19 confinement, eating patterns and habits have changed.

Objective: To know the frequency of consumption of processed and ultra-processed foods and its relationship with the nutritional status of university students during confinement by COVID-19.

Methods: Cross-sectional analytical design. Sample of 461 university students of both sexes. After accepting the informed consent, an online questionnaire was applied to find out the consumption frequencies of; Sugary drinks (SD), Sausages, cured meats and cold meats (SCMM), Pastry products (PP), Chocolates and derivatives (CHD), Salty and fried snacks (SSPF), Fats and oils (FO). Nutritional status (NE) was estimated by self-reported weight and height. Statistical analysis used STATA 17.0. Frequencies, percentages and confidence intervals (CI95%) were determined. The relationship of variables used Chi-square ($p < 0.05$). The study was approved by the Bioethics Committee of the Universidad del Bío-Bío, Chile.

Results: 67% of the sample were women. The average age was 22 ± 5.2 years. 50% have malnutrition due to excess. It is observed that 4 out of 10 university students consume SD, and only 16% (95% CI [13.7%-20.6%]) do not consume them. The relationship between the consumption of SCMM and NE, shows significant differences ($p = 0.00$). The consumption of PP is higher in women, reporting differences of 11 percentage points more than men. 34% of university students refer to CHD consumption 3 or more times/week. The prevalence of consumption of SSPF is higher in women. For the consumption of FA, the highest prevalence is found in young people with excess malnutrition.

Conclusions: The confinement due to COVID-19 increased the consumption of foods with a high degree of processing. Urgent measures are required to discourage the consumption of these foods identified as precursors of obesity in Latin America and the Caribbean.

Keywords: Processed and ultra-processed foods, University students, Confinement, COVID-19.

P057

Physical and Neuromotor Development in Wistar Rat Pups with Maternal Protein Restriction and Amino Acid Supplementation

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Introduction: Maternal malnutrition reduces the nutrient supply to the fetus during gestation, causing notorious effects not only on physical, but also on cognitive, motor and social development. Although all macro and micronutrients play a role in fetal brain maturation, proteins seem to be the most crucial for the development of neurological functions.

Objectives: The aim of this work was to evaluate the physical and neuromotor development of Wistar rat pups with maternal protein restriction and supplemented with amino acids.

Methods: 16 and 4 female rats were fed a low protein diet (LPD) and a normal protein diet (NPD) for one month prior to mating. The LPD contained 9% casein as a protein source while the NPD contained 14%. Subsequently, females consuming LPD were randomly divided into 4 groups according to the type of diet provided during gestation and lactation: LPG: low protein group; I-LPG: LPG-supplemented with isoleucine; IG-LPG: LPG-supplemented with isoleucine and glycine and IGP-LPG: LPG-supplemented with Isoleucine, glycine and proline; the control group (CG) consumed NPD. After birth, physical and neuromotor development were assessed in 10 offspring of each group by a battery of tests.

Results: Compared to the CG, the LPG showed significant differences in the day of appearance of surface straightening, grasping and auditory response reflexes ($p < 0.05$, ANOVA, Bonferroni) while the supplemented groups had no differences with the CG ($p > 0.05$, ANOVA). Regarding physical development, at postnatal day 21, LPG offspring presented lower body length and body weight compared to CG; I-LPG and IGP-LPG offspring showed significantly higher body weights than CG.

Conclusions: Maternal protein malnutrition delays neuromotor and physical development in the offspring, which can be compensated by isoleucine, proline and glycine supplementation.

Conflict of Interest: None.

Keywords: Neurodevelopment, Protein malnutrition, Amino acid supplementation.

P058

Predictive Validation of the Perioperative Nutritional Screen (PONS) for Prediction of Postoperative Outcomes in Brain Tumor Patients

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Introduction: Malnutrition risk is associated with postoperative complications such as increased mortality, length of stay (LOS), and infection risk. The perioperative nutritional screen (PONS) was recently validated in heterogeneous elective surgical patients to predict the risk of adverse postoperative outcomes. There is no specific information on the validity of this tool in patients with brain tumors.

Objectives: To determine the predictive validity of the PONS in the preoperative period to predict postoperative LOS, 30-day mortality, 30-day readmission rate, and the need for home enteral nutrition (HEN) at hospital discharge in patients with brain tumors undergoing surgical resection.

Methods: Retrospective cohort of adult patients diagnosed with adenoma, glioma, and meningioma, scheduled for elective resection surgery between May 2021 to April 2022. The PONS score was calculated using routinely collected data for malnutrition screening and pre-surgical albumin values. Simple linear or logistic regression models adjusted for sex, age, and diagnosis were performed.

Results: A total of 185 patients with a median age of 50.4 years (IQR 38.9-60.5) and BMI of 27.4 kg/m² (IQR 24.2-30.4) were evaluated, with a higher proportion of women (62.7%, n=116) and diagnosis of meningioma (40.5%, n=72). Forty-two patients (22.7%) were found to have a PONS (≥1 point) of high risk. Nutrition risk via PONS was associated with higher LOS in both the simple (3.32 days, 95% IC, 0.46-6.19, p=.023) and adjusted models (3.36 days, 95% IC, 0.46-6.32, p=.023), as well as the need for HEN at hospital discharge in the simple (odds ratio [OR], 4.13, 95% IC, 1.76-9.72, p=.001) and adjusted models (OR, 3.99, 95% IC, 1.60-9.96, p=.003). No association was found with readmission (OR, 0.83, 95% IC, 0.40-1.75, p=.630) and mortality (OR, 2.00, 95% IC, 0.74-5.39, p=.171) in the simple and adjusted models.

Conclusions: PONS independently predicts postoperative outcomes such as LOS and the need for HEN at hospital discharge, however, it is not associated with mortality and hospital readmissions. Further studies should evaluate if, in patients with nutrition risk via PONS, nutritional intervention can contribute to the prevention of postoperative complications.

Conflict of Interest: We have no conflict of interest to declare.

Keywords: Neurosurgery, Malnutrition, Surgical, Screening.

P059

Determination of Potassium Concentration in Cow and Goat Whole Milk after Ion Exchange with a Calcium Resin

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Introduction: The use of calcium resin is indicated in patients with hyperkalaemia associated with severe anuria or oliguria, it reduces serum potassium levels and eliminates excess potassium in the body, also indicated in all states of hyperkalaemia due to the presence of acute and chronic diseases of renal insufficiency. Hyperkalaemia is one of the most frequent electrolyte alterations in patients with chronic kidney disease, so the present work proposes to evaluate the cation exchange capacity of the resin in foods such as milk, which is contraindicated for these patients due to its potassium content.

Objective: To determine the potassium content in samples of whole milk from cows and goats before and after ion exchange with calcium resin.

Methods: Samples from three liters of whole cow's milk and twelve bottles of fluid goat's milk were used, divided into 12 portions of 100ml. Potassium measurements were made by means of atomic absorption spectrophotometry, comparing the potassium concentration before and after the addition of the calcium resin. Rest times of the milk with resin were established at 1, 12, and 24 hours. 15g of resin was used for every 100ml of milk.

Results: The concentration of potassium in 250 ml of fresh cow's milk was 343 mg and after resting for one hour with the resin and decanting it was 63 mg. The potassium concentration in 250 ml of fresh goat milk was approximately 394 mg and after treatment with the resin 82 mg.

Conclusions: It was determined that goat's milk has a higher potassium content than cow's milk. After one hour of standing with the resin, the potassium concentration was reduced by 79% in goat's milk and 82% in cow's milk. The use of calcium resin in food to reduce potassium concentration could contribute to expanding food alternatives for pediatric patients with kidney disease.

Conflict of Interest: None of the authors has any kind of conflict of interest.

Keywords: Chronic kidney disease, Calcium resin, Potassium content in food.

P060**Incorporation of Blueberry (*Vaccinium corybosum*) into the Regular Diet and Its Effect on Lipid Profile and Glucose in Adults from Southern Jalisco**

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Introduction: Blueberry consumption can improve quality of life due to its hyperglycemic and hyperlipidemic properties. Several studies report that its bioactive compounds such as anthocyanins can block the absorption of glucose and lipids, reducing their values in the blood. These compounds can inhibit enzymes that act at the digestive level such as lipase, preventing triglycerides from being catalyzed and absorbed. Another mechanism is the inhibition of enzymes such as amylases and α -glucosidases that degrade starch decreasing glucose absorption, which prevents insulin resistance. WHO recommends a minimum daily intake of total anthocyanins of 2.5mg/kg body weight/day to obtain the benefits of these fruits.

Objective: The aim of the present work was to evaluate the effect of consumption of two amounts of blueberry on lipid profile and glucose in adults.

Methods: The study was divided into two phases, each phase lasted six weeks, in phase 1 the participants did not consume blueberry. In phase 2 the participants were divided into two groups; one group consumed a moderate amount of blueberry 60g/week based on the WHO anthocyanin intake recommendations and the other group consumed a higher amount than the recommended 120g/week. A blood sample was obtained at the beginning and end of each phase. For the statistical analysis, the % change of each phase was calculated to later compare the results of the biochemical parameters of each participant between phases 1 and 2 with a paired T student.

Results: Participants who consumed a moderate amount of blueberry had a trend towards a decrease in triglycerides with a $p=0.08$. Participants who consumed a high amount of blueberry had a statistically significant decrease in glucose levels with a $p=0.04$ as well as a trend towards an increase in c-HDL with a $p=0.06$.

Conclusion: Blueberry consumption can be an alternative for the prevention of hyperglycemia and dyslipidemias.

Conflicts of Interest: This study has no conflicts of interest.

Keywords: Blueberry, Consumption, Lipid profile, Glucose.

P061**Lifestyle Characteristics Associated with Mental Health at the COVID-19 Pandemic in Oaxaca, Mexico**

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Introduction: The current pandemic of the SARS-COV-2 began in China at the end of 2019, but it was not until February 2020 that the first case was identified in Mexico. This isolation situation will undoubtedly cause drastic changes in the population in all the aforementioned aspects. In Oaxaca, Mexico, the impact due to the health emergency and the indication of isolation may be increased, as it is one of the states with the lowest socio-economic level in the country.

Objective: The objective was to analyse the lifestyle characteristics associated with the risk of anxiety and depression in the Oaxacan population during isolation due to the COVID-19 pandemic.

Methods: A longitudinal study with residents of the state of Oaxaca (n=499).

Results: Comparing the start of the isolation due to the COVID-19 pandemic (March 2022), vs the phase of maximum contagions (January 2021), the inhabitants of Oaxaca increased their consumption (in servings/day), of soft drinks (0.71 ± 0.85 vs 2.66 ± 1.73), junk food (1.14 ± 0.76 vs 2.79 ± 0.78), sugars (0.76 ± 1.03 vs 2.85 ± 0.77), alcoholic beverages (0.12 ± 0.12 vs 1.57 ± 1.23). The hours spent sitting/day also increased (7.04 ± 3.01 vs 16.83 ± 2.99), and hours of sleep/day decreased (7.65 ± 0.99 vs 6.51 ± 1.73), respectively. The prevalence of anxiety increased from 18.2% to 96.6% ($p<0.001$), as well as depression from 14.4% to 94.9% ($p<0.001$). It was found that higher consumption of soft drinks (OR 1.947; $p=0.001$), sugars (OR 2.427; $p<0.001$) and spending more time sitting (OR 1.744; $p<0.001$), increases the risk of depression. While a higher consumption of sugars (OR 1.068; $p<0.001$), and spending more time sitting (OR 0.877; $p<0.001$), were associated with a higher risk of anxiety.

Conclusions: In the Oaxacan population, during confinement due to the SARS-COV-2 pandemic, the prevalence of anxiety and depression increased. Higher consumption of soft drinks, sugars and spending more hours sitting was associated with a higher risk of depression. Moreover, higher consumption of sugars and spending more hours sitting were associated with a higher risk of anxiety.

Keywords: SARS-COV-2, Lifestyle, Anxiety, Depression, Mexico.

P062

Obesity and Overweight in Guatemalan Children: Nutrition Program Practice Experiences

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Introduction: In Guatemala, 49% of children have chronic malnutrition; this condition of malnutrition, both in excess and deficiency, is associated with several health problems. Obesity during childhood is related to chronic diseases in the adult stage and low weight can affect proper growth and development. For the region of Latin America and the Caribbean, the prevalence of obesity has been determined to reach an average of 4.4%. Guatemala is one of the 11 countries with higher levels (5.4%) than the regional average, these levels are in a tendency to increase, even maintaining high levels of malnutrition as the largest problem in the country. During the development of the Clinical Nutrition career program at the Mariano Galvez University, the students carry out a supervised professional practice in the rural/community area in their last year, where nutritional status surveillance activities are carried out in the areas of incidence of the institutions. The results of this study show an increase in cases of obesity and overweight in children which implies a change in the orientation of nutritional food interventions considering the current context such as an increase in the use of technology, social networks, access to ultra-processed foods and fast food, changes in family structures, incorporation of women in the labor field, changes in eating habits and consumption patterns, among others.

Methods: During the Community Nutrition practice, professionals and students evaluated the nutritional status of children in 2 non-governmental organizations that provide care to the maternal and child group and schoolchildren, using standardized anthropometric equipment. All prevention measurements due to COVID pandemic and standardized procedures were used.

Results: 980 children between the ages of 3 to 18 years old that attend AMG centers were evaluated, 13.9% presented overweight, 4.1% presented obesity and only 2.8% fit in the category of low weight. 1192 children under 5 attending the Caritas Arquidiocesana program in rural and urban areas were evaluated, 17% presented overweight, 5% presented obesity and 73% normal weight for stature.

Conclusions: The prevalence of overweight and obesity in Guatemalan children is increasing, for this reason, it is important to direct efforts to community, family and individual level interventions with the participation of key actors for the promotion of a healthy lifestyles as well as the orientation of public policies and regulations at the national level.

Conflict of Interest: None of the authors has any kind of conflict of interest.

Keywords: Malnutrition, Obesity, Overweight, Children.

P063

Assessment of the Nutritional Status and the Risk of Undernutrition in Community-Dwelling Elderly Adults Attending a Daycare Centre in Guatemala

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Introduction: The geriatric population is one of the groups at greatest risk of developing nutritional deficiencies. These deficiencies may be due to multiple causes related to nutritional status, associated with the ageing process, and resulting in metabolic disorders and functional capacity impairment.

Objective: To determine the nutritional status and risk of malnutrition in older adults attending a daycare centre using anthropometrics and the MNA (Mini Nutritional Assessment).

Methods: A sample of 50 senior adults who attended the “Mis Años Dorados” programme in the municipality of Sanarate, El Progreso, Guatemala, are participants of this study. For the assessment of nutritional status and nutritional risk, measurements of weight, height, and arm, calf, and waist circumferences were measured; the BMI, waist-to-height ratio and the MNA score were calculated. Descriptive statistics and correlation analyses were performed between anthropometric indicators and the MNA (Spearman’s coefficient, rho).

Results: Of the total sample, 54% were male (N=27) and the median age was 74.5 years (60-93 years). Based on BMI, 38% (N=19) of the subjects were overweight or obese. Based on the MNA, 42% (N=21) were at risk of undernutrition and 2% showed undernutrition, with similar results when analysing by sex and with increasing risk of malnutrition as age increases. A strong and statistically significant ($p < 0.001$) relationship was observed between BMI and waist-to-height ratio ($\rho = 0.86$), arm circumference ($\rho = 0.80$), calf circumference ($\rho = 0.75$) and abdominal circumference ($\rho = 0.74$). A moderate significant relationship was observed between MNA and arm circumference ($\rho = 0.37$), BMI ($\rho = 0.35$), and calf circumference ($\rho = 0.33$).

Conclusions: A significant prevalence of undernutrition risk could be observed in almost half of the sample, as well as a high prevalence of overweight and obesity. Although they are older adults of limited economic resources, the food provided in this daycare centre contributes to preventing malnutrition.

Conflict of Interest: None of the authors have any type of conflict of interest.

Keywords: Older adult, Nutritional status, Mini Nutritional Assessment, Body Mass Index.

P064**Estimation of Dietary Intake in Community-Dwelling Elderly Adults Attending a Daycare Centre in Guatemala**

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Introduction: Diet is a fundamental factor in the nutritional status of the elderly. A low energy and protein intake is a major dietary risk factor. Adequate micronutrient intake is key in the prevention of several geriatric syndromes.

Objective: To estimate the dietary intake of elderly people who attend a daycare centre in Guatemala.

Material and Methods: A sample of elderly people, users of the “Mis Años Dorados” programme in the municipality of Sanarate, El Progreso (N=50) was selected. Nutrient intake was estimated by means of a dietary register of 3 non-consecutive days. Dietary intake analysis was performed using EVALFINUT 1.0 software with BEDCA (Spain) and USDA (USA) food composition tables. Descriptive and correlation analyses (Spearman’s coefficient, rho) were performed.

Results: Of the 50 subjects, 46% were female (N=23). The median age was 78 years in men and 72 years in women. Dietary reference intakes for energy (2106 kcal/day) and macronutrients (protein, median=82 g/day and carbohydrate=363 g/day) were met. Vitamin A covered 61%, vitamin B₁₂ 59% and calcium 53% of the recommendation. Potassium reached 41% and sodium exceeded the recommendation (180%). Vitamin D intake covered less than 10% of the recommendation. The relationship between carbohydrates and fibre was strong (rho=0.72, p<0.001). A moderate and statistically significant relationship was observed between vitamin D intake and protein (rho=0.64; p<0.001) and with calcium (rho=0.59; p<0.001).

Conclusions: Modifications of intake are necessary to cover the requirements of some nutrients by increasing the consumption of foods of animal origin, especially foods rich in calcium and potassium, as well as a reduction of sodium intake. Properly designed dietary planning, adapted to the cultural and socio-economic context of the population, is possibly the best nutritional strategy to meet the energy and nutrient requirements of the elderly.

Conflict of Interest: None of the authors have any conflict of interest.

Keywords: Elderly, Dietary intake, Dietary registry, Micronutrients, Daycare centre.

P065**Association between Nutritional Risk Determined by NRS-2002 with Mortality, Invasive Mechanical Ventilation and Length of Stay in Patients with Cardiogenic Shock**

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Introduction: Cardiogenic shock (CS) is a clinical condition in which there is an inadequate tissue perfusion because the heart is unable to pump the appropriate amount of blood. Patients admitted with CS are at high nutritional risk (NR) given the complications that can develop over the course of the disease. The Nutritional Risk Screening 2002 (NRS-2002) tool is widely used in hospital settings to determine the NR of patients on admission. At present, the association between NR with mortality, invasive mechanical ventilation (IMV) requirement and length of stay (LOS) in these patients has not been determined.

Objective: To evaluate the association between NR determined by NRS-2002 with mortality, requirement of IMV and LOS in patients with CS.

Methods: Retrospective cohort study including adult patients who were admitted with a diagnosis of CS to the coronary unit of a tertiary care hospital and who were screened within the first 24 hours with the NRS-2002 tool. Clinical and demographic data were extracted from electronic records from November 2019 to May 2022. A score of 3 or higher on the NRS-2002 as determined as NR.

Results: A total of 59 patients were included in the study, with a mean age of 57.66 ± 1.76 years, of whom 71.19% were male. The mean NRS-2002 score was 4.44 ± 1.76. 81.46% of the patients presented NR at hospital admission. NR was associated with the requirement of IMV (OR 6.39; CI95% 1.24, 32.99; p = 0.016) but not with mortality (OR 1.06; CI95% 0.27, 3.78; p = 0.98). However, no significant difference was observed between the at-risk and no-risk groups with LOS (p = 0.56).

Conclusions: NRS-2002 constitutes an adequate tool for the assessment of NR. In our study, NR was associated with IMV requirement, but not with mortality or LOS in patients with CS.

Conflict of Interest: We declare that we have no conflict of interest.

Keywords: Cardiogenic shock, NRS-2002, Nutritional risk, Invasive mechanical ventilation, Mortality, Length of stay.

P066

Effect of Maternal Overweight and Obesity on the Newborn

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Introduction: overweight and obesity are one of the main public health problems worldwide. According to the WHO, in 2016, more than 1.09 million adults over the age of 18 were overweight, of whom more than 650 million were obese. Of this number, 340 million children and adolescents (5-19 years) were overweight or obese, and 41 million children under the age of 5 were overweight or obese. This situation does not exclude women of reproductive age or pregnant women

Objective: to know the impact of maternal overweight and obesity during pregnancy and to identify the possible alterations of the newborn in the city of Comodoro Rivadavia, Chubut (Argentina).

Materials and Methods: 293 mothers from Comodoro Rivadavia (Chubut), Argentina were studied from the 16th week of pregnancy. Weight, height, body mass index (BMI), waist circumference (WC) and arm circumference were evaluated. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured, and the following were determined: blood glucose (G), total cholesterol (TC), HDL cholesterol (HDL), LDL cholesterol (LDL) and triglycerides (TG) (spectrophotometry). Data on lifestyle were recorded (validated survey). Body length, weight, head circumference and lipid profile in umbilical cord blood were measured in newborns.

Results: women who entered pregnancy overweight or obese had significantly higher blood pressure levels than normal weight throughout pregnancy and their blood glucose levels were also higher ($p < 0.05$) in the pregnancy three quarters. Newborns of overweight or obese mothers have higher levels of TC, HDL, LDL and TG in the cord blood ($p < 0.05$).

Conclusions: all efforts should be directed so that women of reproductive age adopt a healthy lifestyle before preconception, thus avoiding the harmful effects of overweight and obesity on their offspring.

Conflict of Interest: the researchers declare that they have no conflict of interest.

Keywords: Pregnancy, Epigenetic, Newborns.

P067

Comparison of an Individualized Feeding Technique on Hospital Stay and Body Composition in Preterm Infants

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Introduction: After birth, premature newborns (RNP) gain less weight than in the uterus due to their physiological characteristics, the pathological processes they present, and the possibility of necrotizing enterocolitis, which causes prolonged stays in the Hospital.

Objective: To compare the effect of two oral feeding techniques (individualized versus traditional Hospital) on length of stay and body composition of RNP

Material and Methods: We studied 43 RNP with 29 to 36 SEG assigned into two groups by double random assignment. Group A (24 PNB) was fed with individualized technique and Group B (19 PNB) with the traditional hospital technique by their treating physicians; all had adequate birth weight, Apgar > six at 5 minutes, and the ability to tolerate 25 mL/kg/day at the start of the study. A complete nutritional evaluation was carried out at the beginning and end; gastric residues and clinical data of intolerance to the oral route were also monitored. Weight was measured daily, and height, mid-arm circumference, and skinfolds were measured every seven days. The study ended for the patient upon discharge by his physician. Statistical analysis. Analysis was performed using Student's t-test, χ^2 , and Kaplan Meyer survival table for hospital stay; in all cases, $p < 0.05$ was considered significant.

Results: No differences were found between the groups at the beginning of the study. Six children presented complications attributed to feeding techniques (one in group A and five in group B $\chi^2 < 0.02$), and three did not complete the study. The days of stay were Group A 12.8 ± 7.4 vs. 16.3 ± 10.4 , $p = 0.14$). A significant difference was found at discharge in weight (Gpo A 1888.75 ± 128 g vs. Gpo B 1992.22 ± 187 g, $p = 0.39$) and in the ponderal index (2.48 ± 0.2 vs. 2.26 ± 0.20 , $p = 0.02$).

Conclusion: Although no significant statistical difference was established, this study suggests that the individualized technique can reduce hospital stay length and promote adequate RNP growth.

P068

Modifiable and Non-Modifiable Predictors of Exclusive Breastfeeding in Mexican Women at Primary Care Health Services: A Longitudinal Study

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Introduction: In Mexico, exclusive breastfeeding (EBF) is only 28.6% among children under 6 months of age. Intention to breast-feed has proved to be a predictor of EBF regardless of non-modifiable life conditions.

Objectives: Determinate modifiable and non-modifiable personal predictors of EBF in Mexican women users of public primary care services.

Methods: The design study was a prospective longitudinal survey. A non-probabilistic purposive sample was used to evaluate pregnant women in two primary care centers in Mexico City and Aguascalientes state. Women with any condition that contraindicated breastfeeding were not eligible for the study. Sociodemographic, psychosocial characteristics and the intention to breastfeed exclusively were assessed. After delivery, a telephone follow-up was carried out to obtain information about the type of lactation and variables related to childbirth, social support, and the mother's employment status.

Results: 186 women participated, the mean age was 25.5 years (s.d. = 6.1 years), most of them were married, with high school or higher education, and low-middle socioeconomic level. 61% of the participants reported a high intention to breastfeed during pregnancy. The prevalence of EBF was 53%.

In a multivariate model adjusted by age (Hosmer-Lemeshow goodness-of-fit test $\chi^2= 6.90$ $p= 0.55$), intention to breastfeed (OR =1.96, 95%CI= 1.01-3.82) and attitudes related to stress and perceived lack of time (OR =0.59, 95%CI= 0.38-0.92) were identified as modifiable predictors. Non-modifiable factors were post-partum infant health problems (OR =0.15, 95%CI= 0.04-0.58) and maternal work status (OR =0.25, 95%CI= 0.18-0.51).

Conclusions: The findings suggest that encouraging the intention to breastfeed during pregnancy could improve women's decision to breastfeed, and the relevance of the role of personal decision-making and the enabling of breastfeeding-friendly work environments are discussed.

Conflict of Interest: The authors declare no conflicts of interest

Keywords: Breastfeeding, Intention, Psychosocial determinants, Primary care.

P069

Alcohol Consumption, Sleep Quality and Insulation Level in University Students During Confinement Due to the COVID-19 Pandemic

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Introduction: The social isolation caused by the COVID-19 pandemic has been related to the development of alterations in the wake-sleep cycle and sleep quality. Additionally, experts report that alcohol consumption has been related to this isolation, since it has been used to temporarily relieve high-stress levels and remains a major problem in university students.

Objective: To determine alcohol consumption, quality of sleep and level of isolation in university students from Jalisco during confinement due to the COVID-19 pandemic.

Methods: The study was carried out in 2020, made up of a universe of 6,817 individuals, obtaining a representative sample of 257 students. A digital version of the Pittsburgh Sleep Quality Questionnaire, an Isolation Level Scale, and a section of the ENSANUT that assesses the frequency of alcohol consumption were modified.

Results: In relation to the level of isolation, only 17% isolated themselves only by going out to get food, while 35% maintained all care measures and only 1.4% of the participants led their normal lives. 57% of the participants presented a good quality of sleep while the rest had poor quality. 44.6% did not drink alcohol or did so almost never, however, 18.8% consumed it more than once a week. The proportion of students with more frequent alcohol consumption was higher in those who presented poor sleep quality and sleep quality was higher in those who remained in a higher level of isolation.

Conclusions: University students are a particularly vulnerable population due to their psychological and social development characteristics, so the situation that has been presented by the social isolation pandemic can have a significant impact on their well-being, including poor sleep quality in sectors of the population, social isolation that can increase the probability of suffering from stress and depression, as well as sleep problems that can exacerbate the risk of alcohol abuse as a mechanism to control stress, even temporarily.

Conflict of Interest: No conflict of interest.

Keywords: Alcohol consumption, Sleep quality, Isolation level, COVID-19.

P070

Food and Essential Nutrients for Recovery from COVID-19

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Introduction: COVID-19 is a virus that is characterized by manifesting itself in various ways that are not yet fully known. Nutritional status greatly influences the course of the disease and also the number of nutrients a person has since vitamins and trace elements play an important role in immunomodulation and have been proposed as a therapeutic option.

Objective: The objective of this research is to know which nutrients are influential in the recovery from infection of the COVID-19 virus and what would be the nutritional recommendations with food groups that help this recovery.

Methodology: The research is descriptive because it describes theoretical information about the disease, nutrients that help post-COVID-19 recovery, and nutritional recommendations of the food groups to choose from. The analysis of the information was obtained from scientific articles, theses, books, and technical reports. The search is carried out through Google and Google Scholar, using keywords such as: COVID-19 and essential nutrients, COVID-19 and recovery, COVID-19 and food.

Fifteen bibliographic citations are selected to carry out this bibliographic review.

Results: Some essential nutrients for the proper functioning of the immune system are vitamin A, beta-carotene, vitamin D, vitamin E and zinc since these participate in the correct activation of cells that help the immune system defend against infection. Selenium, resveratrol, and flavonoids help neutralize free radicals that cause oxidative stress and help eliminate the virus.

Conclusions: Vitamins and minerals in general are essential for the recovery from COVID-19, it is necessary to consume them in optimal amounts. Each nutrient has a different function in terms of recovery from the virus. Therefore, it is necessary to maintain a healthy diet and include all food groups in order to obtain all these essential nutrients.

Conflict of Interest: There is no conflict of interest.

Keywords: COVID-19, Vitamin A, Vitamin C, Vitamin D, B vitamins, Selenium, Zinc.

Nutritional Epidemiology and Public Health Challenges in Iberoamerica

P071

Feeding and Stress of Children in Early School Years During Distance Education

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Introduction: The problems that we currently face coupled with a change in education, can promote a higher level of stress in children, which affects their eating practices. In 2020, 90.9% of children in early school years consumed sugary drinks and 50% sweet cereals, snacks, sweets, and desserts, this is a consequence of changes in economic factors and lifestyle.

Objectives: Evaluate, in early school years students with distance education, their stress level and associate it with the food they eat and the activities they carry out during mealtime.

Methods: Cross-sectional quantitative design; the sample was for the convenience of 387 early school years students. A validated questionnaire of food practices and the "Child Daily Stress Inventory" was applied through online or face-to-face interviews, the statistical tests were carried out with SPSS version 22.

Results: The age of the participants was 6 to 12 years (50.9% women, 49.1% men), with a mean age of 9.4 ± 1.3 years. 71% attended a public school and 79.6% took online classes. 23.8% presented a medium stress level, and 8.5% a high level. The students reported consuming more than once a week: *pan dulce* (84.8%), chips (93.6%), and sugary drinks (93.3%). Only 22.5% consumed vegetables and 31% ate fruits every day. As for the activities carried out during mealtime, 65.9% watched television and 53.4% used cell

phones. In addition, a statistically significant association was found between the food consumed by students in their early school years and their stress levels ($p < 0.05$). Between the activities performed during mealtime and stress levels, there is no relationship ($p > 0.05$).

Conclusions: Schoolchildren have a high consumption of nutrient-poor foods, and these are closely related to their level of stress. Making good choices regarding food consumption by children in early school years is of vital importance since they play a fundamental role in the level of stress, and this has an impact on their quality of life.

Conflict of Interest: None

Keywords: Stress, Feeding, Children in early school years.

P072

Somatotype of Mapuche Schooled Adolescents from Rural Schools in a Southern Chilean Commune

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Introduction: Childhood obesity is one of the most serious public health problems of the 21st century. Malnutrition due to excess has been observed in school children, including those of Mapuche ethnicity, which influences their nutritional status, body composition and somatotype.

Objectives: To determine the Somatotype of Mapuche schooled adolescents from rural schools in a commune in southern Chile.

Methods: A cross-sectional descriptive study of 178 schoolchildren, made up of two groups, one of the Mapuche ethnicity and the other non-Mapuche. The age fluctuates between 10 and 14 years. Frequency tables of these variables and contingency tables, crossing of variables, were made to determine associations, using the non-parametric statistic of Chi-square. For significant contrasts, a p-value < 0.05 was considered.

Results: Prevalence of overweight and obesity is evident (26.4% and 31.5% respectively). Significant differences were observed by sex in endomorphism, in women ($p = 0.005$). In the rurality variable, significant differences were observed with a predominance of ectomorphism in the urban population ($p = 0.010$). The ethnic variable was significant with a tendency to ectomorphism in the Mapuche ethnic group ($p = 0.016$).

Conclusions: It is evident the predominant somatotype of schooled adolescents in the Mapuche ethnic group of endomorphic meso, predominating the skeletal muscle component, and in the non-Mapuche endo-mesomorphism, where the relative body adiposity predominates. These data are relevant for future research, where it is expected to increase the number of subjects to obtain greater external validity of the results.

Conflict of Interest: There are no conflicts of interest

Keywords: Somatotype, Nutritional status, Mapuche ethnic, School children.

P073

Perceptions of Employers and Workers of Medium-Sized Textile Companies about the Conditions of Food During Their Workday. Medellín, Colombia

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Introduction: The WHO and ILO state that proper nutrition can increase employee productivity, as a well-nourished person has more opportunities to achieve higher performance, concentration, and job satisfaction and reduce absenteeism due to food-related illnesses.

Objectives: To know the perception of workers and employers of medium-sized textile companies in Medellín, in relation to the conditions in which they eat during the working day.

Group food consumption.

Methods: Qualitative, exploratory study with a phenomenological perspective that evaluated the perception of workers and employers of 10 companies on: time, environment, facilities, equipment, furniture of the place where food is consumed, and food preferences or preparations. Ten individual semi-structured virtual interviews were conducted with employers and five group interviews with workers.

Results: Regarding food consumption time, some consider it short but are not willing to pay extra time during their working day, and others believe that it is enough even to share with their colleagues, especially when they have support staff to heat and serve the food. In relation to the place where food is consumed, most perceive the space as ventilated, bright and spacious, a pleasant environment, commonly equipped with refrigerators, floating or fixed shelves, microwaves, and in some cases, hot and/or cold drinks, depending on whether a food service exists in the company. The meals most consumed during the working day are breakfast and lunch, with a high consumption of flour, fried foods, sausages, legumes, eggs, and meat, but few salads. They report low consumption of fruits, juices and preparations such as soups due to the risk of spoilage and spillage. The most consumed beverages are coffee, sodas, sugary drinks, and water.

Conclusions: Workers and employers of companies with food service or food support staff had a better perception of the food conditions at work, highlighting the importance of companies making efforts to implement and make continuous improvements to the spaces for food consumption of their workers, contributing to their health and well-being.

Conflict of Interest: The authors declare that they have no conflict of interest with the development of the project or with the parties involved in the study.

Keywords: Feeding, Occupational health, Eating behavior, Working conditions, Collective feeding, Work hours.

P074

A Critical Dietary Nutrient Density Approach to the Overconsumption Situation

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Introduction: The recommended intakes of essential nutrients are expressed as amounts to be consumed daily in isolation of any dietary context. As nutrients are obtained from the foods and beverages that contain them, an approach was developed in 1998 to evaluate the adequacy of nutrient intake in terms of appropriate dietary energy consumption and has been termed “desired” or “critical” nutrient density. For certain vitamins and minerals, their consumption in excess can have adverse impacts in the direction of toxicity, and these are quantified as tolerable upper intake levels (UL). As with the side of the adequate intake, the expressions of excess consumption are daily amounts in isolation of a dietary context.

Objective: To design a system for the expression and analysis of dietary nutrients based on the approach of critical nutrient density in excess.

Methods: We use the summary tables of the Reference Dietary Intakes (US and Canada) for the nutrient ULs, specific to age groups. We use the estimated daily energy requirements of the FAO/WHO/UNU Human Energy Requirements (2006) for male and female children from 1 to 13 years. The numerators for the density calculations are the ULs, whereas the denominators are the specific energy needs. The ratios are normalized to per 1000 kcal for the critical density expression. A higher density expression is considered to be more protective than a lower one.

Results: The calculations generated from 18 nutrients and 26 age-sex groups resulted in a composite matrix with 468 total cells. Critical densities were consistently higher in girls than in boys. In no instance is the recommendation higher than the UL. With abundant fortification in diets, densities of vitamin A and zinc could exceed the density by excess.

Conclusions: Children can be at risk for excess intakes of certain nutrients at certain ages of life. The need to relate nutrient intakes to their food and beverage sources suggests that an approach of critical nutrient density for excess is a valuable initiative.

Conflict of Interest: I have no conflict of interest.

Keywords: Nutrients, Nutrient density, RDIs, UL.

P075

Stunting and Body Proportions in Elderly from Urban and Rural Settings in the Western Highlands of Guatemala

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Introduction: Human linear growth is determined by nutritional, genetic, and environmental factors and may vary in urban and rural settings. Impaired linear growth is affected by adversity and is expressed as short stature and lower extremities' elongation failure sustained at old age. Sagittal photos had been used to assess ratios of THE relative length of the torso and the lower extremities in diverse populations.

Objective: To establish the relationship between stunting and body proportions in elderly from urban and rural settings in the Western Highlands of Guatemala.

Methods: Data was generated from three independent studies approved by ethical committees. A total of 196 elderly participants (>60 yrs old) were evaluated: 103 women and 93 men, 96 from urban (Quetzaltenango) and 100 from rural (Sololá) settings in the Western Highlands of Guatemala. Anthropometric data (weight and height) was collected by trained professionals using SECA® stadiometers and digital weight scales. Stunting in adults was assessed using standard cutoffs: ≤ 145 cm for women and ≤ 150 cm for men. Sagittal photos were taken using Nikon® Coolpix digital camera and printed-out photos were measured to determine body proportion ratios of relative length of the torso and lower extremities (T/L).

Results: For urban women (UW) median height of 144.5cm and 53% were classified as stunted compares to their rural peers (RW) with 139.2cm and 92% respectively. For men in urban settings (UM) median height of 156.0 and 14% stunting compares to rural men (RM) with 149.9 cm and 52% stunting. The median T/L ratio in the non-stunted women of 0.67 compares to 0.60 with their stunted peers. For men, T/L ratio was 0.61 for stunted and non-stunted participants.

Conclusions: The difference in the prevalence of stunting between women and men, in urban and rural settings, could be indicative of adverse conditions for growth and development, especially among rural women.

Results suggest that height status among stunted women is affecting body proportions who presented shorter legs.

Conflict of Interest: The authors declared no potential conflicts of interest with respect to this abstract.

Keywords: Adult stunting, Body proportions, Guatemala.

P076

Creation and Evaluation of a Didactic Package Designed to Provide Vitamin Knowledge to School Children and Their Parents

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Introduction: Hypovitaminosis in school children is caused by a low intake of one or more vitamins and is associated with poor performance and developmental problems. Generating and applying didactic materials on nutrition reduces misinformation and has a positive impact on nutritional deficiencies; however, nutritional education needs to be improved by implementing different pedagogical techniques and tools.

Objective: To provide knowledge about vitamins to school children and their parents through the creation and evaluation of a didactic package.

Methods: Quasi-experimental research in schoolchildren from two study groups. Group 1 (G1) received nutrition education from a nutrition specialist using the didactic tool “memorama” (own creation) and group 2 (G2) only used the “memorama” without nutrition education. The groups were subdivided into schoolchildren aged 6 to 7 years and 8 to 10 years. The level of knowledge about vitamins was evaluated before and after the use of the memorama in G1 and G2. In addition, the manual for parents called “Feeding me healthy with vitamins” was generated and its acceptability and comprehension were evaluated. Statistical analysis with GraphPadPrism v7.0. Wilcoxon test to evaluate differences between groups. $p < 0.05$ for statistically significant differences.

Results: When comparing the correct scores obtained on knowledge of vitamins at the beginning and end of the study, there was a significant difference ($p = 0.0313$) in the schoolchildren of G1, as opposed to G2 ($p = 0.5$). When assessing the differences in the successes obtained for each subgroup with or without educational intervention, it was found that in the 6 to 7 years old subgroup ($p = 0.0198$) and in the 8 to 10 years old subgroup ($p = 0.004$) the educational intervention of a nutrition specialist improved the learning of knowledge about vitamins. Finally, 100% of parents showed acceptability and understanding of the manual “Feeding me healthy with vitamins”.

Conclusion: Schoolchildren exposed to the didactic material created in conjunction with the accompaniment of a nutrition specialist gained more knowledge about vitamins. In addition, the manual “Feeding me healthily with vitamins” created for parents had good acceptability and comprehension.

Conflict of Interest: No conflict of interest.

Keywords: Nutrition education, Didactic material, Vitamins.

P077

Food Addiction in Students at the Degree in Nutrition of a Higher Education Institution in the Mexican Southeast

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Introduction: In recent times, it has been debated whether certain types of foods that have high palatability could have a potential or even be highly addictive, having behavior overeating and/or craving (desire, eagerness or urge to eat), presented by patients with eating disorders or obesity, could be addictive behaviors.

Objective: Analyze food addiction as a risk factor for malnutrition due to excess in students of the Nutrition Degree of a public University in the Mexican southeast, in the year 2021.

Methods: a descriptive cross-sectional study, sampling simple random probability. The Yale Food Addiction Scale was used to validate instruments to measure food addiction and the body mass index was used to identify nutritional status.

Results: 6% of the students presented food addiction; in those who have this addiction, 5% corresponds to students with malnutrition due to excess (overweight and obesity); the principal gender was women with 5%. The most frequently overriding symptom was “Persistent desire or frustrated attempts to abandon the substance” in 91%, followed by “Tolerance (marked increase in quantity, decrease in effects)” in 32% of cases; and the “Reduced or canceled participation in important social activities” by 21%.

Conclusions: Food addiction looked in students with malnutrition due to excess and mainly in women, and although without a diagnosis of food addiction, there are students who presented more than 3 symptoms.

Conflict of Interest: It is declared that there is no conflict of interest.

Keywords: Addiction, Addiction to food, Malnutrition, Young adult, Craving, Overeating.

P078

Respective Contribution of Minimally- and Ultra-Processed Foods in the Diet of Rural Schoolchildren in Western Guatemala

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Introduction: Child malnutrition is a public health problem in Guatemala, especially in rural settings, where a double burden of nutrition has been evidenced and foods with a higher degree of processing are increasingly available. High consumption of ultra-processed foods has been linked to an increase in obesity and the development of chronic diseases. The NOVA food classification

system (Monteiro, 2019) defines four processing level groups that allow evaluating the impact of these on the food pattern.

Objective: Identify the group to which the foods reported belong to in the diet of rural schoolchildren in the western highlands of Guatemala, according to the NOVA system.

Methods: A self-drawn depiction of each meal and snack consumed over a 24-hour period was collected in 58 girls and 57 boys (n=115) aged 8-11 years in a semi-rural public school in Quetzaltenango, Guatemala. The foods consumed were grouped according to the NOVA system as unprocessed or minimally processed foods (G1), processed culinary ingredients (G2), processed foods (G3), and ultra-processed products (G4) by five local nutrition professionals following the definitions of each group.

Results: The diet of the schoolchildren consisted of 153 foods, classified in each group: 51.6% in G1, 4.6% G2, in 10.5% G3 and 33.3% in G4. The most mentioned G1 by respondents were: drinking water by 114 (99.1%), instant coffee by 101 (87.8%), corn tortilla by 96 (83.5%), onions by 90 (78.3%), eggs by 71 (61.7%), and tomatoes by 65 (56.5%). The most mentioned the G4 were: Incaparina® by 80 (69.6%), chicken bouillon powder by 59 (51.3%), liquid whole milk by 48 (41.7%), powdered whole milk by 49 (42.6%), noodles by 44 (38.3%), and powdered drink mix by 27 (23.5 %). Boys consumed fewer of the reported items (121/153=79.1%) as compared to the girls (135/153=88.2%).

Conclusions: Minimally processed foods are the basis of the diet of the evaluated schoolchildren, ultra-processed foods represent at least a third of the food consumed, and in half of the schoolchildren, these foods consisted of fortified products, which could be necessary to contribute to an adequate quality of diet.

Conflict of Interest: I have no conflict of interest.

Keywords: Ultra-processed foods, Schoolchildren, Guatemala.

P079

Contribution of Energy and Nutrients Among the Different Components of the “NOVA” Classification in Rural Schoolchildren of Western Guatemala

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Introduction: Processed and ultra-processed foods have been associated with contributing negatively to people’s health. Transition to food causes the consumption of these foods to increase and has an impact from early childhood. The NOVA food classification system (Monteiro, 2019) defines four processing level groups. Little is known about the energy and nutrient intake according to their processing in the rural population of Guatemalan schoolchildren.

Objective: To identify the energy and nutrient intake according to the different components of the NOVA classification in rural schoolchildren in the western highlands of Guatemala.

Methods: A self-drawn depiction of each meal and snack consumed over a 24-hour period was collected in 58 girls and 57 boys (n=115) aged 8-11 years in a semi-rural public school in Quetzaltenango, Guatemala. The foods consumed were grouped according to the NOVA system as unprocessed or minimally

processed foods (G1), processed culinary ingredients (G2), processed foods (G3), and ultra-processed products (G4). The energy and nutrient contribution of each component was analyzed with reference to assorted food composition tables and nutrient databases.

Results: The average energy intake was 2025 ± 541 Kcal/day. The respective energy contributions by classification group were 43.5% by G1, 22.0% by G4, 20.2% by G2 and 14.8% by G3. G1 represented the highest source of macronutrients and micronutrients (median): folate (317 μ g), thiamin (0.6 mg), riboflavin (0.5 mg), niacin (10.9 mg), vitamin C (19 mg), calcium (388 mg), iron (7.3 mg), and zinc (5.3 mg). This was followed by G4 with vitamin C (4.1 mg), calcium (220 mg), iron (3.9 mg), and zinc (3.1 mg). Despite the consumption of these nutrients, daily intakes of iron, vitamin C, and vitamin D were low in the schoolchildren's diet.

Conclusions: We again show the value of pictorial surveying. Ultra-processed foods and processed culinary ingredients make comparable energy contributions, with the former being vastly more energy-dense. Without the contribution of ultra-processed products, the gap between the requirement and intake of micronutrients would be wider. Dietary recommendations should not be based solely on the degree of processing in food. Foods within the same category have a highly variable nutrient quantity.

Conflict of Interest: I have no conflict of interest

Keywords: Ultra-processed foods, Energy, Schoolchildren, Guatemala.

P080

Evolution of Nutritional Status in Urban Ecuador 2014–2019

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Introduction: The significant increase in the prevalence of obesity worldwide responds to the process of demographic, epidemiological and nutritional transition. In Latin America, more than half of the population is overweight and obese, and Ecuador is no exception to this trend.

Objective: Identify the evolution of nutritional status according to sociodemographic parameters in Ecuador's population living in urban areas.

Methods: The study interviewed 400 subjects aged between 15 and 65 years, stratified by gender, age, region of residence, educational level, and socioeconomic level, as a baseline to assess the evolution of nutritional status, data obtained from the Latin American Study of Nutrition and Health (ELANS – Ecuador 2014). Nutritional status was evaluated through anthropometric measurements (weight, height, and neck, waist, and hip circumferences), and their classification was made according to the WHO criteria. Descriptive statistics of comparison to demonstrate differences were used.

Results: No significant differences were found in the evolution of nutritional status by gender and region according to sociodemographic variables, except for neck and waist circumferences. Concerning the Body Mass Index from 2014 to 2019, differences were found according to low SES and basic educational level ($p < 0.05$), where it was observed that low weight decreased in practically all the variables studied, normal weight increased by 5%, overweight decreased (5%); however, the incidence of obesity increased by about 2%. The subjects of high SES and with partial or complete higher education increased their overweight, this change being more significant in the group of adolescents (14%). Obesity increased in most of the variables, being significant in subjects of low socioeconomic status, except for adolescents and subjects belonging to high SES.

Conclusions: In the country, overweight decreased between 2014 and 2019, except for the group of adolescents in which it increased. Moreover, obesity prevalence increased, especially in subjects belonging to a low socioeconomic level.

Conflict of Interest: There is no conflict of interest.

Keywords: Nutritional status, Overweight, Obesity.

P081

Healthy Eating Index and Classification of Nutritional Status in Schoolchildren of a Public Educational Institution – Quindío – Colombia

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Introduction: Unhealthy eating can lead to overweight and obesity problems, risk factors for Chronic Non-Communicable Diseases (NCDs). Therefore, studies that lead to dietary changes that contribute to the nutritional health of populations are needed.

Objectives: To determine the healthy eating index (HEI) and the nutritional status of schoolchildren in a public educational institution (PEI).

Methods: Quantitative-correlational-longitudinal study in fourth, fifth, and sixth-grade schoolchildren. The following were applied: consumption frequency scale, anthropometric measurements, and a dietary and physical activity survey. The Frequency of Consumption was done in Excel according to the procedural protocol for obtaining the HEI, using the Colombian Food Based Dietary Guidelines. The analysis was performed with SPSS.25 software.

Results: A total of 132 schoolchildren between the ages of 9 and 16 participated; 47% were male and 53% female; the nuclear family was predominant, 36.4% and 82.5% of the families had more than four members. According to the HEI, 78.8% should make changes and it should be noted that none of the participants had a healthy diet. Regarding nutritional status, 53% are adequate and 34.9% are in an inadequate nutritional status due to excess. The result of Spearman's rho correlation was -0.249 ($p = 0.04$) indicating that the

relationship between school grade and nutritional status of school-children is inverse. A Kruskal Wallis was constructed showing that there is a difference by school grade for the nutritional status classification variable ($p=0.17$) and when comparing the means of the grades, a significant difference was found between fourth and sixth grade ($p=.027$).

Conclusions: The schoolchildren assessed exceeded the national prevalence of overweight in children of the same age by 10%; one explanatory aspect can be found in the inadequacy of the diet. It is, therefore, necessary to carry out educational interventions aimed at improving the conditions related to the critical analysis of the food supply in the environment, as well as food selection and consumption, which will enable them to improve their nutritional status and prevent the onset of NCDs during adulthood.

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Conflict of Interest: There are no conflicts of interest of the authors.

Keywords: Diet healthy, Nutritional status, Nutrition surveys, Overweight, Obesity, Child and adolescent, Family.

P082

Eating Disorders in Pediatrics during the SARS-Cov19 Pandemic in Two Spanish Hospitals of Third Level

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Introduction: With the arrival of SARS-Cov 19 the number of eating disorders cases have increased, especially in children and adolescents.

Objectives: To evaluate the clinical profile of patients with eating disorders (ED), analyzing the triggering factors, highlighting the confinement during COVID-19 pandemic as the main trigger.

Methods: It constitutes retrospective research in pediatric patients diagnosed of ED during the pandemic of SARS-Cov2 and transmitted to two Spanish hospitals of the third level. There have been studied demographic, anthropometric, and clinic characteristics, as well as others in relation to diagnosis and treatment.

Results: 15 patients with ED severe in Reina Sofía Hospital in Córdoba and 44 patients in Lozano Blesa Hospital in Zaragoza (Spain) were attended from confinement in March until June of 2020. The average range is between 8 and 17 years. 33,3% of Córdoba and 80% of Zaragoza had a weight below percentile 10.

The average weight loss was 13 kg. We highlight a patient with pericardial effusion. 80% showed symptoms of anxiety and 46,7% of depression in Córdoba, being in Zaragoza of 46,7% and 4,5% respectively. Two patients suffered from obsessive-compulsive disorder. All the patients started the restriction of ingestion in this stage and increased it progressively becoming pathological 3-6 months later. The calorie count, the fear of gaining weight, and the body image distortion were present in almost all the patients. All of them received integral personalized treatment by a multidisciplinary team. Half of the patients have needed nutritional supplements for at least 3 months. Two patients in Córdoba needed feeding with a nasogastric tube and 8 patients in Zaragoza needed parenteral nutrition. 90% needed pharmacological treatment with anxiolytics, antidepressants, and/or risperidone. Approximately half of the cases were hospitalized.

Conclusions: During the situation of confinement due to Covid19 pandemic, the prevalence has increased in eating disorders in pediatric patients with a rapid progression as well as being diagnosed in a worse metabolic and psychological state. Therefore, it is necessary to have a specific formation and development of multidisciplinary teams.

Conflicts of Interest: The authors declare that there is no conflict of interest.

Keywords: Eating disorders, Pandemic, Covid-19, Pediatric.

P083

Evolution of Obesity and Overweight in the United States of America between 2011 and 2019

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Introduction: Obesity and overweight are one of the biggest problems facing society today. The figures indicate that obesity is today one of the diseases with the highest morbidity rate, reducing the life expectancy and representing a high risk of mortality.

Objective: It consisted of describing the percentage of obesity and overweight in the US by age range and State, in the last decade.

Materials and Methods: A unidimensional frequency analysis was used, expressed through percentages, associated with the variables percentage of obesity and overweight. Additionally, the multivariate analysis of variance was used, in order to contrast the different states.

Results: The investigation made it possible to show that adults between 45 and 64 years of age have the highest percentage of obesity in the different regions of the United States of America, while the age range between 18 and 24 years is the group that has the lowest percentage in general.

Conclusions: The male sex presents higher levels of overweight compared to the female sex. Similarly, it is observed that obesity has increased over time, while overweight has decreased slightly.

Keywords: Diet, Eating behavior, Disease, Lifestyle, Obesity, Overweight.

P084

Economic Investment in Health in America, between the Years 2000 and 2019

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Introduction: Investment in health is essential to be able to provide timely care to patients and at the same time carry out prevention programs for the good of the public.

Objective: To compare the investment in health in the countries of America in the last twenty years.

Methods: The General Linear Model was used based on the MANOVA technique, supplementing with cluster analysis. The variables evaluated were: spending invested by the public sector in health expressed as a percentage; percentage of total expenditure invested in health; Health GDP and public health expenditure per capita expressed in euros.

Results: The United States presents a statistically significant difference with respect to the other nations of the continent ($p < 0.05$), in relation to GDP and per capita public spending in euros for health. Venezuela has the lowest expenditure invested by the public sector in health expressed as a percentage.

Conclusions: There are large gaps in investment in health in America, where the countries with the highest purchasing power, the United States and Canada, present the highest figures. Venezuela is the country with the lowest GDP investment dedicated to health expenses, being the only nation that in recent years has reduced this variable.

Keywords: America, Statistics, Financing, Investment, Health.

P085

Characteristics of the Feeding of Food Handlers in Commercial Food Services

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Introduction: Commercial service food handlers are workers with access to food, some highly caloric, throughout their workday, which is related to inadequate eating habits; they also have other conditioning factors such as extended work hours, eating times according to work activities, and long intervals between meals, which generates changes in eating patterns thus affecting their weight and life quality.

Objective: Characterize the eating habits of food handlers during their working day.

Methods: Quantitative, descriptive, and cross-sectional study with exploratory elements. 163 food handlers from different companies were randomly selected. An online survey was shared for self-completion on eating habits in the workplace during their workday.

Results: 163 food handlers responded to the survey. 84% of the surveyed reported that the company does not supply them with food at the workplace. 68.7% do not have fixed hours for food consumption and 46.6% stated that the change of shifts and the workload are the main reasons for the variation in eating hours. Regarding consumption at the workplace, they reported that they prepare it and bring it from home: breakfast (59.5%), lunch (84%), and dinner (46%). In addition, 58.3%, 65.8%, and 58.3% reported consumption of breakfast, lunch, and dinner below the recommended amount, respectively ($\leq 70\%$). 20.2% did not report consumption of breakfast, 16% of lunch, and 34.4% of dinner.

Conclusions: Food handlers in commercial food services are exposed to environmental and working conditions that could negatively affect consumption habits, since they do not have fixed eating times and prioritize work activities overeating meals.

Conflict of Interest: The authors state that they have no conflict of interest with the development of the project or with the parties involved in the study.

Keywords: Feeding, Food services, Collective feeding, Workers, Food handling, Working conditions, Risk factors.

P086

The Role of Autonomy in Public Nutritional Policies in Uruguay

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Introduction: In health and nutritional policies, the ethical problem is expressed in the tension between the protection of the community and respect for the freedom of the individual and the issue of autonomy is rarely raised.

Objective: To recognize the development of the nutritional policies of the Uruguayan State, emphasizing their interference in the construction of autonomy.

Methods: We reviewed of policies that were conceived by the Uruguayan State to combat nutritional problems. They were analyzed based on the following analytical dimensions: analysis of nutritional problems, intervention proposals, the principle of autonomy and arguments used.

Results: In the mid-twentieth century, the country is experiencing a process of involution in economic and social matters and concomitantly the problems of nutritional deficits become notorious. In this context, the mother-child binomial is taking force inserted in a larger model of a coherent ideal family with the capitalist mode of production: the nuclear family.

At this time, the Uruguayan State had several assistance programs to improve undernutrition. The deficit indicators have improved markedly, although focused problems persist. The speech of individual responsibility emerged in the 1970s associated with malnutrition and then with few changes the same is used to address the problems of excess.

As for obesity and associated chronic diseases, nutrition interventions are permeated by the concept of "lifestyles", in this line, health promotion focuses on the delivery of information. In the general Public Health discourse, the absence of precautions against

publicly known risks, is due to a lack of individual control and self-efficacy.

The speech approaches the relationship from an interpretive model that takes the individual

as a moral agent qualified to decide the best. In this speech, people's autonomy is not considered and instead appeals to responsibilities.

Conclusions: It is necessary that the State, in its role as a protective agent, to make structural changes, modifying those aspects that condition individuals' choice of a healthier life and create conditions for people to exercise their autonomy.

Conflict of Interest: No conflicts of interest to declare

Keywords: Nutritional policies, Personal autonomy, Bioethics, Human rights.

P087

The Household as Source of Dietary Patterns Rich in Sugars, Mainly of Ultra-Processed Foods and Drinks, at School *almuerzo* in Mexican Children

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Introduction: Foods are consumed together and not in isolation; the evaluation of dietary patterns provides a broad view of food consumption. In Mexico, patterns of the intake of a whole day or of breakfast in children have been explored, but not of school *almuerzo*.

Objective: To describe the dietary patterns identified from the school *almuerzo* and its relationship with the nutritional status and metabolic parameters of schoolchildren.

Methods: Cross-sectional study, schoolchildren from four primary schools participated. After signing the informed consent, sociodemographic and anthropometric data were obtained, the BMI *Z-score* was calculated, and the children were classified as normal weight/overweight/obese. A fasting blood sample was taken, and metabolic parameters were determined. Information was obtained on the food and drinks that the children brought in their school *almuerzo*; the caloric and nutritional content were estimated, and food groups were constructed to generate dietary patterns from the energy percentage of said groups. For the construction of the patterns, k-means cluster analysis was used.

Results: 395 schoolchildren with an age of 7.9±1.2 years were included, 24.3% were overweight and 22% obesity. 89.4% of schoolchildren brought school *almuerzo*. Four dietary patterns were identified: a pattern of sandwiches, *tortas* and sweetened dairy consumed by 13.1% (n=46), a varied sweet pattern consumed

by 50.3% (n=176), and a pattern of sweetened dairy consumed by 15.1% of the children (n=53) and pattern of sandwiches, and *tortas* consumed by 21.4% (n=75), with marked differences in caloric and nutritional content between patterns (p<0.001). The patterns had between 26 to 40% of the energy from sugar except for the pattern of sandwiches and *tortas* which had 15.8%. No association was found between the anthropometric and metabolic parameters of children with dietary patterns.

Conclusions: No dietary pattern from school *almuerzo* was identified as healthy, all had a high energy content and a high percentage of energy from sugar, mainly from ultra-processed foods and beverages.

Conflict of Interest: The authors declare that they have no competing interests.

Keywords: Child, School *almuerzo*, Dietary patterns, Sugar.

P088

A Multicomponent Intervention at Home and School: Effects on Physical Activity and Sedentary Behaviors in School Children

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Introduction: Physical inactivity and a sedentary lifestyle are risk factors for the development of overweight and obesity. Intervention strategies are required to modify these behaviors in children, the age at which habits are acquired.

Objective: Evaluate the impact of an educational intervention using digital media and face-to-face activities with children, parents, and the school, on the level of physical activity and sedentary behavior of schoolchildren.

Methods: Secondary analysis of data arising from a community trial, students from four primary schools in Mexico City participated, two were assigned to the intervention group (IG) and two to the control group (CG). The intervention lasted 12 months, with a face-to-face component that involved educational material and workshops for parents and children; and a distance component using electronic means (web portal, text messages to the parents' mobile phone). The CG received only general written recommendations on eating habits and physical activity. After signing the informed consent, anthropometric measurements were obtained, and through a questionnaire applied to the parents, sociodemographic information was collected, on physical activity of moderate to vigorous intensity (MVPA) and screen time at baseline, 6, and 12 months.

Results: 201 children from the IG and 167 children from the CG were included. At baseline, median MVPA was 150 min/week (IQR: 0 to 360) and screen time was 180 min/d (IQR: 120 to 240). At 12 months, the IG presented a change of -33.4 min/d [95% CI: -53.5 to -13.3] in screen time, while in the CG it was 12.5 min/d [95% CI: -10.5 to 35.6], observing a difference between groups ($p=0.003$). No changes in MVPA were identified in both groups during the follow-up period.

Conclusions: The multicomponent educational intervention decreased screen time in children at 12-month follow-up. It is a feasible and accessible strategy to promote changes in sedentary behaviors and healthy habits in the population.

Conflict of Interest: The authors declare that they have no competing interests.

Keywords: Obesity, Children, Educational intervention, Physical activity, Sedentary behaviors.

P089

Perception of Front-of-Package Labeling as a Strategy for the Prevention of Non-Communicable Diseases in Asunción and Central-Paraguay

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Introduction: To prevent and/or avoid the increase in chronic non-communicable diseases, structural changes and interventions in the food environment are necessary, frontal nutritional labeling could be one of the various strategies

Objectives: Evaluating the perception of the frontal warning nutritional labeling as a prevention strategy for chronic non-communicable diseases in adults from Asunción and Central in September 2021.

Methods: Descriptive cross-sectional study, with random sampling. Men and women, >18 years old, self-reported healthy, residents of the Central Department and Asunción were interviewed in September 2021. Frontal labels were designed with three different systems: black octagon, traffic light, and magnifying glass. Demographic information, perception of understanding, and potential change in the consumption frequency, purchase intention, and usefulness of the information according to the type of labeling were collected. Descriptive statistics were used to summarize the data and ANOVA for comparisons. The research protocol was approved under code CEI/FCQ/UNA No. 757/2021.

Results: 200 adults participated (63.5% women), and half lived in Asunción. Three out of ten were <30 years old, 44.5% had

completed high school and 38% were independent workers. A third indicated that the presence of the labeling was very attractive and 50% found it easy to understand the information. 35% stated that the presence of any of the front labels would almost never consume the product and 37.5% would almost never buy it in the presence of the octagon. Seven out of ten perceived the presence of labeling as useful or very useful for making healthier choices. When comparing the three labeling systems, no significant differences were found in terms of the degree to which it draws attention; facility to understand the information, perception of change in the consumption frequency; modification of current purchasing intention, utility level of the presence of labeling to make healthier decisions ($p>0.05$; ANOVA).

Conclusions: The perception of adults about front labeling as a prevention strategy indicated that its implementation could have a favorable result in terms of choosing the healthiest option.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Food labeling, Nutrition policy, Health promotion, Disease prevention.

P090

Change in the Nutritional Status of the Employees of the State-Owned Electric Company of Uruguay – UTE

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Introduction: Workers spend most of their time at work and some main meals are taken away from home, so there is an increased risk of developing diseases derived from poor eating habits. Therefore, the health and nutritional status of workers is of concern to health institutions, not only because it affects their quality of life and that of their families, but also because it increases health costs and reduces their productivity, compromising the country's development.

Objectives: To study the evolution of the nutritional status of a cohort of UTE civil servants who joined between January 1, 2010 and December 31, 2017.

Methods: Analytical observational retrospective cohort study of the evolution of the nutritional status of UTE employees. A random sample of 162 employees who joined the company between the indicated date and who attended the company's health service for their annual medical check-up between August 2021 and April 2022 was taken. Anthropometric data (weight, height, waist circumference) were taken at the time of joining the company and at

the medical check-up. This research was approved by the Research Ethics Committee of the University of Granada.

Results: The mean age at admission was 25 years, being 34 years at control. The difference in body mass index (BMI) at admission and control was statistically significant (53.71 % and 69.14 % respectively ($p < 0.05$)). The 54.94 % presented a waist circumference with a high or very high cardiovascular risk according to the WHO. The difference in weight gain between admission and the first control indicates that the staff gained 5.2 kg, and this difference in BMI was 1.7 kg/m² greater ($p < 0.05$).

Conclusions: A large percentage of employees significantly increase their overweight and obesity figures from the moment they join the company. Eating habits and physical activity should be evaluated in order to design appropriate interventions to reduce these risk factors.

Conflict of Interest: No conflicts of interest.

Keywords: Occupational health, Nutritional status, Obesity.

P091

Predictors of the Response to *Moringa oleifera* Supplementation in Adults with Prediabetes

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Introduction: *Moringa oleifera* (MO), a plant with high nutritional value and rich in phytochemicals, has demonstrated hypoglycaemic activity in subjects with prediabetes; however, individually, the response is highly variable.

Objectives: To analyse the influence of baseline levels of inflammation and relevant gut microbiota groups as predictors of the glycated haemoglobin (HbA1c) response.

Methods: A randomised, double-blind, placebo-controlled, parallel-group study of MO supplementation (2.4g/day) for 12 weeks was conducted in 65 prediabetic subjects. Seven bacteria groups and two species representative of the gut microbiota were analysed by qPCR and plasma inflammatory cytokines (IL-1, IL-6, TNF- α and MCP-1) by multi-analyte assay with Luminex xMAP®. Based on whether or not HbA1c levels decreased during the intervention, 58% of subjects in the MO group were classified as responders (R) compared to 38% in the placebo group. Differences between R and non-responders (NR) in baseline biomarker levels were analysed, as well as their potential predictive value using a decision tree analysis in which anthropometric variables (BMI, waist circumference) and the above-mentioned biomarkers were tested.

Results: In the MO supplemented participants there was a trend toward lower basal abundance of *Bacteroides* in the R group compared to NR (9.45 \pm 0.53 vs 9.79 \pm 0.37 CFU/g stool; $p = 0.085$. BMI-adjusted ANOVA) and significantly lower TNF- α values (5.55 \pm 1.03 vs 7.55 \pm 3.14 pg/mL; $p = 0.033$). In the decision tree,

TNF- α concentration contributed significantly ($P = 0.025$) to the correct classification of 77% of the R or NR subjects, with a discriminant threshold of 7.33 pg/mL. Above this value, all subjects were NR while baseline TNF- $\alpha \leq 7.33$ identified 72% of the R subjects. No baseline biomarker showed differences between R and NR, nor predictive capacity, in the placebo group.

Conclusions: The inflammatory cytokine TNF- α seems to be a key factor in identifying prediabetic individuals who may respond favourably to low-dose MO leaf supplementation.

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Conflicts of Interest: The authors declare no conflict of interest.

Keywords: *Moringa oleifera*, Glycaemia, Microbiota, Cytokines.

P092

Intervention Study on Healthy Habits in University Workers, Hasen Project, before and during the COVID-19 Pandemic

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Introduction: Isolation due to the COVID-19 pandemic has led to major changes in lifestyle habits. The present study applied the HaSEN programme (structured in two phases of 6 months each: intervention and follow-up), which was created in 2017 to promote healthy habits in university workers.

Objective: To analyze the outcome of the “intervention” phase of the HaSEN programme in two groups, pre-, and pandemic.

Methods: Group 1: 11 workers (2019, pre-pandemic, two men); Group 2: 12 workers (2021, pandemic, two men). All of them are in the Contemplation Phase of motivation for change. Variables: BMI, motivation for change (URICA), adherence to Mediterranean diet (PREDIMED), ACHIEVEMENT motivation, lifestyle (PEPS-2). Statistical tests: to compare groups, Student's t-test (mean \pm standard deviation) or Wilcoxon test (median \pm standard deviation), to compare intragroup differences pre-post intervention, related samples t-test. Effect size and statistical power were calculated. Jamovi 1.6 and G*power 3.9.1 statistical software was used.

Results: The groups did not differ in age (43.2 \pm 8.0 vs 43.3 \pm 8.8) nor in BMI at the beginning of the study (27.5 \pm 4.9 vs 25.3 \pm 4.2) or at the end (27.1 \pm 4.1 vs 25.1 \pm 4.1). Group 2 scored higher on Predimed than group 1 (8.8 \pm 1.4 vs 6.7 \pm 1.7) at baseline and on achievement motivation at the end (7.8 \pm 0.7 vs 7.1 \pm 0.9). Lifestyle increased in both groups (119.9 \pm 11.2 vs 142.8 \pm 14.3 group 1; 132.3 \pm 18.2 vs 152.3 \pm 19.4 group 2). URICA score increased in group 2 with the intervention (1 \pm 0 vs 2 \pm 0.5). All analyses had large effect sizes and acceptable statistical power (1- $\beta > 0.8$).

Conclusions: Workers in group 2 (pandemic) have better adherence to the Mediterranean diet at the beginning and higher achievement motivation at the end. This group also improved their motivation for change during the intervention phase. Both groups improved in lifestyle.

Conflicts of Interest: No conflicts of interest.

Keywords: Occupational health, Adherence to Mediterranean diet, Motivation for change and achievement, Lifestyle, COVID-19.

P093

Macronutrient Intake Evolution in an Ecuadorian Urban Population 2014–2019

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Introduction: Epidemiological transition is related to variations in disease patterns and causes of death that afflict the population due to several interrelated factors, where sociocultural changes such as nutrient intake play an important role.

Objective: To evaluate energy and macronutrient intake in an urban Ecuadorian population between 2014 and 2019.

Methodology: This is a cross-sectional comparative study that analyzes dietary intake based on data from the 2014 Latin American Nutrition and Health Survey - Ecuador (ELANS-Ecuador). In 2019, 400 participants were studied under the same ELANS protocols, with the following characteristics: Ecuadorians of both sexes aged between 15 and 65 years, residents of the urban area of the Coast and Highlands. Two 24-hour recall surveys were conducted according to the multi-step methodology on non-consecutive days. Additionally, dietary intake of energy, and macronutrients, was compared according to sociodemographic characteristics (sex, age, region of residence and socioeconomic level). The results are presented as medians, minimum and maximum, and the evolution according to Mann-Whitney tests.

Results: On average, total energy, total carbohydrates, added sugar, and polyunsaturated fatty acids decreased, while trans fats and cholesterol increased between 2014 to 2019. Men decreased in most nutrients, while women increased monounsaturated fatty acids, trans fats, cholesterol, and protein intake. Both Coast and Highlands had increased intakes of trans fats and cholesterol. The same occurred in all age groups, where there was an increase in trans fats and cholesterol consumption and a decrease in added sugars. According to socioeconomic level, there was a decrease in the consumption of added sugars at all levels.

Conclusion: According to the sociodemographic characteristics, a decrease in the intake of calories and added sugar and an increase in the intake of trans fats and cholesterol were observed in the majority of the population studied.

Conflict of Interest: There is no conflict of interest.

Keywords: ELANS, Sociodemographic characteristics, Intake, Macronutrients.

P094

Effect of a Theoretical-Practical Course to Increase Breastfeeding Knowledge, Attitudes, and Beliefs in Health Students: A Quasi-Experimental Study

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Introduction: Breastfeeding (BF) is the ideal food for newborns due to its nutritional properties and bioactive compounds. There are several barriers that contribute to the low rates of BF in Mexico (28.6% according to ENSANUT-2018). The lack of health professionals trained in the subject is one of them.

Objective: To evaluate the effect of an educational intervention on increasing knowledge and favorably modifying attitudes and beliefs about breastfeeding in healthy students.

Methods: A quasi-experimental study with a control group was carried out; participated 99 students from CUCS-UdeG, Guadalajara, Mexico, in June-July 2018. Participants were medical, nursing, and nutrition college students enrolled in two 32-hour Health Update courses. A theoretical-practical course was implemented in the intervention group (IG, n=59), whose main topic was BF. The control group (CG, n=40) received other Health Update themes. The students answered on two occasions (IE: initial evaluation and FE: final evaluation), three surveys to assess knowledge (ABKQ: 38 items, 5-point Likert scale; each correct answer one point), attitudes (ABAQ-13Mx: 20 items, 5-point Likert scale; where 1=poorly adopted and 5=strongly held) and negative beliefs in BF (30 items, 5-point Likert scale; where 1=adherence to the belief and 5=did not believe in that belief). Differences in each questionnaire score (FE-IE) were averaged and converted to a percentage of the maximum score. Shown as: % of initial score; % variance, and paired T-test value (p<0.05 statistically significant).

Results: FE score was higher than IE score in IG in both knowledge (37.4%, 15.0%, p=0.001), attitudes (76.0%, 9.2%, p=0.001) and beliefs (70.9%, 12.1%, p=0.001) compared to CG (knowledge: 44.2%, -4.7%, p=0.096; attitudes: 76.4%, 3.4%, p=0.031; beliefs: 70.9%, 3.3%, p=0.090).

Conclusions: Implementing an educational program on BF in health students proved to be effective in improving their knowledge, attitudes, and beliefs.

Conflict of Interest: The authors declare that they have no competing financial interests or known personal relationships that could have influenced the work presented.

Keywords: Breastfeeding, Educational intervention, Knowledge, Attitudes, Beliefs, Medical students, Nursing students, Nutrition students.

P095

Body Perception and the Relationship with Its Percentage of Fat Mass and Lean Mass in Dance Students from the Municipal Dance Center of Mérida, Yucatan

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Introduction: Lifestyles among adolescents and young adults directly influence the search for beauty standards, with or without performing some type of dance, affecting the concordance with the real body composition, impacting in their nutritional and/or psychological state. Currently, there are few studies in Yucatan that involve various methods of evaluating body image perception (BIP), not just silhouettes and body mass index (BMI).

Objective: Relationship between perceived body perception and the percentage of real fat and lean mass in dance students belonging to the Municipal Dance Center of the city of Mérida, Yucatán.

Methods: 194 Municipal Dance Center (MDC) participants aged 11 to 24 years, 182 women and 12 men. The Stunkard and Stallard silhouette scheme was applied, and anthropometric measurements (weight and height) according to Lohman's techniques, using a SECA® brand stadiometer for height, and weight, percentage of fat and lean mass the Inbody R20®. Using X² with a 95% confidence interval for inferential statistics.

Results: 34.02% of the population presented underestimated BIP and 14.43% overestimation in relation to the real BMI. The body composition (BC: fat mass [FM] and fat-free mass [FFM]) of 86.08% of the students presented an underestimation of BIP and 1.03% an overestimation of it.

Conclusion: There is BIP distortion in dance students, where women with normal BIP are overweight according to BMI, with a high %FM and very low FFM compared to their BC; men with thin BIP present obesity according to BMI and high %FM with very low FFM in their BC.

Conflicts of Interest: The authors of this work declare no conflict of interest.

Keywords: Adolescents, Body dissatisfaction, Body composition, Dance.

P096

Learning and Practices of Families Participating in a Food and Nutrition Education Intervention for Colon Cancer Prevention

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Introduction: During the years 2019, 2020 and 2021, in an educational institution in the city of Medellín, Colombia, a comprehensive educational intervention on food and nutrition was carried out with schoolchildren and their families with the aim of promoting healthy lifestyle habits for the prevention of obesity as a risk factor for colon cancer.

Objectives: To identify the learning and practices derived from a food and nutrition education intervention for colon cancer prevention.

Methods: Qualitative research; different educational sessions were conducted in Health Education and EAN; to evaluate the learning and effects, a self-administered printed questionnaire was applied to the parents and/or caregivers of the students who participated. The questionnaire consisted of four open questions that inquired about perceptions, learning, practices, difficulties, and experiences. The completed questionnaires were grouped, scanned, and transcribed into an Excel database. The responses were grouped by the question and then analyzed by open coding of the units and subsequently categorized.

Results: A total of 391 surveys were received. 39.5% of the families indicated the implementation of healthy lifestyle habits at home such as physical activity, and healthy eating habits; 31.8% implemented some strategies to improve food at home, avoid or control the consumption of some food constituents such as saturated fats, sugar, sodium and concentrated carbohydrates, to prevent the appearance of excess weight; 18.6% consume fruits and vegetables more frequently and 7.7% responses indicate that families have decreased the consumption of ultra-processed products.

Conclusions: It was evident that the families implemented healthy lifestyle habits such as physical activity, increased consumption of vegetables, decreased consumption of products high in critical nutrients and use of healthy cooking methods. This implies a favorable result with respect to the application of the lessons learned to prevent excess weight and NCDs such as colon cancer, built in the educational sessions, and a positive effect on the lifestyle habits of the families.

Conflict of Interest: None

Keywords: Food and Nutrition education, Healthy eating, Health promotion, School children, Obesity.

P097

Compliance with the Regulation of the Food Scholarship for Higher Education in the JUNAEB Menus Offered in Food Chains in the Malls of Two Regions of Chile

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Introduction: The Food Scholarship for Higher Education (BAES) is a government program of the National School Aid and Scholarship Board (JUNAEB) that provides economic support to university students in vulnerable conditions. A card is delivered with a monthly amount of \$32,000 Chilean pesos (USD \$40) exclusively for the purchase of food in accordance with BAES regulations. In addition, it is redeemable in shops and food establishments under the BAES JUNAEB agreement. To date, there is little information regarding the use of BAES in places that sell food to university students.

Objective: To evaluate compliance with the regulations of the food scholarship for higher education in the menus offered in food chain stores in malls in two regions of Chile.

Material and Method: 3 Malls from two regions were selected. As an inclusion criterion, an instrument was applied that considers qualitative characteristics (menu publication, price, menu structure) to the premises for their selection according to BAES JUNAEB regulations for food outlets in a closed network. Subsequently, each menu was purchased and analyzed in a food laboratory, calculating the nutrient contribution of the menus by weighing technique and using the INTA 2018 food composition table. Descriptive and inferential statistics were used using Stata 15.0 with an $\alpha=0.05$.

Results: Of the 60 establishments found, 46 accepted purchases with a BAES card and 44 offered a JUNAEB menu. Of the 159 BAES menus available, only 32% correspond to the JUNAEB menu and 12.5% meet the structure requested by JUNAEB. However, no place meets the protein intake, 29.5% exceed the sodium limits and 100% exceed total sugars. There is no statistically significant relationship between compliance with the BAES scholarship regulations, nutrient composition, and the menus offered at food outlets ($p>0.05$).

Conclusions: The premises attached to this benefit do not comply with the regulations imposed by JUNAEB for the BAES menus in the premises of the food chain in agreement, selling food outside the JUNAEB standard.

Keywords: BAES JUNAEB Card, Malls, Food places.

P098

Food and Health at Work in an Agroforestry Company in Colombia

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Introduction: Proper nutrition is an essential right for everyone, although sometimes it is not considered relevant in the work environment. The quality of food at work can be affected by different environmental factors, harming the health, performance, and productivity of workers.

Objective: To identify the health risks related to the feeding of the workers of an agroforestry company in Colombia.

Methods: Quantitative, exploratory, descriptive, and cross-sectional study. Within the framework of the sociodemographic and health profile applied by the Company, occupational health and safety personnel were trained to collect data related to feeding through an in-person survey. A telephone survey was applied to some people responsible for forestry projects in rural areas regarding the process of buying and preparing food for the workers. A hygiene and health profile was applied to evaluate compliance with Resolution 2674 of 2013, mandatory in Colombia for any place that produces feeding.

Results: 425 workers (80%) and 7 managers of projects with on-site food preparation were surveyed. 55.5% reported consumption of sugar based on sugary drinks at lunch, low consumption of dairy products at breakfast (89.4%) and fruits and vegetables at dinner (80.5%). The acquisition of food has inadequate processes of purchase, receipt, storage and preparation. 100% of the camps do not have drinking water for food production or direct consumption.

Conclusion: The rural location of the forest camps, the quality of the water, and the frequent consumption of sugary drinks constitute risks in the work environment, which can lead to gastrointestinal diseases, food poisoning, cardiovascular diseases, increase the risk of some types of cancer, among other pathologies, affecting the health, safety, performance, and productivity of workers.

Conflict of Interest: The authors state that they have no conflict of interest with the development of the project or with the parties involved in the study.

Keywords: Occupational health, Collective feeding, Risk factors, Food handling, Forestry, Working conditions.

P099

Osteopenia and Low Weight Present in Artistic Gymnastics and Synchronized Swimming under 16 Years of Age from Querétaro

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Introduction: Body composition is an indispensable part of people's nutritional assessment and is increasingly used for the diagnosis, prevention, and treatment of diseases. It is also important as a monitoring tool in people who perform some type of exercise or sport, to evaluate the effect of this on the composition and performance of the person. The osteogenic action of exercise is critical in the stage of adolescence, especially in young women. However, rhythmic gymnastics and swimming are sports disciplines that have been reported to negatively affect the bone and musculoskeletal health of adolescent girls who practice them.

Objective: This study aimed to evaluate the body composition in girls under 16 years of age who practiced artistic gymnastics and synchronized swimming in the city of Querétaro.

Methods: Girls between the ages of 11 and 16 participated, of which 21 of them practiced artistic gymnastics (AG) and 13 synchronized swimming (SS). They were collected in fasting weight, height, waist, and body composition by DXA (Values of fat mass, percentage of body fat and density, and bone mineral content in the total body and by body compartments).

Results: No differences were found in the characteristics of the participants regardless of the sports discipline they practiced. Half of the GAs and NSs were underweight. The body composition of the fat-free mass, as well as the total bone mineral density (BMD) and in the different body segments, was similar in both GA and NS. Synchronized swimming participants had lower bone density and therefore the highest prevalence of hip osteopenia. The rhythmic gymnasts presented better BMD in the hip, but low BMD in the spine, while the swimmers, the low BMD presented it in the spine.

Conclusion: These two sports disciplines can put the bone health of girls at risk due to the type of exercise performed and the concern for the weight of its practitioners.

Conflicts of Interest: There are no conflicts of interest among any of the authors

Keywords: Body composition, Adolescents, Gymnastics, Synchronized swimming, Bone density, DXA.

P100

Importance of Physical Activity in the Prevention of Metabolic Risk in Children and Adolescents

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Introduction: The high prevalence of childhood and adolescent obesity is associated with changes in lifestyles, among which the decrease in physical activity stands out.

Objective: Evaluation of the association between different lifestyle patterns (diet and physical activity, PA) with adiposity and metabolic risk in children and adolescents.

Material and Methods: A total of 549 children aged 5-14 years (46% male) were included in the study. Food frequency consumption and IPAQ physical activity questionnaires were carried out. Body composition was evaluated by anthropometry and DEXA and biomarkers of metabolic risk in blood were determined. Hierarchical cluster analysis was performed based on adherence to dietary and PA recommendations to establish lifestyle patterns. Package R v.4.0.3.

Results: Three groups: Group 1 (55.7%), low vigorous PA and less adherence to diet; Group 2 (32.4%), lower moderate and vigorous PA and greater adherence to diet; and Group 3 (11.8%), higher PA, especially vigorous, and medium adherence to the diet. Group 2 presents lower levels of HDL-c and higher levels of LDL-c. Group 3 presents lower fat mass, lower insulin levels and higher lean mass and HDL-c, with less presence of Metabolic Syndrome than Group1 and Group2. Adherence to the recommendations for healthy eating and physical activity is different depending on sex, the highest percentage of boys is found in Group3 and that of girls in Group2.

Conclusions: Compliance with PA recommendations is associated with a lower metabolic risk. For the prevention of overweight,

obesity and metabolic and in this mainly the lipid profile and insulin resistance risk, it is not only important to keep adherence to healthy eating recommendations in mind, but also the practice of physical activity, mainly vigorously. In obesity and metabolic risk prevention and intervention strategies, we must promote, in addition to the fulfillment of the Dietary Guidelines, the WHO physical activity recommendations.

Conflict of Interest: None.

Keywords: Overweight, Obesity, Children, Adolescents, Dietary guidelines, Insulin resistance, Lipid profile, Metabolic syndrome, Metabolic risk.

P101

Intake of Vitamin D in the University Population of Querétaro

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Introduction: There is a chronic deficiency of vitamin D worldwide. If we take the population of Querétaro as a sample, vitamin D deficiencies are also observed in the school population. The university students, a population with resources, will indicate the efficacy of the interventions carried out by professionals in terms of vitamin D intake.

Objectives: Contribute to the characterization of the vitamin D intake of the university population of Querétaro, as an integral part of the general population of said state

Methods: This is a cross-sectional observational study, which is intended to describe the target population. This study was carried out in 2016. The study population is made up of 155 students, most of them from the nutrition and dietetics degree (143), horticulture (4), architecture (1), engineering (1), medicine (1) and physical education (1) who study at the natural sciences department of the Autonomous University of Querétaro, on the Juriquilla campus. To collect all the data, an individual life habits survey was used, which includes an FFQ, and a 3-day 24-hour recall (2 during the week and one during the week). The population, between 18 and 41 years of age, with an average of 22.53 years (SD: 3.67), distributed 84.50% of women and 15.50% of men.

Results: The population follows a mean vitamin D intake of 3.29 µg (SD: 1.88). The mean intake of men is 3.53 µg (SD: 1.78), and that of women is 3.26 µg (SD: 1.90) P= 0.658. The mean percentage adjusted to the vitamin D intake recommendation is 43.18% (SD: 26.22). For men, the mean is 41.32% (SD: 27.14) and for women, 43.42% (SD: 26.24) P=0.526.

Conclusions: Our population presents a deficit of vitamin D intake, in accordance with the worldwide deficiency of this vitamin. It is necessary to continue studying other similar populations individually.

Conflict of Interest: There is no conflict of interest with any author.

Keywords: Vitamin D, Recommended intakes, University population, Querétaro.

P102

Healthy School Environments in Elementary Level Schools of San Fernando del Valle de Catamarca Argentina Year 2021

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Introduction: Child and adolescent obesity has physical and psychological consequences for health, being an important predictive factor of obesity in adulthood, cardiovascular diseases and type 2 diabetes. This situation contributes to behavioral and emotional difficulties such as depression and anxiety, stigmatization, and reduce the educational level that Boys, Girls and/or Adolescents (NNyA) can reach. One of the main determinants is exposure to an obesogenic environment and inappropriate behavioral and biological responses to it. In recent years, international and national organizations have published numerous documents that establish a set of measures to regulate obesogenic environments. Within these recommended measures, one that is key and has a high consensus at the international level is the regulation of school environments to promote adequate nutrition and physical activity.

Objective: To describe the characteristics of primary school environments in San Fernando del Valle de Catamarca.

Methods: Descriptive observational and cross-sectional study. Sample: 45 Primary Schools of public management of the province that receive funds from the Directorate of the Equal Opportunities Program (PIO) belonging to the Ministry of Social Development and Sports of the Province.

Results: 45 schools in the context of a pandemic (COVID-19) were analyzed, and the following data were obtained: Food provision: 64.5% of the schools offered food modules (A), 22.2% served breakfast in the school cafeteria and complemented the provision with the delivery of a food module (B), while 13.3% Remaining % provided both breakfast and lunch at the same institution. Only 36% of schools declared having a kiosk. 9% of the establishments surveyed responded that they did not have access to mains water; The number of hours of physical education completed in the week was also consulted, where the majority answered that they had 2 hours of teaching.

Conclusion: the regulation of school environments to promote healthy eating habits and physical activity is a key strategy to stop the growth of overweight and obesity in children and adolescents.

Conflict of Interest: no conflict of interest

Keywords: Infant-juvenile obesity, School environments, Public politics.

P103

Sleep Schedules and Eating Habits in Adolescents during Confinement by COVID-19

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Introduction: March 2020, marked the change of life in the world, to the point of subjecting the population to voluntary confinement, being the purpose not to get infected with the SARS-CoV-2 virus. Children and adolescents were denied the opportunity to enjoy and maintain interaction with the environment. Teenagers were confined to smaller or larger spaces, regardless of the size of their homes. They spent a year and a half isolated from their extended family, friend, and schoolmates, in addition to little practice of extracurricular activities. For some, this confinement was a cause of sadness, social isolation, stress, and depression affecting their lifestyle.

Objectives: To describe the modification of sleep schedules and eating habits in high school students during the confinement by COVID-19.

Methods: 89 adolescents between 12 and 15 years old, of both sexes, enrolled in a healthy lifestyle class participated. Through a personal interview in the presence of their parents, they were asked about their usual sleeping hours, mobile phone usage, breakfast consumption, and the type of diet adopted during confinement. Descriptive statistical analysis was performed.

Results: Participants were 51.69% female and 48.31% male, respectively. Sleeping times were 33.7% from 10:30 to 12:00 at night and only 3.37% after 12 at night. Of these last 9% use their mobile phone all night; 40.44% do not eat breakfast despite being at home and the diet adopted during confinement corresponds to a strict vegetarian diet (10.11%), a lacto-ovo-vegetarian diet (17.98%), and 71.91% a mixed diet. 72% of the adolescents were confined at home due to the absence of parents due to work or study.

Conclusions: Confinement at home generated unhealthy behaviors regarding rest and eating habits, mainly affecting those who were alone or with partial support from caregivers.

Conflicts of Interest: The authors declare that there is no conflict of interest in the presentation of this abstract and this work

Keywords: Sleep, Eating habits, Confinement.

P104

Effect of Obesity on Growth in Schoolchildren in Mexico City. Intervened Cohorts

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Introduction: Excess weight has been associated with metabolic alterations, accelerated linear growth and early pubertal development, however, it is still not clear regarding the dynamics and potential causes.

Objective: To evaluate the effect of nutritional status on the change in height and height/age Z score in schoolchildren, during 1 year of follow-up.

Methods: Study of cohorts intervened in schoolchildren from 8 CDMX primary schools, 2 cohorts were included: cohort 2013-2014 and cohort 2018-2019, with one year of follow-up. After signing informed consent, sociodemographic information was obtained and anthropometric measurements were made at baseline, 6 and 12 months; the change in height (cm), height/age (*z-score*) from baseline to 6 months and from baseline to 12 months was calculated. The body mass index (BMI_{Zscore}) was obtained, and the children were classified as normal weight, overweight and obese. The analysis was stratified by age and sex.

Results: 1069 schoolchildren aged 8.6±1.6 years were included, 49.2% were female, 23.6% were overweight and 20.5% obese. At baseline, girls who were overweight and obese had 4.0cm (95% CI 2.9-5.3) and 6.4cm (95% CI 5.0-7.8) more than normal weight girls. Obese children had 4.9cm (95% CI 3.7-6.1) more than normal weight children. In growth velocity during one year of follow-up, overweight girls were found to be 0.33cm (95% CI 0.04 to 0.61) more at 12 months versus normal weight. Overweight children had 0.27cm (95% CI 0.01-0.54, p=0.045) and 0.45cm (95% CI 0.16-0.74, p=0.002) more at 6 and 12 months, respectively, compared to normal weight children. Obese children had 0.47 cm (95% CI 0.19-0.74) more at 12 months than those of normal weight.

Conclusion: Children with overweight/obesity had height, height/age and growth velocity higher than children with normal weight. However, since the effect decreases as age increases, it does not seem that the final height of obese schoolchildren is greater than that of normal weight.

Conflict of Interest: The authors declare that they have no competing interests.

Keywords: Obesity, Schoolchildren, Height, Height for age, Growth velocity.

P105

The More Entertaining Your Conversation on WhatsApp, the More Food You Eat

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Introduction: Using the cell phone implies that the individual clearly stops perceiving signals from his or her environment in order to focus on the screen. This phenomenon is known as immersion, whose effects are found in feeding episodes, which may affect eating behavior. It has been shown that eating while immersed in action or an object other than consumption increases food intake due to alteration when processing satiation signals. Some authors call it “meaningless eating”. The immersion caused by the cell phone during a feeding episode has effects on food intake, these effects have been poorly studied.

Objectives: To determine the relationship between immersion in the cell phone and food intake in a group of young people.

Methods: An experimental study was carried out. The sample included 31 young people aged from 18 to 29 years old. Each participant was randomly exposed to two conditions: eating sandwich rolls without using any cell phone and eating sandwich rolls while chatting via WhatsApp. Immersion was measured through a visual analog scale, while the number of rolls consumed was used to measure food intake.

Results: The variables showed a non-parametric distribution, so Spearman’s correlation test was used. The duration of cell phone use correlated with immersion ($p = 0.01$) and with the consumption of rolls ($p < 0.001$). A correlation was found between immersion and consumption of rolls in the presence of the cell phone ($p = 0.02$). No correlation was found between the duration of the session without cell phone usage and the consumption in the absence of the cell phone ($p = 0.7$).

Conclusions: The greater immersion in the cell phone, the greater consumption. This is consistent with the meaningless eating hypothesis, which states that environmental factors not related to food have an influence on variations in food intake due to interruption in the signal processing of food intake regulation (such as the perception of gastric distention). It is important to encourage a decrease in the habit of eating food while using the cell phone. Further research in this area is needed, as the cell phone is widely used by the population, especially adolescents and young people.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Ingest, Cellphone, Screen, Immersion.

P106

Malnutrition Due to Excess, Abdominal Obesity and Lifestyles in Academic and Administrative Officials of a Chilean University

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Introduction: Work environments are changing; they evolve and the policies and methods to promote health must evolve together with them. Therefore, health promotion must be designed to face the obstacles arising from social changes.

Objectives: Relate malnutrition due to excess, abdominal obesity, and lifestyles in officials in the different locations of a Chilean university.

Methods: Analytical cross-sectional study of 279 officials between 20-64 years old. Nutritional status (EN) was determined through the body mass index (BMI), abdominal obesity (OA) through waist circumference, lifestyle through the FANTÁSTICO survey and socioeconomic level (SES) through means ESOMAR survey. Descriptive and inferential statistics were performed, Chi-square and Fisher’s exact test were used for the relationship of variables. STATA 16.0 software was used with a significance level of $\alpha < 0.05$.

Results: 53.4% correspond to men, 65.6% are administrative and 37.3% have a very high socioeconomic level. 72.4% have excess malnutrition (EM), 40.4% have abdominal obesity and 61.3% are on the right track. Employees with a “right path” and/or “adequate” lifestyle have less abdominal obesity than those classified as “can improve” ($p = 0.02$). Those with higher education and a lifestyle “can improve” (60%) have a higher percentage of abdominal obesity ($p = 0.002$) and according to occupation, 58.1% of academics who classify as “can improve” have obesity abdominal. Academics with LE “can improve” and/or “adequate” have a higher proportion of malnutrition due to excess (87.1% and 77.1%, respectively), than those who are on the “right track” (46.7%) ($p = 0.002$). Those with a very high socioeconomic level and LE “can improve” have greater malnutrition due to excess (87.5%), than those who are “adequate” (69.8%) and “on the right track” (62.5%) ($p = 0.033$).

Conclusions: Both academic and administrative officials who classify with a lifestyle that “can improve” present greater malnutrition due to excess and abdominal obesity. There is a relationship between lifestyle, abdominal obesity and malnutrition due to excess according to schooling, occupation and schooling.

Conflict of Interest: No conflict of interest.

Keywords: Lifestyle, Excess malnutrition, Abdominal obesity.

P107

Typology of Sugar-sweetened Beverage Consumers in Mexico before and after Soda Tax

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Introduction: The consumption of sugar-sweetened beverages (SSBs) in Mexico is among the highest in the world. As a public policy action aimed to reduce its consumption, in 2014 the tax on SSBs was implemented in Mexico. However, almost 8 years after its implementation, little is known about how the tax has affected the population's sugar-sweetened beverages intake.

Objectives: The aim of this study is twofold. First, to identify the typology of SSBs consumers in Mexico. Second, to examine how this typology has changed after the implementation of the soda tax.

Methods: The data used comes from the National Health and Nutrition Survey 2012 and 2018-19. Latent class analysis, specifically the finite mix model, was used to identify intake groups based on the SSB daily intake in milliliters. These groups were eventually associated with different sociodemographic variables using multinomial regression.

Results: According to data from 2012, three groups of consumers were identified, "healthy SSBs drinkers" (75% of the sample), "moderate SSB drinkers" (18%) and "Heavy SSB drinkers" (7%). In contrast, according to data from 2018, four types of consumers were identified, where also a group of healthy SSB consumers (85%) and a moderate SSB drinkers' group (12%) were found. However, in 2018, two groups of high consumption were identified, one that consumes an average of 2,780 ml of SSBs per day (2%) and a group of extreme consumers that consumes an average of 5,991 ml per day but that represents only 0.2 % of the sample.

Conclusions: This study shows the changes in SSBs consumers typology after the implementation of the soda tax. Where there was an increase in the percentage of healthy consumers, a slight decrease in moderate consumers, and more importantly, a reduction in high SSBs drinkers. These results can be an indicator of the effectiveness of fiscal policies aimed to improve population diets.

Conflict of Interest: I declare no conflicts of interest

Keywords: Sugar sweetened beverages, Sugar tax, Mexico.

P108

Application of an Intervallic and Non-intervallic Physical Exercise Program of Moderate Intensity and Its Effect on the Reduction of Body Fat in Sedentary University Students

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Introduction: Performing physical activity and exercise brings several health benefits: muscle strengthening, decreased risk of overweight, obesity, and chronic degenerative diseases, among others. Therefore, the importance of its execution in a frequent manner and with daily adherence to an exercise program.

Objectives: To evaluate and compare the effect of an interval and non-interval exercise program on the reduction of body fat in sedentary university students.

Methods: A 30-day prospective longitudinal intervention study was carried out, in which university students aged 18 to 22 years were invited, 40 showed interest in participating and 30 met the inclusion criteria. However, 17 did not complete all the exercise sessions and were eliminated from the study. Only 13 concluded the study satisfactorily. The exercise was performed on treadmills within the institution's gymnasium and consisted of two conditions: 1) intervallic exercise and 2) non-intervallic exercise. The first with 4 exercise intervals per day, with a duration of 10 minutes each, the second without intervals, with a continuous duration of 40 minutes per day. Both conditions are at moderate intensity and with a duration of 15 days each. Body fat measurements were carried out before and after the exercise sessions on an Inbody 370 scale under similar conditions for each measurement.

Results: It was found that both types of exercise (intervallic and non-intervallic) generated a statistically significant decrease in body fat with a value of $p < 0.01$ concerning baseline. However, no statistically significant difference was found in the amount of fat reduced concerning each type of exercise.

Conclusions: It is concluded that regardless of the type of exercise performed (intervallic or non-intervallic) the most important thing is the performance of daily physical exercise to generate a reduction in body fat levels and optimal benefits in the health status of young university students.

Conflict of Interest: There are no conflicts of interest.

Keywords: Intervallic exercise, Non-intervallic exercise, Body fat, Students.

P109**Identification of Modified Eating Habits during Confinement by COVID-19 in a Preschool Population**

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Introduction: The pandemic caused by the SARS-CoV-2 virus brought with it endless changes in many aspects of life. Confinement has brought two problems, 1) Malnutrition due to the decrease in purchasing power of families. 2) Overweight or obesity due to lack of physical activity, stress, increased consumption of processed foods and uncontrolled consumption of food.

Objectives: Identify modified eating habits during confinement by COVID-19 in a preschool population.

Methods: 54 preschool students from the community of Juan C. Bonilla, Puebla, Mexico participated. A questionnaire of 25 questions answered by the parents through the google forms platform was applied.

Results: Of the participants, 56% were male and 44% female, 89% of children had breakfast before online classes, and 11.95% only sometimes. 59.3% of the parents consider that their children's nutrition remained the same, 29.6% improved, and 11.1% considered that it did not improve. The consumption of cold cuts decreased during confinement; from 56.6% consumption once a week to 48.14%. They asked about the intake of fruit, pastries and fried foods before and during confinement, however, the intake was reported the same. On the contrary, for cereals, daily consumption increased by 18.6%, Processed foods consumed 1-2 times per week increased from 40.7% to 63.0%. The same behavior is observed with the intake of sugary drinks increasing by 14.8% in the consumption once a week.

Conclusions: There is an increase in the consumption of processed foods, and sugary drinks, which are high in calories and low in micronutrients, which can lead to overweight or obesity.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Eating habits, Preschool children, Obesity, Confinement.

P110**Physical Activity Associated with Nutritional Status, Depression, and Functionality in Older Adults in the Ecuadorian Sierra**

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Introduction: Physical exercise in older adults benefits the prevention of overweight and obesity; decreases depression, while improving functionality for basic activities of daily life, autonomy, and independence.

Objective: To determine the prevalence of physical activity level and its association with nutritional status, depression and functionality in older adults in Azuay-Ecuador.

Methods: A cross-sectional study in 400 older adults, in urban and rural areas, in whom the Physical Activity Questionnaire in its short version (IPAQ-SF) was applied, anthropometry was performed, modified Yasavage, Katz and Barthel, after having fulfilled the inclusion criteria and that they have signed the informed consent. The data were analyzed in the SPSS version 15.0 program, using descriptive statistics such as: frequencies, percentages, measures of central tendency (mean) and dispersion (standard deviation). Odds Ratio (OR) with a 95% confidence interval was used for associations, and chi-square was used for statistical significance with its value of $p < 0.05$.

Results: The average age of the participants was 77.1(±7.7) years, 60.3% female, 49.5% married, 95% mestizo, 78.3% primary school, the prevalence of physical activity according to the IPAQ-SF was high level 27.5%, moderate level 43.25%, low level or inactive 29.25%, both in urban and rural population had moderate physical activity (47% and 40% respectively); however, if the level of physical activity was lower, there was more overweight and obesity (31% and 36% respectively), there was a statistically significant association with BMI (OR=1.64; 95%CI 1.028-2.626; $p=0.037$), with depression (OR=2.91; 95%CI 1.866-4.559; $p < 0.001$), with functionality according to Katz (OR=17.56; 95%CI 3.896-79.151; $p=0.000$) and according to Barthel (OR=2.65; 95%CI 1.705-4.124; $p < 0.001$).

Conclusions: The level of physical activity in older adults is inversely associated with malnutrition, depression, and any degree of functional disability. The beneficial effects of physical activity are evident, and it is necessary to include older adults in exercise programs to reduce preventable pathologies.

Keywords: Physical activity, Older adults, Nutritional status, Depression, Functionality.

P111**Association of Folate Intake with Sociodemographic and Anthropometric Characteristics in Pregnant Women**

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Introduction: Pregnancy is characterized by increased nutrient intake to meet nutritional demands by virtue of fetal growth and development. Folate consumption in particular plays an important role since it is necessary for DNA synthesis and cell replication. Its deficiency has been related to neural tube defects, low birth weight, premature delivery, and fetal growth retardation. The progressive changes in diet have led to the modification of eating patterns, which consequently leads to a diet with low nutritional quality and, in turn, micronutrient deficiencies, particularly folate.

Objectives: To associate dietary folate intake with sociodemographic and anthropometric characteristics in pregnant women.

Methods: A retrospective, cross-sectional and observational study was carried out where information was collected through the clinical records of 215 pregnant women in the period 2011 - 2019. For the dietary evaluation, 2 24-hour recalls, and frequency of food consumption were analyzed in Nutritionist Pro™ DietAnalysis Software. The recommendations according to the Dietary Reference Intakes (DRI) established by the Food and Nutrition Board for pregnant women were used. All analyzes were carried out with the statistical package IBM SPSS Statistics 25.

Results: The dietary intake of folates with respect to the percentage of adequacy showed deficiency with a mean of 35.02 ± 16.73 of consumption. When folate intake was compared by different groups of pre-pregnancy body mass index and level of schooling, no statistically significant differences were found between the groups ($p > 0.05$). However, when evaluating the type of medical institution where the participants were treated, a statistically significant difference was found in the consumption of folates in those from a public hospital ($32,446 \pm 1,721$) with those from a private hospital ($41,247 \pm 2,830$) with a ($p < 0.05$).

Conclusion: According to the results, statistically significant differences in dietary folate intake were observed between the groups of participants who attended a public hospital and a private hospital.

Conflict of Interest: The authors have no conflicts of interest to declare.

Keywords: Eating patterns, Micronutrient, Pregnancy, Folate, Folic acid.

P112**Impact of COVID-19 on Eating Behavior, Stress, Anxiety and Depression in Students of University**

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Introduction: The COVID-19 pandemic brought changes in many spheres of life for university students, which can cause alterations in the way they eat and their emotions. In the field of higher education, the traditional educational process of face-to-face classes in the classrooms of the institution to the virtual rooms of various platforms was significantly modified and interrupted, all with the aim of continuing the training of students.

Objectives: The objective of this research was to evaluate the impact of confinement due to the pandemic on nutrition, stress, anxiety, depression, and frustration in university students.

Methods: A quantitative study was carried out using a questionnaire, which was applied digitally to a sample of 510 students, to analyze the frequency of food consumption and a measurement instrument (DASS-21) to determine the level of stress, anxiety, and student depression.

Results: It was found that 40% of the population studied gained weight, when before confinement due to the pandemic, 75% of them were at a normal weight. Likewise, 48% increased the consumption of healthy foods, and 37% decreased the consumption of unhealthy foods. In the frequency of consumption, fast food was consumed by 42% of the population from 1 to 2 times a month, legumes by 45.49% from 2 to 3 times a week, vegetables by 39.41% consumed them daily, dairy products by 37.64% of 2 to 3 times a week, processed beverages 31.17% once a week. In emotional matters, 14.50% presented a level of mild stress, 17.25% extremely severe anxiety, 22.74% moderate depression and 73.13% felt frustrated on more than one occasion.

Conclusions: University students have an unhealthy diet that is altered according to their emotional state in which they are. Likewise, they presented stress, anxiety, depression, and frustration at some level during the COVID-19 confinement.

Conflict of Interest: We declare that there is no real or potential conflict of interest for the publication of this work.

Keywords: Food, Stress, Anxiety, Depression, University students.

P113

Nutritional Status and Self-care of New Undergraduate Students According to Their Educational Profile: A Prepandemic Study

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Introduction: During university education, many of the habits that translate into risk factors during adulthood are established. Consequently, this stage brings with it magnificent opportunities for intervention in favor of healthy behaviors, and efforts must be made to understand the self-care behaviors of the students in order to take action.

Objectives: To determine the nutritional status and frequency of various healthy behaviors, as well as recognized risk factors in a population of new undergraduate students.

Methods: A cohort of 1,708 new undergraduate students from seven university faculties were evaluated in 2019; the faculties and their respective fields of knowledge served as categorization units in subsequent analyses. Nutritional status was determined through anthropometric, biochemical, and dietary parameters. The analysis of self-care was based on data obtained from a series of self-applied instruments, subjected to consistency controls.

Results: A high prevalence of overweight and obesity was found among students, accompanied by health risk behaviors. There were statistically significant differences between groups in the following variables: BMI, waist-height index, fat mass, glucose, triglycerides, total cholesterol, HDL cholesterol, dietary habits, frequency and duration of exercise or physical activity, tobacco, and other drug use.

Conclusions: Students from the social sciences and humanities group showed a lower degree of healthy self-care behaviors in terms of their sexual life, substance consumption, sedentary lifestyle, and eating behavior, as well as a higher prevalence of overweight and obesity, compared to students from faculties oriented to natural sciences, exact sciences, and engineering, so it is pertinent to delve deeper into the psychosocial factors underlying such behaviors.

Conflict of Interest: The authors disclose no conflicts of interest.

Keywords: Nutritional status, Self-care behaviors, Undergraduate students.

P114

Acceptance, Use, and Objective Understanding of Front Warning Labeling by Mexican Undergraduate Students

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Introduction: High consumption of ultra-processed foods has been associated with an increased risk for obesity and other chronic non-communicable diseases. Public policies have been implemented to reduce the consumption of these foods. Nutrition Labeling (NL) is the Mexican tool to recognize the content of risky components in ultra-processed foods.

Objective: To analyze the acceptance, use, and objective understanding of the front warning label among Mexican university students.

Methods: Cross-sectional, descriptive, and prospective study. Two questionnaires were applied via e-mail, one to measure acceptance, use and understanding, and one to measure the frequency of food consumption.

Results: Out of 450 participants, 62.2% accepted front labeling, 83% said they used it properly and 50.4% had an objective understanding. In these young adults, consumption of ultra-processed foods is high.

Conclusions: The success of the implementation of labeling is determined by factors such as acceptance, use and objective understanding, which should be analyzed together to contribute to the correct application of health strategies in young populations.

Conflict of Interest: The authors declare that they have no conflicts of interest.

Keywords: Frontal warning labeling, Acceptance, Use, Objective understanding, Food and beverage consumption.

P115

Characteristics of Emotional Eating Behavior According to Sex and Nutritional Status in Chilean University Officials in Confinement during the Covid-19 Pandemic

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Introduction: The period of confinement during the COVID-19 pandemic affected people by influencing their emotions, triggering the consumption of foods perceived as “Comforting”

distinguished by being high in fats and sugars, those with this characteristic are called “Emotional Eaters”, whose behavior generates a change in nutritional status, which can be influenced by sex.

Objectives: To determine the characteristics of the emotional influence on eating behavior according to sex and nutritional status in university officials in Chile during the period of confinement during the COVID-19 pandemic.

Methods: Cross-sectional study, with a sample of 177 university officials where a survey was applied that considered characteristics of emotional influence on eating behavior, weight, height and sex. The data were analyzed using Stata software with a descriptive analysis.

Results: The sample was characterized by being mostly female with 65.5%, average age of 45.9 years, 73.9 kg and 1.66 m. Malnutrition due to excess was predominant in both men and women 68.85% and 54.31% respectively. Both sexes (75.8% of women and 57.38% of men) have been influenced at some time by the scale, food cravings and lack of control in the intake of sweet foods. Eating under negative emotions was high in both sexes, being higher in women. The female sex also stands out in overeating favorite foods alone (58.62%), feeling guilty when consuming prohibited foods (74.1%), being influenced by tiredness in lack of control when eating (76.73%) and food restriction leads to lack of control when eating (68.97%). Obesity stood out for being influenced by the scale (82.49%), food cravings (94.59%), lack of control over the intake of sweet foods (64.85%), difficulty in controlling the consumption of certain foods (86.46%), eating under negative emotions (91.9%) and overeating favorite foods when alone (59.4%).

Conclusions: The characteristics of emotional influence on the eating behavior of university officials are more prevalent in females and in obese nutritional status.

Conflict of Interest: No conflict of interest.

Keywords: Emotional eating influence, Obesity.

Objective: Determine the factors related to the consumption of a healthy breakfast in young people from a Colombian university during COVID 19.

Methods: Descriptive, cross-sectional study. A probabilistic, random sampling of enrolled students, 290 men and women between 17 and 25 years old. BMI was identified, an online questionnaire based on the frequency of food consumption desired to be considered a healthy breakfast according to an assessment scale that scored the least healthy consumption at 1 and the healthiest at 5.

Results: With the COVID-19 pandemic, 42.7% of students returned to their places of origin, 60% considered that their breakfast improved; 69.9% of the population were regular breakfast consumers, 24.5% occasional and 5.6% skippers; 53.1% of the students ate a healthy breakfast, while 36.5% had a moderately healthy breakfast and 9.7% ate the healthiest breakfast. Between 23 and 24% include foods from all groups daily.

According to the Kruskal-Wallis test for two groups the classification breakfast consumers Students who were regular breakfast eaters were found to have a higher academic achievement (P 0,0242); students who used electronic devices had a less healthy breakfast (P 0,000) and their academic performance was higher in students who spent more time eating it (p 0,0104). According to the Chi 2 test, there was no statistical significance between the consumption of a healthy breakfast and migrant status, sex or BMI (P>0.05).

Conclusions: The consumption of a healthy breakfast in students during the pandemic was related to using of electronic devices, academic performance and with the time spent eating breakfast.

Conflict of Interest: The authors belong to the Metropolitan University

Keywords: Healthy breakfast, COVID-19, Students, Colombian University.

P116

Factors Related to the Consumption of a Healthy Breakfast in Young People from a Colombian University during the COVID 19

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Introduction: Breakfast is one of the meals related to an optimal daily nutrient intake, it is often omitted or does not meet the nutritional quality. According to the Estudio Latinoamericano de Nutrición y Salud (ELANS) (2020), in subjects ages 15 to 65 years old, 78.6% of the population were regular breakfast consumers, 15.9% occasional and 5.5% skippers. In nutrition students from Córdoba, Argentina (2017) 60.2% ate breakfast daily, and only 10.5% ate a breakfast considered to be of quality. Borja found (2019) that skipping breakfast appears as a marker of atherosclerosis.

P117

Correlations of Metabolic Syndrome with Intestinal Parasites in a Suburban Settlement

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Introduction: Some intestinal infections might be involved in the derangement of host metabolism. In Cuba, the relative endemicity of intestinal parasites, and the increasing incidence of overweight and related chronic metabolic diseases, warrant the search for probable associations.

Objectives: To evaluate the prevalence of Metabolic Syndrome (MetS) and intestinal parasites, as well as their associations in a suburban settlement of the Cuban capital.

Methods: Descriptive cross-sectional study on 302 adults (mean age 52.2 ± 16.5 years) from a transitional settlement, who underwent anthropometric (weight, height, body mass index,

waist circumference), arterial pressure and biochemical (glucose, triglycerides, and cholesterols: total, HDL, and LDL) measurements, using conventional methods. International Diabetes Federation criteria were employed for MetS diagnosis. Intestinal parasites were identified by microscopic stool examination using a direct smear, the Willy technique, and the Kato-Katz method. Associations among variables were assessed by corresponding stadigraphs and software SPSS 20.0.

Results: The prevalence of MetS was 35.1% (95% CI. 28.8–41.2). Overweight, dyslipidemia and increased waist circumference showed elevated proportions. Among metabolic markers, LDL-c exhibited the highest frequency of vascular risk values (40%). MetS showed a positive and significant correlation with mean concentrations and risk values percentages for both total cholesterol and LDL-c in females. The prevalence of intestinal parasitism was 31.5%. Parasite-positive subjects and those with mixed protozoa infection had a higher frequency of MetS than non-parasitized ones or those with single protozoan infection, respectively. Prevalence of MetS was significantly correlated with *G. lamblia* infection.

Conclusions: There is a high prevalence of MetS and a moderate prevalence of intestinal parasitic infection in the studied suburban settlement. Furthermore, MetS correlates positively with *G. lamblia* infection. Factors associated with an increase in such metabolic imbalance should be analyzed in-depth in this kind of community as well as the potential influence of some intestinal parasites on the metabolic risk.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Metabolic syndrome, Overweight, Dyslipidemia, Waist circumference, Intestinal parasites, Suburban settlement.

P118

Food Consumption of the Mexican Population before and during the Confinement Due to the Covid-19 Pandemic

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Introduction: The COVID-19 pandemic, in addition to affecting health, meant adjustments in food consumption for many households, which have been influenced by confinement, leading to changes in dietary patterns.

Objectives: Describe the changes in food consumption before and during the confinement by COVID-19 of the Mexican population.

Method: Descriptive-cross-sectional study, non-discriminatory exponential snowball sampling, data collection through an express questionnaire sent by Google forms through social networks. Descriptive statistical analyzes and frequencies.

Results: n=1202, female 74% male 26%, age 15 to >60 years. Predominating 15–35 years. Western Region 68%, Northwest 12%, South Central 9%. Consumption before the pandemic: 90%

consumed plastic/energetic /regulatory foods, 100% ultra-processed, fresh and alcoholic beverages without difference between the sexes. Consumption of plastic/energy boost/regulatory foods vs. age: 95% 25-34 years old, 91% 15-24 years old, 83% 35-44 years old. 100% of the age groups consumed ultra-processed, fresh foods, and alcoholic beverages. Plastic/energetic/regulatory consumption vs region: 89% West, 100% Northwest, 100% Northeast; Ultra-processed, fresh and alcoholic beverages 100% from the regions. Eliminated vs gender: 21% Plastic / Energetic Female, 29% plastic Male, 29% energetic both. Age vs eliminated: 15-24 years 23% plastic/energetic, 25-34 years 19%, 35-44 years 22% plastic/energetic. Region vs eliminated: West 19% plastics, Northeast 33% plastic /energetic, Northwest 33% plastics/energy/regulators. 35% do not eliminate any food. Consumption during the pandemic: Increase VS Gender: 36% plastic/energetic/ Female Energetic 16% ultra-processed, 32% plastics/energetic, 4% ultra-processed Male. 100% Fresh and 1.2% alcoholic beverages with no difference between genders. Eliminated vs Age: 17% Regulators 15-24 years, 26% energetic, 14% regulators, 39% plastics /energetic 23% regulators 25-34 years, 30% plastics/energetic 35-44 years. Region vs Increase: West: Plastics/energetic 38%, Northwest 17% regulators, Northeast 25% regulators.

Conclusion: Because of the lockdown, interest was shown of fresh and regulated food consumption for health; in addition, the consumption of non-recommended foods increased due to economic difficulties and stress; so it is necessary to create environments that encourage healthy food choices and good health.

Conflict of Interest: No conflict of interest.

Keywords: Consume, Food, COVID-19, Pandemic, Mexicans.

P119

Body Mass Index, Perception of the Change of Body Weight, and the Emotions Presented during the First Wave of the COVID-19 Pandemic Based on a Mexican Population

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Introduction: The pandemic's first wave was an enhancer of alterations of emotions and intake, combined with the lockdown causing weight gain and changes in eating habits. Some associated risk factors include female sex, younger age, and previous excess weight, in addition, the small house-room, low educational level, and economic income. This situation generated the need to carry out remote evaluations and referred by the subjects for safety.

Objective: To Analyze the body mass index, the perception of the weight change, and emotions during the first wave of COVID-19 in the Mexican population.

Method: Descriptive-cross-sectional study, non-discriminatory exponential snowball sampling, data collection by Google forms, expressly sent by social networks BMI (WHO, 2006). Descriptive statistical analysis and correlation.

Results: n1202, Women 74%, Men 26%, age 15 a >60 years, mean: 69.09kg, 1.64m, BMI 25.4kg/m². West predominates 68%, northwest 12%, South Center 9%; singles 55%, married 39%; BMI: Undernutrition 3%, Normal 52%, Overweight 31%, Obesity 14%; change perception in kg: >kg 39%; negative emotions 66%; Isolated confinement 57%. Change of perception kg vs BMI (Women vs Men): >kg: NL 53%vs48%, SP 34%vs36%, <kg: Normal 50%vs39%, Overweight 27%vs%; Change of perception in kg vs BMI (single vs married): >kg: Normal 55%vs44%, Overweight 34%vs37%, Obesity 0%vs17%, <kg: Normal 50%vs39%, Overweight 28%vs27%, Obesity 18%vs34%; Region vs Overweight: North Central 39%, South East 75%; Region vs negative emotions: North >60%, Central >50%, South 70%. Women >kg 35%, while men have maintained in kg 58%. At a higher isolation level >kg and BMI; Significant correlation: BMI vs Emotions -.095, BMI vs Age .089.

Conclusion: One of the pandemic consequences has been the social changes and the best way of beating the preventive measures, since the nutritional area, the first step is to identify the subjects at risk, nutritional problems, and the associated factors; to create interventions that help modify inadequate eating practices and improve nutritional status with strategies that can be carried out remotely and in person.

Conflict of Interest: No conflict of interest.

Keywords: Nutritional state, Emotions, Covid-19, Change weight, Mexicans.

P120

Changes in Lifestyle of Black Women with Educational Intervention of the “Actúa con Corazón de Mujer” Program in Three Municipalities of Colombia

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Introduction: Every day in Colombia 60 women die from cardiovascular disease (CVD) and black women are at higher risk. According to the World Health Organization (WHO), these deaths are preventable. “Care as a lifestyle” (CEV) is an intervention of the Actúa con Corazón de Mujer program of the Colombian Society of Cardiology and Cardiovascular Surgery (SCC) and the Colombian Heart Foundation (FCC).

Objectives: Train leaders to promote the adoption of healthy behaviors.

Methods: Municipalities with a black population were selected with the commitment of the local authorities. 395 women were elected. Risk perception was measured with an instrument adapted by the FCC. The educational intervention was divided into 4 sessions in each municipality for 5 months. Participants were trained in blood pressure measurement, Blood Pressure Self-Monitoring (AMPA) was used to confirm hypertension, and anthropometric and physiological measurements were included to calculate cardiovascular and diabetes risk.

Results: The women learned about care. 90% reported an “ideal” perception of risk, made promises, and adopted behaviors taking action against their risk factors and more than 50% showed changes in anthropometric measurements.

Conclusions: The results show that education strategies, especially with community leaders, can be of great relevance for public health.

Conflict of Interest: The authors have no conflicts of interest

Keywords: Behavior changes, Culture of care, Cardiovascular risk, Population intervention.

P121

Type of Diet and Religiousness of Adventists in the Western Panamanian Region in Relation to COVID-19 Morbidity March 2020 to September 2021

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Introduction: For millennia, the diet and health of the individual were closely related to their religious beliefs, but during the Age of Reason the study of it was discarded. During the last 40 years, at a global level, this subject has become an emerging branch of research in the health sciences. This work represents the first attempt to introduce religiosity as a construct in empirical research on health and nutrition in Central America.

Objectives: To investigate a possible relationship between the type of diet and religiosity of Seventh-day Adventists with morbidity from Covid-19 in the first 18 months of the pandemic. To compare morbidity from Covid-19 between Adventists and the general population.

Methods: Cross-sectional descriptive exploratory study where a Virtual Survey was applied to 414 Seventh-day Adventist participants who were invited through the media and Adventist social networks from the western region of Panama that includes the provinces of Veraguas, Chiriquí, Bocas del Toro, and the Ngäbe Bugle Comarca.

Results: 56.5% of Adventists practice some variation of vegetarianism. 98.3% reported a high level of religiosity. The morbidity prevalence of Covid-19 is 14.2% among Adventists and 8.6% in the general population of the western region of Panama.

Conclusions: There is no direct relationship between the type of diet and the level of religiosity with morbidity from Covid-19. While the results of the comparison between morbidity due to Covid-19 between Adventists and the general population, there is a statistically significant difference ($p < 0.001$).

Conflict of Interest: The author declares no conflict of interest in this study.

Keywords: Type of diet, Religiosity, Covid-19 morbidity.

P122

Role of the Nutritionist During Feminization Hormonal Therapy in Transgender Women

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Introduction: A transgender person is one who decides to undergo hormonal and surgical intervention to adapt their body to the gender identity with which they feel identified. These can be called transfeminine (THM), which is a person with anatomically male genitalia, but with female gender identity, adopting attitudes, behaviors and hobbies culturally associated with the role of binary women. In transgender women, feminizing hormone therapy generally includes the administration of estrogens in combination with antiandrogens. At a physiological level, this type of hormone therapy could increase triglyceride levels, LDL cholesterol, blood pressure, and visceral fat, among others, favoring the occurrence of cardiovascular events. That is why the management of people with feminization hormone therapy involves a multidisciplinary team that must include the nutritionist.

Objective: To analyze the role of the nutritionist in relation to feminization hormone therapy in transgender women.

Methods: Study with a mixed approach (quantitative-qualitative), descriptive, non-experimental and cross-sectional type. The sample consisted of 16 Chilean transgender women between 18 and 55 years old. Data collection was carried out through a survey prepared and validated for this study. The participants signed informed consent.

Results: 68.8% declared that during feminization hormonal treatment they did not receive support from a nutritionist. Some of the stated reasons were: "We do not have direct access to health as a guarantee of rights", "We do not have health rights contemplated", "The public system is not used to dealing with transgender people and paying for a nutritionist is expensive, at least for me", and "I don't have the resources to pay a nutritionist and it should be included in the health of trans girls". However, 87.5% believe that nutritional intervention is important during feminization hormone therapy.

Conclusions: The nutritionist must actively participate within the multidisciplinary team, incorporating nutritional counseling before and after the process of feminization hormone therapy.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Nutritionist, Transgender, Hormone therapy, Nutritional intervention.

P123

Relationship between Food Intake and Academic Stress in Students at the Universidad Autónoma de Chihuahua, Mexico

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Introduction: Academic stress usually occurs in students when they are subjected to various demands and requirements by the University where they study, it can cause different effects, reducing their quality of life and causing: depression, sadness, fatigue and, headaches, among others, resulting in affection of nutritional status.

Objectives: To determine the relationship between food consumption and academic stress, in university students in the 4th semester of the Bachelor of Medicine at the Autonomous University of Chihuahua, Mexico.

Methods: The study population is made up of 117 students in the 4th semester of the Faculty of Medicine of the Autonomous University of Chihuahua, in the year 2020, with participants of both sexes, grouped into age ranges between 19-20 and 21-43 years. The selection of respondents, given the pilot nature of the research, was by simple random sampling, applying the SISCO inventory, which includes 31 items on academic stress, which was completed by the chosen sample.

Results: There is a positive correlation between the increase and the reduction in food consumption and the overload of tasks and jobs and chronic fatigue in the group of men between 21 and 43 years old, while in the group between the ages of 19 and 20 no correlation was found. Regarding food consumption, related to feelings of depression and sadness, the group of men aged between 19 and 20 years, showed a low correspondence, in the group of women between 21 and 43 years, a positive correlation was observed. In addition, the presence of a higher frequency of stressful situations was observed among the respondents, in conditions that: cause worry and nervousness, overload of tasks and work, restlessness, concentration problems, chronic fatigue, and reluctance to carry out academic work.

Conclusions: Academic stress is usually related to different psychological, physical, and behavioral manifestations, which can directly influence students. Sleep disorders, chronic fatigue, drowsiness, restlessness, feelings of depression, anxiety, lack of concentration, and aggressiveness, determine certain academic pressures that influence the eating habits of university students.

Keywords: Academic stress, Eating habits, University students.

P124

Nutrimetry for the Primary Prevention of Malnutrition in the First 1000 Days of Life

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Introduction: Nutrimetry is a methodology (described in other publications), that allows characterizing the population in nutritional risk groups, which in turn enable early interventions at a primary prevention level of malnutrition. It presents both, clinical and epidemiological evidence of the changes in the linear growth development of children.

Objectives: Study the behavior of linear growth development in Nutrimetry normal body mass index (BMI) groups (8, 6, and 4) in the first 1,000 days of life.

Methods: 328 data of children measured during the years 2010-2017 were analyzed, a cross-analysis of height/age Z score and BMI/age Z score with Nutrimetry was made and the prevalences by year and nutritional lowest risk groups (4, 6 and 8) were compared with Kruskal Wallis.

Results: The average prevalence of the years 2010 to 2017 for the group 8 (high height/normal weight) were 2010 = 0%, 2011 = 3.45%, 2012 = 1.92, 2013 = 2.17%, 2014 = 2.17%, 2015 = 5%, 2016 = 0% and 2017 = 0%. Prevalences for the group 6 (normal height/normal weight) were 2010 = 47.06%, 2011 = 48.28%, 2012 = 48.08%, 2013 = 54.35%, 2014 = 54.35%, 2015 = 55%, 2016 = 47.50%, 2017 = 46.34%. Prevalences for the group 4 (low height/normal weight) were 2010 = 11.76%, 2011 = 10.34%, 2012 = 7.69%, 2013 = 8.70%, 2014 = 13.04%, 2015 = 10%, 2016 = 17.50%, 2017 = 9.76. Group 6 presented an increase in its prevalence in the years 2013, 2014 and 2015, which decreased in 2016, along with an increase in prevalence in group 4. These differences weren't statistically significant.

Conclusions: Nutrimetry allows early intervention with primary prevention measures for malnutrition, revealing evidence of improvement in normal nutritional risk group 6 through the years 2013, 2014, and 2015.

Conflict of Interest: The authors declare that there is no conflict of interest.

Keywords: Nutrimetry, Nutritional risk groups, Malnutrition primary prevention, Early intervention, Crossed variables.

P125

Bone Mineral Density Evaluation in Adults over 40 Years Old, 2022

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Introduction: during human growth, bone modeling starts to occur. More than 94% of bone mineral density (BMD) is acquired by age 16. Starting at the age of 40, BMD starts to reduce slowly and progressively, with an increased risk of suffering from osteoporosis. The more relevant risk factors are a low calcium diet, low physical activity (PA), and excessive consumption of alcohol and tobacco. Women can be primarily affected by hormonal changes.

Objectives: to diagnose BMD, nutritional situation, and lifestyles of the people in the study sample.

Methods: a descriptive cross-sectional study, approved by the IRB 00003070 ethics committee, with a convenience sample of 50 men and women aged 40 and over. Anthropometric and body composition measurements were made using SECA™ equipment, and bone densitometry measurements using Sunlight MiniOmni™ equipment whose criteria are based on the ones provided by the WHO. It was performed a 24-hour dietary recall analyzed with Food Processor™ and an IPAQ auto report of PA. Data was analyzed in EPI INFO v7.2.

Results: the average age of the sample was 48.9 years. 58% and 42% were women and men, respectively. Their nutritional situation (according to body mass index) was 10% normal, 54% overweight, and 36% obese. 3% and 8% presented high and low skeletal muscle mass, respectively; 90% presented a high body fat index. 13 cases of osteopenia were identified and one case of osteoporosis of which 71% (including the case of osteoporosis) were in women and 29% were in men. 93% of the cases appeared in participants suffering from obesity and overweight. PA was 48% low and 42% moderate. 57% of osteopenia cases were people with low PA levels. The calories consumed daily per person was an average of 2,517 with 23% adequacy of vitamin D and 90% adequacy of calcium (58% < 90% adequation).

Conclusion: we can confirm the urge to control overweight and obesity. Cases of osteopenia should be diagnosed at an early stage to avoid osteoporosis.

Conflicts of Interest: there are no conflicts of interest.

Keywords: Physical activity, Nutritional situation, Bone mineral density.

P126

Association between Dietary Patterns and the Anthropometric Profile of the Costa Rican Urban Population: Results of the Latin American Study of Health and Nutrition

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Introduction: The analysis of dietary patterns assesses the summative effect of the nutrients provided by a dietary pattern and its association with sociodemographic characteristics and nutritional status (Karageorgou et al., 2019). This represents an advantage over the food and/or nutrient approach, which underestimates the complexity of the diet.

Objectives: Analyze the association between the main dietary patterns and the anthropometric profile of the Costa Rican urban population during the year 2014-2015.

Methods: An Exploratory Factor Analysis by Principal Components was carried out to obtain the dietary patterns of the Costa Rican urban population. The extracted factors were compared between sociodemographic and anthropometric variables using multivariate analysis of variance.

Results: The following patterns were identified in the Costa Rican urban population: (1) Traditional Pattern, (2) Western Pattern, (3) Coffee Pattern, (4) Soup with Vegetables Pattern, (5) Prudent Pattern and (6) Meats and Cereals Preparations Pattern. A positive association with the Traditional pattern was observed in people aged 25-34 years ($p < 0.001$), men ($p < 0.001$) and of low socioeconomic status (SES) ($p < 0.001$). For the Western pattern, a positive association was observed in men ($p < 0.001$), adolescents ($p < 0.001$) and high SES ($p < 0.001$). The Coffee pattern was preferred by people from 35 to 49 years old ($p < 0.001$) with no differences by gender and SES, while the Soup with Vegetables pattern and the Prudent were most preferred by women ($p < 0.001$) and people from 50 to 65 years of high SES ($p < 0.001$), respectively. Finally, adherence to the Traditional pattern was associated with lower waist circumference and BMI, while adherence to the Western pattern was associated with lower neck circumference.

Conclusions: This study provides relevant information on food consumption trends in the Costa Rican urban population according to sociodemographic characteristics. These findings could contribute to the planning and evaluation of nutritional interventions and public policies. The study found no associations between the patterns and excess weight. These results must be confirmed with longitudinal studies that also allow to establish associations with other diseases.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Dietary patterns, Obesity, Overweight, Nutrition.

P127

Patterns and Preferences of Consumption of Processed and Ultra-processed Products, Fruits, and Vegetables in a University Population from Cuenca (Ecuador): A Mixed Methods Study

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Introduction: Ecuador is going through an epidemiological transition, in which the main causes of morbidity and mortality are chronic noncommunicable diseases that are increasingly occurring at younger ages. The consumption of processed and ultra-processed products due to their high content of fat, salt, and sugar could be related to the development of these diseases.

Objective: To determine the consumption patterns and preferences of processed and ultra-processed products, fruits, and vegetables in the university population.

Methods: Design with a mixed approach (quantitative/qualitative). A quantitative cross-sectional study was carried out on 423 adults between 18 and 30 years of age through a questionnaire on the frequency of consumption of processed and ultra-processed products, fruits, and vegetables through an online Google Forms form, and a qualitative study at 9 university students through semi-structured interviews to find out their food preferences via zoom. Consumption patterns were determined by factor analysis in STATA v17. For the qualitative analysis, the hermeneutic method was used, in an intentional sample, the categories of consumption preferences were analyzed manually. The participants signed informed consent prior to data collection. The project was approved by the Bioethics Committee of the University of Cuenca.

Results: 56.7% of the participants were female, 60.5% had normal weight and 29.6% lived in rural areas. Four consumption patterns were identified: Pattern 1 (ultra-processed foods, fried foods, and snacks with high sodium content); Pattern 2 (Cheese and sweet snacks); Pattern 3 (canned and preserved fruits); and Pattern 4 (Fruits and vegetables). The university students indicated that they prefer to frequently consume processed and ultra-processed products due to their taste, availability, and price, despite knowing the nutritional traffic light.

Conclusions: In the university population of Cuenca, 3 patterns were identified in the consumption of processed and ultra-processed products, as well as consumption preferences related to taste, price, and accessibility. It is necessary to carry out studies that identify the causes that promote the consumption of these products that could be potentially harmful to health.

Conflict of Interest: none

Keywords: Processed products, Ultra-processed products, Food preferences.

P128

Municipal Sociodemographic Indicators Associated with Low Birth Weight in Children in the State of Mexico

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Introduction: Low birth weight (LBW) is a global public health problem. Among the factors associated with LBW, the anthropometric, nutritional, sociocultural, and demographic characteristics of the mother have been pointed out, and the territorial socioeconomic characteristics have been little explored.

Objectives: To evaluate the association of sociodemographic indicators of the municipalities of residence of children in the State of Mexico with their prevalence of LBW.

Methods: The percentages of poverty, vulnerable population due to income, educational gap, lack of access to health/housing/food services, population with income below the welfare line, human development index, and marginalization index were obtained from the databases of CONEVAL, 2015 intercensal survey, and INEGI localities catalog. The prevalence of LBW (<2500 g) in 2017 in the 125 municipalities (MN) of the State of Mexico was obtained from the UAEH Maternal and Child Nutrition Observatory, which were classified into 3 groups: 0-1.9% (group 1: 32 MN), 1.91-5.75% (group 2: 62 MN) and > 5.75% (group 3: 31 MN).

Results: The average of the indicators of poverty, marginalization, income vulnerability, and the population with income below the minimum welfare was in all cases lower in group 3 compared to 1 and 2 ($p < 0.05$); in contrast, the human development index was higher in group 3 (0.75 ± 0.05) compared to groups 1 and 2 (0.72 ± 0.05 and 0.71 ± 0.06), $p < 0.05$.

Conclusions: The municipalities with the highest prevalence of LBW have a higher level of human development and lower poverty, vulnerability, and marginalization, compared to those with a lower prevalence of children with LBW. This is contrary to what was expected, suggesting that there are unidentified factors, such as environmental contamination, that could explain LBW in the different geographic areas of the State of Mexico.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Sociodemographic indicators, Low birth weight, Municipalities, State of Mexico.

P129

Association of Sweetened Beverage Consumption with Abdominal Obesity and Fasting Glycemia in Mexican

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Introduction: High consumption of sweetened beverages has been associated with weight gain in schoolchildren due to their high energy content.

Objectives: To evaluate the association of beverage consumption with anthropometric and biochemical indicators in schoolchildren from the metropolitan area of Pachuca, Mexico.

Methods: Cross-sectional study was conducted on a random sample of 203 schoolchildren, and anthropometric and biochemical indicators were evaluated. To evaluate beverage consumption and diet, they were asked to record their beverage intake for 7 days in a consumption diary and two reminders using ASA24. Based on the GDA labeling of 800 beverages available in convenience stores, the nutritional composition of energy, sweeteners, and macro and micronutrients was elaborated. Descriptive data are presented according to their distribution, using χ^2 and Mann-Whitney U Tests to compare groups.

Results: The beverages that contributed most to total fluid intake were water (41.9%), flavored water (17.9%) and milk (13.1%). An association was found between juice and nectar consumption and abdominal obesity ($p < 0.05$). School children with normal fasting glucose levels consumed higher amounts of milk (282.8 ml/d) and flavored milk (182.5 ml/d). An average energy intake of 1683.5 kcal/d was estimated, of which less than 5% was contributed by the beverages. The contribution of macro and micronutrients (Folic acid, B12, Vit C, Calcium), through the beverages was 1 to 8%.

Conclusions: Evidence is provided that the high consumption of juices and nectars is associated with abdominal obesity in school children. The consumption of milk and flavored milk beverages may favor lower fasting glycemia. The energy intake of beverages in the diet of schoolchildren was lower than estimated in national surveys.

Conflict of Interest: The authors have no conflicts of interest to declare.

Keywords: Abdominal obesity, Glycemia, Sweetened beverages, Schoolchildren.

P130

Anemia, Inflammation Markers and Iron Deficiency Are Not Associated with Intestinal Parasitosis in a Suburban Community of Havana

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Introduction: Iron deficiency anemia is the main nutritional problem in Cuba. Low iron intake, intestinal parasites, and chronic inflammation status are common causes of this deficiency. Although the intestinal parasite infection burden is low in the country, some areas are endemic to this infection and the physical condition of individuals can be affected.

Objectives: To estimate the prevalence of anemia, inflammation, and iron deficiency in a suburban community of Havana. To evaluate the association of anemia and iron deficiency with intestinal parasites and nutritional status.

Methods: Descriptive cross-sectional study on 272 adults from a suburban community in Havana, Cuba. Variables (indicators in parentheses) were anemia (hemoglobin), iron deficiency (ferritin), nutritional status (body mass index and waist circumference), and inflammation (C-reactive protein, and acid alpha 1-glycoprotein). Intestinal parasites were identified by microscopic stool examination using direct smear, the Willy technique, and the Kato-Katz method. SPSS 20.0 and Epi Info 7.1.2.0 were used for statistical analysis.

Results: Anemia prevalence was 39,7% (mainly in females with 47.8%), inflammation at 67.6%, and iron deficiency at 2.9% (only in females). Iron deficiency was more associated with anemia ($\chi^2=0.005$). Excess body weight (obesity, overweight) was found in 58,8% with higher values in females than males. The obesity and overweight were not associated with anemia or inflammation. Intestinal parasites were not associated with anemia, iron deficiency and inflammation

Conclusions: The prevalence of anemia is a moderate public health problem in this population. Iron deficiency is not a public health problem and is only associated with anemia in women. Inflammation is highly prevalent. Anemia is not associated with parasitic infection and inflammation. Overweight and obesity are high and are not associated with anemia and inflammation

Conflicts of Interest: The authors declare no conflict of interest.

Keywords: Anemia, Intestinal parasites, Iron deficiency, Inflammation, Obesity, Suburban community.

P131

Mediterranean Diet Based-Intervention with Bakery Products in Children with Overweight/Obesity. MEDKIDS Study

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Introduction: One in four children are overweight/ obesity in Spain. A low adherence to Mediterranean Diet has been observed

Objectives: To develop a diet intervention with bakery products with a better nutritional profile in order to obtain a higher adherence to the dietetic recommendations

Methods: A randomized controlled cross-over trial with 2 periods of 8 weeks was developed. The potential sample included 60 children between 6 to 14 years with overweight/obesity. A clinical study that included body composition indicators, blood, urinary and fecal samples, and questionnaires with parents was developed at the beginning and the end of each intervention period. Weekly dietary planning is provided based on the tastes of the participant and the recommendations of the Mediterranean Diet. A loaf of bread and two pastry products (baked and fried dough) have been developed in which the nutritional profile has been modified, reducing at least 15% and 30% the sugars and saturated fats, respectively, and increasing at least 30% the fiber, compared to conventional products.

Results: Nutritional intervention consists of weekly monitoring of each, delivery of planning, and video advice. The products developed are included at the rate of 2 slices of bread (60 gr) /day and 4 pieces of pastries (50gr) per week. A loaf of bread has been developed with a 51.6% and 58.2% reduction in sugars and fats, and an 84.4% increase in fiber. The baked dough has been developed with a reduction of 20.8% and 47.8% of sugars and fat, and an increase in fiber of 191.3%. The fried mass has been developed with a reduction of 14.7% and 57.7% of sugars and fats, and an increase of 270% of fiber.

Conclusions: The development of this nutritional intervention makes it easier for families to follow up on the recommendations, as well as achieve greater adherence to the dietary guideline through the implementation of the products developed.

Conflict of Interest: MEDKIDS study is funded by Ministerio de Economía y Competitividad, Centro para el Desarrollo Tecnológico Industrial, Spain.

Keywords: Nutritional intervention, Bread, Pastries, Children, Overweight, Obesity, Mediterranean Diet.

P132

Lifestyles and Health Outcomes in Vulnerable Groups. A Pilot Intervention Study

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Introduction: Lower socio-economic groups tend to have worse health outcomes compared to those groups of higher socio-economic status. Among the reasons for these differences are poorer lifestyles including increased risk of physical inactivity, unhealthy diet, smoking, and alcohol consumption. One of the barriers that the most vulnerable groups often report to healthier behavior is the economic cost of healthier foods.

Objective: The present study aimed to conduct a pilot study on an intervention project to improve lifestyles in a group of vulnerable people.

Methods: A total of 66 people (34 in the intervention group and 32 in the control group) received a food voucher of 120 euros per month if they were 12 years of age or older (60 euros for those under that age) for three months. The intervention group also received an educational intervention that included the creation of weekly personalized menus and two talks a week on the impact of our lifestyles on our health for ten weeks. All participants belonged to the Red Cross extreme vulnerability program.

Results: 76.5% of the adults and 31.3% of the children were overweight or obese. Participants in the intervention group achieved an average weight loss of more than one kilogram and improved their cholesterol, triglycerides, uric acid, and transaminase levels in ten weeks. However, the control group gained on average 700 grams in weight and even some biochemical parameters worsened.

Conclusions: An economic intervention is not sufficient to improve health levels. Educational interventions are needed to promote healthy habits among the most vulnerable individuals.

Keywords: Vulnerable groups, Socioeconomic level, Intervention, Lifestyles, Obesity, Economic barriers.

P133

Association of Dietary Carbohydrates and Body Fat Mass in Adolescents from Mestizo and Indigenous Communities from Chiapas, Mexico

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Introduction: Different types of carbohydrates have diverse effects on body composition. However, the influence of dietary carbohydrates on body fat in adolescents from highly marginalized areas in Chiapas is scarcely studied.

Objective: To assess the association between dietary carbohydrates and body fat excess in adolescents from Mestizo and Indigenous communities from Chiapas, Mexico.

Methods: This cross-sectional study included 220 adolescents from the Tzotzil-Tzeltal and Selva regions of Chiapas, Mexico. Food intake was assessed using 24-hour recalls. Energy and nutrient intakes were estimated by using the Nutrient Composition Tables for Mexican foods. The dietary glycemic index (GI) was assigned to each food item reported in the 24-hour recalls using a standardized protocol. Body fat mass was assessed using bio-impedance scales. We categorized body fat as normal or high according to age and sex-specific cutoff points. We categorized the intake of total carbohydrates, dietary fiber, dietary GI and energy-adjusted dietary GL into tertiles. Log-binomial regression models were fitted to estimate prevalence ratios (PRs) with 95% Confidence Intervals (95% CI) to assess the association between dietary carbohydrates categories and categories of body fat excess.

Results: 220 adolescents were studied, of which 49.6% were girls and the mean age was 14.1 years. The median values of total carbohydrates, fiber intake and dietary GI were 315.1 g, 26.2 g, and 51.4 units, respectively. Adolescents with the highest dietary fiber intake presented a lower prevalence of body fat excess (PR: 0.36, 95% CI: 0.15 - 0.83) than subjects with the lowest dietary fiber intake. Subjects in the highest tertile of dietary GI had a higher prevalence of body fat excess (PR: 2.59, 95% CI: 1.29 - 5.21).

Conclusions: Adolescents from Mestizo and Indigenous communities of Chiapas with the highest dietary fiber intake had a lower probability of body fat excess than subjects with the lowest intake of dietary fiber. On the contrary, adolescents with a high GI diet had more than a two-fold prevalence rate of body fat excess, when compared to those with a low GI diet.

Conflicts of Interest: The authors have no conflicts of interest to declare.

Keywords: Carbohydrates, Dietary GI, Fiber, Adolescents, Mestizo and Mayan communities, Chiapas-México.

P134

Evaluation of the Quality of Nutritional Care Focused on the Detection of Anemia during Pregnancy in First-level Care Services in Six Mexican States

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Introduction: Anemia is a condition characterized by the deficient production of healthy red blood cells to transport an adequate level of oxygen to the body's tissues. The most prevalent type of anemia worldwide is iron deficiency or iron deficiency anemia, and during pregnancy it has been associated with higher rates of maternal death, perinatal death, premature birth, preeclampsia, low birth weight and cesarean delivery. The treatment of iron

deficiency anemia is quite simple; however, inadequate detection and diagnosis are related to a poor quality of care in health services.

Objectives: To evaluate the quality of nutritional care in primary care health centers for the early detection and treatment of anemia in pregnancy.

Methods: The quality of nutritional care for the detection and treatment of anemia in pregnancy was evaluated through the indicator "Detection of anemia", based on the extraction of recommendations derived from guidelines with better methodological quality through AGREE II, and of semi-structured interviews with health personnel and users of 95 first-level health centers around the country.

Results: Any of the evaluated health centers achieved optimal compliance (>90%) with the "Detection of anemia" indicator. Only 1 out of 10 women (10.5%) receives correct nutritional care with an optimal diagnosis of anemia during pregnancy. The state with the highest compliance with the indicator was Chiapas (17%), followed by Yucatán (13.2%), Veracruz (8.9%), State of Mexico (6.9%), Oaxaca (6.9%), and finally, Chihuahua (2.4%).

Conclusions: The quality of care related to optimal detection is inadequate, the results obtained are mainly attributed to the lack of supplies and material, poor availability and accessibility to laboratory tests, shortage of drugs and supplements for treatment, and recent changes in the Mexican health system, among others.

Conflict of Interest: None.

Keywords: Anemia, Pregnancy, First level of care, Quality of care.

P135

Mortality Due to Digestive and Hepatobiliary Pancreatic Tumor and Non-tumor Diseases in the Population of the Ciudad De La Paz, January to December 2017

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Introduction: The evolution of mortality has changed today, with an increase in mortality due to non-communicable diseases.

Objective: To determine the relationship of sociodemographic factors with mortality due to Digestive and Hepatobiliary Pancreatic Tumor and Non-tumor Diseases of the population of the City of La Paz, January to December 2017.

Methods: Retrospective analytical study. Universe and sample made up of the total number of cases of death from tumorous and non-tumorous pancreatic digestive and hepatobiliary diseases. Death certificates that were duplicated and belonged to other municipalities were excluded. The method of data collection was the death certificates found in the cemeteries.

Results: Mortality was 14.5% due to digestive and hepatobiliary pancreatic diseases, according to location in systems or organs of the ICD-10 list due to tumor diseases due to malignant tumors in digestive organs; in non-tumorous ones they are due to liver diseases, due to the location in the gastrointestinal tract, in both sexes

it was presented in the adjoining digestive glands. In terms of years of life lost YPLL, of the total, 389 people under 72 years of age died and 6,553 years were lost. The relationship with sociodemographic factors, the probability value calculated Chi-square is less than the significance value of 5%, accepting that the variables occupation, sex, and marital status, is associated with the groups of mortality due to digestive diseases and hepatobiliary pancreatic tumors and non-tumor and according to the level of education there is no significant relationship.

Conclusions: Mortality according to location in the gastrointestinal tract, in both sexes, occurred mainly in the adjoining digestive glands, in the tumorous ones in the gallbladder and in the non-tumorous ones in the liver. The years of life lost was 6553 years. There is a relationship with the sociodemographic factors of occupation, sex, and marital status.

Keywords: International classification of diseases, Mortality, Tumoral, Non-tumor, Digestive and hepatobiliary pancreatic diseases.

P136

Nutritional Care through Menu Elaboration – Knowledge Acquired in the Training of Social Cooks in the Solidary Kitchen / Gastromotive Program, in Brazil and Mexico

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Introduction: The Solidarity Kitchen Program, created in the Covid-19 Pandemic, came to help cooks who had people in social vulnerabilities in their territories, who at that moment were going through the terrible evil of Hunger. At this moment, the program was created, using gastronomy as an instrument of innovation and social impact, with education as a means of transforming the lives of cooks, who had also lost their jobs, and doing even more, training social cooks. They receive educational and logistical support in the preparation of balanced menus, considering the importance of making full use of food, contributing to the construction of a new food conscience. Thus, this program works to minimize food insecurity, found in territories affected by social inequality, in Brazil and Mexico.

Objective: The present work consists of demonstrating the nutritional quality of the menus prepared by Social Cooks in Brazil and Mexico, from the perspective of healthy eating.

Methodology: We used the methodology of Evaluation of the Quality of Menu Preparations (AQPC) to verify the perspective of healthy eating for the beneficiaries of the Solidarity Kitchens. The project team visited the Supportive Kitchens to follow up on site and talk to the cooks, so that together they could elaborate the technical sheets of the preparations. We analyzed 15 consecutive days of menus, only lunch menus, referring to the two Kitchens. After all, the technical sheets referring to the menus were put into an Excel spreadsheet and analyzed through the AQPC.

Results: The application of the AQPC method was performed daily for 15 days, being evaluated the criteria of Cooking Technique:

86.66%, Color of the Salad: 26.66%, Combination of colors: 66.66%, number of preparations rich in sulfur: 86.66%, appearance of leafy: 40%, canning in the salads: 20%, fruits in the desserts: 0%, presence of candies: 0%, amount of fat in the preparations (meats): 66.66%, fried food: 46.66%.

Conclusion: We observed that our Solidarity Cooks prepared adequate menus for the beneficiaries of the territories served, and it is consistent with what was addressed in their training, however, a Nutritional Education intervention is necessary, later on in the beneficiaries (long term), because rather, it is necessary to contribute to minimizing food insecurity. It is worth mentioning that we need to expand the study to all our Solidarity Kitchens that are in 6 Brazilian states and Mexico, so we will have a greater vision of learning, and the impact of the quality of the menus developed by Solidarity Cooks.

Keywords: Solidarity cook, Partner kitchens, Solidarity kitchens, Social gastronomy, Menus, Quality Assessment of Menu Preparations (AQPC).

P137

Identification of Culinary and Alimentary Skills, Nutritional Status, and Quality of Life of Elderly People in a Community Care Group

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Introduction: The World Health Organization establishes care for the elderly and the promotion of active aging as a priority issue. Maintenance of culinary and alimentary skills are associated with a higher quality of life, diet quality, and consumption of fruits and vegetables. Culinary skills are defined as the mechanical and physical processes used for food preparation, which include cutting, mixing, baking, cooking, among others. Alimentary skills refer to the production of food at home, for example: planning and purchase of food, budget available for food, food safety and healthy food consumption.

Objective: To identify the culinary and alimentary skills, nutritional status, and quality of life of elderly people in a community care group.

Methodology: an exploratory uncontrolled quantitative study was developed with elderlies that participate in community care groups. Data on cooking and alimentary skills, body composition, metabolic parameters, health status, and quality of life were collected. The SPSS statistical program was used.

Results: the age of the participants was 74+7.6 years, 76.5% were overweight or obese, 45% had high levels of blood pressure and low-density lipoproteins. It was observed that 41% of older adults show a high level in the development of culinary skills, 41% in alimentary skills and 41% in the use of the kitchen as a recreational activity. The alimentary skills they carry out most frequently are reviewing nutritional labeling on packaged products and planning the menu in advance. For culinary skills, less development was observed in baked dishes.

Conclusion: The maintenance of culinary and alimentary skills in older adults was observed, however, it is necessary to carry out a project to reinforce kneading and baking activities, which promote active aging.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Culinary skills, Alimentary skills, Active aging.

P138

High Protein and Fat Intake in Nutrition Students during Confinement by COVID-19

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Introduction: Food consumption during the COVID-19 pandemic has changed radically in the general population. It is known that in some cases the lack of availability has not allowed to have varied and healthy diets, as well as the increase in the prices of basic food basket products and the lack of work or changes in the income of Mexican households.

Objective: To evaluate the adequacy of diets of nutrition students during virtual classes 2 years after the beginning of the COVID-19 pandemic.

Materials and Methods: Thirty-six nutrition students of both sexes participated and collected replicates of their diets for proximal chemical analysis (PCA) and analysis using the Mexican food equivalents system (MFES). Sixteen of the students were foreigners and 20 of them resided in Querétaro. The amount of water consumed was reported and metabolic water was calculated.

Results: It was found that the mean values of fat and protein were significantly higher when the diet was analyzed by MFES compared to PCA (49.6±17.6 g/d vs 41.9 ± 25.5g/d for protein and 73.1±26.8 g/d vs 62.8±23.8 g/d for fat). Sixty-one percent of participants had high fat intakes, but interestingly 94% were found to have protein intakes greater than 20% of their caloric intake. Twenty-eight percent consumed less than 45% of carbohydrates in their daily diet. It was also found that water intake was higher in foreign students compared to Queretaro residents (1052±280.8 mL/d vs. 876.1±271.0 mL/d) and related to the consumption of more brothy foods.

Conclusion: The change in the diet of nutrition students due to COVID-19 pandemic confinement increased fat and protein intake. Diets with higher water content were observed in foreign students. The MFES overestimated fat and protein in the diets of the nutrition students.

Conflicts of Interest: There is no conflict of interest on the part of the authors.

Keywords: Diet, Nutrition, COVID-19, Mexican food equivalents system.

P139

Food Labeling: Understanding, Expectation and Its Relationship to Well-being, Basis for Design Public Education Strategies

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Introduction: The increase in preventable chronic diseases, related to an increase in processed food consumption, has mobilized the authorities linked to the elaboration of public policies, to design education strategies for the citizens' healthier foods choice.

Objective: To analyze the public food package enjoyment and the labeling understanding in different Argentinian locations.

Methods: It was conducted a cross-sectional, qualitative, descriptive, and correlational study. This study employed a semi-closed survey, using Google Forms, that used information distributed in social networks with $n=1158$, ages from 12 to 81 years, and 70% responses from the female gender.

Results: For the data analysis, an "ad hoc" criterion was applied, where the information on the label is considered from the attribute of selection by the consumer and how he would use it to avoid or choose a product because he considers it "harmful" or "beneficial" for his health, as well as data with and without nutritional information. It was established that 1) the amount of: fibers, proteins, calcium, iron, and vitamins comprise beneficial readings; 2) the amount of: sugars, calories, carbohydrates, fats, sodium, or salt could include readings of a harmful nature; 3) the Nutrition Facts table, weight or ingredient list comprise neutral readings; 4) the registration of the company, expiration date, lot and logos would be independent of the nutritional content. The contents of labels most read by consumers are those defined as harmful (35%), only 14% of consumers point their reading to beneficial content and the rest are interested in general information, other than nutritional or other (25%, 24%, and 2% respectively).

Conclusions: People recognize that there are "harmful" foods that prevent complete well-being. In the beginning, it is recommended, to solicit education strategies from the labels, through an interactive system such as QR (Quick Response) directed to a website and social networks, on the inadequacy of food with a warning, supported by dietary guidelines, without using content that alarms, as recommended by social marketing.

Conflict of Interest: The authors declare that they do not have conflicts of interest.

Keywords: Labeling, Consumers, Education, Nutrition

Safe, Healthy, Sustainable and Social Food

P140

Level of Food Insecurity and Nutritional Status of Mothers of Children Using a Food Program in a District of the Central Department of Paraguay during the Second Semester of 2021

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Introduction: The traditional role of women in society as caregivers and food preparers for the family, as well as the growing recognition of their role as heads of household, further support the consideration of women as a special group to assess the impact, consequences, and areas of intervention in terms of food insecurity (FI).

Objectives: To identify the level of food insecurity and nutritional status of mothers of children users of a food program in a district of the Central Department during the second semester of the year 2021.

Methods: Descriptive cross-sectional design in which data from 59 mothers of children using a food program were included. Measurements of weight, height, and waist circumference were obtained, and body mass index was calculated. The level of individual food insecurity was measured using the Food Insecurity Experience Scale (FIES). Descriptive statistics were used. The research protocol was evaluated by the Research Ethics Committee Code 724/2021.

Results: Data from 59 women, with an average age between 18 and 24 years, were analyzed. A total of 64.4% reported having experienced mild AI, 25.9% moderate AI and 10.2% severe AI. The mean BMI in the participants was 30 kg/m², 42.38% presented obesity and a higher prevalence of "Very high" cardiovascular risk was observed (55.93%). The mean waist circumference of the mothers was 89.2 cm.

Conclusions: There is a higher frequency of mothers with mild food insecurity. And almost half of them were obese, and most of them have a very high cardiovascular risk.

Conflict of Interest: No conflict of interest exists.

Keywords: Food insecurity, Women, Nutritional status

P141

Nutritional Components and Sensory Analysis of 3 Byproducts of the *Brosimum alicastrum* Ramón Tree for Human Consumption

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Introduction: The *Brosimum alicastrum* ramón tree has had multiple therapeutic and traditional uses in Mexico. Formerly it used to be cultivated and used as subsistence food by the ancient Mayan civilization, today various communities seek to obtain a source of income from its byproducts.

Objective: In the present work, the bioactive components of three products obtained from *B. alicastrum* were analyzed: (a) coffee obtained from the nut, (b) tea obtained from the leaves, and (c) jam obtained from the pulp of the fruit. Sensory analysis was performed to assess acceptability.

Methods: The bioactive components of coffee and tea infusions were tested at different infusion times (1, 5, 10, 15, 20, and 25 min). The concentration of total phenols, vitamin C, carotenoids, glycosylated flavonoids, and condensed tannins was evaluated. For the jam, the proximal analysis and the calculations of nutritional content were carried out.

Results: The maximum concentration of bioactive components in coffee and tea were obtained after 10 and 15 min of infusion, respectively. The total phenol content was 3115 and 3402.9 mg GAE/100 g; vitamin C 1.936 and 0.48 mg/dl; total carotenoids 1.904 and 104.61 g/100 g, glycosylated flavonoids 90.8 and 75 mg/100 g DW, condensed tannins 10.942 and 2.26 µg EqCAT/100g. Of the 3 products analyzed, the one that had the greatest acceptance was ramón jam due to its flavor, the second most accepted was tea due to its appearance, and the least accepted was coffee due to its aroma.

Conclusions: Ramon coffee is a good source of total carotenoids; ramón tea provides a high amount of total phenols and flavonoids; ramón jam is a product reduced in sugar, with a high content of vitamin C and with a greater contribution of protein compared to similar products.

Conflict of Interest: There is no conflict of interest between the authors.

Keywords: *Brosimum alicastrum*, Coffee, Jam, Tea.

P142

Peptides from Spent Coffee Ground: Bioactivity and Docking *in silico* with the Peroxisome Proliferator-activated Receptor Gamma (PPAR γ)

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Introduction: During the brewing of coffee, 90% of the coffee bean ends up as spent coffee ground (SCG), a by-product that implies a waste of an essential fraction of potentially bioactive peptides present in the protein fraction, which represents 10 to 17% of SCG. Plant-derived peptides have demonstrated antiadipogenic capacity by binding to PPAR γ , regulating the development of overweight and obesity, a condition present in 70% of Mexicans. It is proposed to identify peptides from the protein fraction of SCG with a possible antiadipogenic effect by regulating PPAR γ .

Objectives: Determinate the presence of SCG peptides (*Coffea arabica* L.) with ligand interaction to PPAR γ receptor.

Methods: Determination of proteins present in SCG through bibliographic review, the FASTA sequence was obtained from UniProt and RSCB PDB, proteolysis and potential bioactivity were performed in BIOPEP-UWM, peptides from 2 to 5 amino acids were selected, characteristics of peptides and bioactivity prediction were performed in PepDraw and PeptideRanker respectively. The affinity of the peptides to residues CYS285, MET364, ARG288, SER289, and ILE281 of PPAR γ in HPEPDOCK (< -160 kcal/mol) and the binding energy to the same residues in AUTODOCK4 (< -4.8 kcal/mol) were measured.

Results: The 11S storage globulin (G11S) is the most abundant (45%) of the protein fraction present in the SCG, in addition, free peptides were identified. Peptides of 2 to 5 amino acids released from *in silico* proteolysis show ACE inhibitory activity (32%), DPPIV (34%), DPPIII (4.9%), and antioxidant activity (7.8%). 13% of peptides presented an affinity < -160 kcal/mol from G11S, and 29% from free peptides. Peptides with receptor affinity have a pI from 3 to 11, average hydrophobicity +8.5, and 50% have a bioactivity >0.5. Peptides PQPR, AIF, APH, VAF, IF, PEY, and IPIL from G11S, AWAH, and YQH from free peptides, showed binding energy < -4.8 kcal/mol.

Conclusions: Peptides present in the protein fraction of SCG are related to an inhibitory activity of various receptors. Their binding capacity proposes their potential antiadipogenic effect on PPAR γ *in silico*.

Conflict of Interest: The authors declare that they have no competing interests.

Keywords: Spent coffee grounds, PPAR γ , *In silico*.

P143

Intake of Slow-digesting Carbohydrates is Associated with Changes in the Microbiome in Diet-induced Obesity Growing Rats

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Introduction: Childhood obesity is the main driver of insulin resistance and contributes to future comorbidities into adulthood. High-calorie diets and lack of physical activity play a role in the development of metabolic diseases, and though the energy density of food is one of the main obesogenic factors; indeed, food quality rather than the quantity of the different macronutrients is desirable.

Objectives: The present study aimed to investigate the effects of changing the quality of carbohydrates from rapidly to slowly digestible carbohydrates on gut microbiota composition and functional pathway profiles in growing rats fed a high-fat diet (HFD).

Methods: Growing rats were fed on an HFD containing carbohydrates with different digestion rates: an HFD containing rapid-digesting carbohydrates (OBE group) or slow-digesting carbohydrates (ISR group), for 4 weeks. A non-obese group (NOB) was included as a reference and rats were fed on a rodent standard diet (AIN93G). The composition of gut microbiota was analyzed by 16S rRNA-based metagenomics; a linear mixed-effects model (LMM) was used to determine the abundance changes from baseline to 4 weeks of treatment.

Results: The groups showed a comparable gut microbiota at the baseline. At the end of the treatment, animals from the ISR group exhibited differences at the phylum levels (decreasing the diversity Fisher index, and *Firmicutes*, and increasing the Pielou's evenness and *Bacteroidetes*); at the genus level by increasing *Alistipes Bifidobacterium*, *Bacteroides*, *Butyrivimonas*, *Lachnospirillum*, *Flavonifractor*, *Ruminiclostridium* 5 and *Faecalibaculum*, and decreasing *Muribaculum*, *Blautia* and *Ruminiclostridium* 9. Remarkably, relative abundances of genera *Tyzzellerella* and *Angelakisella* were higher in the OBE group compared to NOB and ISR groups.

Conclusions: This study demonstrates that the replacement of rapidly digestible carbohydrates for slowly digestible carbohydrates within a high-fat diet improved the gut microbiota composition, which may have a protective effect against the development of metabolic disturbances in obesity.

Conflict of Interest: The authors declare no conflict of interests.

Keywords: Obesity, Dietary carbohydrates, Gastrointestinal microbiome, Metabolism, Microbiota, Pediatric obesity, Rats.

P144

Functional and Nutritional Properties of Tarwi Seed (*Lupinus mutabilis Sweet*) Germinated at Different Times and Presentations

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Introduction: Tarwi is a seed characterized by its high protein content (>40%). However, the presence of alkaloids decreases the bioavailability of nutrients, which can be partially improved by soaking and sprouting, which lead to the production of simpler compounds from storage proteins and carbohydrates due to intense metabolic activity.

Objectives: Aimed of the present research was to evaluate the effect of germination time and the different presentations of tarwi seed on functional and nutritional properties.

Methods: Tarwi seeds, after a selection, classification and soaking process, were subjected to germination for four and five days, respectively, and presented as a final product with sprouts and without sprouts. On the product, after milling and sieving, the solubility (SA) and the absorption capacity (CAA) of water, the adsorption capacity of oil (CAAc) and the swelling capacity (CH) were determined. In addition, the proximal analysis and the *in vitro* digestibility of the protein were determined.

Results: SA of the germinated tarwi flour has decreased from 28.89% to 10.07% as well as the CAAc from 3.48% to 2.33%; and, on the contrary, CH and CAA increased from 2.80 to 5.53 ml/g and 2.92 to 3.45 g/g, respectively, compared to non-germinated seeds. Protein content and its *in vitro* digestibility, fat and crude fiber increased with germination from 43.53 to 50.37%, 93.22 to 97.46%, 18.94 to 22.26 and 5.76 to 9.97%, respectively, with respect to non-germinated. In none of the cases, values of functional and nutritional properties modified with germination time and seed presentation (with and without sprouts).

Conclusions: The germinated tarwi seed modifies its functional and nutritional properties with respect to the non-germinated ones; on the other hand, the germination time and the presentation of the product (with and without sprouts) do not modify these properties.

Conflict of Interest: The authors have no conflict of interest.

Keywords: Germinated, Functional properties, Digestibility.

P145

Training on the Consumption of High Protein-source Foods and Pesticides Use in the Canton Simiatug- Ecuador

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Introduction: Simiatug, a canton located in the province of Bolívar - Ecuador, is categorized as an area with the highest levels of chronic malnutrition in Ecuador (37% of children under 5 years of age). UBN indicator reaches 98%, also most of the population is indigenous.

Objectives: Training Simiatug community leaders on the use of pesticides and high protein-source foods consumption as determining factors to prevent chronic malnutrition in children and improve the health of the population.

Methods: For the training, educational material on available food and a practical workshop with labels of different pesticides was developed. Gathering information was carried out on the main existing crops in the area, which are legumes (fava beans, beans, peas), cereals (corn, barley), tubers and vegetables, as well as the most consumed food by infants, which is colada called Machica (made with water, toasted barley flour and sugar). For the nutritional improvement of the product, several alternatives mixing cereals and legumes were elaborated, the one with the best organoleptic characteristics was that of Fava Bean-Machica, sugar was replaced by jagger (panela), and two alternatives were presented with water or milk as the base.

Results: Forty-five community leaders were trained, and they commented on their lack of knowledge about the use of pesticides, the different colors of the labels and the risks to which they were exposed. The workshop on protein foods was pleasantly received. In addition, the idea of protein supplementation was introduced, tasting a colada with a higher content of minerals and higher quality protein.

Conclusions: This intervention allowed the development of a training methodology in communities; gathering information on the available ingredients and the foods consumed, to carry out a nutritional improvement. The need to work on knowledge of the use of pesticides to improve their use was also identified.

Conflict of Interest: None.

Keywords: Community nutrition, Protein quality, Food safety, Plant-based food, Chronic undernutrition.

P146

Dietary Intake of Polyphenols in Bachelor's Degree in Nutrition Graduates of the Universidad Autónoma de Yucatán (UADY)

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Introduction: Polyphenols confer health benefits, and therefore it is expected that health professionals, specifically in the area of nutrition, have a high consumption of these metabolites. In Mexico there is only one study that reports that Yucatan is the state with the lowest consumption of total and individual polyphenols nationwide. However, that study was conducted in adult women and used a food frequency that may not consider regional foods typical of the Yucatan region.

Objectives: To estimate the consumption of total and individual polyphenols from 24-hour dietary recall (RD-24) in graduates of the Bachelor's Degree in Nutrition.

Methods: A 24 h recall was applied to 38 graduates of the UADY Bachelor's Degree in Nutrition during 2021. The intake of total and individual polyphenols was determined using the Phenol-Explorer and United States Department of Agriculture (USDA) databases. In addition, foods with high total polyphenol content and foods absent in these databases were identified. Descriptive statistics were performed using Microsoft Excel and the results were plotted using Graphpad-Prism.

Results: The average intake (mg/day \pm SD) of total polyphenols, flavonoids and phenolic acids were 1,251 \pm 879, 129.6 \pm 114.1 and 31.2 \pm 35.3, respectively; other polyphenols, lignans and stilbenes had an intake of 13.3, 2.1 and 2.1 mg/day. Only 7 people consumed stilbenes; 17, lignans and 31, other polyphenols. Foods consumed rich in polyphenols were fruits (tangerine, orange, blueberry, strawberry, pineapple, banana and kiwi), vegetables (broccoli, cauliflower and peppers), corn, beans, lentils, Hass avocado and Mexican spices (black pepper, caper, cloves, cinnamon, thyme and star anise). Some foods absent from the databases were: fruits (mamey and plantain), vegetables (chayote, habanero peppers, jicama), cereals (granola, oats and amaranth), oils (pumpkin seeds), bakery products, meat and meat products and industrial products.

Conclusions: The consumption of total polyphenols was variable but the average was higher than that reported in Mexico, Yucatan or even Finland, Poland and Japan, above the amount associated with lower cardiovascular risk (1,170 mg/day). Intake of flavonoids and phenolic acids was low, while other polyphenol ligands and stilbenes were infrequent.

Conflict of Interest: The researchers stated that there is no conflict of interest.

Keywords: Phenolic compounds, Stilbenes, Flavonoids, Lignans, Polyphenols.

P147

Effects of Pomegranate (*Punica granatum*) Peel Supplementation on Body Weight, Glucose Levels, and Food Intake in Rats Fed a Cafeteria Diet

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Introduction: Currently, scientific interest in the study of pomegranate peel has increased because it contains significant amounts of bioactive compounds: gallic acid, flavonoids, anthocyanins, lignans, and catechins, among others. These compounds have functional properties, and beneficial therapeutic effects on health.

Objective: The aim of the present study was to evaluate the effect of pomegranate peel supplementation on body weight, glucose levels, and food intake in diet-induced obese rats.

Methods: Fifteen male Wistar rats were randomly distributed into 3 groups: a control diet group (CTL) (3.35 kcal/g), a cafeteria diet group (CAF) (3.72 kcal/g), and a cafeteria diet group supplemented with pomegranate peel (CAF+G) (200 mg/kg body weight). Body weight was recorded once a week and food intake three times per week for 15 weeks. Finally, fasting blood glucose levels were obtained, the rats were sacrificed, blood was collected to obtain serum samples, and tissues were extracted for further analysis.

Results: A significant difference in body weight gain was found ($p < 0.01$) between CTL (269.98 ± 14.99 g) and CAF (408.32 ± 65.72 g). Regarding the food intake (g/day), we found a significant increase in CAF intake compared with CTL ($p < 0.05$). Similarly, blood glucose levels were significantly higher in CAF compared with CTL ($p < 0.01$).

Conclusions: CAF promotes an increase in food intake, this causes a greater gain in body weight, as well as higher blood glucose levels. Pomegranate peel supplementation induced less body weight gain as well as lower blood glucose levels compared with CAF, but these differences were not statistically significant.

Conflicts of Interest: The authors declare no conflict of interest.

Keywords: Obesity, Pomegranate, Food intake, Glucose, Cafeteria diet.

P148

Cilantro, Onion, and Lettuce. Diet Quality and Food Consumption Patterns in Mexican Travelers

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Introduction: The role of diet quality and the identification of food consumption patterns play a determining role in addressing the progression and increase of chronic degenerative diseases related to the diet of individuals. Currently, the evaluation of the diet focuses on indicators or indices aimed at evaluating the quality of the diet of individuals based on knowing whether or not their consumption pattern is healthy. In this regard, Gil et al. (2015) stated that in addition to evaluating food groups and nutrients to identify the quality of the diet, aspects related to food safety should be included, such as consumption of processed foods, handling, preparation, and storage. food; access to drinking water and eating habits, including patterns of consumption of alcoholic beverages and salt; buying seasonal and local foods; cooking at home and conviviality as well as patterns of physical activity, sedentary lifestyle and rest and some sociocultural habits. Under such a context, this study evaluated food consumption in Mexican travelers within a travel context from an eating behavior perspective.

Objectives: To evaluate the quality of the diet and food consumption patterns of Mexican travelers in 5 different spaces and time periods.

Methods: Descriptive analytical, non-experimental with a mixed approach. eating behavior was analyzed in a feeding episode, in 4 different spaces and temporalities. A virtual, mixed questionnaire was applied. the participants were 322 Mexican travelers, older than 18 years.

Results: As preliminary results, it has been identified that there are foods that are consumed more regularly, for example, "cilantro", "onion" and "lettuce". Food, mostly "homemade" is consumed and finally, it is shown that eating behavior changes in a travel context.

Conclusions: To meet the needs of current food problems, it is necessary to study eating behavior in different contexts and with different groups of individuals, one of them, being Mexican travelers.

Conflict of Interest: no conflict of interest

Keywords: Diet quality, Consumption patterns, Mexican travelers.

P149

Selenium Enrichment of Meat of Pampa Rocha Pig Raised Outdoor, and Its Effect on the Fatty Acids Composition and the Oxidative Status

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Introduction: Pampa Rocha pig (PR) is a native resource, adapted to the biotope of Uruguay. In the search of obtaining a differential meat product through the productive system, and functional for its nutritional contributions, the present investigation about the effect of supplementation with selenium in the diet of PR, has been undertaken.

Objectives: Feeding PR with concentrate supplemented with organic or inorganic selenium, could enrich meat with that element. However, it is important to know what kind of selenium, organic versus inorganic, is more effective to enrich meat. Other parameters such as fatty acids composition and oxidant status of meat have been studied.

Methods: The animals (n=24) were raised outdoors, fed concentrate supplemented with selenium, with access to pasture and shelters. Three groups of eight PR were randomly established: Control (C), organic selenium (OS), and inorganic selenium (IS), supplemented with 0 (C), 0.3 ppm of organic (OS), or inorganic selenium (IS). The animals have been slaughtered at 180 days of age, and the *Longissimus dorsi* muscle was sampled between the 10th and 12th rib. The selenium has been determined by atomic spectrophotometry (Perkin Elmer AA 300), fatty acids using a capillary column and chromatograph Perkin Elmer Clarus 500. The oxidative status has been determined by the TBARS-MDA method.

Results: PR meat has been enriched in selenium ($p < 0.001$) only in inorganic form. The levels of selenium in meat were 0.16, 0.22, and 0.31 mg/kg of meat for C, OS, and IS, respectively. Regarding the fatty acids' composition, selenium does not change the content of C14:0 and C16:0 (atherogenic fatty acids), but IS raised the level of C16:1 ($p < 0,01$). No differences between treatments have been observed for the oxidative status of meat.

Conclusions: The meat of PR pigs has been enriched only with the IS. No noticeable effect has been observed on the composition of fatty acids (except for the C16:1) and no differences have been observed in the oxidative status.

Conflict of Interest: There is no conflict of interest

Keywords: Selenium, Fatty acids, Lipid oxidation, Pampa Rocha pig.

P150

Antioxidant Capacity of Resveratrol on the Hippocampus of Wistar Rats Administered with Ethanol

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Introduction: A high consumption of ethanol is associated with memory loss and neuronal disorders associated with oxidative stress. Oxidative stress is an imbalance between oxidants and antioxidants leaning towards an oxidative environment, potentially leading to cellular and molecular damage. Chronic ethanol intake has been found to favor hippocampal deterioration, inhibit cell survival, and alter neuronal morphological maturation. To counteract these effects, various antioxidants have been described, both natural and synthetic, one of the most being resveratrol, a polyphenol with antioxidant, anti-aging, anticancer, and neuro-protective properties.

Objectives: to analyze the antioxidant capacity of resveratrol on the hippocampus of Wistar rats administered with ethanol.

Methods: Male Wistar rats, 3 months old, were divided into the following categories: Control (without treatment), 5 groups administered with high doses of ethanol (10, 20, 30, 40, and 50% ethanol), respectively and another 5 groups administered resveratrol 10 mg/kg/day + ethanol, for 2 months. Subsequently, the production of nitrites, MDA, and 4-HDA, and enzymatic activity of SOD and CAT were quantified.

Results: The levels of nitric oxide and lipid peroxidation products increased significantly with increasing ethanol concentration compared to the control group, however, resveratrol treatment significantly reduced oxidative stress caused by high ethanol intake. The enzymatic activity studied (catalase and superoxide dismutase) did not present significant changes with respect to the controls. The results show that resveratrol prevents damage by acting as an independent scavenger of the endogenous system. Furthermore, there is a decrease in markers of oxidative stress when resveratrol is administered in high alcohol consumption.

Conclusions: Resveratrol prevents ethanol-induced oxidative stress in the hippocampus of Wistar rats by decreasing cellular lipoperoxidation, but not the activation of catalase and superoxide dismutase enzymes.

Conflict of Interest: None.

Keywords: Resveratrol, Alcohol, Antioxidant activity.

P151

Quality of Life and Food Vulnerability: Livelihood Strategies Developed in the South of Jalisco

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Introduction: Today, the quality of life (QoL) construct encompasses such a wide range of dimensions in human beings that its study in everyday rural life has become a collective component of QoL. Likewise, QoL is an integral part of human beings' lives, to the point that when a disrupted negative crisis comes, families come at a risk. When the risk is food-related, it becomes food vulnerability (FV), and families react by deploying a series of actions that allow them to re-stabilize their life situation; these arrangements are well known as subsistence strategies (SS).

Objective: Analyze the quality of life and survival strategies developed in contexts of food vulnerability.

Methods: The design was a qualitative ethnographic study. It took place in a rural community in the south of Jalisco. Instruments used: were eight in-depth interviews, 15 semi-structured interviews, field notes, and three direct observations. Participants were households, elders, and key informants. The analysis was thematic and developed data triangulation.

Results: The results showed that, in the ejido, the SS of common use focused on the satisfaction of material needs and actions for the solution of both individual and collective problems. In addition, people perceived and described SS, under three basic categories: 1) coping, 2) adaptation and 3) resilience (including food behaviors); It was also identified that, during the crisis presented by COVID-19, the most affected family aspects were economic, social and homeschooling. Regarding the meaning of the QoL concept for people in the ejido, the domains, on which its conception is based, are family, environmental and social.

Conclusion: The different natural livelihoods are what people in rural areas identify to maintain their quality of life, however, lifestyles, changes in land use, and the consumption of ultra-processed foods and socio-structural conditions are the factors that are away from a better quality of life for them.

Conflict of Interest: None

Keywords: Quality of life, Subsistence strategies, Crisis, Vulnerability.

P152

Proposal of a New Way to Express Experimental Results of the Reducing Power in Vegetable Extracts

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Introduction: Oxidative stress is a condition in which free radicals predominate over antioxidants in a living being. Determining a plant extracts reducing power allows evaluation of its antioxidant effect. Currently, there is no appropriate way to express

experimental results to compare the reducing power of food samples or medicinal plants.

Objective: Propose a new way of expressing the experimental results of the reducing power in plant extracts.

Methods: The determination of the reducing power was carried out using the technique proposed by Oyaizu whose foundation lies in the transformation of potassium ferricyanide into the compound potassium ferrocyanide which, when reacting with ferric chloride, generates a green compound, whose absorbance is proportional to the concentration of the reducing compound. Analytical results are expressed as mg equivalents of ascorbic acid/g of fresh or dry food, for which purpose it is necessary to prepare a standard curve with ascorbic acid.

Results: To evaluate the reducing power, samples were used such as those of the aqueous extract of the carambola fruit (*Averrhoa carambola*), whose reducing power was found to be 0.657 ± 0.004 mg ascorbic acid equivalents/g of the fresh edible part, while the leaves of said plant had a value of 1.181 ± 0.016 mg equivalents of ascorbic acid/g of fresh sample, the reducing power of the aqueous decoction of the leaves of *Rubus sparsiflorus* whose value was 94.35 ± 1.99 mg equivalents of ascorbic acid/g of the fresh sample was also evaluated. g of dry sample, the hydroalcoholic extract of this vegetable had a value of 88.08 ± 1.82 mg equivalents of ascorbic acid/g of dry sample, on the other hand, the methanolic extract showed a value of 105.36 ± 3.60 mg equivalents of ascorbic acid/g of dry sample.

Conclusions: The proposal to express the experimental results of the reducing power as equivalent milligrams of ascorbic acid/gram of sample allows comparisons between plant extracts of different origins and even with other analytical techniques to evaluate the antioxidant capacity.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Reducing power, Ascorbic acid, Antioxidant, Oxidative stress.

P153

Degree of Conservation of Chicken Eggs Sold in Model Markets of Metropolitan Lima

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Introduction: The chicken egg is a product of mass consumption and of great importance in the diet of people due to its nutritional contribution. Likewise, this product, due to its composition of essential amino acids, is considered a complete food. There are parameters that allow determining the quality of the egg which can be quantified by means of the yolk index and the Haugh units; these are important because they allow evaluating the degree of conservation of the internal structures and consequently the quality of the egg.

Objective: To determine the degree of conservation of chicken eggs sold in model markets of Metropolitan Lima.

Methods: The degree of conservation of chicken eggs was determined in twelve markets of Metropolitan Lima, for which purpose the quality evaluation was carried out as detailed: a.- Haugh Units. - It is calculated using destructive techniques, it is necessary to crack the egg to determine freshness; this provides objective and precise measurements, whose value mathematically relates the height of the egg white to the weight of the egg. b.- Yolk index. - takes as factors: the height and the diameter of the yolk. It is based on the decrease in the consistency of the proteins that surround the yolk during storage, the degradation that produces a reduction in the height of the yolk, and an increase in its diameter.

Results: According to the Haugh units, it was observed that only one market is within the AA range (extra), four markets within the A range (good), and seven markets in the B range (regular) in the first week. When using the yolk index, it was found that two markets are within the range of fresh eggs and ten within regular freshness.

Conclusions: The analysis of the quality of the chicken eggs evaluated in twelve model markets of metropolitan Lima made it possible to determine that they are within the acceptance ranges; however, close to the rejection limits.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Quality, Yolk index, Hen egg, Haugh units.

P154

Evaluation of the Use of Ethanol as a Vehicle for the Administration of Resveratrol in the Hippocampus of Wistar Rats

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Introduction: Oxidative stress is an imbalance between endogenous antioxidants and oxidizing molecules, the latter having an unpaired electron in their last valence layer, the most important are those derived from oxygen and nitrogen. Resveratrol is a natural polyphenol with antioxidant characteristics reducing oxidative stress, however, the bioavailability of resveratrol is low due to rapid excretion and its extensive metabolism. Polyphenols are known to improve their bioavailability in the presence of ethanol. Ethanol is a substance used in many cultures as an alcoholic beverage, and as a vehicle in the pharmaceutical industry.

Objectives: Determine the appropriate concentration of ethanol as a vehicle for the administration of Resveratrol.

Methods: 10 mg/kg/day of resveratrol were administered orally to male rats of the Wistar strain for two months, at concentrations of 2.5, 5, 7.5, and 10% ethanol, after administration the hippocampus was analyzed to evaluate the oxidative stress and enzyme activity.

Results: It was observed that the levels of nitric oxide and lipid peroxidation products decrease significantly with 7.5% ethanol compared to when it is administered with 10%, and no significant changes in enzyme activity were observed.

Conclusions: With this evidence, 7.5% ethanol is considered as a concentration that improves the antioxidant effects of resveratrol.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Resveratrol, Alcohol, Oxidative stress.

P155

Plant Species with Normoglycemic Effect via Enzymatic Inhibition of α -amylase and/or α -glucosidase in Type 2 Diabetes Mellitus, in the Last Decade. A Systematic Review

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Introduction: Diabetes mellitus is a chronic and metabolic disease; causing morbimortality, generating macro and microvascular complications, and that currently has been increasing both worldwide and nationally, due to pandemic times. In Peru, 1 to 8% of the general population suffers from it. Globally, there is a goal to stop the increase in diabetes and obesity by 2025.

Objective: The objective of this review is to analyze studies of plant species with active metabolites that possess normoglycemic effects via enzymatic inhibition of α -amylase and/or α -glucosidase in type 2 diabetes mellitus, identifying the metabolite and its respective mechanism of inhibition, hoping to guide future research of new therapeutic agents in the treatment of type 2 diabetes mellitus, since it is the most common diabetes and represents 80 to 90% of cases, with higher prevalence in adults.

Methodology: A qualitative systematic search of articles published between 2011 and 2021 in databases and indexed journals was carried out using the PRISMA method.

Results: 363 articles were reviewed, of which 52 were selected and classified according to the type of study, plant species, plant drug, mechanism of action, and metabolites present.

Conclusions: In the analysis of the different studies, the flavonoid catechin stands out as a bioactive compound inhibitor of α -glucosidase and α -amylase with greater presence in the plant species reviewed, exhibiting a competitive inhibition towards α -amylase, which is related to its ability to substitute the hydroxyl in the B ring and the existence of 3-OH; α -glucosidase possess a non-competitive type inhibition, affecting the decomposition of the enzyme-substrate complex because it does not bind to the free enzyme. It is evident that the active metabolites of different plant species adapt to the active site or to other residues of α -amylase and/or α -glucosidase causing their inhibition; however, further studies are required regarding their structures in order to use them as therapeutic agents in the treatment of type 2 diabetes mellitus.

Keywords: Type 2 diabetes mellitus, Normoglycemic effect, Enzymatic inhibition, α -amylase, α -glucosidase.

P156

Glycemic Index of Carrot (*Daucus carota*) and Variability Factors

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Introduction: Foods can be classified by their glycemic index (GI), which is related to the carbohydrate content and allows food to be classified according to the increase in glycemia that they produce after ingestion. In diabetic patients, it is important to take into account the GI of the foods provided in the diet, as well as the variability that may occur as a result of the mixture of foods present in it.

Objective: To determine the effect of variability factors on the glycemic index in *Daucus carota* (carrot).

Methods: The determinations were made in a group of 10 adult males, with a normal body mass index. The GI measurement was carried out on 4 different days, for this purpose 4 different food presentations were used (pure glucose, raw carrot, liquefied carrot, and cooked carrot), one each day. The participant had to attend without having consumed any food 8 hours before the performance of the experimental part. For the determination of glucose, an Accu Check Advance brand glucometer was used and blood samples were taken from the finger pad using a lancet at 0, 15, 30, 60, and 90 minutes. Finally, the corresponding calculations were carried out.

Results: It was shown that the GI of the cooked carrot is the highest, followed by the raw carrot and finally the liquefied carrot. The GI of the blended carrot is 28.9 and that of the raw carrot is 34.2. Finally, in relation to variability, it was lower in the liquefied carrot than in the cooked and raw carrot.

Conclusions: The effects of variability of the different carrot presentations influence the GI and this can contribute to providing a better recommendation for the diet of diabetic people.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Glycemic index, Glycemic load, *Daucus carota*, Variability factors.

P157

Energy Bar, Gluten-free, Rich in Vegetable Protein Enriched with Vitamin B12

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Introduction: An increasing number of people are inclined to follow a vegetarian diet, either because of some disease, beliefs or to care for the environment, however, the most frequent cause of cobalamin (CBL) deficiency in our environment is its insufficient intake. In infants it is usually due to the low level of CBL transferred during gestation and lactation by mothers with diet-related CBL deficiency. The foods with the highest cobalamin content are: parenchymal organs, animal or fish meat, shellfish, dairy products and eggs. There are different types of vegetarian diets; the risk of developing cobalamin deficiency depends on the degree of restriction of animal products in the diet. Therefore, it is necessary to offer products containing vitamin B12 and thus provide alternatives to solve this problem.

Objective: To create a food product complete in proteins of vegetable origin, rich in vitamin B12, suitable for people who follow a vegetarian or plant-based diet.

Raw materials: Black bean, amaranth, chia, nutritional yeast, prune, monk fruit, salt, coconut oil.

Methods: We worked on a semi-industrial scale with different mixing conditions, time and temperature, until obtaining a product with good organoleptic characteristics, adapting the process of Ferreyra 2010.

Analytical methodology: The C-PER calculation was used to determine the apparent in vitro digestibility of proteins and FAO tables were used to determine the other nutrients present in the bar. Fine plate chromatography was used to determine vitamin B 12.

Results: A bar with acceptable organoleptic properties for a group of the target population was produced, which turned out to be rich in proteins of vegetable origin, rich in vitamin B12, a nutrient that tends to lag behind in the diet of vegetarians.

P158

Use of *Rhizopus oligosporus* in the Fermentation of Soybean to Obtain a High Protein Meal

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Introduction: Due to the context in which the world currently finds itself, where there is environmental damage caused by unsustainable management of food production as well as a high prevalence of chronic degenerative diseases whose etiology is related to food, it is necessary to produce foods that can be developed in a sustainable manner and also benefit the health of the population.

Plant-based foods with functional capacity can be an excellent option, since they could serve as meat substitutes, benefiting healthy eating.

Objectives: To develop a safe product with high protein value based on fermented soybean by inoculation of *Rhizopus oligosporus* mycelium so that it can be used as a meat substitute.

Methods: The proximate composition of the product and its micro-toxicological safety were analyzed. Different packaging options were investigated to maintain ideal conditions for optimal growth of *R. oligosporus*.

Results: The final product presented 14% protein, 54.61% moisture, 1.37% ash, 5.77% crude fiber and 14.07% ethereal extract. The total coliform number was <3/g NMP and the aflatoxin concentration was 33.81 ng/mL, which confirms the safety of the product according to Mexican Official Standard NOM-188-SSA1-2002, Products and Services. Control of aflatoxins in cereals for human and animal consumption. Sanitary specifications.

Conclusions: *R. oligosporus* was able to create a safe fermentation of soybeans to obtain a protein-rich food.

Conflict of Interest: There is no conflict of interest.

Keywords: Tempeh, Vegetable protein, Meat substitute.

P159

Short Food Commercialization: A Tool to Exercise Food Sovereignty

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Introduction: The Short Food Marketing Circuits (CCCA) aims to regenerate and strengthen trust between producers and consumers, which allows resocializing of food from the local context built in alternative markets, based on community values, tradition, or way of production. This results in the creation of new alternatives considered revolutionary that prioritize the consumption of local and low-mileage foods. In the case of Mexico, it is the elements of the milpa diet (corn, beans, chili, pumpkin and quelites) that respond to the above. In the CCCA, people with common interests meet and create alternative places as meeting points. Through the study of eating behavior, the understanding of these strategies is deepened with the synergy and collaboration of behavioral psychology and anthropology.

Objectives: To analyze the phenomenon of food marketing in CCCA from the structural model of eating behavior, to describe the interactions between producers and consumers of an alternative meeting space

Methods: Multidisciplinary ethnographic study with a mixed approach. Transversal, descriptive and observational

Results: The strengthening of trust networks among those involved through participatory guaranteed systems (SPG), which are responsible for providing information on the food produced, was observed. The results obtained, based on behavioral and nutritional observation instruments, highlight the similarities that

producers and consumers share in terms of waking hours (first food-last food), however, in terms of the occurrence of the consumption of the elements of the diet milpa was the bean that represented a significant difference in the consumption of the producers.

Conclusions: The alternative space functions as a space for interaction and exchange of personal and professional knowledge in addition to marketing. The data obtained help to understand the dynamics of the space and the similarities shared by the participants. However, a greater presence of the elements of the milpa diet was expected in the dishes of both groups.

Conflict of Interest: None.

Keywords: Short food marketing circuits, Milpa diet, Producers, Consumers, Eating behavior.

P160

Development of a Functional Drink Based on Oats (*Avena sativa*) and Lentils (*Lens esculenta*)

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Introduction: Many of the foods we consume every day involve production processes that have been proven not only to affect health, but also the environment in particular. Climate stability and ecosystem resilience are threatened by global food production, so eating a diet rich in plant-based foods and consuming less animal-based foods provides both health and environmental benefits.

Objective: To develop a functional drink from a mixture of oats (*Avena sativa*) and lentils (*Lens esculenta*).

Methods: It started with oatmeal (trademark) and lentil seeds, which were soaked, the cuticle was removed, dried, and ground. Different mixtures of both flours were prepared and diluted to different concentrations, the mixture was evaluated for its physicochemical stability (sediment separation) and the mixture with the best characteristics was pasteurized at 80°C for 20 minutes. Subsequently, the sensory acceptance with different flavorings was evaluated and the physicochemical evaluation was finally carried out.

Results: The most widely accepted beverage was pineapple flavor, with an overall acceptance of 4.2 on a 5-point hedonic scale. Protein intake (NX6.25) was 3.17%, ether extract 2.1%, soluble fiber 5% (by addition of inulin) and crude fiber 0.81%.

Conclusions: The elaboration of substitute products for foods of animal origin with legumes is possible, as is the case of the product elaborated from the lentil-oat mixture. The protein intake was very similar to that of milk but as a refreshing drink and a good source of soluble fiber.

Conflict of Interest: The authors report no conflict of interest.

Keywords: Legumes, Cereals, Nutritional value, Functional food.

P161**Valorization of Food Surpluses for the Formulation of Innovative Food Prototypes in Wholesale Markets of Chile**

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Introduction: The Lo Valledor Wholesale Market (MMLV) is the main fruit and vegetable sales point in the Metropolitan Region of Chile, whose operations currently generate some 25,000 tons of waste per year, just as a result of the commercialization of fruits and vegetables. In the fruit and vegetable operation, it is estimated that the fraction of organic material reaches 70%, that is, about 18,000 tons of surplus compounds such as leaves, stems and products not suitable for sale, whose final disposal is in a landfill. This generates inefficiency in the food system due to food waste, which generates greater pressure on natural resources such as water; and its decomposition both in landfills and in composting contributes to the production of greenhouse gas emissions, associated with bad odors (ammonia, hydrogen sulfide and some volatile organic compounds) and gases that can have an effect on climate change (CO₂, methane and nitrous oxide).

Objective: Valorize food surpluses from wholesale markets through the formulation of innovative foods.

Methods and Results: In order to be able to generate prototypes with high sensory acceptability from agri-food surpluses, 17 experimental tests of salty concentrates (surpluses of broccoli, celery, beetroot and tomato) and 9 experimental tests of sweet concentrates (surpluses of pear, banana and plum), for subsequent sensory evaluation. From this sensory analysis, 13 salty prototypes and 6 sweet prototypes were selected, making improvements to the prototypes to implement a new sensory panel. Finally, the selected samples were P14, P17, C8 and C9. In addition, it was sought to generate in the formulations of the concentrates, a mixture of flavors that would allow greater versatility in the preparation of culinary recipes. The 4 prototypes will be distributed free of charge to vulnerable populations in the Metropolitan Region of Chile.

Conclusions: This project is a social, environmental, and business innovation based on an unprecedented recovery of food surpluses through the formulation of solidary and healthy foods.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Valorization, Surplus, Foods, Innovation, Prototypes.

P162**Revalorization of Agri-food Industry By-products: Application of Cava Lees to Improve Safety of Fermented Meat Products**

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Introduction: Food safety can be compromised by bioactive compounds such as biogenic amines, which accumulate in fermented foods due to the decarboxylation of amino acids by fermentative or spoilage bacteria. Previous studies have suggested that cava lees, a winery by-product rich in fiber and phenolic compounds, could be revalorized in food safety applications.

Objective: The aim of this study was to investigate whether the inhibitory effect of cava lees on biogenic amine formation can be harnessed to improve the safety of fermented meat products.

Methods: Four batches of meat products were produced: 2 spontaneously fermented with or without the addition of 5% freeze-dried lees, and 2 fermented with the starter culture *Lactobacillus sakei* CTC494 with or without 5% lees. After the fermentation process (2 days, 23°C), the meat products were cured (19 days, 15°C). Amines were determined using UHPLC-FL according to the method described by Latorre-Moratalla et al. (2009).

Results: The different batches of fermented meat products were found to contain cadaverine, putrescine and tyramine. The addition of lees in the spontaneously fermented products reduced the levels of cadaverine and putrescine (62% and 78%, respectively) compared to the control (without lees), whereas no effect on tyramine accumulation was observed. The formation of all three amines was totally inhibited in batches fermented with *L. sakei* CTC494. The high efficiency with which this starter culture prevented amine accumulation meant we were unable to observe any synergistic effect when it was combined with cava lees.

Conclusions: The addition of cava lees in the formulation of fermented meat products proved to be an effective strategy to improve food safety. By promoting the revaluation of a waste product, this novel application is in line with the principles of circular economy and the sustainability of agri-food systems.

Conflict of Interest: We declare no conflict of interest

Keywords: Cava lees, Winery by-product, Biogenic amines, Fermented meat products.

P163**Sustainable Food Practices in Vulnerable Families in the Ñuble Region, a First Approach**

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Background: A Sustainable Food System is one that guarantees nutritional food security for all people, not risking the economic, social and environmental foundations of future generations. With the approval of the Sustainable Development Goals in 2015, “Ensuring sustainable consumption and production patterns” became a global goal to be achieved by 2030.

Objective: To describe sustainable food practices in vulnerable families in the Ñuble region.

Methods: Cross-sectional design. Sample of 22 households from Ñuble, Chile. After the acceptance of consent, a validated instrument was applied, with items of sociodemographic background, compliance with the frequency of consumption of recommended foods and considered sustainable due to their low or no processing: Fruits; Vegetables; Vegetables; Rice, noodles, potatoes, and cereals. And variables of eating behavior: production, processing, and preparation of food; food loss and waste; food waste management. Statistical analysis used STATA 17.0. Frequencies, percentages, and confidence intervals (CI95%) were determined. The study was approved by the Bioethics Committee of the Universidad del Bío-Bío, Chile.

Results: In 77% of the families, the woman is the head of the household. 90% of the families do not meet the recommendation for the consumption of fruits and vegetables/day, while 100% meet the recommendation for the consumption of legumes 2 times/week. 9 out of 10 families meet the recommendation for the consumption of rice, noodles, potatoes and cereals. 72.7% (95% CI [49.0-88.0]) of the families report having practices of food preparation and processing, with poultry raising (45.4%) being more prevalent. 9 out of 10 families indicate carrying out activities to reduce food losses and waste, and the most used strategy is to freeze or refrigerate them (59% (95% CI [36.4-78.4])), followed by the use of leftovers of food 40.9% (95% CI [21.5-63.5]). 50% of families recycle at home, composting being the most used reduction strategy.

Conclusions: Little is known about sustainable food practices. It is urgent to implement strategies that promote them at a planetary level.

Conflicts of Interest: Do not exist.

Keywords: Food practices, Food sustainability, Food losses and waste.

P164**Effect of *Bifidobacterium* Probiotics Consumption on Gastrointestinal Symptoms**

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Introduction: Different probiotic preparations exist and sometimes it depends more on whether they are single or multi-strain preparations. However, the mechanisms by which multi-strain probiotics exert beneficial health effects have been documented. Gut-associated actions are the main effects of probiotics. Despite the importance of the use of these microorganisms in clinical practice, still no reviews that summarize the findings of different trials.

Objectives: The objective was to know the effect of *Bifidobacterium* consumption on gastrointestinal symptoms

Methods: A search was carried out in PUBMED with the words: *Bifidobacterium* AND “gastrointestinal symptoms”, activating the filter: clinical trial.

Results: The results shows that the use of *Bifidobacterium* probiotics has shown a beneficial effect in different populations, with a duration from 1 week to 6 months. Its beneficial potency has been identified in most stages of life (from newborns to the adult population), in a healthy population, or with already detected pathologies (both in hospitalized and outpatient patients).

Conclusions: In conclusion, the applicability in the clinical field has been proven both in isolation and in combination (with other probiotics or with vitamins such as B6), obtaining positive results in improving the frequency of evacuation and increasing intestinal permeability; and also, in the reduction of potential pathogens in the microbiota, diarrhea, vomiting, heartburn, and stomach pain.

Conflict of Interest: None

Keywords: *Bifidobacterium*, Gastrointestinal symptoms, Probiotics, Symbiotic, Microbiota.

P165

Elaboration and Analysis of Functional Properties of an IV Range Product of Three Varieties of Pomegranate (*Punica granatum*) Produced in Mexico

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Introduction: The high content of antioxidant, lipid-lowering and hypoglycemic compounds are highly valued functional properties of pomegranate fruits, as well as their derivatives. Pomegranate arils are a fresh, minimally processed ready-to-eat food, considered as an IV gamut food.

Objective: The purpose of the present work was to elaborate, and determine the total antioxidant capacity, total phenols, total anthocyanins of the dehydrated arils of three varieties of pomegranate produced in Mexico.

Method: For the elaboration of the three products, the arils of the three varieties of pomegranate (*Apaseo*, *Tecozautila*, and *Wonderful*) were obtained, these were subjected to a dehydration process in an Excalibur brand oven, at different times and temperatures not higher than 50 °C., until obtaining a final moisture content of the aril products not greater than 10%. Total antioxidant capacity was determined by the DPPH method, total anthocyanin concentration was determined by spectrophotometry with differential pH, total phenols by spectrophotometry using the Folin-Ciocalteu reagent. For the analysis of results, the statistical tests of variance ANOVA and Tukey were carried out.

Results: The average total phenol content of the dehydrated arils of the three pomegranate varieties was 1386.09 mg/GAE/100g, the average total antioxidant capacity of the dehydrated arils of the three pomegranate varieties was 220.12 mMolTroloxE/100g, the average of total anthocyanins of the dehydrated arils of the three pomegranate varieties was 34.9723 ECn3G mg/100ml. The ANOVA statistical analysis with Tukey showed significant statistical differences ($p < 0.05$) in the content of total phenols, total anthocyanins and total antioxidant capacity between the arils of the three varieties of pomegranate, being the arils of the *Wonderful* variety the ones that presented the value higher in the concentrations of the three variables.

Conflicts of Interest: This study has no conflicts of interest.

Keywords: Pomegranate, Products, Phenols, Anthocyanins.

P166

Evaluation of the Energizing and Anti-Fatigue Effect of an Aqueous Extract Based on Black Maca (*Lepidium meyenii* Walp)

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Introduction: Currently, research shows that energy drinks are the most consumed by young people, however, many of them do not meet the desired effect, or have adverse effects. An alternative to this problem is the consumption of natural products such as black maca hypocotyls (*Lepidium meyenii* Walp.); well known for their anti-fatigue activity in their traditional use. From recent studies, it is known that this effect is due to the presence of macamides and polysaccharides characteristic of this vegetable.

Objectives: The objective of this study is to evaluate the energizing activity of maca (*Lepidium meyenii* Walp.) in the aqueous extract of the hypocotyl in young people aged 20 to 30 years for 4 weeks through a biochemical analysis.

Methods: Maca extract containing 3g of dry product per day in a 30% glycerin solution was administered for 4 weeks to 16 people between men and women aged 20-30 years. The anti-fatigue effect was determined by biochemical analysis of serum samples collected before and after treatment, the biochemical tests performed being: creatinine, urea, urea nitrogen, transaminases, lactate dehydrogenase and lactate. A statistical analysis of the results was performed to check if the anti-fatigue effect of black maca (*Lepidium meyenii* Walp.) was significant.

Results: Serum LDH is known to be an indicator of muscle damage and lactate is a highly activity level dependent metabolite that is directly related to oxygen availability. In our study, it was observed that the levels of LDH and lactate measured before (100.49 ± 39.26), (0.65 ± 0.40); and after (79.89 ± 48.87), (0.28 ± 0.12) respectively decreased and showed a significant difference ($p < 0.05$)

Conclusions: The anti-fatigue effect of black maca could be experimentally evaluated by evaluating the levels of LDH and lactate measured before and after the intervention, observing a significant decrease ($p < 0.05$). Therefore, it is concluded that 3 g of black maca extract administered in a 30% glycerin solution for approximately one month seemed to have an anti-fatigue effect in most of the participants.

Conflict of Interest: The authors do not report any conflict of interest.

Keywords: *Lepidium meyenii*, Energizing, Anti-fatigue effect, Lactate, Lactate dehydrogenase.

P167

The Supplementation of Liquefied *Moringa oleifera* Leaves Reduces Body Weight in Rats

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Introduction: Malnutrition and nutritional transition continue in Peru, while the unscientific use of plants for their preventive or curative properties increases, within these, moringa is consumed as a medicinal plant with remarkable composition and content of bioactive compounds. However, there is no evidence about the use of physical processes in moringa and the influence that this could generate.

Objectives: Therefore, it is intended to evaluate the effect of consuming moringa leaves subjected to physical processes of infusion (IMO), liquefied (LMO) and grinding (HMO), on somatometry, liver weight and adipose tissue in an animal model.

Methods: 24 male Holtzman rats were used, considering four treatments, which received one of the four diets for 35 days: T1, basal (water); T2, basal+IMO (1% PV); T3, basal+LMO (1% PV) and T4, basal+HMO (at 30%). At the end, the animals were sedated to perform somatometric measurements (body weight, naso-anal length, waist circumference and Lee's index), then they were sacrificed to extract and record the weight of the liver, subcutaneous and visceral adipose tissue. The data were analyzed using Kruskal-Wallis considering $P < 0.05$ as statistically significant and Tukey for the mean test using the RStudio Build 485 program.

Results: The body weight achieved was lower at T3 compared to the other treatments ($P < 0.05$). The liver index was lower at T3 compared to T4, but similar to T1 and T2, which is related to a lower final body weight ($P < 0.05$); however, there were no significant differences in the indicators of naso-anal length, waist circumference, Lee index, subcutaneous and visceral adipose tissue ($P > 0.05$).

Conclusions: The consumption of a diet supplemented with liquefied moringa leaf reduces the final body weight, compared to a preparation through infusion or flour; In addition, it did not affect the consumption, growth and development of the experimental animals.

Conflict of Interest: The authors of this communication declare that they have no conflict of interest.

Keywords: *Moringa oleifera*, Infusion, Liquefied, Flour, Somatometry, Liver.

P168

Germination of Common Bean (*Phaseolus vulgaris* L.) Seeds Improve the Content of Tryptophan

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Introduction: The seed of the common bean (*Phaseolus vulgaris* L.) is one of the most important grain legume foods for the human diet worldwide. Common bean seed is gaining attention

due to its content of secondary metabolites with positive effects on human health, however, is well known that, nutritionally, common bean is particularly low in tryptophan content.

Methods: In the present work the effect of germination on the content of the amino acid tryptophan of black 8025 common bean seed was analyzed after the enzymatic hydrolysis of protein.

Results: The content of Trp in raw common bean (RCB) and in germinated common bean (GCB) seeds were 6.1 and 7.9 mg/g of protein, respectively. Considering the amino acid scoring patterns recommended for humans older than 3 years of the Food and Agriculture Organization, Trp was a limiting amino acid only in raw common bean. During germination of common bean seeds, storage proteins are degraded, and new metabolic pathways such as the shikimate pathway are activated. The shikimate pathway offers the possibility for a *de novo* synthesis of aromatic amino acids. The higher content of Trp in germinated common beans could be related to this metabolic activation.

Conclusions: Germination of black common bean seed improves the Trp content, the essential amino acids profile, and nutritional value.

Keywords: Black common bean, Germination, Tryptophan.

P169

Mesquite Seed Based Diet Improve Cardiovascular Health in Mice Model

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Introduction: Major risk factors associated with CVDs development are smoking, high body mass index, low physical activity, and dietary risks. These risk factors are related to atherosclerosis development. In atherosclerosis, high levels of lipids in the blood or dyslipidemia increase the pass of low-density lipoproteins to the intima of the vascular epithelium, where they are oxidized to form foam cells. Foam cells gradually build the atherosclerotic plaque, resulting in the narrowing of the lumen of the artery. The intake of legume seeds has been associated with a reduction in blood lipid levels and dyslipidemia development. The lipid-lowering effect of legumes is associated with their low lipids content, low glycemic index, and high content of fiber and antioxidants.

Methods: In the present work we use mesquite legume seed flour (*Prosopis laevigata*) to develop a mesquite based extruded diet. This diet was described and used to develop a mouse biological diet treatment assay for four months. Four weeks old mice were feed with a mesquite seed diet or casein-based diet. After four months of treatment mice were anesthetized and blood was taken by heart puncture for the determination of serum parameters. Fasting triglyceride (TG), total cholesterol (TC) and high-density lipoprotein cholesterol (HDL-c) were measured. The atherogenic index (AI) was calculated using the following formula: $TC (mg/dL) / HDL-c (mg/dL)$.

Results: Nonsignificant difference was found in weight gain during the first 2 weeks of treatment (Weeks 4–6), suggesting that mesquite seed diet supported the mice nutritional requirements for the growing stage as diet based on casein. At the end of the treatment (four months) the levels of TG for mesquite diet and

casein diet were 101.6 and 158.3 mg/dl, respectively and for TC the values were 73.6 and 130.9 mg/dl, respectively. The AI in mesquite diet was 2.25 and 3.31 in the casein diet.

Conclusions: These results suggest that other components in the mesquite diet trigger the observed anti-atherogenic effect. The main differences between diet compositions were phenolic compounds, antioxidants, and apigenin content. These results highlight the anti-atherogenic potential of a diet based on mesquite seed.

Keywords: Atherogenic index, Mouse model, Cardiovascular diseases, Mesquite, *Prosopis laevigata*.

Methods and Tools in Nutrition

P170

Effects of *Bifidobacterium breve* CNCM I-4035 on a Hepatic Model of Inflammation

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Introduction: Non-alcoholic fatty liver disease (NAFLD) causes more than 2 million deaths per year worldwide. This pathology comprises a group of diseases ranging from steatosis to hepatocellular carcinoma. On the other hand, the intestine and liver communicate through the portal vein, the biliary tract, and the systemic circulation (intestine-liver axis). An imbalance in the intestinal microbiota (dysbiosis) leads to an increase in intestinal permeability, which facilitates the influx of microbial metabolites into the liver, leading to impaired bile acid metabolism and the development of systemic inflammation. To date, the alterations of the intestinal microbiota that could be involved in the pathophysiology of liver disease have not been fully characterized. Our group has demonstrated that the probiotic *Bifidobacterium breve* CNCM I-4035 reduces hepatic steatosis, becoming a potential candidate for being used in inflammatory liver diseases.

Objective: To evaluate the effect of *B. breve* CNCM I-4035 in a cell line with characteristics of hepatocytes in an inflammatory state.

Methods: The human cell line WRL-68 was used as a hepatic model. The inflammatory state was induced with lipopolysaccharide (LPS) and interleukin (IL)-1 β . Cell viability was assessed after probiotic addition for 4, 8, and 24 hours by two methodologies: 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide

(MTT) and Crystal Violet. Lactate concentration in the culture medium was also determined as an indicator of cell damage. Protein levels of VEGF-a (activator of hepatocyte proliferation), PPAR- γ (regulator of hepatic lipid metabolism) and activation of Akt (cell survival signal) and NF κ B (inflammation signal) proteins were measured by Western-blot.

Results: *B. breve* CNCM I-4035 decreased lactate concentration, increased VEGF-a and PPAR- γ levels, and induced NF κ B activation.

Conclusions: *B. breve* CNCM I-4035 exerts an immunomodulatory and protective effect on the WRL-68 cell line that may be of great interest for its application in inflammatory liver diseases.

Conflict of Interest: None.

Keywords: Akt, *B. breve*, IL-1 β , LPS, Microbiota, NAFLD, NF κ B, PPAR- γ , VEGF-a.

P171

Body Frame Size and Fat-free Mass: Influence of the Determination Method

Systematic Review

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Introduction: Body measurements should be interpreted according to the age, sex, clinical status, and measurements of each individual. Body frame size (BFS) describes the robustness and size of the skeleton. This allows adjusting the differences between the body mass index (BMI) and the nutritional status of the patient. BFS measurements have been reported to be correlated with fat-free mass (FFM), body fat, bone mass (BM), and body weight. There isn't a single method to determine BFS, and that is related to BM; the gold standard to determine BM is dual-energy X-ray absorptiometry (DXA) but it cannot be used on a daily basis. However, there is no standardized method for the determination of BFS.

Objectives: To analyze the influence of the BFS determination method in relationship with FFM.

Methods: Systematic review of studies in which the estimation of BFS, FFM index, and fat mass index is carried out in healthy subjects >18 years old. Key steps: a) Abstracts and full-text manuscripts were screened for eligibility; b) The quality of the selected studies was assessed using a tool based on one of the NIH Quality Assessment Tools; c) Extraction of data from the selected studies.

Results: The search in databases was carried out on October 14, 2021, and 3666 articles were obtained. The selection of studies was carried out by two reviewers in 3 phases: titles, abstracts, and full text. A 0.93 kappa coefficient was obtained in the pilot test of the full-text phase. Eighteen full texts that met the inclusion criteria were reviewed, and the reviewers extracted data from the studies, synthesized the evidence, and drew conclusions on the relationship of BFS and FFM.

Conclusions: Body frame size can be obtained by different methods, with the DXA measurement method the most used. In the adult population, FFM has a positive correlation with the different measurements of body frame size.

Conflict of Interest: The authors declare that they have no conflicts of interest.

Keywords: Body frame size, Lean mass, Adults.

P172

Creating and Making of a Nutritional Sieving in Nutrition Habits in Patients with Long COVID-19

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Introduction: Nutritional sieving's always have been in the clinical practice all day, though, has much nutritional sieving but none in COVID-19. The nutritional state is associated with the nutritional habits. Nutritional sieving has to need to make for 4 structures: clinical, anthropometry, biochemical and dietetic.

Objectives: Design and Validate nutritional sieving in nutritional habits in patients with long COVID-19

Methods: The validation of sieving nutritional was made for 5 experts in the area of clinical nutrition. Consist in a review of the items If it were correct for the nutritional sieving. Made a pilot test for taking items out. We made a statical analysis of Pearson for have items of correlation and two statically analyses for intra and extern correlation of the nutritional sieving. The test for inter and external use was Spearman and Kuder Richardson 20 (KR-20) respectively. For stability rehabilitee, the technical test-retest and reconfirm was used Pearson; for sensitivity and specificity, Gold Standard applied the nutritional sieving NR-2002. We were using the software SPSS 2022 for windows media.

Results: The results have been examined for the moment.

Conclusions: None for the moment.

Conflict of Interest: For the moment, nothing conflict of interest

Keywords: Long COVID, Nutrition, UCI.

P173

Concordance Between Nutrition Students in the Classification of Guatemalan Foods According to the "NOVA" System

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Introduction: The NOVA system is a tool that establishes four levels of food processing (Monteiro, 2019). It has been questioned for the breadth and rigidity of its definitions. Because the complexity of processing certain foods can be prone to interpretation, there could be inconsistent placement in the different classification groups.

Objective: To evaluate the consistency of the NOVA system in the classification of foods consumed by rural schoolchildren in the western highlands of Guatemala among nutrition students.

Methods: A single 24-hour pictorial dietary intake record was collected from 115 schoolchildren aged 8 to 11 years in a rural school in the highlands of Guatemala. Five students with a closed Nutrition curriculum were asked individually to follow the criteria established by the system to classify foods into minimally processed foods (G1), processed culinary ingredients (G2), processed foods (G3) and ultra-processed products (G4). The strength of the agreement between the students' classification was established according to the analysis of the Kappa coefficient in EPIDAT 4.2 software, with values between 0 and 1, with the best reproducibility being closest to 1.

Results: 132 of 153 foods mentioned by schoolchildren showed discrepancies in their classification. The strength of agreement for each evaluated group was as follows: G1=0.41, G2=0.05, G3=0.26, G4= 0.64. In general, the classification system had a Kappa coefficient=0.38. The foods in which there was more discrepancy were: instant coffee, ground beans and water-based ice cream, classified into 4 groups; pre-cooked rice, corn tortilla and corn tamale were classified into at least 3 groups of the NOVA system.

Conclusions: For the evaluated group, the NOVA system presented an acceptable concordance, being especially good for the group of ultra-processed products, however, it is shown that there is a discrepancy in the criteria of the students in the perception of the definitions of the NOVA system. The use of a more structured system in its definitions or with a greater number of categories could be more beneficial for the study of eating patterns.

Conflict of Interest: I have no conflict of interest

Keywords: Nova system, Ultra-processed foods, Concordance, Schoolchildren, Guatemala.

P174

Comparative Study with Pattern Recognition to Determine the Quality of the Most Consumed Flavored Milks in Mexico

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Introduction: Milk is an important source of vitamins, minerals and proteins of high biological value, which are essential as part of a balanced diet. There are countless dairy products on the market to cover the diversity of tastes and demands of people; thus, flavored milks which acquire their flavor through the addition of fruit, chocolate and/or flavors, sugars and/or sweeteners have emerged, however, there are differences among their nutritional

contributions, resulting in more recommended options for consumption than others.

Objective: Objectively determine, using pattern recognition techniques, which are the most recommended flavored milks for consumption, taking into account only their nutritional contributions.

Methods: Based on the quality studies in 2015 and 2021 on flavored milks reported by Profeco, a database was created considering 100 ml portions, then pattern recognition techniques such as PCA, k-medias, Gauss and Spectral Clustering were applied to make a classification.

Results: It was found that flavored milks analyzed in 2015 and 2021 can be classified into two classes: recommended and not recommended for consumption. The difference between the two groups is evident when graphing the two most relevant dimensions of PCA, which maintains average representativeness of 87.1%. The trend was to decrease total sugars by 5.58 g, free sugars by 8.66 g, energy content by 5.58 kcal and fat by 0.228137 g, as well as increasing protein by .059 g.

Conclusions: Although nutritional trends indicate that flavored milks should improve their nutritional contributions, it was found that the flavored milk brands of All Bran Kellogg's and San Marcos remained not recommended for consumption, and even the Great Value brand went from being recommended to not recommended. On the other hand, brands such as Hershey's and Nesquik remained recommended for consumption and other brands such as Alpura, Santa Clara and Yomi Lala went from being not recommended to recommended for consumption.

Conflict of Interest: None.

Keywords: Comparative study, Flavored milks, Pattern recognition.

Objective: To associate NC and SMSF with classical clinical, chemical, and anthropometric biomarkers in obese adults aged 40 to 64 years.

Methods: A cross-sectional study of 388 obese adults aged 40 to 64 years. weight, height, NC, SMSF, waist circumference (WC), capillary glucose (CG), triglycerides (TG), total cholesterol (TC), HDL-cholesterol (HDL-c), systolic blood pressure (SBP), and diastolic blood pressure (DBP) were measured. BMI, waist-hip ratio (WHR), and waist-height ratio (WHR) were calculated. Statistical analysis with JASP v.0.13.1. Pearson's correlation and simple linear regression (SLR) were applied for having normally distributed data.

Results: NC had a slight to moderate correlation with WC, BMI, SBP and DBP in both genders ($r=0.52$, $r=0.57$, $r=0.20$ and $r=0.31$ respectively for women; $r=0.26$, $r=0.21$, $r=0.21$, and $r=0.21$, for men) and with ICT ($r=0.51$) and HDL-c ($r=-0.22$) only in women. The SMSF showed a slight to high correlation with WC, WHR, BMI, WHR, SBP, DBP, TG, TC and HDL-c in both genders ($r=0.50$, $r=0.25$, $r=0.51$, $r=0.49$, $r=0.34$, $r=0.45$, $r=0.20$ $r=0.20$, and $r=-0.22$, respectively for women, and $r=0.70$, $r=0.46$, $r=0.58$, $r=0.72$, $r=0.30$, $r=0.50$, $r=0.34$ $r=0.39$, and $r=-0.36$, for men) and with CG ($r=0.39$) only in men. According to the SLR, changes in NC are explained by changes in WC ($r^2=0.27$), BMI ($r^2=0.32$), and WHR ($r^2=0.26$) in women but with no variable studied in men. Changes in SMSF are explained by changes in WC ($r^2=0.25$), BMI ($r^2=0.26$), and WHR ($r^2=0.24$) in women, and WC ($r^2=0.49$), WHR ($r^2=0.21$), BMI ($r^2=0.33$), and WHR ($r^2=0.52$) in men. All the associations shown had a $p<0.05$.

Conclusions: NC and SMSF were associated with clinical, chemical, and anthropometric biomarkers but mainly SMSF.

Conflicts of Interest: No conflict of interest

Keywords: Obesity, Neck circumference, Submandibular skinfold.

P175

Association of Neck Perimeter and Submandibular Skinfold with Classical Clinical, Chemical, and Anthropometric Biomarkers in Adults with Obesity Aged 40 to 64 Years

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Introduction: Obesity is a metabolic disease characterized by excess body fat. There are different parameters to evaluate adiposity and cardiometabolic risk (CMR), among them, the neck perimeter (NC) and the submandibular skinfold (SMSF) are proposed as simple and practical parameters to perform but little explored.

P176

Design of Food Frequency Questionnaires for Adults: A Narrative Review

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Introduction: Assessment of food consumption is essential to know the nutritional status of a population. The knowledge of food intake allows epidemiological and clinical studies to analyze the association between diet and health. Different instruments are used to measure food consumption in epidemiological studies; one of the most widely used is the Food Frequency Questionnaire (FFQ). The FFQ has to be validated before it is used to assess food intake in a certain population.

Objective: The aim of this study is to develop a narrative review to find out which are the most common instruments used to design FFQs.

Method: The search for scientific articles was performed in PubMed using the searching syntax: (development OR design) AND (ffq) AND (surveys OR questionnaires). The including

criteria were: articles published between 2016 to May 2021. A group of 5 researchers, divided into two groups reviewed 436 articles screening by title, abstract and full text, those articles that meet the inclusion criteria. Finally, 42 articles were selected for the review.

Results: The main methods used to design the FFQ were 24-hour recall (R24h), the adaptation of other FFQs, National Food Surveys periodically conducted in some countries, Food Composition Tables, and dietary records (DR). All the papers showed convenience sample of the population used to collect food intake for the development of the FFQs.

Conclusions: This narrative review concluded that the measurement of food intake is a topic of interest shown by the large number of articles published in the last 5 years. R24h, diet surveys, and other FFQs were the most commonly used method for developing new FFQ.

Conflict of Interest: The authors have no conflict of interest.

Keywords: FFQ, Development, Narrative review.

P177

Agreement Between the Use of a Cutoff Point for BMI and the BMI by Age in Children and Adolescents in a City in Northeastern Brazil

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Introduction: The health harms caused by overweight in children and adolescents strengthen the importance of nutritional diagnosis and the use of assessment tools that are valid and accessible. The Body Mass Index (BMI) for age is the method recommended by the World Health Organization (WHO) to assess the nutritional status of this public, however, different definitions can be used for this classification.

Objectives: To estimate the nutritional status and verify the agreement between the use of BMI cut-off points and BMI by age for children and adolescents.

Methods: This is a cross-sectional study carried out with adolescents in the city of Fortaleza-Ce. Participants' weight and height were measured to calculate BMI. The nutritional status was classified as lean/eutrophic, overweight and obesity, based on the WHO curves (2007) and the definition established by Cole et al. (2000). Data were expressed as frequencies and percentages. The Kappa (k) test was performed to verify the level of agreement between the definitions of nutritional status. The agreement was considered moderate $k < 0.6$, strong $k > 0.6$ and ≤ 0.8 , and excellent $k > 0.8$. Data were analyzed in SPSS 22.0, with statistical significance when $p < 0.05$.

Results: 898 children and adolescents aged 5 to 18 years were evaluated. According to the WHO classification, 20.4% ($n=183$) of the participants were overweight and 15.4% ($n=138$) were obese.

The Cole et al. (2000) classification identified the same prevalence of overweight as the WHO and a lower prevalence of obesity (11.6%; $n=104$). Kappa test showed strong agreement between the two definitions ($k=0.746$) in identifying overweight and excellent agreement in identifying obesity ($k=0.829$).

Conclusions: The cut-off point established by Cole et al. (2000) for classifying BMI proves to be a very useful and effective tool for classifying the nutritional status of individuals in a more simplified way.

Conflict of Interest: The authors declare that there is no conflict of interest.

Keywords: Nutritional status, Diagnosis, Overweight, Obesity, Pediatrics.

P178

Predictors of Continuous Metabolic Syndrome in Adolescents with Overweight/Obesity

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Introduction: The prevalence of pediatric obesity and cardio-metabolic (CM) comorbidities, which all cluster together under the umbrella of metabolic syndrome (MetS), has reached epidemic proportions. To overcome the controversy and limitations of binary Mets, the use of MetS continuous scores has been proposed.

Objective: 1) To explore MetS predictors using a pediatric simple MetS score (siMetS) to assess MetS. 2) To assess the validity of siMetS to predict MetS; 2) to estimate a cutoff value of siMetS to predict MetS

Methods: A longitudinal retrospective cohort study was conducted, enrolling overweight/obese subjects aged 10-17 years followed at two clinical centers in Portugal (2018-2021). To test the association of siMetS with potential predictors univariate and multiple regression analyses were performed. Spearman correlation analysis was conducted for baseline and follow-up scores. Receiver operator characteristic curve analysis was performed to estimate the optimal cutoff of siMetS for predicting MetS.

Results: Eighty-four subjects were included, with a median age at baseline of 11.5 years, 69% with obesity, and 31% with overweight. The mean follow-up time was 15 months. The prevalence of MetS was 7% at baseline and 8% at follow-up. Mean siMetS was 2.05 ± 0.48 at baseline and 2.11 ± 0.52 at follow-up. The female sex had a negative association with siMetS (baseline and follow-up). Independent predictors of baseline siMetS were: ≥ 2 MetS criteria, BMI z-score, insulin resistance, and dyslipidemia. At follow-up NAFLD, baseline siMetS and BMI increase from baseline were predictors of a higher score. SiMetS at baseline showed a strong correlation with siMetS at the last follow-up ($\rho=+0.67$). SiMetS was highly accurate in predicting MetS (AUC=0.96), with an optimal cutoff in this data of 2.46 (sensitivity 100%, specificity 89%).

Conclusion: SiMetS demonstrated a good performance in assessing MetS. Its use may enable better identification of individuals with increased CM risk. We can recommend special attention to CM risk in males, those with NAFLD, dyslipidemia, IR, and with higher BMI z-score and higher BMI z-score increase over time. There is an urgent need to raise awareness among pediatricians regarding the screening for MetS using simple and reliable methods, such as siMetS.

Disclosures: The authors declare that they have no potential conflicts and no financial relationships relevant to this article to disclose.

Keywords: Obesity, Metabolic syndrome, Continuous metabolic syndrome score, Adolescents showed.

P179

Response of the Liver Transcriptome of an Obese Murine Model Treated with a Supplemented Normocaloric Diet

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Introduction: Obesity is an excess of adipose tissue, associated with chronic-degenerative diseases, the leading cause of death in the world. It has been proven that probiotics and prebiotics can modulate the intestinal microbiota and promote weight loss, adipose tissue, and pro-inflammatory factors, among others.

Objectives: The aim was to evaluate the liver transcriptome of an obese murine model treated with a supplemented normocaloric diet.

Methods: Using a murine model (C57BLACK6) of 15 adult organisms induced to obesity and under a post-treatment of 8 weeks, with a normocaloric diet and normocaloric supplemented (*Lactobacillus acidophilus* + inulin). The liver was dissected as target tissue, a tRNA pool of five individuals was isolated, and cDNA was synthesized. Using DNA microarrays (UMDNA-UNAM), the transcriptome of each treatment was analyzed by hybridizing with 22,000 mouse genes. Differential expression was analyzed under 3 hybridization processes between the different treatments: a) obese versus normocaloric, b) normocaloric and symbiotic, and c) obese versus symbiotic. Image quantification data were analyzed with GenArise software, using the z-score to determine genes under/over expressed. Enrichment analysis of gene ontology was performed for differentially expressed genes.

Results: An average overexpression of 1.26% and repression of 2.2% were obtained in relation to the hybridized genome, the number of overexpressed genes were: a) 295, b) 294 and c) 246, while those repressed were: a) 575, b) 394 and c) 500 genes. Globally, 50 overexpressed and 137 repressed genes are associated with normocaloric treatment; and for the symbiotic treatment, 13 genes were overexpressed and 43 repressed. Enrichment analysis identified a relationship of these with fatty acid binding function, immune response, and inflammation.

Conclusions: The use of microarrays made it possible to identify genes that are modulated by the effect of a symbiotic treatment, showing that its use can be an alternative in the treatment of

obesity due to its anti-inflammatory effect and the activation of pathways related to fatty acids.

Conflict of Interest: No conflict of interest

Keywords: Obesity, Microarrays, Symbiotic.

P180

Effect of the Promotion of Fruits and Vegetables on University Students through a Mobile Application

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Introduction: Overweight and obesity are multicausal diseases, for which low consumption of vegetables and fruits has been identified as one of the risk factors for their development. This behavior has been evidenced in first-year college students. In response to this, strategies have been used to promote healthy eating habits and self-care behaviors. However, consumption of fruits and vegetables well below the recommended levels for university students still occurs. One of the possible strategies could be developed from ICTs, such as the cell phone, whose wide accessibility and ease of use have drawn attention as a tool to implement strategies to promote healthy behaviors.

Objective: To assess the effect of the promotion of fruits and vegetables through a mobile application on university students.

Methods: A quantitative, quasi-experimental, longitudinal, and analytical study was conducted. The study population included students who had just entered the university. The fundamental purpose of the mobile application based on social cognitive theory was to increase the consumption behavior of vegetables and fruits, with the goal of 5 servings per day.

Results: When using student's T-tests for independent samples, we found that consumption per day and type of fruits was higher in the intervention group compared to the control group after using the mobile application for 6 weeks. Although the means were higher in the intervention group, only fruit consumption was significant for at least 1 time a week ($p = .018$). Regarding vegetable consumption, consumption increased 2 to 4 times per week ($p = .048$) and zero consumption decreased ($p = 0.18$).

Conclusions: In the group that used the mobile application based on social cognitive theory to promote the consumption of vegetables and fruits, consumption increased in both. However, not all the results were statistically significant. Further research is needed on TICs, such as mobile apps, to promote healthy food consumption and improve eating habits.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Mobile health application, Prevention, Smartphone, University.

P181

Body Composition and Physical Activity in Young Adults at High Altitude

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Introduction: According to the World Health Organization, 3 of 4 people suffer a non-communicable disease, exercise can be a modifiable predisposing factor since it has a positive impact on health status and body composition. Previous studies have observed an increase in body fat in the high-altitude populations of different age groups and different levels of physical activity.

Objectives: To compare the body composition of young athletes and sedentary young adults of the city of La Paz-Bolivia (at 3600 masl).

Methods: This is a descriptive comparative study of the anthropometric characteristics: body mass index, skinfolds, circumferences, and body composition through Bioelectrical Impedance Analysis (Bodystat, QuadScan). Sedentary lifestyle according to the modified IPAC survey was defined as less than 30 minutes of physical activity of moderate intensity 3 times a week, athletes from different branches (volleyball, martial arts, soccer) who have moderate to intense aerobic training for at least 45 minutes 3 times per week were invited to participate.

Results: A total of 23 sedentary subjects and 24 athletes of both sexes were evaluated. Significant differences were found in variables associated with weight and adiposity, such as skinfolds and waist circumference. Height does not present a significant difference, the average body mass index (BMI) in athletes of 22.3 ± 2.3 is in the normal range, and the sedentary group with a BMI of 24.2 ± 3.6 is close to the overweight limit. The body composition variables show statistically significant differences, in athletes the averages of Fat Mass%= $19.2 \pm 6.9\%$, Total Body Water%= $57.5 \pm 4.8\%$, Extracellular Fluid%= $24.9 \pm 1.4\%$ and Intracellular Fluid %= $32.3 \pm 3.8\%$; unlike sedentary subjects with averages of Fat Mass%= $25.5 \pm 9.1\%$, Total Body Water%= $52.4 \pm 6.9\%$, Extracellular Fluid %= $23.3 \pm 1.9\%$ and Intracellular Fluid %= $29.5 \pm 4.4\%$. Marked differences by sex were also observed, with the sedentary female group having greater body fat and the male group does not present significant differences.

Conclusions: People who practice moderate aerobic exercise of 45 minutes at least 3 times a week as a habit have lower body fat and higher total body water and intracellular fluid, confirming that regular exercise helps to maintain good metabolic health at high altitudes.

Conflict of Interest: None.

Keywords: Body composition, High altitude, Physical activity.

P182

Sickle Cell Identification Using a Fractional Detector for Anemia Diagnosis

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Introduction: Sickle cell anemia is a disorder in which the red blood cells take the form of a sickle instead of their normal disk form, blocking blood flow due to they are stiff and sticky and tend to cluster. In this sense, when blood flow is blocked person will experience pain and organ damage. In this work, a fractional edge detection operator for red blood cells image processing is proposed.

Objectives: Design and develop a fractional edge detector based on the Caputo-Fabrizio derivative to highlight and identify the characteristic features of sickle cell in medical images, in order to achieve a more accurate diagnosis, analysis, and monitoring of anemia.

Methods: An edge is defined as the boundaries of objects in a digital image or a sudden change in a gray level between neighboring pixels, which are calculated by using the partial derivatives of the image. On the other hand, fractional derivatives are the generalization of these derivatives to an arbitrary non-integer order. In this work, an edge detector is designed by introducing the Caputo-Fabrizio fractional derivative, which has a high capacity to extract more details of the structure of the images and is implemented in a red blood cells image database of the American Society of Hematology.

Results: Experimental results demonstrate that our operator enhances the red blood cell image texture and contrast, making easier visual detection of sickle cell. Also, the fractional-order operator can identify the edges of sickle cells than other approaches reported in the literature.

Conclusions: In this work, an edge detection method based on Caputo-Fabrizio fractional-order derivative for red blood cell medical image processing was developed and compared with existing methods. Experimental results demonstrated the effectiveness of our edge detector for detecting both strong edges (boundaries of cells) and weak edges (image texture), improving the capacity to identify sickle cells which are the symptoms of anemia. Finally, the proposed approach was applied to identify this disease by using red blood cell images.

Conflict of Interest: None.

Keywords: Fractional calculus, Sickle cell anemia, Edge detection, Image processing.

P183

WhatsApp as a Tool in Nutrition Monitoring: Adherence and Social Network

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Introduction: Diet adherence is one of the behavioral problems in nutrition care. Likewise, establishing a social network helps in behavior change. The WhatsApp instant messaging system is an application that almost everyone commonly uses on their mobile phone. Thus, WhatsApp can be a tool for nutrition monitoring.

Objectives: Identify WhatsApp as a tool for a social network and adherence to the diet.

Methods: The present descriptive study was conducted on 32 nutrition students (29 women and three men); the intervention lasted 33 days with a personalized diet. Adherence to the diet was considered with 80% of the participant's behavior that coincides with the nutrition prescription. A WhatsApp group was created, and participation in the chat was recorded. Adherence was measured by submitting photos of their meals and a video of their diet experience of <5 min daily. It is essential to mention that the WhatsApp strategy began in the second week of intervention.

Results: They were eliminated from the study for not following the diet: six participants in the first week; one in the third week; three in the fourth week; one in the fifth week. At the end of the study, 21 participants remained. 11 presented an attachment to the diet but reported how difficult it was to follow. All participants mentioned that hunger or craving was the reason for not following the diet. 9 out of 10 said they could not follow the diet on weekends because of the family diet; 2 out of 10 mentioned overeating when visiting grandma or cannot avoid eating their mother's food. 6 out of 10 mentioned longing for ultra-processed foods, including soda.

Conclusions: It was possible to establish WhatsApp as a social network with all the participants, clarify doubts, and know their emotions about the food plan. In addition, adherence to the diet was objectively monitored.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: WhatsApp, Diet, Nutrition, Adherence.

P184

Methods for the Identification of Overweight and Its Relation to Dyslipidemia in Brazilian Adolescents

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Introduction: In recent years the prevalence of overweight in adolescents has taken alarming proportions in the world. The increase in body adiposity is associated with the emergence of other morbidities, including dyslipidemia (DLP), which has great relevance as a health problem, due to its association with cardiovascular diseases.

Objectives: Evaluate the association between excess weight, identified by two different methods, and dyslipidemia (DLP) in adolescents from Ceará-Brazil.

Methods: This is a cross-sectional study carried out with adolescents in the city of Fortaleza-CE. The Body mass index (BMI) was calculated from weight and height and nutritional status was classified as: not overweight (thinness and normal weight) and overweight (overweight and obesity) according to BMI-for-age (WHO, 2007) and the definition by Cole et al. (2000). DLP was defined as an alteration in one of the lipid components: triglycerides, total cholesterol, HDL-c or LDL-c. Data were expressed as frequencies and percentages, and the association between overweight and PLD was verified by Poisson regression in two models: model 1 (no adjustment) and model 2 (adjusted for sex and age). Analyzes were performed using SPSS version 22.0 with a significance level of 5% (p<0.05).

Results: A total of 826 adolescents between the ages of 10 and 17 were evaluated. 32.3% of the adolescents were overweight according to the WHO classification (2007) and 26.6% according to Cole et al. (2000). DLP was present in 66.2% of the adolescents evaluated. Regression showed that there was no association between the presence of DLP and overweight identified by BMI/age (WHO, 2007). In adolescents who were overweight, as defined by Cole et al. (2000), the prevalence of dyslipidemia was 27% (PR: 1.27; 95% CI: 1.15-1.39) higher compared to those who were not overweight.

Conclusions: In the study population, the Cole et al. (2000) classification was able to identify the association between overweight and DLP.

Conflict of Interest: The authors declare that there is no conflict of interest.

Keywords: Dyslipidemias, Diagnosis, Obesity, Overweight, Pediatrics.

P185

Prediction Model of Adiposity from Muscle Mass Adjusted by Gender, Age, and Nutritional Status in Children and Adolescents

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Introduction: It is likely that in children and adolescents whose muscle mass values are higher or lower than reference values for age, the BMI inaccurately estimates the proportion of body fat and leads to a misdiagnosis of nutritional status.

Objective: Evaluate the relationship between muscle mass (MM) and adiposity adjusted by age, gender and nutritional status in children and adolescents.

Methods: This cross-sectional study was carried out in 341 students 6-12 years old; 51.3% were females. Anthropometry: weight, height; circumferences (arm, thigh and calf); and skinfolds (triceps, subscapular, thigh and calf). Statistics: t-test for independent samples, one-way ANOVA, Pearson's correlations and multiple linear regressions. Adiposity percentage was calculated with Slaughter's and MM with Poortman's formulas.

Results: Muscle mass was significantly higher in the age group 9-12 years, and in students with higher adiposity. Adiposity was higher in females; MM was higher in males. The determination coefficient, R^2 , was 0.54 with MM as the independent variable and its value increased to 0.6, 0.63 and 0.78 with the inclusion of sex, age group and nutritional status respectively as intervening variables. The increase of prediction with the intervening variables was 24%. In this multiple regression model, the Durbin-Watson test (1.92) leaves out the occurrence of multicollinearity and the variance inflation factor of each variable, with values around one, rules out autocorrelation in the residuals.

Conclusions: Adiposity was predicted from MM and was influenced by age, gender, and nutritional status. The results suggest that muscle mass should be considered in the evaluation of adiposity and in the diagnosis of overweight and obesity, especially in those male children with high muscle mass and ages above eight years.

Conflict interest: The authors report no conflict of interest.

Keywords: Muscle mass, Adiposity, Nutritional status, Childhood, Adolescents.

P186

Prediction of Maternal Fat Mass Percentage and Gestational Weight Gain during Pregnancy Based on Psychosocial Factors and Eating Behaviors

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Introduction: The evaluation of body composition during pregnancy is mainly focused on the maternal pregestational weight and/or gestational weight gain (GWG), because of associations between the pregestational body mass index and the risk of adverse perinatal outcomes. However, this weight-centered approach ignores other factors that can also be associated with such outcomes, such as psychosocial factors and eating behaviors. Moreover, it often entails adverse effects like worries about food and body, weight loss and gain cycles, eating disorders, weight stigma, discrimination, etc. We are looking for alternative nutritional assessments that allow for a transition towards perinatal health that is not weight-centered.

Objective: To predict the maternal fat mass percentage during the first trimester (%FM) and the GWG based on psychosocial factors and eating behaviors of the pregnant woman.

Methods: This longitudinal and predictive cohort study included healthy, adult pregnant women with less than 13 gestational weeks at admission. We gathered data on 21 variables of sociodemographic, gynecologic-obstetric, psychological characteristics, and eating behaviors, from clinical records and by applying validated psychometric instruments. Using artificial neural network models, from these variables we obtained nonlinear equations for predicting %FM and GWG and evaluated concordance between measured data (through bioimpedance and GWG calculation) and data predicted by the models.

Results: All predictive models had a mean square error $<10^{-10}$, correlation coefficient >0.9 , and high concordance values between measured and predicted data. Variables with stronger influence for predicting %FM were socioeconomic level, occupation, maternal age, marital status, and support network, followed by psychological variables, as well as restrained and intuitive eating behaviors. For the prediction of GWG, variables with stronger influence were schooling, anxiety, number of abortions, perceived stress, maternal age, and external and intuitive eating behaviors.

Conclusions: Our results show that it is possible to predict %FM and GWG without considering maternal weight, thus transitioning towards a model of perinatal care that is inclusive of all body sizes.

Conflicts of Interest: Authors declare no conflicts of interest.

Keywords: Pregnancy, Health at every size, Weight-inclusive approach to health, Body composition, Gestational weight gain, Artificial neural networks.

P187

Diagnostic Usefulness of the Fat Mass Index for Detecting Excess Adiposity in Adults

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Introduction: Obesity is a chronic disease caused by adipose tissue accretion in the body usually diagnosed using Body Mass Index (BMI) cut-off values and thus may produce errors in categorizing adiposity and also in the risk assessment of obese individuals due to its limitation of merely correlating weight and height instead of being a proper measure of body fat. Therefore, is of paramount importance to evaluate new tools that use adiposity as the main diagnostic criteria for obesity in order to develop therapeutic strategies from earlier stages.

Objectives: To evaluate the diagnostic usefulness of the Fat Mass Index (FMI) as a tool to measure excess adiposity in a cohort of Mexican adults.

Methods: Prospective study of a cohort of adults (>18 years of age) of both genders, residing in Ciudad del Carmen, Campeche, México, who went through a body composition assessment with electrical bioimpedance as part of a nutritional evaluation. BMI and FMI were obtained and a comparison between both methods was performed using cut-off values set by the WHO for the BMI and from Kelly TL et al. (doi:10.1371/journal.pone.0007038) for the FMI.

Results: 223 subjects were included in the study (62.7% male). Using BMI as a diagnostic tool showed that 42% of all women were “normal”, 34.5% were classified as “overweight” and 21% as “obese”. In contrast, when using FMI, 98.75% had excess adiposity (obesity). Men showed similar results, with the use of BMI 12.14% were classified as “normal”, 54.28% had overweight and 33.58% had obesity. When FMI was used, less than 1% had normal adiposity, 43.6% had a high level of adiposity characterized as “overweight” and 55.7% were diagnosed as “obese” according to validated cut-off values.

Conclusions: There is a significant difference between using BMI or FMI as tools to establish the diagnostic category of obesity in adults, this appears to be even more relevant in female individuals. It is recommended to determine the body fat mass using a validated body composition method to measure adiposity instead of solely relying in BMI as a diagnostic method for obesity.

Conflict of Interest: All authors have no conflict of interest to declare.

Keywords: Adiposity, Obesity, Fat mass index, Body mass index.

P188

Biophysical Parameters of Extracellular Vesicles as Potential Biomarkers of Loss of Bone Integrity in Breast Cancer Patients Receiving Nutritional Treatment

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Introduction: Supportive care in cancer, such as nutritional interventions, aims to improve the quality of life of patients by providing health benefits like bone preservation. In breast cancer patients there is a disturbance of bone metabolism resulting in damaged bone mineral density (BMD). Currently, there is a search for biomarkers to evaluate bone integrity in cancer patients that allow adjusting their treatments, including nutritional ones. Extracellular vesicles (EVs) are potential biomarkers due to their ability to interfere with their receptor tissue's metabolism. Biophysical parameters of EVs could affect their uptake, nonetheless, it is still necessary to characterize those parameters in relation to other physiological variables to understand their clinical relevance.

Objectives: To evaluate the association between bone density of breast cancer patients and biophysical parameters of their plasma EVs.

Methods: EVs were isolated by using ExoQuick® from blood samples of 16 patients that volunteered on quasi-experimental research where they received a six-month nutritional intervention, with initial and final measurements. BMD was assessed by dual energy x-ray absorptiometry and biophysical parameters of EVs were measured by dynamic light scattering and electrophoretic light scattering. Confounding was adjusted by mixed effect linear regression models.

Results: Associations were found between the following set of variables: average hydrodynamic diameter of large EVs with femur's neck bone mineral content (BMC) and lumbar spine BMD, average hydrodynamic diameter of EVs with whole body BMC, intensity percentage of small EVs with whole-body BMD, and intensity percentage of large EVs with total hip BMD. Molecular markers of breast cancer were associated with zeta potential, the average hydrodynamic diameter of both small and large EVs, and intensity percentage of small EVs.

Conclusions: Results proved that there could exist an association between biophysical parameters of EVs and physiological variables, such as bone density. It is suggested that these parameters should be included in future research about these particles, in order to get a better understanding of the possible interactions between EVs and bone metabolism.

Conflict of Interest: Authors declare not having any conflict of interest.

Keywords: Extracellular Vesicles, Dynamic light scattering, Breast cancer, Nutritional intervention, Bone mineral density.

P189

Total Sugar, Added Sugar and Sugar Sweetened Beverages Intake in Children and Its Relationship with Breath Carbon Isotope Ratio as a Potential Biomarker

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Introduction: Added sugar and sugar sweetened beverages (SSB) intake has increased during the last decades and, consequently, the need for an objective biomarker of its consumption. The Breath 13C/12C Carbon Isotope ratio (CIR) has been recently reported as a potential biomarker of added sugar intake.

Objective: The aim of our study was to evaluate total sugar, added sugar and SSB intake of a children population and its possible association with breath CIR.

Methods: A cross sectional study was conducted in fasted dyspeptic children (4-16y) referred to the Gastroenterology Unit of a Pediatric Hospital, Buenos Aires, Argentina. A sociodemographic survey was administered, weight and height were determined using validated tools. Nutrient intake was assessed by 24 h dietary recalls to the parents. Duplicate breath samples were obtained for CIR measurement in a mass spectrometer coupled to a gas chromatographer (GC-MS). Statistical analysis was performed using the SPSS software.

Results: We included 491 patients (10.0±3.1y), of which 55.2% were female. Anthropometric evaluation showed that 7.0% were underweight, 71.6% normal weight and 21.5% overweight/obese. Mean total sugar and added sugar intakes were 105.6 g/d and 72.5 g/d, which represented 23.0% and 15.8% of the total energy intake, respectively. Mean SSB intake was 32.0 g/d. Overall, 77.8% exceeded the WHO recommendations for added sugar intake. Mean fasting breath $\delta^{13}\text{C}$ value was (-19.8±4.3)‰. A positive correlation was obtained between breath CIR and the consumption of added sugar intake ($r=0.095$; $p=0.035$); however, no correlation was observed with SSB intake ($r=0.040$; $p=0.510$).

Conclusion: High added sugar and SSB intakes were obtained in children with digestive symptoms. Our results support the potential use of the breath CIR as a biomarker of added sugar intake. Future studies will be necessary to evaluate its application for epidemiological purposes.

Conflicts of Interest: The authors declare no conflicts of interest.

Keywords: Total sugar, Added sugar, Sugar sweetened beverages, Breath carbon isotope ratio, Dietary biomarker, Children.

P190

Metabolic Syndrome Induced by High Fat-fructose Diet Leads a Greater Cardiac Damage after Ischemia-reperfusion Event

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Introduction: Metabolic syndrome (MS) is defined as a set of risk factors characterized by presenting three or more physiological alterations such as arterial hypertension, obesity, hypertriglyceridemia, hyperglycemia and insulin resistance, the high incidence of MS has been related to an increased risk of suffering cardiovascular events.

Objective: This study aims to characterize the functional damage to the heart caused by an ischemia-reperfusion (I-R) event in a rat model of MS induced with a high-fat-fructose diet.

Methods: Two groups of male Wistar rats were used, the first with Rat Chow® food and the second with a hypercaloric diet containing 15% clarified butter, 20% fructose and 65% Rat Chow® (HFFD) for 12 weeks at the end of which SM development was evaluated by quantifying biochemical and somatometric parameters. In the isolated heart, LVDP, LVEDP, $\pm dP/dT$ max and rate of pressure product (RPP) were quantified before and after an I-R event using Langendorff preparation, the infarct zone in the heart was measured with triphenyl tetrazolium.

Results: The HFFD induced MS in rats by increasing triacylglycerides, glucose, total cholesterol, and both systolic and diastolic pressure; in addition, BMI and Lee index values indicative of obesity also increased significantly. The hearts of rats with metabolic syndrome showed a significant increase in left ventricular end-diastolic pressure (LVEDP) from 4 minutes after the I-R event, in addition to a significant decrease in LVDP, $+dP/dT$ max, $-dP/dT$ max and RPP. Quantification of the total infarct area showed that hearts with SM generate greater injury from the I-R event.

Conclusion: Metabolic syndrome induced by the HFFD leads to a larger infarct area and affects cardiac functionality after an I-R event, by decreasing inotropic and lusitropic capacity, pressure development, decreased systolic volume and cardiac energy consumption.

Conflict of Interest: The authors report no conflict of interest.

Keywords: Hypercaloric diet, LVDP, $dP-dT$ max, Metabolic syndrome, Ischemia-reperfusion.

P191**Serum Cytokines Modification and Their Relationship with Metabolic Syndrome Parameters**

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Introduction: Metabolic syndrome (MS) is a cluster of metabolic alterations in triglycerides, glucose, insulin, and HDL and in blood pressure that predispose individuals to different chronic diseases; these alterations modify cytokines secretion by blood cells and provoke chronic inflammation that triggers MS, causing insulin resistance, diabetes, and cardiovascular diseases.

Objective: To analyze the relationship between inflammatory serum cytokines in MS with the metabolic parameters that diagnose it.

Methods: In 69 youth (18 to 24 years old) with and without MS, blood chemistry and serum cytokines were analyzed. Comparisons between individuals bearing or not MS were made; from those were obtained the following data: for triglycerides (TG) normal/high, glucose (GLU), insulin (INS) and HDL normal/low, and the number of cytokines.

Results: TGF- β diminished in groups with normal HDL and MS, and high GLU no MS, both vs. the normal group no MS, in addition to the group with high TG and MS vs. high TG no MS. IL-2 diminished in the group low HDL and MS vs. low HDL no MS; high INS and MS vs. high INS no MS, and in the group of normal GLU and MS vs. normal GLU no MS. TNF- α diminished in high GLU and MS vs. normal GLU no MS; as well as in low HDL and MS vs. low HDL no MS. IL-6 diminished in high GLU no MS vs. normal GLU no MS. IL-8 diminished in normal INS and MS vs. normal INS no MS, as well as in high GLU and MS vs. normal GLU no MS. IL-10 and INF- γ were lower in high GLU no MS vs. normal GLU no MS.

Conclusions: Modifications in each metabolic parameter of MS differentially affect serum cytokines production, even in absence of MS evidencing its complexity as well as its treatment.

Conflict of Interest: The authors declared not to have a conflict of interest.

Keywords: Metabolic syndrome, Cytokines, Inflammation.

P192**Effect of the Aqueous Extract of *Bidens Pilosa* in Lipid and Aqueous Solution in a Murine Model with Diabetes Mellitus**

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Introduction: Type 2 Diabetes Mellitus is a highly prevalent disease in Mexico, so look for alternatives that, together with adequate medical and nutritional treatment, improve the prognosis of the disease by reducing the complications associated with this disease. There is a wide variety of plants with hypoglycemic action that can be used for this purpose, so it is important to investigate the mechanisms associated with their effects in a model of this disease.

Objectives: To compare the effect of the inclusion of the aqueous *Bidens Pilosa* Extract (BPE) on the levels of glucose, triglycerides, and visceral fat in a murine model of diabetes in an aqueous solution against a lipid solution.

Methods:

- Standardize a model of diabetes in a mouse model of the CD1 strain using the drug streptozotocin (STZ) at concentrations of 50, 100, 150, 175 and 200 mg/kg of weight.
- Standardize energy-dense diet.
- Determine study groups using different concentrations of BPE.
- Measure indicators of plasma glucose and triglycerides.
- At the end of the study, it is proposed to weigh all the adipose tissue and compare between the study groups.

Results: Trials are in process, work is being done on the standardization of the diabetes model, so far, the most promising model to achieve an effective model is that of 150 mg/kg of STZ, however, the observation of the subjects has not yet concluded.

Conclusions: So far, no results have been obtained from the administration of BPE, however in the coming weeks it will begin with its administration.

Conflict of Interest: Those involved in this study declare that they have no conflict of interest.

Keywords: Type 2 diabetes mellitus, Hypoglycemia, Aqueous extract, Murine model, Streptozotocin.

P193**Professional Competencies of Nutrition Graduates on Fermented Foods**

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Introduction: Consumption of fermented foods has increased considerably in the Argentine population in recent decades, gaining importance the competencies of Nutrition Graduates when recommending them to the population.

Objectives: To analyze the professional competencies of Nutrition Graduates on fermented foods and their association with their own consumption habits.

Methods: Cross-sectional observational design in a non-probabilistic sample of Argentine Nutrition graduates, who agreed to answer a structured online questionnaire (June 2021).

Dependent Variables:

- Professional competencies through the covariates knowledge according to the Battle Test (3 questions categorized into no knowledge, partial knowledge and knowledge (0 to 1; 2 and 3 points respectively) and recommendation to the population according to reason, recipients and weekly frequency.
- Fermented foods consumption habits: according to type (artisanal and/or industrial) and weekly frequency.

Independent Variables: food profiles (omnivores, flexitarians, and vegetarians).

Statistical analysis with SPSS 21.0 calculating measures of central tendency and chi2 or Fisher's test according to sample size, considering significant values at $p < 0.05$.

Results: Sample ($n = 468$; 97.6% women and 2.4% men). Mean age: 36.4 (SD: 8.3) years; 71.8% ≤ 40 years; Omnivores 73.5%, Flexitarians 17.7% and Vegetarians 8.8%, of which 12% are Vegans. 45% have knowledge about fermented foods; the majority recommend them (76.7%) and consume them (80.9%). Consumption was associated with knowledge ($p: 0.027$) and recommendation ($p: 0.0000$). And knowledge with age ($p: 0.020$) and food profiles ($p: 0.02$).

Conclusions: The professional competencies of Nutrition Graduates on fermented foods were associated with their own consumption habits, being dependent on the age and food profile of each one of them.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Professional competencies, Knowledge, Recommendation, Fermented foods.

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