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BOOK OF ABSTRACTS

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Rīga Stradiņš University

Latvia University of Life Sciences and Technologies

University of Latvia

FOREWORD

The three largest Latvian universities — Riga Stradiņš University (RSU), University of Latvia (LU) and Latvia University of Life Sciences and Technologies (LBTU) – have been jointly implementing the inter-university Master's study program "Nutrition Science" since 2006 and now present the 4th international scientific conference "Nutrition and Health (ICNH2024), held in Riga on December 5-6, 2024 (previous conferences were organized in 2012, 2016 and 2020 (online formal only due to COVID-19 lockdown)).

The aim of the ICNH204 is to provide an opportunity for Latvian researchers to report on their achievements and results; for foreign researchers - to inform the audience about study results at the international level and introduce colleagues to current research problems; and for Master's students, as well as those interested in nutrition science and health problems - to improve theoretical and methodological knowledge in nutrition science, food science, health science and research in these areas.

The conference will feature 78 reports, including 19 key lectures, 32 oral reports and 26 poster reports, prepared by Master's students in collaboration with faculty members of partner universities (RSU, LU and LBTU), program graduates (PhD students and PhD candidates in nutrition-related fields), researchers representing Latvian and foreign scientific institutions, as well as industry professionals. The topics of the papers are related to the main issues of nutrition science: nutrition policy, public health and epidemiology, nutrition science, diet, nutrition, and chronic disease prevention, nutrition throughout life, maternal nutrition, nutrition and metabolic syndrome, sports nutrition and metabolism, health-relevant food, food quality and safety and sustainable and functional food.

In accordance with the research topics, the reports will be presented and discussed in seven conference sessions. The audience will gain a comprehensive view of nutritional science, observe its interdisciplinary nature and complexity, as well as its role in the prevention and treatment of diseases.

May you be inspired to new research directions transforming into scientific publications which contribute to additional knowledge in nutrition studies!

Lolita Vija Neimane
ICNH2024 Chair
Director of the inter-university study programme "Nutrition Science"
Rīga Stradiņš University

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Oral - NUTRITION POLICY, PUBLIC HEALTH and EPIDEMIOLOGY

An Insight into the First Studies of Dietary Habits Conducted in Latvia and Their Importance Today

Oral

Ms. Māra Kampara [1]

1. *Department of Rehabilitation, Rīga Stradiņš University*

Objectives

Introduction

In Latvia, the first studies of dietary habits were started in the 1960s as scientific expeditions to rural areas to study the population's diet and its relationship with health status. The materials of the expeditions that have survived to this day are a potential subject of repeated research, as more and more scientific studies confirm that human nutrition and environment can influence the predisposition of several future generations to the development of various diseases.

Overview

The first expedition in 1960 was still organised under the supervision of the Institute of Nutrition of the USSR. The next four scientific expeditions from 1961 to 1964 took place at the initiative of Professor Ksenija Skulme (1893 – 1967), the founder of Latvian nutrition science. The relationship between the consumption of smoked fish and the prevalence of stomach cancer was studied. The 1965 expedition was led by Dr. med. Lilija Žihare. The aim of the 1966 expedition was to find the relationship of some nutritional factors with both lipid metabolism and blood coagulation system indicators, as well as the prevalence of ischemic heart disease in a selective population group - all 40 - 60 years old men. From 1969, Dr. med. Guntis Vitenbergs took over the leadership of the expeditions, and in that year, in addition to the actual nutritional status of the rural population, the spread of gastrointestinal and cardiovascular diseases was also studied. In 1971 and 1973, similar expeditions were organised in other districts. The expeditions continued until 1993, covering most of the country's 26 districts and more than 20,000 inhabitants in a total of almost 30 years. Currently, only the original materials from the 1975-1983 expeditions have survived.

Conclusions

Digitisation of survey data will save the remaining research material from destruction and preserve it for future generations. Historical data will be able to serve as a reference point for the analysis of current dietary habits, will allow assessing how they have developed over time, and to compare how different socio-economic, environmental, and food availability factors affect the population's diet.

Keywords

dietary habits, scientific expeditions, health status

Changes in Nutrition Habits and Body Weight of the Lithuanian Adult Population During and After the COVID-19 Pandemic

Oral

Dr. Janina Petkeviciene [1], ***Dr. Vilma Kriaucioniene*** [1], ***Dr. Asta Raskiliene*** [1]

1. *Faculty of Public Health, Lithuanian University of Health Sciences*

Objectives

In Lithuania, the COVID-19 quarantine lasted from 16 March 2020 until 1 July 2021. This study aimed to assess nutrition, physical activity and body weight changes during the quarantine and the persistence of these changes after the quarantine among the Lithuanian adult population.

Materials and Methods

A study was conducted on a random sample of Lithuanian residents aged 20 to 64 in 2023. Face-to-face interviews were carried out within households across the country. The participants were asked about their lifestyle habits and body weight during and after the COVID-19 quarantine. A total of 1500 individuals (742 men and 758 women) participated in the survey.

Results

Many participants reported that they increased consumption of home-cooked food (34.9%), snacking frequency (29.1%), and the quantity of food eaten (21.3%) during the quarantine. Additionally, almost one in ten respondents increased consumption of homemade confectionery, fast food and home-delivered food. Furthermore, 29.5% of respondents reduced their physical activity, and 22.7% reported an increase in body weight. The likelihood of body weight gain was associated with increased quantity of food eaten and frequency of snacking, increased consumption of confectionery, sweetened drinks and home-delivered food, as well as reduced physical activity. The proportion of respondents who reported the maintenance of the quarantine changes in dietary habits varied from 23.2% to 71.4% in the post-quarantine period. More than 60% of respondents who indicated they increased their consumption of fish, vegetables, fruits and cereals during the quarantine maintained these habits in the post-quarantine period. Even 40.9% of participants maintained the increased habit of ordering food from stores. Body weight gained during the quarantine persisted among 64.3% of the participants, who continued to maintain a high amount of food eaten (37.3%), frequent snacking (36.9%), increased meat consumption (57.7%) and confectionery consumption (40.5%).

Conclusions

The COVID-19 quarantine significantly affected the nutrition habits and body weight of Lithuanian adults. Many individuals who changed their lifestyle habits and body weight during the quarantine indicated that these changes persisted after the pandemic. The targeted interventions are needed to help individuals develop and maintain healthy lifestyle habits, even in times of crisis.

Keywords

COVID-19 quarantine; adults; eating habits; body weight; changes

Changes in Students' Lifestyles, Weight Regulation Practices, and Willingness to Apply Lifestyle Medicine Knowledge in Their Future Practice.

Oral

Dr. Vilma Kriaucioniene [1], ***Dr. Janina Petkeviciene*** [1], ***Dr. Monika Grincaite*** [1]

1. *Faculty of Public Health, Lithuanian University of Health Sciences*

Objectives

This study assessed changes in students' lifestyles, body weight trends, management practices, and willingness to apply lifestyle medicine after medical studies.

Materials and Methods

Three cross-sectional student surveys were analyzed. The first, conducted in 2000, 2010, and 2017, involved 1430 first-year students from five Kaunas universities. The second, in 2022, included 1430 first-year students from four major Lithuanian Universities of Applied Sciences. The third, also in 2022, included 304 residents and 161 sixth-year medical students from the Lithuanian University of Health Sciences. Students reported their lifestyle habits, self-reported weight and height, and changes during and after quarantine. BMI was calculated from self-reported data, and residents and medical students were asked about their intent to apply lifestyle medicine knowledge.

Results

Among male students, the prevalence of normal weight decreased from 84.8% at the beginning of the study to 71.6% in 2017, with overweight prevalence nearly doubling, reaching 24.3% in the last survey. Females showed a smaller increase in overweight prevalence, from 5.2% to 9.6%. Body dissatisfaction was more common among females (34.7% vs. 25.9% for males). They were also more likely to worry about weight gain and engage in weight loss behaviors.

Moderately reduced food intake and exercise were popular methods of weight management, but extreme methods persisted among some students with overweight. Quarantine exacerbated poor habits, with weight gain reported by over a third of students, associated with increased snacking, fast food consumption, and reduced physical activity. Post-quarantine, unhealthy habits, and weight gain persisted for many. 40.9% of students who gained weight during quarantine kept it after. Many continued frequent snacking and unhealthy habits, while nearly half reported reduced physical activity.

The majority of medical students and residents did not follow a healthy lifestyle, and a third of them indicated that they did not intend to counsel patients on lifestyle changes in their practice.

Conclusions

Overweight prevalence increased among students, particularly males, over 17 years. Quarantine-induced lifestyle changes led to persistent weight issues, underscoring the need for health interventions and incorporating lifestyle medicine into medical education to foster lifelong health.

Keywords

Nutrition, physical activity, body weight, COVID-19 quarantine, lifestyle counseling.

Dietary guidelines and sustainability - the need for global harmonization

Oral

Dr. Diana Bogueva [1]

1. *President Global Harmonization Initiative (GHI); Curtin University Sustainability Policy Institute, Australia*

Objectives

This presentation addresses the current status of the dietary guidelines across the world and the global need for harmonizing dietary guidelines and sustainability assessments to improve public health and environmental outcomes. It explores the Balanced Food Choice Index (BFCI) as a tool for assessing dietary patterns, with a focus on few countries including Australia's ranking and insights gained from this framework. It highlights the current disparities in international nutrition regulations, such as differences in Nutrient Reference Values (NRVs), daily energy intake, and health claims, which hinder global consistency. The role of the Global Harmonization Initiative (GHI) in aligning nutrition policies is discussed, alongside recommendations for harmonizing dietary guidelines and food regulations. Emphasis is placed on the societal needs driving this initiative, including the alignment of nutrition legislation with sustainable food systems. The proposed harmonization framework aims to ensure fair trade, better food quality, and improved health outcomes worldwide, reinforcing the need for global cooperation and evidence-based policies.

Emotional Response to Food Taste as a Novel Moderator in the Diagnosis of Depressive Disorders

Oral

Prof. Elena Bartkienė [1], ***Prof. Vesta Steibliene*** [2], ***Prof. Virginija Adomaitiene*** [2], ***Ms. Laura Jarutiene*** [2], ***Dr. Dovilė Klupšaitė*** [3]

1. *Department of Food Safety and Quality; Institute of Animal Rearing Technologies; Lithuanian University of Health Sciences,* ***2.*** *Psychiatry Clinic, Lithuanian University of Health Sciences,* ***3.*** *Institute of Animal Rearing Technologies, Faculty of Animal Sciences, Lithuanian University of Health Sciences*

Objectives

In this research, we proposed that the emotional reactions triggered by various food tastes might differ between individuals diagnosed with major depressive disorder and those in the control group (individuals without a history of major depressive disorder for at least one year). The primary objective was to assess the emotional responses of major depressive disorder patients to different taste profiles of food and to compare these findings with those from the control group.

Materials and Methods

The research involved two groups: patients diagnosed with major depressive disorder (DeDi group) and a control group (C group) consisting of individuals without major depressive disorder for at least one year. A psychiatrist confirmed the diagnosis of major depressive disorder, and the severity of symptoms was measured using the Montgomery and Asberg Depression Rating Scale (MADRS). The study took place at the Psychiatry Clinic of the Lithuanian University of Health Sciences (Kaunas, Lithuania). To evaluate facial expressions, FaceReader-6 software was employed. Additionally, participants rated their overall acceptance of various food tastes using a 10-point Likert scale, ranging from 0 (extreme dislike) to 10 (extreme like).

Results

The findings from the FaceReader analysis revealed distinct emotional response patterns in patients with major depressive disorder to various food tastes. Compared to the control group, major depressive disorder patients showed reduced expressions of “happiness” and “contempt” but higher levels of “surprise” and a greater negative emotional valence across all tested tastes ($p \leq 0.05$).

Conclusions

These insights could help enhance understanding of dietary needs for individuals with major depressive disorder. Additionally, the creation of new food products that evoke more positive emotions in major depressive disorder patients presents a promising area for future research and development.

Keywords

The taste of food; Major Depressive Disorder; Nutrition; Mental health; Choice of food

Parental Attitudes and Approach to Feeding Preschool Aged Children

Oral

Ms. Kristīne Smita [1]

1. *University of Latvia*

Objectives

This is the first study done in Latvia that addresses children's nutrition with the main focus on food parenting. The purpose of this study was to explore the development of eating habits in young children by assessing their carer's approach to food parenting, and to identify the main reasons that interfere with healthy eating in families with young children in Latvia.

Materials and Methods

Participants were 479 parents or primary carers of at least one preschool aged child. Participants were invited to take part in the study via pre-schools in Latvia. Participants' approach to food parenting was assessed using the CFPQ questionnaire that was translated to Latvian language and adapted to the local environment as part of this study. Participants were also asked about their opinions and priorities in regards to feeding their young children.

Results

Control methods of food parenting that are associated with poor long-term outcomes, such as pressure to eat, food as reward and food for emotional regulation were prevalent in the researched population. Child's picky eating was named number one obstacle to healthy eating in participants' households. Nevertheless, many of the participants were unknowingly encouraging pickiness through their food parenting approach. Parent's / carer's knowledge about The Healthy Eating Plate was linked to a higher vegetable consumption in preschool aged children and a stronger autonomy and structure-based food parenting approach, such as involving the child in cooking and encouraging variety. Food parenting approach was linked to family income.

Conclusions

Parent's knowledge of The Healthy Eating Plate could be viewed as an indication to the food parenting their child is receiving. Younger children are more likely to be considered picky eaters indicating that parents are unaware of the natural phase of pickiness that most children exhibit at a young age. Food parenting training should be offered to parents as a public health strategy. Continuous longitudinal research is needed to fully assess the effects of food parenting on child's long-term health and relationship with food.

Keywords

Food parenting, CFPQ, child's nutrition, development of eating habits

RELATIONSHIP BETWEEN HEALTHY EATING, DIFFERENT EATING TIME AND ANTHROPOMETRIC DATA IN HEALTHY SUBJECTS

Oral

Mrs. Sandra Vaskelė [1], ***Dr. Rasa Volskienė*** [2]

1. *Kauno kolegija Higher Education Institution,* ***2.*** *Kauno Kolegija Higher Education Institution*

Objectives

The aim of the research was to assess the relationship healthy eating, different intermittent fasting patterns and anthropometric data in healthy subjects. The object of the research were changes in anthropometric data in healthy subjects eating according to the recommendations of the healthy eating and different intermittent fasting patterns. The problem of the research is how different intermittent fasting patterns and eating according to the healthy nutrition recommendations alters anthropometric data in healthy individuals.

Materials and Methods

For reasearch used quantitative research method and carried out an experimental diagnostic study. Study sample was ten persons (nine women and one man). All ten persons has got general and specific recommendations of healthy eating and were divided into two groups: 16/8 IF group (4 persons) and 12/12 IF group (6 persons).

Results

Statistically significantly decreased fat mass in 12/12 IF group (p=0,043), and visceral fat mass in 16/8 group (p=0,046), in whole sample regardless of IF pattern was identified statistically significant decrease in weight (p=0,028), BMI (p=0,032), fat mass (0,008) and visceral fat mass (0,025). 16/8 intermittent fasting pattern was statistically significantly effective in reducing visceral fat mass comparing to 12/12 pattern (p=0,038).

Conclusions

1. Comparing the results separately in each group, it was found that statistically significantly decreased fat mass in 12/12 group, and visceral fat mass in 16/8 group. The remaining anthropometric data (weight, BMI, and muscle mass) did not change statistically significantly in both groups.
2. Comparing the results in whole sample regardless of IF pattern, it was found out that there was statistically significant decrease in weight, BMI, fat mass and visceral fat mass, while muscle mass did not change statistically significantly.
3. It was found that 16/8 intermittent fasting pattern was statistically significantly effective in reducing visceral fat mass comparing to 12/12 pattern. Changes in the remaining anthropometric data (weight, BMI, fat mass and muscle mass) did not differ between fasting patterns.

Keywords

Fasting, healthy nutrition, body composition, anthropometric data.

Risk factors of neurogenic oropharyngeal dysphagia and malnutrition

Oral

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Objectives

Dysphagia directly affects food intake, but malnutrition may exacerbate these manifestations due to progressive neuromuscular dysfunction. Presence of dysphagia is also associated with greater risk of malnutrition. The aim of this study was to investigate risk factors of neurogenic oropharyngeal dysphagia and malnutrition according to the International Classification of Functioning, Disability and Health (ICF) model.

Materials and Methods

Cross-sectional study was done with 144 participants who received treatment at Riga East University Hospital and National Rehabilitation Centre "Vaivari". Inclusion criteria: age ≥18 years; hemodynamic stability and confirmed neurological diagnosis. Dysphagia was determined with Standardized Swallowing Assessment. Malnutrition was diagnosed according to GLIM framework.

Risk factors were split into groups according to ICF components and logistic regression analysis was performed to find the model of predictor variables that best explains each outcome. Models were compared using Hosmer-Lemeshow Goodness of Fit Test.

Results

The best Body structure (BS) model that explained dysphagia (χ^2=14.7, p=0.065) contained four variables: teeth, lips, jaw, soft palate. Body function (BF) model included appetite and cognitive functions (χ^2=5.55, p=0.698). Activities and participation (AP) model included WHODAS Getting along domain and employment status (χ^2=8.34, p=0.400). Personal factor (PF) model included education, physical activity, oral hygiene, time since onset of illness and age (χ^2=0.153, p=1.000).

For malnutrition, BS model with best fit consisted of three variables – teeth, soft palate and calf circumference (χ^2=13.152, p=0.107). BF model included appetite (χ^2=5.510, p=0.239). AP model included WHODAS Getting along domain score (χ^2=6.101, p=0.636). PF model included marital status (χ^2=7.420, p=0.115).

Models of Environmental factors and Health conditions showed no significance in predicting dysphagia or malnutrition.

Conclusions

Impaired teeth, lips, jaw and soft palate, loss of appetite and impaired cognition, high WHODAS Getting along domain score and unemployment as well as low education level, low physical activity, inadequate oral hygiene, smaller amount of time since onset of illness and older age are risk factors for neurogenic oropharyngeal dysphagia.

Higher risk of malnutrition is associated with impaired teeth, soft palate and low calf circumference, loss of appetite, high WHODAS Getting along domain score and living alone.

Keywords

Malnutrition, oropharyngeal dysphagia, risk factors, International Classification of Functioning, Disability and Health, neurology

Oral - NUTRITION and PREVENTION OF CHRONIC DISEASES

HOW NUTRITIONAL MISCONCEPTIONS SHAPE EMOTIONAL EATING IN WOMEN WHO DO NOT FOLLOW DIETS?

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Objectives

Nutritional misconceptions can lead to a misperception of one's own nutritional needs, which potentially intensifies the tendency towards emotional eating in response to stress or other challenging emotions. As a result, these individuals may more frequently turn to food as a way to cope with emotions, rather than satisfying actual physiological needs. Nutritional misconceptions are well-documented as a factor influencing emotional eating in women who follow diets; however, it is still unclear whether the same mechanism is observed in women who do not follow specialized diets. Therefore, the aim of this study was to assess the impact of nutritional misconceptions on the intensity of behaviors typical of emotional eating in women who are not on a specialized diet or weight reduction plan. An attempt was also made to characterize this mechanism.

Materials and Methods

A cross-sectional study was conducted among 208 women. Two standardized tools were used: the Nutritional Misconceptions Scale (NMS) and the Emotional Eating Scale (EES). Linear regression analysis was employed to assess the impact of the independent variable on the dependent variable. The dependent variable was the intensity of emotional eating (EES score), while the independent variable was nutritional misconceptions (NMS score).

Results

On the NMS, participants scored an average of 12.49±5.22 points (Min=6 points; Max=28 points), and on the EES, they scored an average of 13.23±3.95 points (Min=5 points; Max=25 points). Regression analysis revealed that nutritional misconceptions (independent variable) explained 16% of the variability in emotional eating (dependent variable) among women not following diets (Nagelkerke R-square = 0.164) - $F(1;207)=40.474$; $p<0.001$).

Conclusions

Analyzing and modifying nutritional misconceptions (e.g., through cognitive approaches), as well as developing effective emotion regulation strategies, could reduce the frequency of emotional eating in women who are not on a specialized diet or weight reduction plan. Further research is necessary to understand how nutritional beliefs influence emotional eating in this group.

Keywords

diet, psychological factors, emotions, functions of eating, psychology

Lipid Profile Changes in Perimenopausal Women Depending on Buttermilk Consumption in Diet: A Paired Samples Analysis

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1. *Latvia University of Life Sciences and Technologies,* ***2.*** *Riga Stradins university,* ***3.*** *Riga Stradins university; Institute of Life Sciences and Technology, Daugavpils University*

Objectives

Perimenopausal women experience hormonal fluctuations that significantly affect their lipid metabolism, increasing the risk of cardiovascular diseases. This study aimed to evaluate the changes in lipid profile among perimenopausal women depending on diet using a paired samples statistical approach.

Materials and Methods

The randomised clinical trial was conducted from October 2023 to June 2024 with perimenopausal women (aged 49.4±2.9 years, n=61) and moderately high low-density lipoprotein cholesterol (LDL-C) level 3.61±0.30 mmol L-1. The intervention group (n=30) consumed 250 mL buttermilk (0.5% fat, 0.13% polar lipids, SC "Tukuma piens") daily for 28 days, while the control group (n=31) maintained their diet. Blood samples were collected before and after to measure total cholesterol (TC), LDL-C, high-density lipoprotein cholesterol (HDL-C), and triglyceride (TG). Lipid concentrations were determined using the enzymatic colour reaction method. Approval was obtained from Rīga Stradiņš University Ethics Committee (Nr. 2-PĒK-4/513/2022). Paired sample t-tests were used to analyse within-group changes using Jamovi (2.6).

Results

Participants had a mean weight of 70.6±12.9 kg and body mass index (BMI) of 25.3±4.5, classifying them as overweight. The control group showed a significant decrease in TC from 5.93 to 5.44 mmol/L ($p = 0.018$), whereas the intervention group showed no significant change, with a reduction from 5.93 to 5.88 mmol/L ($p = 0.717$). The control group experienced a significant LDL cholesterol decrease from 3.62 to 3.34 mmol/L ($p = 0.027$). The intervention group did not show substantial change, with LDL levels slightly rising from 3.59 to 3.63 mmol/L ($p = 0.696$). Neither group showed significant triglyceride changes (intervention: $p = 0.803$; control: $p = 0.258$).

Conclusions

The paired sample analysis revealed notable differences in lipid profile changes between the control and intervention groups. The control group showed statistically significant reductions in lipid profile, while the intervention group demonstrated insignificant changes. The present findings indicate the necessity of investigating the various impact factors on lipid profiles in perimenopausal women.

Acknowledgements: This study was supported by the program "Strengthening Research Capacity in the Latvia University of Life Sciences and Technologies" project "The study of buttermilk polar lipids" (Z59).

Keywords

lipid profile, perimenopausal, cholesterol, LDL-C

Prevalence of dumping symptoms after oesophageal cancer surgery: a nationwide cohort study in Sweden

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Objectives

Dumping syndrome is a poorly understood post-surgical complication with a wide heterogeneity (0-78%) in reported prevalence among oesophageal cancer patients. Severe symptoms can reduce the quality of life and promote weight loss, often requiring dietary adjustments. This study investigates the prevalence of dumping symptoms longitudinally in oesophageal cancer patients after oesophagectomy.

Materials and Methods

This prospective, nationwide cohort study (OSCAR) included all patients who underwent oesophageal cancer surgery in Sweden from 2013 to 2020. Of 617 eligible, 418 were included at year one post-surgery. Clinical data were drawn from the Swedish National Patient Register, Swedish Cancer Register, and medical records. Dumping symptoms at years one and five post-surgery were assessed via a study-specific questionnaire covering 10 most characteristic symptoms. Symptom severity was rated on a 4-point Likert scale and overall severity was classified as 'none', 'moderate', or 'severe' dumping. Symptom onset was categorized as 'early' or 'late' based on patient interviews. Frequencies are presented as numbers (%). Group comparisons used chi-square test, and time-point comparisons Wilcoxon Signed-Rank Test, with significance set at $p<0.05$.

Results

Complete data on dumping symptoms at year one post-surgery were available for 385 patients (91.7% men; median age 68.7 at surgery). A total of 204 (53%) reported early dumping symptoms (43.1% moderate, 9.9% severe), and 42 (10.9%) reported late symptoms (9.1% moderate, 1.8% severe). The most common early symptoms were stomach cramps, nausea, and diarrhoea, while sleepiness was a predominant late symptom. Five years post-surgery, 112 patients completed the dumping symptom questionnaire. Among these, 70 (62.5%) experienced early and 17 (15.2%) late dumping symptoms. Among 109 patients reporting at both years one and five, early symptom severity increased significantly over time ($p=0.018$), but late symptom severity did not differ. Younger patients reported higher severity of early ($p=0.009$) and late ($p=0.044$) dumping symptoms at year one. No significant associations were found between dumping severity and gender, comorbidity, preoperative body mass index, tumour histology, neoadjuvant therapy or postoperative complications.

Conclusions

Dumping symptoms are common and persistent over time in patients undergoing oesophageal cancer surgery. A standardized diagnostic tool is needed to address inconsistencies across studies.

Keywords

Dumping; Oesophageal neoplasm; Surgical complications; Oesophagectomy

The potential of fresh algae spirulina as supporting therapy in various diseases.

Dr. Agnese Stunda-Zujeva [1]

1. *SpirulinaNord SIA*

Objectives

Microscopic algae spirulina is a popular food supplement showing high antioxidant, antiinflammation, antimicrobial, antiviral and neuroprotective properties. The unique blue pigment – phycocyanin (phycobiliprotein)is reported as the most important therapeutic substance in spirulina. Due to high nutrient concentration, the daily dose is just 3-15g of dried spirulina. Clinical trials of spirulina health benefits have been conducted since the 1970s. Conventionally, spirulina is sold in dried form (powder, capsules, or tablets). In this study, our aim was to analyze the latest clinical trial results on dried spirulina consumers and compare them with those of fresh spirulina consumers. Fresh spirulina is stated to be more bioactive due to its higher antioxidant and enzyme activity, while dried spirulina contains a higher ratio of protein and minerals.

Materials and Methods

During the study, 147 fresh spirulina users anonymously filled the questionnaire.

Results

The most reported effect was increase of energy (58%, n = 84), better brain activity (21%, n= 30). Part of respondents reported decreased iron level; 40% of them (n = 29) reported improvement in iron level in blood. While 43% (n=23) of those having digestive system problems reported improvement in the digestive system. Other studies report spirulina powder in the treatment of several gastrointestinal disorders such as gastric ulcer, ulcerative colitis, and fatty liver. While spirulina ability to reduce total cholesterol, LDL-C, and triglycerides is proven in several systematic reviews and meta-analyses of the impact of Spirulina supplementation in our study on fresh spirulina, only 23% reported this benefit.

Conclusions

Fresh spirulina has a potential as complementary therapy in iron deficiency and gastrointestinal disorders such as gastric ulcer, ulcerative colitis but further studies are needed.

Keywords

complementary therapy, iron deficiency, gastrointestinal disorders, spirulina, supplements.

Oral - NUTRITION THROUGHOUT LIFE

AGING – ACCEPT OR ACT?

Ms. Inga Elksne [1]

1. *Rīga Stradins University, Faculty of Health and Sports Sciences*

Objectives

Although life expectancy is generally increasing with the development of modern medicine, it is accompanied by a rise in age-related diseases, including cancer, cardiovascular disease, and dementia. Aging is characterized by phenotypic changes that manifest over the course of an average lifespan. These changes can be represented as a parameter space capturing the transition from young adulthood to old age. The pursuit of longevity should not be limited to extending the life cycle but should also focus on improving the quality of life, specifically by extending the health span. The ultimate goal of all aging-related mechanisms is to achieve “healthy aging” through effective intervention measures. A central focus of this presentation is the role of muscles in the aging process. Despite significant variability, muscle mass decreases by approximately 30 to 50 percent relative to body weight in adults. This loss is not linear but accelerates with increasing age. Muscles are crucial in the aging process as they serve as important protein storage. They play a vital role in both physical and mental health during aging. To maintain healthy muscles, appropriate nutrition, particularly protein intake, and regular physical activity are essential.

MALNUTRITION IN AGEING – A VIEW FROM FINLAND

Ms. Carina Kronberg-Kippilä [1]

1. *University of Helsinki, Department of Food and Environmental Sciences*

Objectives

Disease related malnutrition is frequent in Europe: 3-4 % of the population and 20-30 % of hospital patients has it[1]. In Finland the situation is quite similar: less than 10 % of ageing population living independently at home and 30 % of hospital patients has malnutrition[2]. Malnutrition has several consequences and thus screening, diagnosis and management of it is so important[3].

Finns seem to think at losing weight unintentionally seems to be part of ageing. This is not true! Many actions have been carried out to support better recognition of malnutrition: a new nutritional care guideline[3] and many peer-reviewed articles to healthcare professionals have been published. Experts have also shared their opinions widely in national and regional newspapers and shared detailed information about the consequences of malnutrition but also costs of malnutrition in a video recording to all decision makers of the well-being counties in Finland.

Malnutrition is still not well-recognized by healthcare professionals who meet most of the ageing people in healthcare centers. There needs to be more education to healthcare professionals as well as support to take screening, diagnosing and management of malnutrition into use whenever a patient is met. The work of implementing the nutritional care guidelines[3] with specific advice how to screen and manage malnutrition, needs to continue as well as a broad communication to healthcare professionals, decision makers and broader public.

RESEARCH IN POST-MENOPAUSAL WOMEN'S HEALTH – THE U.S. WOMEN'S HEALTH INITIATIVE

Prof. Mara Z. Vitolins [1]

1. *Department of Epidemiology and Prevention, Wake Forest University School of Medicine*

Objectives

The Women's Health Initiative (WHI) specifically the WHI diet modification intervention is a valuable resource to support collaborations with other scientists interested in studying health issues in post-menopausal women. The Women's Health Initiative (WHI) is a study funded by the National Heart, Lung, and Blood Institute and is the largest study on women's health in the US. The original WHI trials began in the early 1990s and concluded in 2005, follow up of the WHI cohort continues.

Materials and Methods

The trials included the Hormone Replacement (HT) Therapy trial, a Diet Modification (DM) trial and a Calcium Vitamin D(CAD) trial. The DM trial studied whether a diet low in fat and high in fruits, vegetables, and grains influenced incidence of breast and colorectal cancer and coronary heart disease. Study participants in the DM were randomized to follow their usual diet or a low-fat diet pattern. More than 161,000 women aged 50-79 enrolled in 40 clinical centers and of those, 48,835 were enrolled in the DM.

Results

In the DM, participants in the intervention lowered intake from dietary fat by 8% at year six. In women who consumed higher amounts of fat at baseline, the DM significantly reduced risk of CHD (HR (95% CI)=0.66 (0.46. 0.94). The average reduction in % energy from fat was 16% from baseline (42%).No statistically significant reductions were noted in invasive breast cancer or colorectal cancer risk. However in participants with high fat intake at baseline, those participants had significantly lower breast cancer incidence.

Conclusions

WHI is still ongoing as a series of extension studies, participants complete questionnaires on a yearly basis to report health updates and health outcomes. WHI continues to focus on informing strategies to prevent the major causes of death, debility, and frailty in women. WHI data are available to further explore and investigate many more research questions regarding older women's health issues.

Keywords

Women's Health Initiative, postmenopause, diet modification

Oral - NUTRITION and METABOLIC SYNDROME

Association between dietary factors and micro- and macrovascular complications in type 1 diabetes in Latvia

Oral

Dr. Jana Baranova [1], ***Mr. Aleksejs Fedulovs*** [1], ***Dr. Jelizaveta Sokolovska*** [2], ***Mr. Vladimirs Grigorjevs*** [2]

1. *University of Latvia, Faculty of Medicine, Laboratory for Personalized medicine,* ***2.*** *University of Latvia*

Objectives

Diet plays an important role in managing type 1 diabetes, but the association between dietary intake and health in this population has not been extensively studied. The main objective of this study was to evaluate the association between dietary factors, clinical parameters and different complications status for patients with type 1 diabetes.

Materials and Methods

Data from 130 patients with type 1 diabetes participating in the longitudinal LatDiane study who attended a baseline visit in 2013-2016 and a follow-up visit in 2018-2019 with a mean follow-up time 4.2 (3.8–5.0) were studied. Dietary intake was assessed using a self-reported questionnaire (InterDiane) and diet score, expressing the extent to which individuals adhered to standard dietary recommendations. Patient data, including medical history, blood glucose levels, and complication status, were collected for analysis from medical records.

Results

The average of Diet Score level decreased in the participants during the follow-up. In 60 subjects (46%), the Diet Score decreased; in 19 subjects (15%), it remained the same, while in 51 subjects (39%), the Diet Score increased. During the 1st visit we observed correlation between diet score and age, BMI, metabolic syndrome ($p<0.001$), waist circumference, number of diabetic complication, diabetic retinopathy, level of blood pressure ($p<0.005$), coronary heart disease, peripheral vascular disease, diabetic polyneuropathy, smoking, TG level ($p=0.05$). Among=130 participants, 36 showed progression in at least one complication.

Conclusions

In type 1 diabetes, dietary habits are linked to the prevalence of diabetic complications, cardiovascular disease and cardiovascular risk factors. These findings underscore the importance of personalized dietary interventions in the comprehensive management of Type 1 diabetes. More attention should be paid to dietary counselling of patients with type 1 diabetes.

Keywords

Type 1 diabetes, dietary factors, complication of diabetes

Association of dietary factors with faecal and serum inflammatory markers in patients with type 1 diabetes in Latvia

Oral

Ms. Sofija Ivanova [1], ***Mr. Aleksejs Fedulovs*** [1], ***Ms. Inese Siksna*** [2], ***Dr. Jelizaveta Sokolovska*** [1]

1. *University of Latvia,* ***2.*** *Institute of Food Safety, Animal Health and Environment "BIOR"*

Objectives

Our aim was to evaluate the relationship between dietary factors and inflammatory markers in faeces and serum in patients with type 1 diabetes (T1D).

Materials and Methods

This study is a part of project Lzp-2020/1-0138 "Association between glucose variability, intestinal disorders and progression of diabetic nephropathy in type 1 diabetes patients".

Patients with T1D and non-diabetic controls participated. They completed dietary assessments including a food frequency questionnaire, a 24-hour diet record, and a 3-day food diary. Food quantities were estimated using a validated portion size picture book or weighting. Serum high sensitivity C-reactive protein (hsCRP), lipopolysaccharide (LPS), lipopolysaccharide-binding protein (LBP), endogenous anti-endotoxin core antibodies (EndoCAb IgG and IgM) and faecal calprotectin were measured in a certified clinical lab.

Results

74 T1D patients (38% male) and 32 controls (41% male) participated, with mean ages of 45 and 37 years, respectively. Both groups consumed less than recommended amounts of vegetables, fruits, legumes, fish, nuts, carbohydrates (average 37%), and fiber (average 18g), while fat intake was about 10% higher than recommended. Serum hsCRP levels were significantly higher in the T1D group (p=0.002). Logistic regression adjusted for BMI and HbA1c showed that in T1D elevated hsCRP levels correlated with increased intake of coffee, tea, cocoa (OR 3.620, p=0.012) and legumes (OR 3.083, p=0.045); higher LPS levels were linked to more consumption of red meat (OR 2.872, p=0.035) and water (OR 3.564, p=0.027); higher LPS/HDL ratios were associated with greater consumption of cereals/pasta (OR 2.749, p=0.039) and red meat (OR 2.626, p=0.047); greater intake of sweeteners was associated with lower calprotectin (OR 0.348, p=0.033) and IgM levels (OR 0.367, p=0.044). Lower protein (OR 0.293, p=0.027), fat (OR 0.332, p=0.042), and energy intake (OR 0.280, p=0.015) were linked to higher hsCRP levels, but higher protein intake was associated with increased calprotectin levels (OR 3.012, p=0.030) in T1D. Higher fiber intake was associated with lower hsCRP level in T1D group, adjusted by BMI and diabetes duration*(OR 0.340, p=0.047*).

Conclusions

The study shows that dietary patterns may affect inflammatory markers, that highlight the role of diet in T1D inflammation management. Further studies are necessary.

Keywords

Food, macronutrients, lipopolysaccharide, lipopolysaccharide-binding protein, calprotectin

Clustering of Type 1 Diabetes Patients Based on CGM Profiles: Increased Insulin Resistance and Risk of MAFLD Evaluated by Surrogate Markers in Patients with Poor Glycemic Control.

Oral

Mr. Aleksejs Fedulovs [1], ***Dr. Leonora Pahirko*** [1], ***Dr. Jelizaveta Sokolovska*** [1]

1. *University of Latvia*

Objectives

The rising prevalence of “double diabetes” and metabolic-dysfunction-associated fatty liver disease (MAFLD) in T1D patients, often linked to metabolic syndrome (MS) and serving as an independent cardiovascular risk factor that may worsen glycemic control, is under-studied, with no data on the correlation between CGM outcomes and MAFLD risk. This study aims to investigate differences in MAFLD risk markers, insulin resistance and MS prevalence between clusters of T1D patients based on CGM profiles.

Materials and Methods

This cross-sectional study included 75 T1D patients. They were divided into two clusters based on CGM data (average glucose, coefficient of variance, glucose management indicator (GMI)%, time above range (TAR), time in range (TIR), time below range (TBR), low glucose events) using hierarchical clustering. CGM was done by FreeStyle Libre ProiQ for 14 days. TIR was defined as glycaemia between 4 and 10 mmol/l. Risk of MAFLD was assessed by fatty liver index (FLI) and hepatic steatosis index (HSI) formulas. MS prevalence was assessed by using NCEP criteria. Insulin sensitivity was assessed by estimated glucose disposal rate (eGDR) formula.

Results

Cluster 1 had 28 patients with worse CGM results, while Cluster 2 had 47 with better results. The clusters showed no significant differences in gender, age, diabetes duration, anthropometrics, or complications. Patients in Cluster 1 had statistically significantly higher mean glucose, GMI, TAR, and estimated HbA1c, along with shorter TIR and TBR and higher HbA1c levels ($p<0.001$). Additionally, patients in Cluster 1 had higher alanine transaminase ($p=0.048$), aspartate aminotransferase ($p=0.005$), and HSI and FLI indices ($p<0.03$) than Cluster 2. Cluster 1 had a higher prevalence of hepatic steatosis based on HSI (64.29% vs. 40.43%, $p=0.046$) and more high-risk fatty liver cases based on FLI (35.71% vs. 10.64%, $p=0.032$). Conversely, eGDR was significantly lower in Cluster 1, indicating higher insulin resistance ($p=0.001$), confirmed by higher median insulin dosages than in Cluster 2 ($p=0.012$). Cluster 1 had a higher prevalence of MS than Cluster 2, but not statistically significantly ($p=0.089$).

Conclusions

Our study discovered links between glucose daily profiles assessed by CGM and MAFLD and insulin resistance markers in patients with T1D using clustering approach.

Keywords

T1D, CGM, MAFLD, MS

Des-acyl Ghrelin (DAG) as a Prognostic Factor for Weight Loss after Bariatric Surgery

Oral

Mrs. Guna Bīlande [1], ***Dr. Maksims Mukāns*** [2], ***Dr. Igors Troickis*** [2], ***Dr. Oļegs Kozlovskis*** [3], ***Dr. Egons Liepiņš*** [4], ***Dr. Juris Žarinovs*** [3], ***Prof. Valdis Pirags*** [1]

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Objectives

Bariatric surgery holds potential as a long-term intervention for mitigating the global health burden imposed by obesity. However, the magnitude of sustained weight loss post-surgery and its consequent benefits to both patients and the healthcare system remain equivocal. One physiological system impacted by bariatric surgery is the regulation of des-acyl ghrelin (DAG) secretion, which for a long time was considered to be a by-product of acylated (or acyl) ghrelin, but currently receiving increasing attention in studies of preproghrelin gene-encoded peptides. Emerging evidence suggests a robust negative correlation between DAG levels and both excess adiposity and insulin resistance.

Materials and Methods

Fasting blood samples for DAG quantification were collected at three time points: one day pre-operatively, two days post-operatively, and at the three-month postoperative follow-up. Concurrent with blood sampling, anthropometric measurements and other blood tests were conducted at the same time

Results

A total of 62 patients participated in the study. Of these, 64.5% (n=40) underwent Roux-en-Y gastric bypass (RYGB) and 35.5% (n=22) underwent sleeve gastrectomy (SG). The study population predominantly comprised females (67.7%).

Median body weight and BMI before the surgery were 129 kg (IQR 106-150 kg) and 45.1 kg/m², respectively. The median excess weight loss (EWL) achieved at three-month follow-up was 40% (IQR 32-54%).

A sharp initial decrease in DAG levels was observed two days post-bariatric surgery, followed by a gradual increase over the subsequent three months. At the three-month follow-up, DAG levels were significantly higher in the RYGB group compared to the SG group. A robust negative correlation was found between baseline DAG levels and BMI at the three-month follow-up, indicating that higher initial DAG levels were associated with greater weight loss afterwards.

Conclusions

DAG levels exhibited a sharp decline immediately following both RYGB and SG, followed by a gradual increase over the subsequent three months. Higher DAG levels before bariatric surgery were associated with greater weight loss afterwards. These findings suggest that DAG could serve as a potential biomarker for evaluating outcome following bariatric surgery.

Keywords

Des-acyl ghrelin (DAG), unacylated ghrelin, bariatric surgery, Roux-en-Y-gastric bypass (RYGB), sleeve gastrectomy (SG), obesity, weight loss, insulin resistance, metabolic improvement, biomarker, hormones.

The effect of dairy consumption on insulin sensitivity in patients with type 1 diabetes mellitus

Oral

Ms. Līga Balode [1], ***Mrs. Guna Bīlande*** [2], ***Dr. Jelizaveta Sokolovska*** [2]

1. *Riga Stradins university,* ***2.*** *University of Latvia*

Objectives

Type 2 diabetes mellitus is often characterized by insulin resistance, which can precede disease diagnosis. While type 1 diabetes is typically associated with autoimmune destruction of insulin-producing beta cells, a growing number of patients also exhibit overweight or obesity, potentially impacting metabolism and insulin sensitivity. A contentious topic in this context is the role of milk and dairy products in modulating insulin sensitivity. While most studies have focused on type 2 diabetes, there is a paucity of research examining this association in type 1 diabetes. To address this knowledge gap, we investigated the correlation between antropometric measures, estimated glucose disposal rate and injected insulin levels and dairy consumption in patients with type 1 diabetes.

Materials and Methods

74 patients with type 1 diabetes and 39 healthy volunteers participated in this study. The median age was 42.5 (31.6; 74.4) years, with an average disease duration of 20.43±9.69 years for diabetes patients; and the mean age for healthy control participants was 37.08 ± 8.99 years. Body weight, length, waist circumference and body mass index did not significantly differ between both groups. Laboratory tests were conducted, and a detailed medical history was obtained. A food frequency questionnaire was administered to assess dairy consumption patterns.

Results

The median total annual milk and dairy consumption in the type 1 diabetes cohort was estimated to be 839.5 (629.6; 1469.1) equivalents, and 769.5 (577.1; 1346.6) equivalents in healthy control group. The median total daily insulin dose administered to patients was 48.0 (36.0; 84.0) units. The median estimated glucose disposal rate was determined to be 7.41 (5.51; 12.0) $mg/kg^1 \cdot min^{-1}$ for diabetes patients and 10.55 (7.95; 12.9) $mg/kg^1 \cdot min^{-1}$ in controls ($p<0.001$). A moderate negative correlation was observed between the ratio of total insulin dose to body weight and consumption of fermented dairy products (correlation coefficient: -0.31; $p<0.007$). No other association between dairy consumption and study variables was detected in neither group.

Conclusions

The study findings suggest that lower fermented dairy product consumption is linked to the higher required insulin dosage, suggesting a potential impact on insulin sensitivity.

Keywords

Insulin, type 1 diabetes, dairy products, food frequency, estimated glucose disposal rate

The PRAESIIDIUM Project: exploring collaboration between clinical practice and artificial intelligence for prediabetes risk prediction

Oral

Dr. Sabine Skrebinska [1], ***Ms. Zane Šmite*** [2], ***Prof. Līga Plakane*** [2], ***Mrs. Guna Bīlande*** [2], ***Ms. Sofija Ivanova*** [2], ***Ms. Marina Arisova*** [2], ***Mr. Aleksejs Fedulovs*** [2], ***Mr. Kaspars Ozols*** [3], ***Mr. Leo Selavo*** [3], ***Mr. Roberto Larcher*** [4], ***Mr. Paolo Tieri*** [5], ***Mr. Peter Rosengren*** [6], ***Mr. Pablo Giraudi*** [7], ***Ms. Laura Azzimonti*** [8], ***Dr. Jelizaveta Sokolovska*** [2]

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Objectives

This study aims to collect longitudinal data from individuals with overweight or grade I obesity in Latvia to enhance data availability in the prediabetes field, validate the outputs of a physics-informed machine learning (PIML) algorithm, and develop a prototype tool for real-time prediction of prediabetes risk.

Materials and Methods

The University of Latvia is one of the centres of the PRAESIIDIUM project conducting longitudinal non-randomized cohort data collection. We will recruit 75 otherwise healthy adult individuals aged 18 to 65, with overweight (BMI 25.0 – 29.9 kg/m2) or obesity stage I (BMI 30 – 34.9 kg/m2), without prediabetes or diabetes according to fasting glucose and/or HbA1c levels by ADA/WHO criteria. Subjects will be observed for 4 months, including three face-to-face visits every two months. In addition to laboratory analysis (blood, faecal and urine samples), each participant's physical activity will be assessed with a 6-minute walking test to determine VO2 max, and dietary habits using a 24-hour food recall, food frequency questionnaire, and 3-day food diary. According to results, individual physical activity plans and dietary recommendations will be provided by sports physiologists and nutritionists. Daily glucose excursions and physical activity will be tracked using blinded continuous glucose monitoring sensors and a smartwatch, respectively.

Results

For now, 142 potential participants were interviewed, 60 (42.2%) of them were eligible for inclusion criteria. So far, 60 participants have attended the first visit, which is 80% of the required number. Currently, 55 participants have completed the second visit. This is 73.3% of the required 75 participants. In total 22 out of 75 participants or 29.3% have completed the third visit.

Conclusions

We are continuing to recruit participants to reach the necessary sample size for further data analysis.
This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement No 101095672.

Keywords

overweight, obesity, prediabetic state, prediction, artificial intelligence, algorithm

Oral - NUTRITION and WOMEN'S HEALTH

Evaluation of Iodine Intake and Its Dietary Sources Among Lactating Women in Latvia

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1. *Latvia University of Life Sciences and Technologies*

Objectives

To evaluate iodine intake and its dietary sources among exclusively breastfeeding women in Latvia, using previously unpublished data from Līva's Aumeistere's *Ph.D.* thesis research "The Study of Human Milk Composition".

Materials and Methods

Data provided by 48 exclusively breastfeeding women were selected (Ethical approval No. 6-1/01/6, 30th January 2020, Riga Stradiņš University Research Ethics Committee). The food frequency questionnaire (FFQ) was used to determine participants' dietary sources of iodine. A 72-hour food diary was used to assess daily iodine intake. Nutritional data from food diaries were analyzed using the Finish Food Composition database Fineli. Data statistical processing was performed using MS Excel 360 and IBM SPSS 23.

Results

Median iodine intake among participants was 168.91 µg per day but varied widely – from 9.51 to 481.92 µg per day. Dietary iodine intake significantly correlated with milk and dairy product intake ($\rho = 0.353$, $p = 0.014$). Among participants with habitual milk and dairy product intake ($n = 41$), median daily iodine intake reached 169.16 µg compared to only 105.63 µg per day among participants who excluded milk and dairy products from their diet ($n = 7$). Majority of women ($n = 34$) marked on the FFQ that they do not eat fish or consume them only rarely. Five participants noted the use of iodine containing dietary supplements, with the additional iodine intake from supplements ranging from 50 to 150 µg per day.

Conclusions

Milk and dairy products were the main source of iodine among the participants. However, daily iodine intake only slightly exceeded the minimal recommended intake for women during the lactation period (i.e., 150 µg per day according to the Recommended Energy and Nutrient Intakes set by the Ministry of Health of the Republic of Latvia, 2017). To assess the iodine status of lactating women in Latvia more accurately, a new research project* is currently conducted.

*Research project "Human Milk Iodine Concentration as a Biomarker of Iodine Status in Lactating Women and Exclusively Breastfed Infants" (AF9), supported by the project "Strengthening the Institutional Capacity of LBTU for Excellence in Studies and Research", funded by the Recovery and Resilience Facility.

Keywords

iodine, nutrition, diet, lactation, breastfeeding

GESTATIONAL DIABETES IN RELATION WITH PREPREGNANCY BODY MASS INDEX IN PREGNANT WOMEN

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1. *Riga Stradins university*

Objectives

The prevalence of gestational diabetes mellitus (GDM) is increasing, likely due to the upwards trends in maternal age and BMI. Women who are overweight or obese face a higher risk of developing GDM. This study aimed to evaluate the prevalence of GDM among pregnant women in Latvia and to assess the association between prepregnancy BMI and maternal age.

Materials and Methods

This report partially compiles data from an abstract presented as part of the project LZP Nr. lzp-2019/1-0335, funded by the Latvian Council of Science. A cross-sectional survey included 650 women with singleton birth within the first seven days postpartum and pregnant women in their third trimester. Data collected from medical records between July 2020 and December 2022 were analysed using WHO criteria for BMI classification and OGTT thresholds, employing IBM SPSS 26.0 for statistical analysis.

Results

Overall, 19.1% (n=124) of participants had abnormal OGTT results. GDM, determined by OGTT, was found in 22.6% (n=7) of underweight women (BMI < 18.5 kg/m²), 13.4% (n=53) of women with normal BMI (15.5-24.9 kg/m²), 25.5% (n=40) of overweight women (BMI ≥ 25 kg/m²), and 36.4% (n=24) of obese women (BMI ≥ 30 kg/m²). An association between prepregnancy BMI and GDM was found ($p < 0.001$). Additionally, participants aged 35 and older had significantly higher odds of GDM (OR 1.8, 95% CI 1.2-2.6) compared to those under 35.

Conclusions

The prevalence of GDM among Latvian pregnant women is 19.1%. Elevated BMI and older maternal age are associated with an increased risk of GDM. Emphasis should be placed on achieving a normal BMI prior to pregnancy to help reduce the risk of developing GDM.

Keywords

Gestational diabetes, prepregnancy body mass index (BMI), pregnancy.

NUTRITION FOR TWO: INVESTIGATING THE POWER OF FATTY ACIDS

Mrs. Ksenija Nikolajeva [1], ***Ms. Olga Aizbalte*** [1], ***Mrs. Anna Piskurjova*** [1], ***Ms. Roberta Rezgale*** [1], ***Mrs. Vinita Cauce*** [1], ***Dr. Dzintars Zacs*** [2], ***Prof. Laila Meija*** [1]

1. *Riga Stradins university,* ***2.*** *Institute of Food Safety, Animal Health and Environment "BIOR"*

Objectives

Dietary fats play a critical role in maternal and fetal health. The composition of fatty acids (FAs) in erythrocyte membranes reflects dietary intake and other contributing factors. This study aimed to assess the relationship between key erythrocyte membrane FAs and factors such as dietary fat intake, supplementation, and lifestyle behaviors in Latvian pregnant women. Additionally, it examined the influence of specific omega-3 FAs on gestational length and infant birth weight.

Materials and Methods

This report consolidates data from two published reviews (n=250 and n=236), both conducted within the framework of the Latvian Council of Science project "Excess Weight, Dietary Habits, and Vitamin D and Omega-3 Fatty Acid Status in Pregnancy" (Project No. Izp-2019/1-0335). Data collection involved medical records, a food frequency questionnaire, and a survey on demographic, lifestyle, health, and nutritional factors, gathered from outpatient clinics and maternity departments. FA profiles in erythrocyte membrane phospholipids were analyzed using gas chromatography. In line with World Health Organization guidelines, preterm birth was defined as occurring before 37 weeks of gestation. Low birth weight was classified as <2500 g, and fetal macrosomia as >4000 g.

Results

Significant correlations (n=236) were identified between dietary saturated fatty acids (SFAs) and erythrocyte SFAs ($r=-0.140$, $p=0.032$), as well as with polyunsaturated fatty acids (PUFAs) ($r=0.167$, $p=0.01$). Dietary PUFAs were inversely related to erythrocyte monounsaturated fatty acids (MUFAs) ($r=-0.143$, $p=0.028$). SFAs, MUFAs, and PUFAs positively correlated with n-3 and n-6 erythrocyte FAs. Vitamin D correlated positively with MUFAs and negatively with PUFAs and arachidonic acid. There was a negative correlation between dietary vitamin A and linoleic acid in erythrocytes. Physical activity and alcohol consumption also influenced FA composition. Notably, differences in eicosapentaenoic acid (EPA) levels were associated with varying birth weights (n=250, $p < 0.05$).

Conclusions

Evidence suggests that certain dietary FAs may correlate with erythrocyte FA profiles. Influencing factors for this association include alcohol consumption, physical activity, and levels of vitamins D and A. Additionally, there are indications of a potential relationship between EPA levels and infant birth weight.

Keywords

pregnancy; nutrition; fatty acids; omega-3; omega-6; erythrocytes

Prevalence of vitamin D and iron deficiency in pregnant women in Latvia

Ms. Inese Siksna [1], ***Ms. Ilva Lazda*** [1]

1. *Institute of Food Safety, Animal Health and Environment "BIOR"*

Objectives

The aim of the study was to investigate the prevalence and severity of vitamin D and iron deficiency in pregnant women in Latvia in order to promote the development of a national prevention program for addressing vitamin D and iron deficiency.

Materials and Methods

Data on risk factors and lifestyle habits of pregnant women in second trimester related to vitamin D and iron deficiencies were collected using questionnaires and laboratory tests, including a complete blood count, and measurements of serum levels of vitamin D (25(OH)D), parathyroid hormone (PTH), ferritin, and soluble transferrin receptors, were conducted. Anthropometric measurements (body weight and height) were recorded. Data were processed and analyzed to identify the prevalence, severity, and risk factors for vitamin D and iron deficiencies.

Results

Among the 1022 participants included in the study, adequate levels of vitamin D were observed in 58.9% of participants, inadequate levels in 22.3%, moderately severe deficiency in 10.8%, and severe deficiency in 2.1%. Adequate levels of vitamin D were most commonly observed in the Pieriga region (63.4% of participants), but least commonly in Latgale (45.8%). Insufficient level of vitamin D and deficiency was most commonly observed in Latgale, with 31.1% and 19.3% of participants, respectively.

Analysing the obtained results according to international guidelines, it is evident that anemia, or a hemoglobin level <105 g/l during the second trimester, was present in 3.7% of the participants. When evaluating ferritin levels according to WHO guidelines, iron deficiency, or a ferritin level<15 μg/l, was observed in 24.6% of the participants. However, when assessed according to the guidelines of the United States and the United Kingdom (ferritin <30 μg/l), 60.5% of the participants had iron deficiency.

Conclusions

The most significant influence on the participants' vitamin D levels was the use of vitamin D dietary supplements. Participants who took vitamin D dietary supplements every day had a level of vitamin D that was 15 ng/ml higher than those who did not use them.

Keywords

vitamin D deficiency, iron deficiency, pregnant women, food supplements

VITAMIN D STATUS AND INFLUENCING FACTORS IN PREGNANT WOMEN IN LATVIA

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Objectives

Vitamin D is crucial for maternal and fetal health during pregnancy, with low levels negatively impacting pregnancy outcomes. We investigated the vitamin D status of pregnant women in Latvia by evaluating serum 25(OH)D level, dietary vitamin D intake from foods and supplements, lifestyle factors, focusing on their association with optimal serum levels advised for pregnancy(>45 ng/mL).

Materials and Methods

This report presents data from a published article on a cross-sectional study conducted in Latvia from July 2020 to January 2023 as part of the LZP project No. lzp-2019/1-0335, involving 735 women (145 pregnant and 590 within seven days postpartum). Data were collected through comprehensive medical records and a validated food frequency questionnaire assessing dietary intake. Serum 25(OH)D levels were measured using the LIAISON® chemiluminescent immunoassay. Participants were categorized by serum 25(OH)D concentrations, with groups defined as below or above 45 ng/mL, a threshold identified as optimal for pregnancy.

Results

The mean age: 31 (IQR: 28-36) years. Mdn serum 25(OH)D 34.0 (IQR: 23.6-43.1) ng/mL. Only 21.9% (n=161) of participants achieved optimal serum levels (>45 ng/mL). 67.5% (n = 387) of postpartum women and 84.1% (n = 122) of pregnant women took vitamin D supplements. Dietary intake (Mdn 2.0 mcg/day (IQR: 1.3 - 3.4), did not significantly correlate with serum vitamin D levels ($p > 0.05$). Users of vitamin D supplements exhibited higher educational levels ($p < 0.001$) and lower smoking rates ($p < 0.001$). Seasonal variations influenced vitamin D levels only among non-supplement users, who showed improved serum concentrations during summer months.

Conclusions

The findings indicate a significant prevalence of suboptimal vitamin D levels among pregnant and postpartum women in Latvia, with only one-fifth achieving serum 25(OH)D concentrations above the recommended threshold for pregnancy. Vitamin D supplementation, rather than dietary intake, emerged as the primary factor associated with adequate vitamin D status, highlighting the need for targeted supplementation strategies. Vitamin D supplement users had higher education levels and lower smoking rates. Seasonal variations impacted serum levels only in non-supplement users, indicating supplementation may prevent seasonal deficiencies.

Keywords

Vitamin D, pregnancy, BMI

Oral - FOOD QUALITY and SAFETY

Changes in Bioactive Compounds in Barley By-Products During Fermentation Process

Oral

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Objectives

This study investigated the effect of *Pediococcus acidilactici* LUHS29 fermentation on the bioactive compound profile of barley bran by-products.

Materials and Methods

Barley bran (BB) was obtained from Ustukiu Malunas Ltd (Pasvalys, Lithuania). The *P. acidilactici* strain, stored at -80°C, was cultured in an MRS medium supplemented with fructose- and maltose at 30°C for two days prior to use. Fermentation was performed using two conditions: solid-state fermentation (SSF) with a water content of 450 g/kg in the BB, and submerged fermentation (SMF) with a water content of 650 g/kg. Under both conditions, *P. acidilactici* constituted 3% of the total cereal/water blend, and fermentation proceeded for 72 hours at 32 ± 2°C. The study analyzed changes in various technological parameters during fermentation, including: crude protein (CP) and fat (CF), ash, dietary fiber, biogenic amines (BAs) and bioactive compounds, such as free amino acids, phenolic compounds (PC), fatty acids (FAs), lignans and alkylresorcinols (ARs).

Results

Fermentation, regardless of method, resulted in a decrease in both CP (by 25.8%) and CF (by 35.9%) and enhance DF content. Both SSF and SMF increased the concentration of various FAs (oleic, eicosadienoic, arachidic) in fermented BB. The control samples exhibited the highest BAs amount (290.6 mg/kg), with putrescine being the most abundant BA in BB. To achieve greater concentrations of the ARs C19:0, it is preferable to use SSF. After 24 hours of SSF, C19:0 amount increased by 75.9%. Vanillic acid levels increased by 18.9% in both SSF and SMF groups after 72 hours of fermentation, in compare with control samples. Additionally, *p*-hydroxybenzoic acid levels showed a more significant rise, increasing by 534.5% in SSF and 46.5% in SMF after the same time period.

Conclusions

The obtained results showed significant changes in the bioactive compound profile of BB following SSF and SMF, indicating its potential as a valuable resource for food, feed, and pharmaceutical applications.

Keywords

Barley; bioactive compounds; fermentation; *Pediococcus*; by-products.

Evaluation of biologically active compounds in black elderberry fruits grown in Latvia

Oral

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1. *Latvia University of Life Sciences and Technologies*

Objectives

To analyse bioactive compounds in black elderberry varieties commercially grown in Latvia. These findings could be crucial for understanding the potential nutritional benefits of different elderberry varieties.

Materials and Methods

A study was conducted on four black elderberry (*Sambucus nigra*) varieties: "Haidegg 17," "Korsör," "Haschberg," and "Emma". The plant specimens were harvested in Valmiera county, Latvia, in September of 2023. Spectrophotometric techniques were employed to evaluate the samples for: total phenolic compounds (TPC) levels, total anthocyanin (TA) and carotenoid concentration.

Results

The obtained results showed that the highest amount of TA was in the variety "Haschberg" – 4.02 g $100g^{-1}$ of fresh weight (FW), while the lowest content was observed in the "Korsör" variety – 2.82 g $100g^{-1}$ (FW). There was no significant difference (p=0.62) between samples of "Emma" and "Haidegg 17". TA content for these two varieties were – 3.50 g $100g^{-1}$ (FW) and 3.35 g $100g^{-1}$ (FW), respectively.

The highest carotenoid content was found in the variety "Emma" – 130.5 mg $100g^{-1}$ (FW), however the lowest in the varieties "Korsör" – 74.9 mg $100g^{-1}$ (FW) and "Haschberg" –77.0 mg $100g^{-1}$ (FW), with no significant difference between them (p=0.81). "Haidegg 17" carotenoid content was 86.4 mg $100g^{-1}$ (FW).

The study revealed a significant difference ($p<0.01$) in TPC among varieties "Haidegg 17" and "Korsör". The "Haidegg 17" variety exhibited the highest TPC – 1.34 g of Gallic acid equivalent per 100 grams of sample (GAE $100g^{-1}$) (FW). In contrast, the "Korsör" variety showed the lowest TPC at 0.98 g GAE $100g^{-1}$ (FW). Varieties "Haschberg" and "Emma" displayed similar TPC levels, with 1.29 and 1.26 g GAE $100g^{-1}$ (FW), respectively. Statistical analysis indicated no significant difference (p = 0.10) between these two varieties.

Conclusions

This study highlights significant differences in the bioactive compounds between analysed black elderberry varieties, which could be valuable for breeding programs and selecting varieties for specific nutritional or commercial purposes.

Keywords

Sambucus nigra, anthocyanins, carotenoids, total phenolic compounds.

Free Amino Acid Profile in Organic and Conventional Fermented Milk: The Role of Starter Cultures

Oral

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Objectives

Fermented milk, such as yoghurt, is the best-known food to supply probiotics. In addition, the proteolytic activity of lactic acid bacteria enhances the composition and functionality of fermented milk by breaking down the proteins into peptides and amino acids (AA), and releasing them into the substrate. The study aimed to compare the protein fractions and free AA in organic and conventional fermented milk using different starter cultures.

Materials and Methods

Pasteurized organic (O) and conventional (C) milk samples (n=12) were inoculated with starter cultures: TCC-20, YFL-811, and YFL-902 (Chr. Hansen, Denmark). Lactic acid bacteria colony forming units (LAB CFU) were determined by the pour-plate method (LVS EN ISO 15214:1998) using MRS and M17 media, free AA were detected by high-performance liquid chromatography (HPLC) and protein fractions were examined by capillary electrophoresis. Protein fraction size in kDA, LAB CFU, and free AA were determined before and after fermentation.

Results

All fermented milk samples had more than 10^7 mL^{-1} LAB CFU, with no significant differences in *Lactobacillus bulgaricus*, *Lactobacillus helveticus* and *Streptococcus thermophilus* CFU between O and C milk, but the significant differences in CFU between the starter cultures were observed ($p<0.001$). All starter cultures are characterised with proteolytical properties providing protein degradation up to peptides and free amino acids with a molecular weight of 7-240 kDa in the fermented milk samples. Free AA analysis showed similar patterns for all cultures in terms of increased concentration (Thr, His, Ala, Pro, Phe) in both O and C fermented milk samples. Among the free essential AA: Thr, Val, Leu, Ile were significantly higher in conventional fermented milk ($p<0.05$). As in the case of LAB CFU, the composition of AA in fermented milk was most influenced by the starter culture ($p<0.001$).

Conclusions

The findings suggest that the starter cultures exhibited different metabolic activity in organic and conventional milk, leading to distinct amino acid profiles in fermented dairy products.

Acknowledgment

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Keywords

Fermented dairy products, lactic acid bacteria, organic yoghurt, *Lb.bulgaricus*, *Lb.helveticus*

HIGH INTERNAL PHASE PICKERING EMULSIONS USING DIFFERENT TYPES OF MODIFIED DIOSCOREA HISPIDA STARCH AS THE SOLE STABILIZER

Oral

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Objectives

Dioscorea Hispida Dennst (D. hispida) is a special kind of yam that can be modified chemically (e.g., esterification with octenyl succinic anhydride, OSA), physically (pre-gelatinization), or in combination using physical and chemical techniques. This starch serves as a solid particle emuslfier to stabilize High Internal Phase Pickering Emulsions (HIPPE). Hence, this study is designed to characterize the structural properties of modified *D. hispida* starch granules and to investigate the physicochemical properties and stability of both native and modified starch for stabilizing HIPEE.

Materials and Methods

The mayonnaise formulation consisted of 50% (v/v) medium chain triacylgyceride oil, 50% (v/v) lime juice, and 200 mg/mL of starch per mL of oil. The physicochemical properties and stability of HIPPE stabilized by native, OSA, pre-gelatinized, and dual modified *D. hispida* starch granules were investigated by analyzing the droplet size, morphology, creaming index, centrifugal test, color, texture, and rheological behavior.

Results

The result showed that the granule size of *D. hispida* ranged from 2.93 to 3.75 µm. Despite a large droplet size (75.1 µm), the OSA-modified starch-stabilized emulsion demonstrated the highest stability, indicated by the highest creaming index, firmness, and consistency in texture analysis. Rheological analysis revealed solid-like (elastic) behavior in all samples, with G' (storage modulus) greater than G'' (loss modulus). Among the formulations, HIPPE stabilized by OSA starch showed the highest G' and G", followed by pre-gelatinized, native, and dual-modified starch, respectively, corresponding to viscosity measurements.

Conclusions

In conclusion, modifying D. hispida starch with OSA, pre-gelatinization, and dual modification imparts different properties to the HIPPE, offering valuable insights for the food industry in developing more effective and sustainable formulations.

Keywords

Starch particles; Emulsion stability; High Internal Phase; OSA; Pickering emulsions

NUTRITIONAL AND SAFETY ASSESSMENT OF PLANT-BASED BEVERAGES

Oral

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Objectives

Mycotoxins are hazardous mould metabolites that contaminate various foods, particularly those derived from cereals, nuts, and legumes. With the rising popularity of plant-based beverages as dairy milk substitutes, understanding the presence and risk of mycotoxins in these drinks is essential for consumer health. However, regulatory guidelines for mycotoxins in plant-based beverages are currently lacking in the European Union. This study aimed to develop and validate an analytical method to assess the occurrence of 22 mycotoxins in plant-based beverages marketed in Latvia and Lithuania, thereby providing data on contamination prevalence and exposure risk.

Materials and Methods

Seventy-two commercially available plant-based beverages, including oat, nut, rice, and soy-based drinks, were collected from retail stores. Mycotoxin extraction was conducted using QuEChERS methodology, followed by analysis with ultra-high-performance liquid chromatography coupled with tandem mass spectrometry (UHPLC-MS/MS). Method parameters were optimized for recovery, sensitivity, and specificity in plant-based matrices.

Results

Results showed that 64% of the analyzed samples contained detectable levels of one or more mycotoxins, with deoxynivalenol, beauvericin, and enniatins (A, B, B1) being the most frequently found. Oat and almond-based beverages exhibited the highest levels of contamination. A preliminary exposure assessment indicated that while most mycotoxin levels were within safe limits for Latvian consumers, emerging mycotoxins require further attention.

Conclusions

The findings highlight the need for regulatory guidelines for mycotoxins in plant-based beverages to ensure consumer safety. Although the acute health risks from these beverages are low, the detection of multiple mycotoxins suggests that continuous monitoring and further toxicological studies on emerging mycotoxins are necessary.

Keywords

mycotoxins, plant-based beverages, liquid chromatography, mass spectrometry, exposure assessment, food safety

Pilot Study on Latvian Dietary Data Collection for Risk Assessment: Implementing the Total Diet Study Approach

Oral

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Objectives

This pilot study aims to update national dietary consumption data, focusing on household-level food preparation practices. In addition, it seeks to assess contaminant exposure, including persistent organic pollutants (POPs), heavy metals, and per- and polyfluoroalkyl substances (PFAS), across various food categories, thus contributing to a comprehensive risk assessment framework.

Materials and Methods

The methodology follows established TDS protocols, adapted for the Latvian context. Food consumption and preparation data were collected from 500 participating households, ensuring the inclusion of a broad cross-section of the population. Regularly consumed food items were selected from various retail outlets, and samples were prepared following standard household practices. Pooled samples representing different food groups – such as dairy, grains, meats, fish, fruits, and vegetables – were created to allow for efficient contaminant analysis. Chemical analysis focused on quantifying levels of POPs, heavy metals, and PFAS across these food categories. An exposure assessment model was applied, integrating consumption patterns and contaminant concentrations.

Results

Preliminary results indicate updates in food consumption trends among Latvian households, reflecting both increased variety and changes in preparation methods due to technological advancements. Furthermore, updated contaminant data reveal the presence of POPs, heavy metals, and PFAS across several food categories, with notable variances between product types. Exposure assessments, based on these findings, provide an important endpoint for understanding the health risks associated with current dietary habits.

Conclusions

The pilot study successfully demonstrates the feasibility of implementing the TDS methodology in Latvia. The updated consumption and contaminant data lay the foundation for more accurate risk assessments and contribute to evidence-based decision-making in food safety management. Moving forward, this approach will serve as a crucial tool for monitoring food safety and shaping national policy.

Keywords

Total Diet Study, food consumption, contaminant exposure, POPs, PFAS, heavy metals, risk assessment, Latvia

Quality of Animal and Plant Proteins Fermented with Pediococcus spp. Strains

Oral

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Objectives

The present paper examines the quality of selected animal and plant proteins that undergo fermentation with *Pediococcus acidilactici* LUHS29 and *P. pentosaceus* LUHS183 strains.

Materials and Methods

Whey protein isolate powder, milk protein concentrate powder, and hemp and lupine seed protein powders were used for 24 and 48-hour fermentation. The analyses conducted included pH, mould/yeast count, total bacteria viable count, lactic acid bacteria viable count, color coordinates, free amino acid profile, gamma-aminobutyric acid content, and biogenic amine profile. A Varian ProStar HPLC system (Varian Corp., Palo Alto, California, USA) and Thermo Scientific LCQ Fleet Ion trap mass detector (Thermo Fisher Scientific Inc., Waltham, Massachusetts, USA) were used for chromatographic analysis.

Results

Fermented plant proteins exhibited a greater viability of lactic acid bacteria and a pH decrease compared to animal proteins. All of the samples were free of yeast and mold. While the fermentation enhanced the redness of the whey, hemp, and lupine proteins, it diminished the lightness in the majority of the milk protein samples. All proteins fermented with the LUHS29 strain had higher levels of free essential and non-essential amino acids, and gamma-aminobutyric acid. Fermented animal proteins contained less gamma-aminobutyric acid and total biogenic amine content than plant proteins. The highest average biogenic amine level (215.8 mg/kg) was found in fermented hemp proteins, whereas the lowest value was found in milk proteins that were fermented with LUHS183 for 48 hours.

Conclusions

The advantageous aspect of plant proteins in fermentation is highlighted by this study. A considerable increase in free amino acid and gamma-aminobutyric acid content in proteins can be achieved by fermentation with *P. acidilactici* LUHS29 strain, although particular focus must be paid to the control of biogenic amines production in fermented hemp proteins.

Keywords

fermented protein, *Pediococcus,* whey protein, milk protein, lupine protein, hemp protein, gamma-aminobutyric acid

Spruce sprout and their potential health benefits and toxicity concerns: review

Oral

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1. *LBTU*

Objectives

Spruce sprouts (*Norway Karst L.*) have been known as food for their health benefits. Spruce sprouts are light green and easy to distinguish from the rest of the tree. Harvesting time is only 1-3 weeks a year. This study provides an overview of the spruce sprout health benefits and potential toxicity.

Materials and Methods

For the study databases such as ScienceDirect and Google Scholar search clusters were used, to search for scientific references on the health benefits and possible toxicity of spruce sprouts published between 2004 and 2024, including one in 1993, in total 28 studies were used for this review.

Results

It was found that spruce sprouts can be used to help prevent diseases such as respiratory and cardiovascular diseases and have antibacterial properties. Weak mitochondrial cells can contribute to several different neurological diseases. It has been found that spruce sprouts contain terpenes like α-pinene which has the property to accelerate the repair processes of weak mitochondrial cells. Spruce sprouts also contain flavanoids that have good health benefits, such as chlorophyll that can have detoxing properties. Alkaloids can also be found in spruce sprouts which can be divided into those that are beneficial to health and those that are not. Alkaloid concentrations can vary according to the size of the spruce sprouts. Epidihydropinidine was found to be the most abundant alkaloid, contributing directly to its beneficial properties as an anti-fungal compound which can be used to prevent food spoilage. Regarding toxicity, it was concluded that heavy metals such as arsenic, mercury, cadmium and lead can be found in spruce sprouts which could have negative health implications. But it was also concluded that this can be avoided by harvesting spruce sprouts at least 100 m from roads. Some research article emphasize the importance of hygiene maintenance to avoid *Salmonella* and *Escherichia coli* contamination.

Conclusions

In conclusion despite years of research there is still little knowledge about spruce sprouts, their composition and limited knowledge on uses in food production. Further research on that will be carried out to ensure more knowledge and quality of new products made from spruce sprouts.

Keywords

alkaloids, flavanoids, heavy metals, terpenes, safety

Oral - SUSTAINABLE and FUNCTIONAL FOOD

Biomodified Lupine Wholemeal Protein Isolates as a Source for High-Quality Protein and Applications for Nutraceuticals Preparation

Oral

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Objectives

This study aimed to formulate a nutraceuticals in chewable form using biomodified lupine wholemeal protein isolates as a source of high protein content and grapefruit essential oil (*Citrus paradise*) for beany taste masking in combination with a low-calorie and low-glycemic index sweetener xylitol, and citric acid.

Materials and Methods

Lupine wholemeal (LW) seeds *Lupinus luteus* and *L. angustifolius* varieties, including newly bred in Lithuania hybrid lines were obtained from the Lithuanian Institute of Agriculture (Vilnius, Lithuania). Prior to fermentation with *Latilactobacillus sakei* strain, lupine seeds underwent milled to achieve a consistent particle size (2 mm) by using a laboratory mill (Braun, Germany). For the fermentation were used submerged (SubF) and solid-state (SoF) fermentation conditions. The milled LW were mixed with water and *L. sakei* suspension, and fermented for 48 hours (30±2°C). Final moisture content in the LW was 45% for SoF and 65% for SubF conditions. Non-fermented LW was analysed as a control samples. Following fermentation, proteins were isolated from the LW using an alkaline extraction method. Finally, for the production of nutraceuticals was selected 'Vilniai' lupine variety, and its protein isolates were incorporated into various nutraceutical formulations at different concentrations.

Results

The 'Vilniai' variety of lupine protein, fermented with *L. sakei* (SubF conditions), was selected for nutraceuticals preparing due to its high protein content (≤ 90%). Also, demonstrated the highest protein digestibility (89.94±0.87%), and minimal amounts of antinutritional factors, such as trypsin inhibitor (19.40± 0.48%), compared with other protein isolates. In addition, the combination of xylitol and ascorbic acid enchaced the overall acceptability (108.7±2.9), and texture firmness (0.7 mJ) of the nutraceuticals. The grapefruit essential (GEo) oil effectively masked undesirible beany taste associated with lupine protein, leading to a significant improvement in overall acceptability (93.6 score), while the addition of GEo increased the score to 125.7.

Conclusions

This study demonstrated that fermentation with *L. sakei* strain enhanced the AA profile of LW, increasing most essential and non-essential AA. Overall, the chewable form nutraceutical formulation, comprising lupine protein isolates (≤ 13.0%), xylitol, and GEo (≤ 0.2%), exhibited desirable functional compounds, favorable texture, and high overall acceptability.

Keywords

Lupine; Fermentation; Protein isolates; Amino acids; Protein digestibility; Nutraceuticals.

Development of Sustainable Omega-3 and Carotenoid-rich Supplements from Flaxseed, Sea Buckthorn and Microalgae Extracts

Oral

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Objectives

This study aims to develop sustainable dietary supplements rich in Omega-3 fatty acids (DHA, EPA, ALA) and various bioactive compounds, including carotenoids and phytosterols, to support cardiovascular and metabolic health. Two novel formulations combining flaxseed with sea buckthorn pulp oil and microalgae were evaluated for their potential health benefits.

Materials and Methods

The biomass from flaxseed seeds, sea buckthorn pulp and microalgae was first freeze-dried to preserve its bioactive content. Following this, supercritical CO_2 extraction was used to efficiently extract the bioactive compounds without using harmful solvents. Flaxseed oil was analyzed for its alpha-linolenic acid (ALA), sea buckthorn pulp oil for beta-carotene, tocopherols, Omega-7 and phytosterols, while microalgae extract was evaluated for docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and fucoxanthin.

Results

The flaxseed-sea buckthorn formulation delivered a broad spectrum of Omega-3, Omega-7, carotenoids, tocopherols and phytosterols, which confer potent antioxidant and anti-inflammatory properties. The flaxseed-microalgae formulation provided a comprehensive blend of DHA, EPA, ALA and fucoxanthin, targeting cardiovascular support and metabolic regulation. The supercritical CO_2 extraction method enhanced the bioavailability of these bioactives while adhering to sustainable practices by utilizing a recyclable solvent.

Conclusions

The two supplement formulations — flaxseed-sea buckthorn and flaxseed-microalgae —demonstrate a promising, natural approach to enhancing cardiovascular and metabolic health. These formulations leverage the synergistic effects of Omega-3 fatty acids, carotenoids and phytosterols, aligning with consumer demands for effective and pure health products. The use of CO_2 extraction ensures high-quality, eco-friendly production, making these supplements health-promoting and environmentally sustainable.

Keywords

Flaxseed, Sea Buckthorn, Microalgae, Bioactive compounds, CO_2 extraction, Cardiovascular health, Metabolic regulation

MENU NUTRITION LABELLING

Oral

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1. *University "Dunarea de Jos" Galati*

Objectives

Nutrition Labelling of menus from the catering units, commercials (restaurants, bistro, buffet, events, etc.) and socials (canteens from schools, universities, hospitals, public system) involve particular issues considering the complex structure of culinary items &beverages and the non-standardized nutrients yield in the catering processing routine. The objective of the present research study was to present the science-based guidelines for the good practicing in assessing and declaring the nutrition value of overall menus, culinary items and beverages in order to comply with the Regulation EU No 1169/2011 and the World Health Organization recommendation on Front of the Pack Labelling. The scientific methodology involves the assessment using the harmonization index proposed by the author in order to evaluate the similitude and gaps between DRV and RDI nutrients value from different jurisdictions. The results reveal the difficulties in menus nutrition labelling without clear mandatory information about the primary foods nutrient composition, convenience foods &beverages harmonized nutrition labelling and an easy-to-use application for nutrition declaration. The conclusion is that a specific regulatory policy need to be developed in the near future for the specific topic of catering menus, in the benefit of the final consumer, the legal interest of the catering unit provider to comply with the mandatory national & EU regulations and to facilitate the global harmonization of labelling applied to better nutritional menus.

Keywords

nutrition, catering, menus, harmonization, FOP labelling.

Potential of different horticultural fruit species' seeds and pits in protein extraction

Oral

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Objectives

The study aims to jointly evaluate the perspectivity of defatted fruit seeds and pits in the extraction of technologically functional proteins as part of Latvia University of Life Sciences and Technologies scientific capacity fund project No. Z75.

Materials and Methods

Mixed variety sweet and tart cherry, plum and apricot pits, and apple and Japanese quince seeds, were collected, milled, and defatted using supercritical CO_2 extraction. Protein solubility across a pH range (4 – 11) was determined using the Biuret method. The same process, excluding defatting, was performed on four Japanese quince varieties to account for genetic variation. Japanese quince amino acid composition was analysed according to ISO 13903:2005.

Results

Apple and Japanese quince seed protein solubility increased at pH above 7, while drupe proteins plateaued between 8 and 11. The highest dissolved protein contents were observed in apple, Japanese quince seed and apricot pit flours. Tart cherry and plum pit protein solubility was similar (p = 0.863), while sweet cherry protein solubility differed marginally from tart cherry and plum (p = 0.0916 and 0.003, respectively). pH-dependant protein solubility of different quince variety seeds were similar (p = 0.119). Japanese quince seed flour and CO_2-defatted protein amino acid composition differed slightly and by fractions of a percent. Glutamic acid (28.32 – 30.22%), arginine (10.35 – 11.57%) and aspartic acid (10.30 – 10.64%) were the main components, and essential amino acids constituted 29.09% of total amino acids in the seeds and 27.93% in CO_2-defatted flour protein, with lysine being the limiting amino acid.

Conclusions

Popular fruit crops have varying perspectivity as alternative protein sources. Extraction pH is an important consideration between different fruit crop species, but protein solubility in the supernatant was similar between varieties within species. The essential amino acid proportion in the seeds and protein is similar to other plant proteins and relatively balanced, lysine being the limiting essential amino acid. Additional studies would be needed to evaluate the digestibility, anti-nutritional factors and allergen cross-reactivity of the proteins.

Keywords

pome, drupe, valorization

Sustainable healthy diets and food systems

Oral

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Objectives

Introduction

Food production currently accounts for around 40% of global land use and 30% of all greenhouse gas emissions. There are increased efforts among governments and policymakers to promote production and consumption of more sustainable healthy diets. But what are sustainable healthy diets for Icelanders?

Overview

The EAT-Lancet commission was established to answer the question “Can we feed a future population of 10 billion people a healthy diet within planetary boundaries?”. An important contribution of the EAT-lancet report is its integration of measures of environmental impacts and human health. These two factors are most often considered separately but integration of both must be done if a transition towards sustainable diets is to be achieved

In this context the EAT-Lancet report provided a more holistic approach. The report also goes further and stresses that cultural, regional and economic aspects must be taken into consideration before implementing major changes in both food production and consumption. But how does this look like for an island like Iceland, which depends largely on imports of most foods? In addition, do we eat healthy and sustainably?

During the presentation I will give an overview of the results of the research project *Sustainable Healthy Diets* which brought together experts from different fields of environmental-, economic-, agricultural-, natural- and social sciences to provide new knowledge and platforms that can be used to make informed decisions on how a transition in Iceland towards more sustainable healthy diets and food policies can be implemented.

Conclusions

This interdisciplinary project created data allowing for calculating simultaneous estimations of nutrient intake and the environmental impacts of individual diets from population-based surveys or pre-fixed dietary patterns. The results also show high dependency on international supply chains for domestic food production raising questions on actual food security in Iceland. The project results provide estimates to take environmental sustainability into consideration when setting dietary recommendations and other food and dietary policy goals including expected social and socio-economic impact that would be associated with shifting consumption and production in a direction of more sustainable diets.

Keywords

diets, food systems, sustainability

SUSTAINABLE NUTRITION - IMPLEMENTATION IN A PROFESSIONAL SETTING

Oral

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Objectives

Sustainable nutrition is a key aspect of modern dietetics, requiring a holistic approach that considers ecological, economic, social, and cultural dimensions of food. It emphasizes plant-based, organic, and locally sourced foods, alongside fair trade and minimally processed products. A major focus is reducing meat consumption in favor of plant-based proteins and adopting environmentally conscious eating practices.

The urgency of climate change intensifies the need for sustainable nutrition. Extreme weather events, such as heatwaves, floods, and droughts, already threaten food security and public health. Climate-related health risks, including malnutrition and the spread of diseases, demand dietary recommendations that consider both environmental impacts and evolving nutritional needs. Dietitians play a crucial role in this adaptation process, ensuring that dietary guidelines address health and sustainability in a rapidly changing world.

Implementing sustainable nutrition involves changes at both individual and community levels. Dietitians are essential in driving this shift through several strategies:

Individual Counseling: Providing personalized advice on adopting sustainable diets, such as recommending plant-based proteins, seasonal foods, and reducing food waste.

Group Programs: Leading workshops to educate on sustainable practices, including cooking classes and tips for making eco-friendly food choices.

Institutional Health Promotion: Introducing sustainable catering initiatives in hospitals, schools, and workplaces, such as meat-free days and local, organic menus.

Menu Planning: Collaborating with kitchen staff to design resource-efficient, sustainable menus with seasonal and plant-based options.

Food Waste Reduction: Educating on portion control, creative use of leftovers, and “upcycling” food to minimize waste.

Staff Training: Empowering kitchen teams and health professionals to implement sustainable practices.

Public Awareness Campaigns: Using media to highlight the benefits of sustainable diets and eco-conscious food choices.

Despite challenges like higher costs and cultural resistance, dietitians are pivotal in overcoming barriers to sustainable nutrition. Their expertise bridges the gap between individual health and environmental considerations, helping shape dietary systems that support both global health and planetary sustainability.

Poster - NUTRITION SCIENCE

“Burgerisation” is the initial step towards global changes in the health and behavior of modern man

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Objectives

“Burgerisation” is a new term that has emerged as a result of changes in food culture and food consumption traditions. Food regulation is now becoming an unnecessary burden on the business of food tycoons. Meanwhile, global trade and marketing are encouraging a surplus of high-calorie food choices. Foods high in salt, saturated fat and sugar. Meanwhile, the steadily rising price of fruit and vegetables reduces their daily consumption.
The increasing trade in alcohol, tobacco, sweetened fruit drinks, processed foods and other unhealthy products poses a serious risk to public health and is incompatible with food production and home consumption. This leads to unhealthy habits and a wide range of diseases in the western and developing world.
“Burgerisation” changes people’s habits because of the calorie barrier: it reduces physical activity, forces them to spend long periods of time in front of the TV, causes stress, leads to loneliness, shyness and poor oral health. All these factors form a pathological circle and encourage overeating. The current “Burgerisation” epidemic is a major contributor to global human disease

Materials and Methods

A survey was conducted among students of Kaunas colleges in order to identify food habits and bad habits that can be formed in the consequence of a diet with a high content of carbohydrates. The number of respondents amounted to 150 people, age 19-30 years old.

Results

Most of the respondents have a change in eating habits towards increased calorie intake, suffer from inactivity and experience loneliness.

Conclusions

The change in eating habits is affecting an increasing number of respondents. At the same time, this is due to the easy availability of food products with a high content of carbohydrates. Constant consumption of fast food is a consequence of stress or is the main mechanism for the emergence of pathological habits such as lack of active lifestyle, loneliness, insecurity, smoking, poor oral health and as a consequence of stress, leading to a new snack. which can be considered as a continuous pathological circle.

Keywords

Burgerisation, food, active lifestyle, loneliness.

Baseline comparison of Nutrient Intake in Vegan, Vegetarian, and Omnivorous Children: Results from KOMPAS cohort study of Czech vegan, vegetarian and omnivore families

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Objectives

Plant-based diets are gaining popularity for their perceived health and environmental benefits. However such diets may also present certain dietary risks, particularly for children. Children following vegan or vegetarian diets may be at risk of several nutritional deficiencies. Unfortunately, detailed data on actual nutrient intake of vegan and vegetarian children are currently lacking, especially in non-western countries.

Materials and Methods

Intake of selected nutrients in 24 omnivore, 19 vegetarian, 41 vegan children (1-7years old) was used for cross-sectional comparison using baseline data of KOMPAS study. Prospective 3-days dietary records were analysed using the NUTRIXo nutritional software, based on validated FCDBs (ArcaiSoft, Czech Republic). Anthropometric measurements and reported intake of energy, protein, fat, fiber, vitamin B12, vitamin D, folate, iron, calcium, iodine, zinc and selenium were compared between dietary groups and in the subgroups of younger (1-3years) and older (3-7years) children.

Results

Omnivores had higher intake of lysine (mean difference: 630.4 mg, 95% CI: 328.3–932.4 mg, $p < 0.001$) and methionine (mean difference: 222.8 mg, 95% CI: 123.2–322.4 mg, $p < 0.001$) compared to vegans. Fiber intake (mean difference: 8.2 g, 95% CI: 4.8–11.6 g, $p < 0.001$) and intake of PUFA (mean difference: 3.1 g, 95% CI: 1.7 – 4.5 g, $p < 0.001$) was higher among vegans compared to omnivores. Omnivores had greater intake of vitamin D compared to vegetarians (mean difference: 0.47 ug, 95% CI: 0.1–1 g, p=0.03, but not vegans (mean difference: 0.07 ug, 95% CI: -0.43ug-0.56 ug, p=0.79). Compared to omnivores, vegans had lower intake of selenium (mean difference: 8.2 g, 95% CI: 1.92–10.39g, $p = 0.01$) but higher intake of zinc (mean difference: 1.45 mg, 95% CI: 0.1–2.75 mg, $p = 0.03$). No differences in reportedanthropometrical measurements were indetified.

Conclusions

Several differences in the intake of nutrients between dietary groups were identified. While a vegan diet offers potential health benefits, addressing specific nutritional challenges remains crucial. Findings of KOMPAS study should support the development of culturally appropriate dietary guidelines reflecting the dietary needs of all families.

Keywords

Plant-based diet, Nutritional intake, Children, Vegan, Vegetarian, Omnivore, Nutritional deficiencies

Changes in Nutrition Habits of Lithuanian First-Grade Children

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Objectives

To assess changes of certain dietary habits among first-grade schoolchildren in Lithuania from 2008 to 2023 year.

Materials and Methods

The data from the results of Lithuanian Child Growth Surveillance Study (COSI) conducted according to the protocol and methodology developed by the WHO is presented. Each study round a national representative sample (n = 5800) of first-grade children in all ten counties of Lithuania was selected. A Family Record Form was used to gather information on a voluntary basis on children's dietary intake. In total, 7730 parents were enrolled in the survey (response rate 72.3% (2008) and 57.8% (2023)). The Chi-square test was applied to determine the homogeneity of distributions between study groups, p value of 0.05 indicated a statistically significant difference between years.

Results

The rate of first-grade children having breakfast every day significantly increased (67.7% vs. 70.7%) as well as the proportion of children never consuming breakfast decreased (10.3% vs. 4.4%) statistically significantly ($p < 0.001$). The number of children who never consume porridge has increased by 3 times ($p < 0.001$). Positive changes in consuming vegetables (17.2% vs. 43.5%) and fresh fruits (31.3% vs. 42.7%) were observed in the year 2023 as the rate of children having these products every day has significantly increased ($p < 0.001$). The rates of meat consumption significantly increased in most days (29.8% vs. 43.1%) and everyday (24.6% vs. 33%) groups ($p < 0.001$), but the rates of fish consumption have decreased in most days (9.9% vs. 4.8%) and increased in never consume (9.3% vs. 15.7%) groups ($p < 0.001$). The proportion of children consuming semi-skimmed and whole-fat milk every day has also decreased significantly ($p < 0.001$). Everyday consumption of cheese, yoghurt, curd and other dairy products was higher in 2008 and significantly decreased in 2023 ($p < 0.001$). The decrease in consumption of soft drinks was significantly lower ($p < 0.001$) in never (9.6% vs. 2.9%) and some days (10% vs. 3%) consumption groups in 2023.

Conclusions

Positive and negative changes emerged in the dietary habits of first-graders, indicating that healthy nutrition is still a priority in children's and parents education.

Keywords

first-grade students, dietary habits, changes.

Eating Habits among Overweight, Obese, and Normal Weight First-Grade Lithuanian Children

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Objectives

To compare the eating habits among Lithuanian first-grade children with overweight, obesity, and normal weight.

Materials and Methods

Presented data of Lithuanian first-graders was collected while participating in the sixth round of the WHO European Childhood Obesity Surveillance Initiative (COSI) in 2023. Anthropometric measurements were performed in 94 schools of 10 counties of Lithuania, and 3355 first-graders were measured. The estimated BMI groups were assessed according to the IOTF cut-offs (2012): normal weight n = 2252, overweight n = 441, obesity n = 203. The Family questionnaire was used to evaluate eating behavior among first-grade children. The chi-square test was used to analyze the dependence between two nominal variables. Differences were statistically significant when $p < 0.05$.

Results

Children with obesity ate breakfast daily significantly less frequently, in comparison with normal weight children (46.2% vs. 60.6%, $p < 0.001$). A higher daily consumption of fruits and vegetables was significantly more common (respectively $p = 0.028$ & $p = 0.005$) in children with normal weight (respectively 43.0% and 44.5%,) than children with overweight (respectively 40.1% and 38.7%) and obesity (respectively 35.7% and 37.2%). The proportion of children eating porridge for more than 4 days per week was significantly lower ($p = 0.0007$) in the group of children living with obesity (16.9%) and overweight (15.1%), compared to children with normal weight (21.8%). The frequent consumption of sweet snacks was significantly more common ($p = 0.019$) in children with normal weight (34.5%) than children with overweight (31.8%) and obesity (25.1%). There were no significant differences in meat, fish, eggs, 100% fruit juice, soft drinks (with and without sugar), savory snacks, and most dairy products consumption among different children's BMI groups.

Conclusions

The study demonstrates that Lithuanian first-grade children with overweight and obesity have less healthy eating habits compared to those with normal weight. These children tend to consume more unhealthy food choices, which may contribute to their weight status. While general dietary habits differ, certain food categories are consistently consumed across all BMI groups.

Keywords

children, overweight, obesity, normal weight, eating behavior

Effects of Probiotics and Prebiotics on Sleep Quality: a Systematic Review

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Objectives

Hypothesis: The use of specific probiotic strains and prebiotics improves sleep quality in the adult population with and without sleep disorders.

Aim of the study: To investigate whether specific probiotic strains and prebiotics provide benefits in relation to improved sleep quality in the population of adults with and without sleep disorders.

Materials and Methods

Systematic review. Data were searched in 5 databases – PubMed, EBSCO, Wiley Online Library, Cochrane Library, ProQuest. Randomised controlled trials from 2018 to 2023 were included.

Results

Three studies showed improvements in at least one of the sleep quality criteria. *Bifidobacterium breve* strain CCFM1025 at 10^9 CFU showed a statistically significant reduction in PSQI score ($p = 0.0419$), subjective sleep quality score ($p = 0.0435$) and sleep disturbance ($p = 0.0032$) in individuals with insomnia. The intervention with yeast mannan tablets and *Bifidobacterium longum* strain NCC3001 at 10^{10} CFU improved certain outcomes in people without sleep disorders.

Intervention with *Lactiplantibacillus plantarum* strain HEAL9 at 10^{10} CFU, prebiotics fructooligosaccharide (FOS) and galactooligosaccharide (GOS), and *Lacticaseibacillus paracasei* strain Lpc-37 at $1.75x10^{10}$ CFU showed no statistically significant difference between the intervention and placebo groups.

Conclusions

The research hypothesis is confirmed. Sleep quality may be improved by probiotic strains *Bifidobacterium breve* CCFM1025 at 10^9 CFU (improves PSQI score, subjective sleep quality and reduces sleep disturbance (awakening during sleep) in people with insomnia), *Bifidobacterium longum* NCC3001 at 10^{10} CFU (improves subjective sleep quality in healthy individuals) and prebiotic yeast mannan (reduces N3 latency in healthy individuals). Probiotics have a more pronounced effect on improving sleep quality in individuals experiencing elevated stress levels compared to those with lower stress levels. Therefore, probiotic supplementation could be a useful strategy for improving sleep quality during periods of increased stress.

Further research is needed on the effects of various prebiotics and probiotic strains on sleep quality, including larger sample sizes, more participants with sleep disorders, and the use of polysomnography as the standard assessment. Future studies should also analyse participants' dietary intake and educate them on probiotic and prebiotic sources before the intervention.

Keywords

Probiotics, prebiotics, gut microbiome, gut microbiota, sleep quality.

Fatty acid status in Latvian pediatric PKU patients

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Objectives

Phenylketonuria (PKU) is the most common inborn error of amino acid metabolism. PKU is caused by enzyme phenylalanine hydroxylase (PAH) deficiency that converts phenylalanine (Phe) into tyrosine. High Phe concentration is neurotoxic and causes severe mental retardation, if is left untreated. The main PKU treatment method is a strict low phenylalanine diet with supplementation of Phe-free L-amino acid formula. PKU patients have a risk of inadequate intake of essential fatty acid (EFA) than healthy population due to low Phe diet.

Materials and Methods

The study was performed at the Latvian Rare Disease Coordination Centre, Children's Clinical University Hospital, Riga, Latvia during 2019–2020. All paediatric patients with PKU were asked to have blood tests to analyze FA status in erythrocytes. Gas chromatography technology was used for FA analysis. Parametric variables were compared using Mann-Whitney test and results were expressed as median ± standard deviation. Comparison of categorical variables were analyzed using the Fisher's test. A p- value <0,05 was considered significant.

Results

Data of 44 patients with PKU and 44 CG respondents was analysed. The mean age of PKU patients 7.8 ± 4.9 years of age and of healthy controls mean age 8.3 ± 5.1 years of age. In PKU group there were 20 female patients and 24 male patients included, and the age and sex matched control group. There was observed deficiency of oleic acid, trans-palmitoleic acid, alpha-linoleic acid, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), total omega-3 levels and increased levels of elaidic acid and arachidonic acid were observed in PKU patients. Transpalmitolic acid significantly was low in PKU patients – 0,06 ± 0,03%, compared to 0,12± 0,03% in healthy controls (p<0,0001). Eicosatrienoic acid was significantly higher in the control group than in PKU patients. Elaidic acid was higher in PKU patients than in CG.

Conclusions

A deficiency of EFA as EPA, DHA and total omega-3 were observed in Latvian PKU paediatric patients. PKU patients need to receive supplementation of EFA like EPA and DHA. More research is needed to see how supplementation with omega-3 will impact FA profile in PKU patients.

Keywords

phenylketonuria, fatty acids, nutrients deficiency, diet

Home Enteral Nutrition: Epidemiological Monitoring and Analysis in Latvia.

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Objectives

To systematically record and analyze patients receiving home enteral nutrition under the National Health Service in Latvia. This includes compiling demographic data, identifying the most common primary diagnoses and indications for home enteral nutrition, and examining patient service status. Additionally, the objective is to determine the regional distribution of home enteral nutrition across Latvia's administrative territories and to assess its incidence in 2023.

Materials and Methods

This is a quantitative, cross-sectional, descriptive study involving 342 patients who first received home enteral nutrition between June 1 and December 31, 2023. Patient data were collected from a register established by the author, supplemented by information obtained through telephone interviews regarding patient service status. The data were compiled and analyzed using *Microsoft Excel* and *IBM SPSS version 29.0*.

Results

Results: The median age of the patients was 71 years (IQR 52.0–81.0), with the largest proportion (26.9%, n = 92) falling within the 70–79 age group. The most prevalent primary diagnoses were circulatory diseases (46.9%, n = 106) and tumors (38.5%, n = 87). Dysphagia was the most common condition leading to the use of home enteral nutrition, accounting for 62.1% (n = 275) of cases. The proportion of patients who continued to receive home enteral nutrition (38%, n = 130) was nearly equal to those who had died (27.7%, n = 129). The Riga region had the highest supply of home enteral nutrition, representing 40.6% (n = 139) of patients. The incidence of home enteral nutrition in Latvia in 2023 was 16.7 patients per 100,000 inhabitants.

Conclusions

Home enteral nutrition was most commonly provided to patients with circulatory system diseases and tumors, though the leading diagnosis prompting its use was dysphagia. The status of patient service showed that the proportion of patients continuing home enteral nutrition was equivalent to those who had died, with a smaller number resuming oral intake. Riga had the highest concentration of home enteral nutrition services, but the distribution across Latvia was uneven. In 2023, the incidence of home enteral nutrition in Latvia was 16.7 patients per 100,000 inhabitants.

Keywords

Home enteral nutrition, home artificial nutrition, incidence.

The connection between sleep disturbances, stress, anxiety, depression, and eating disorders among nurses working day and 24-hour shifts

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Objectives

24-hour shift work has a significant impact on the health and performance of medical personnel, including sleep quality, stress, anxiety and depression rates, and eating patterns. The aim of the research was to assess the relationship between sleep disorders, stress, anxiety, depression and eating disorders of nurses working day and 24-hour shifts.

Materials and Methods

Participants: 24-hour (n=38) and day (n=34) shift nurses working in X and Y hospitals in age groups from 18 to 24 years to 55 to 65 years (Research permit N^{o} 2-PĒK-4/734/2023, Research Ethics Committee, Riga Stradins University). Research instruments: Eating Disorder Examination Questionnaire (EDE-Q 6.0), Pitsburgh Sleep Quality Index (PSQI) and Depression Anxiety Stress Scales (DASS-42). Data processing: IBM SPSS Statistics v29.0.0.0; non-parametric tests, median and I-III quartile, Mann-Whitney u-test (U value), Pearson Chi-square test, P value ($p \leq 0.05$), Cronbach's alpha, Spearman's correlation coefficient (r).

Results

The type of work shift did not have a significant effect on eating disorders ($p > 0.05$). Medications to fall asleep were used significantly more by nurses working 24-hour shifts than nurses working day shifts, 15.8% and 2.9%, respectively ($p = 0.045$). A significantly better sleep quality (PSQI) for nurses working day shifts ($p = 0.031$) was found. In general, 38.2% day shift and only 15.8% 24-hour shift nurses had good sleep quality, while 61.8% and 84.2% had poor sleep quality, respectively. A medium, positive and statistically significant correlation ($r = 0.377$, $p = 0.028$) between eating restrictions and sleep duration for nurses working day shifts was found. A medium, positive and statistically significant correlation ($r = 0.355$, $p = 0.029$) between eating restrictions and sleep latency in nurses working 24-hour shifts was established. The levels of stress (>58.8%), anxiety (>58.8%) and depression (>61.8%) of the majority of nurses working day and 24-hour shifts were within normal limits. No statistically significant relationship between eating disorders and stress, anxiety and depression was observed in all nurses ($p > 0.05$).

Conclusions

The hypothesis that there is a statistically insignificant relationship between eating disorders and sleep disorders, stress, anxiety and depression for nurses working day shifts, but a positive, statistically significant relationship for nurses working 24-hour shifts was partially proven.

Keywords

sleep quality, eating disorders, nurses

Vitamin B12 Status and Dietary Intake in Vegan, Vegetarian, and Omnivorous Children: Results from KOMPAS cohort study of Czech vegan, vegetarian and omnivore families.

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Objectives

The study of vitamin B12 status in children following a plant-based diets is crucial due to the rising popularity of these diets and their potential nutritional implications. B12 deficiencies can result in serious health issues, particularly in growing children. This study investigates their susceptibility for vitamin B12 deficiency and provides valuable insights into the nutritional adequacy of different diets.

Materials and Methods

Biomarkers of vitamin B12 status and dietary intakes of related vitamins of 24 omnivores, 19 vegetarians, and 41 vegans (1-7 yeard old) were cross-sectionally examined using baseline data of KOMPAS study. Anthropometric measurements, blood levels of total vitamin B12, holotranscobalamin, methylmalonic acid, homocysteine and folate together with dietary intake of vitamin B12 and folic acid were compared between dietary groups and in the subgroups of younger (1-3 y.) and older (3-7 y.) children. A 3-day weighted dietary record method was used to evaluate the dietary intake using NUTRIXo nutritional software.

Results

Vegan children had significantly higher blood levels of B12 (mean difference (MD): 342.46 pmol/l, 95% CI: 140.78–544.14 pmol/l, $p<0.001$) and lower levels of homocysteine (MD: 1.53 µmol/l, 95% CI: 0.38–2.68 µmol/l, $p=0.001$). Folate levels were higher in both vegan (MD: 4.27 nmol/l, 95% CI: 1.88–6.67 nmol/l, $p<0.001$) and vegetarian (MD: 3.67 nmol/l, 95% CI: 1.24–6.1 nmol/l, $p<0.001$) compared to omnivores. Dietary intake (without supplementation) of vit. B12 was significantly higher in omnivores compared to vegetarians (MD: 0.58 µg, 95% CI: 0.19–0.97 µg, $p<0.001$) but not vegans. Compared to omnivores, vegan children had higher intakes of folates (MD: 64.76 µg, 95% CI: 19.99–109.53 µg, $p=0.001$). The groups differed significantly in supplementation habits of B12; a high proportion of vegans and vegetarians supplemented B12; omnivores did not supplement B12 at all. There were no differences in anthropometric measurements.

Conclusions

Adhering to a vegan or vegetarian diet did not show an increased risk of vitamin B12 deficiency, due to the common use of fortified foods and supplements. The results of KOMPAS study highlight the critical role of supplementation and the intake of fortified foods in ensuring adequate B12 levels among vegan and vegetarian children.

Keywords

Plant-based, Vitamin B12, Nutritional intake, Vegan, Vegetarian, Omnivore, Nutritional deficiency

Poster - NUTRITION and PREVENTION OF CHRONIC DISEASES

Comparative Analysis of Gastric Microbiota in Autoimmune Atrophic Gastritis: Implications for Autoimmune Disorders and Gastric Neuroendocrine Tumor Development

Poster

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Objectives

The prevalence of different autoimmune disorders (AID) constantly increases. Autoimmune atrophic gastritis (AAG) is an organ-specific autoimmune disease that is primarily asymptomatic in the early stages, and often the cause of these AAG cases is unclear. AAG exhibits vague clinical manifestations and is accompanied by the development of other AID and nutritional malabsorption. It has been proposed that gastric microbiota may have an essential impact on immunological processes within the gastric tissues. However, the changes in gastric microbial communities during AAG development and their potential impact on further AAG and gastric neuroendocrine tumor (GNET) development are still largely understudied.

The objective of this study was to examine the compositions of the gastric microbiome in gastric fluid samples obtained from patients with AAG, GNET and healthy controls, and to outline the key changes in microbial communities linked to these conditions.

Materials and Methods

A total of 25 participants were included, comprising 9 AAG patients, 9 GNET patients and 7 control patients. Patients underwent endoscopy during which gastric fluid was collected. Bacterial DNA was extracted from gastric fluid samples using the Qiagen PowerFecal ProKit. Sequencing was performed on an Illumina MiSeq platform.

Results

The study assessed microbial diversity and relative abundances across different groups, including AAG, NET and controls. Notable genera identified included Streptococcus, Rothia, Helicobacter, Actinomyces, Veillonella and Prevotella. Statistically significant changes were observed in four genera in the AAG group and six genera in the NET group compared to controls. The genus Rothia showed the highest increase in both groups, while the genera Gemella and Haemophilus experienced the largest decreases. The NET group was found to be the most heterogeneous.

Conclusions

In our data we observed that the number of identified species was the same across the study groups, however significant changes could be observed in the evenness metric of the identified species. Moreover, differential abundance testing showed that in both AAG and GNETs group, Rothia genus had the highest increased abundance compared to healthy controls. While genera Gemella (in GNET group) and Haemophilus (in AAG group) had the highest reduction in abundance compared to controls.

Funding:lzp-2022/1-0102

Keywords

Autoimmune disorders, Autoimmune atrophic gastritis, Gastric microbiota.

Effect of Curcumin Supplementation and Resistance Training on Lipid Profiles and Markers of Liver Inflammation in Obese Men and Women

Poster

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1. *Riga Stradins university*

Objectives

Obesity is a chronic pathological condition with a mortality rate, and it is a risk factor for type 2 diabetes, lipid disorders, cardiovascular diseases, and high blood pressure. The measured adult obesity rate in Latvia has increased by 24 % or almost a quarter of all Latvian adults. On the other hand, herbal therapy, such as Curcumin, a yellow pigment derived from Curcuma longa L. (turmeric), has been widely used to prevent many diseases. The **research aims** to evaluate the individual and combined effects of 12 weeks of curcumin supplementation and resistance training on lipid profiles (LDL-C, HDL-C, TG) and markers of liver inflammation (ALP, AST, ALT) in obese men and women.

Materials and Methods

The study will involve **64 obese subjects** (BMI ≥ 30, no history of illness, no allergy to curcumin, male and female) from Latvia who are 20-30 years old. The study will employ a randomized controlled trial design (RCT) of four groups for both genders: the curcumin group, resistance training, resistance training with curcumin, and the control group.

Curcumin Supplementation. Participants will receive a daily dosage of 1,000 mg/day—curcumin capsules.

The r*esistance training program* consists of 12 weeks, three weekly sessions, and 48 to 72 hours of recovery between sessions. Each training session will be followed by exercises (3 sets of 8-20 repetitions at 40-85% of 1-RM.) that target major muscle groups. The intensity of the exercises will be based on each participant's one-repetition maximum (1-RM).

Blood sampling will be collected from participants' forearm veins in a fasting state before the intervention, at the end of the third week, at the end of the sixth week, and after the 12-week program. Standard enzymatic assays will analyze samples for lipid profiles (LDL-C, HDL-C, TG) and liver inflammation markers (ALP, AST, ALT).

Results

The **Paired t-tests** and **ANOVA** will compare pre and post-intervention and the differences in physiological measures among the four groups.

Conclusions

The study will start in 2025. Once data is collected, rigorous statistical analysis will be performed.

Keywords

Curcumin, resistance training, obesity, lipid profiles, markers of liver inflammation

Nutrition interventions for the treatment of myalgic encephalomyelitis/chronic fatigue syndrome: a scoping review

Poster

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Objectives

The prevalence and impact of chronic diseases are rising globally, with projections from the WHO indicating that, if current trends persist, chronic diseases will account for approximately 86% of annual deaths by 2050. Concurrently, conditions with complex etiologies and varied clinical manifestations, such as myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), are also increasing in incidence. ME/CFS presents challenges due to the limitations in diagnostic accuracy and effective pharmacological treatments, suggesting a need for multidisciplinary approaches, including complementary therapies like nutritional interventions. Thus, this study aims to synthesize recent literature on the outcomes of nutrition-based interventions for ME/CFS management.

Materials and Methods

A scoping review was chosen as the most suitable approach. Preliminary research indicated a systematic review conducted by Griffith University (Australia) in 2017, which assessed dietary and nutritional therapies for ME/CFS, covering studies from 1994 to 2016. Consequently, this review extends the search to Medline, Scopus, and Web of Science databases from 2017 to mid-2024 to further examine emerging trends.

Results

The 2017 review included 17 studies, with seven reporting improvements in fatigue with various nutritional supplements, including nicotinamide adenine dinucleotide hydride (NADH), probiotics, high cocoa polyphenol rich chocolate, and a combination of NADH and coenzyme Q10. Subsequent years saw more focused reviews: a 2018 probiotic review found insufficient evidence for their effectiveness in ME/CFS, and a 2019 review on nutrient deficiencies (e.g., vitamin C, vitamin B complex, sodium, magnesium, zinc, folic acid, L-carnitine, L-tryptophan, essential fatty acids, and coenzyme Q10) highlighted these as potentially influential in ME/CFS symptomatology. A 2021 review on mitochondria-targeting nutraceuticals revealed insufficient evidence of the effectiveness in ME/CFS patients. Recent individual studies have investigated coenzyme Q10, prebiotic effects of cocoa, and herbal extracts (e.g., Cervus elaphus Linnaeus, Angelica gigas Nakai, Astragalus Bunge, and botanical products with Cistanche and Ginkgo).

Conclusions

While nutritional interventions in ME/CFS have a documented research history, reviews indicate gaps in evidence-based guidance. Therefore, well-designed studies are needed to ensure robust, evidence-based nutrition research, enabling practical applications in ME/CFS management.

The study was carried out in the framework of Project No. lzp-2024/1-0343.

Keywords

myalgic encephalomyelitis/chronic fatigue syndrome, nutrition intervention, scoping review

The Impact of Selenium Supplementation on Serum Selenium Levels and Immune Modulation in Patients with Euthyroid Hashimoto's Thyroiditis: Preliminary Results from a Six-Month Trial

Poster

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Objectives

Several studies have proposed that the autoimmune response in Hashimoto's thyroiditis (HT) is linked to activation of Th1, Th17, Treg cells and associated cytokines, while selenium has been studied for potential immunoregulatory properties. This study furthers the knowledge on the interdependent relationships between autoimmune thyroiditis and selenium.

Materials and Methods

All together 31 patients with euthyroid HT were included in the trial, receiving supplementation with 200 µg selenium enriched yeast (BioSelenium®, PharmaNord) for the period of six months. Points of interest included such markers as mean serum selenium concentration and median levels of Th17 and Treg associated cytokines, taken at the baseline and trimonthly follow ups. All patients completed 2nd follow up at the three-month mark, while 11 patients completed the study period of six months.

Results

From 31 participants included the mean age was 38,5 (min 22, max 64, SD 12,195). Selenium levels at the baseline varied from inadequate to above the normal range with mean number of 98,9 µg/L (min 56,7; max 164,5; SD 33,5). Data analysis, using paired sample T test, showed statistically significant difference between mean serum selenium concentrations at the baseline and after three months of supplementation, demonstrating selenium level increase on average by 34.7 µg/L, reaching 136.3 µg/L ($t(30)= -4,132$; $p<0.001$). There were no statistically significant changes in cytokine levels after three months of supplementation, but preliminary data suggests that six months of selenium supplementation can lower IFN-γ and IL-17a levels in patients with HT (related-samples Wilcoxon test p values 0.005 and 0.023, respectively).

Conclusions

The preliminary results suggest the importance of baseline selenium levels, supplementation dosage as well as intervention duration. As in previous studies done in Latvian population, this trial similarly demonstrated suboptimal mean selenium levels at baseline. Supplementation with 200 µg of selenium elevated serum selenium concentrations beyond the recommended range, though without reaching toxic levels, potentially achieving selenoprotein saturation. Our findings indicate that cytokine levels decrease only after six months of treatment, suggesting that the current three-month therapeutic period commonly used in clinical practice may be inadequate for effectively modulating the progression of autoimmune thyroid disease.

Keywords

Selenium, Hashimoto's thyroiditis, cytokines, thyroid disease, autoimmune process.

Poster - FOOD QUALITY and SAFETY

Antimicrobial Characteristics and the Development of Bioactive Protein-Derived Compounds in Fermented Spirulina

Poster

Ms. Ernesta Tolpežnikaitė [1], ***Prof. Vadims Bartkevics*** [2], ***Dr. Anna Skrastina*** [2], ***Dr. Romans Pavļenko*** [2], ***Prof. Modestas Ružauskas*** [3], ***Dr. Vytautė Starkutė*** [4], ***Dr. Dovilė Klupšaitė*** [5], ***Dr. Romas Ruibys*** [6], ***Prof. Elena Bartkienė*** [4]

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Objectives

This study aimed to examine the alterations in bioactive compounds—specifically L-glutamic acid (L-Glu), gamma-aminobutyric acid (GABA), and biogenic amines (BAs)—as well as the antimicrobial properties resulting from various fermentation processes using *lactobacilli* strains on Spirulina biomass.

Materials and Methods

Lyophilized Spirulina (*Arthrospira platensis*) powder (Now Foods Company, Illinois, USA) underwent fermentation under two conditions: submerged fermentation (SMF) and solid-state fermentation (SSF), using various lactic acid bacteria (LAB) strains (*Lacticaseibacillus paracasei* No. 244; *Levilactobacillus brevis* No. 173; *Leuconostoc mesenteroides* No. 225; *Liquorilactobacillus uvarum* No. 245). In the SMF process, Spirulina was combined with sterilized water at a 1:20 w/w ratio, while in the SSF process, the ratio was adjusted to 1:2 w/w. The antimicrobial activity of the Spirulina samples—with the lowest concentrations of BAs and the highest levels of GABA—was assessed against a range of pathogens, including *Staphylococcus aureus, Escherichia coli, Acinetobacter baumannii, Staphylococcus haemolyticus, Salmonella enterica, Bacillus cereus, Proteus mirabilis, Klebsiella pneumoniae, Enterococcus faecium*, and *Pseudomonas aeruginosa*.

Results

The highest levels of L-Glu (3841 mg/kg) and GABA (2396 mg/kg) were detected after 48 hours of SSF with the No. 173 and No. 244 strains, respectively. The choice of LAB strain, fermentation conditions, and the interactions among these factors significantly influenced GABA concentration in Spirulina ($p \leq 0.001$, $p = 0.019$, and $p = 0.011$, respectively). Notably, SSF resulted in a higher total BA content compared to SMF. Most fermented Spirulina demonstrated remarkable antimicrobial activity against *Staphylococcus aureus*. When comparing the diameters of inhibition zones (DIZs) between SMF and SSF samples, SSF consistently exhibited greater antimicrobial efficacy. The LAB strain employed in fermentation, along with interactions among LAB × fermentation duration, fermentation duration × SMF-SSF, and LAB × fermentation duration × SMF-SSF, significantly affected the DIZs observed against *S. aureus* ($p \leq 0.05$).

Conclusions

This study demonstrated that while fermentation leads to the production of beneficial compounds, it may also result in the formation of undesirable substances that need to be monitored in the final products.

Keywords

Macroalgae; lactic acid bacteria; gamma-aminobutyric acid; biogenic amines; antimicrobial activity.

CHARACTERIZATION OF APPLE AND BERRY VINEGARS OF BALTIC REGION

Poster

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Objectives

Naturally fermented vinegars derived from various berries of the Baltic region were analyzed to investigate their physicochemical and microbiological properties. While apple cider vinegar is globally recognized for its health benefits and widespread fermentation, there are also a variety of fruit and berry vinegars produced worldwide. The region boasts a diverse range of wild and cultivated berries, such as cranberries, lingonberries, elderberries, currants etc, which are commonly consumed fresh or in the form of jams and juices. The objective of this study was to compare commercially available apple cider vinegars with locally produced berry vinegars.

Materials and Methods

Three conventionally available apple cider vinegars and eight vinegars locally produced from a variety of fruits and berries, including different currants, gooseberries, Japanese quince, nettle, and tomatoes were studied. Total phenol content (TPC), DPPH antiradical activity, titratable acidity (TA), pH, total soluble solids (TSS), total plate count, yeasts and moulds, lactic acid bacteria (LAB) were determined.

Results

Overall the highest TPC was for naturally fermented Japanese quince and black currant vinegars 355.61 ± 9.33 mg GAE 100 ml □¹ and 243.43 ± 5.73 mg GAE 100 ml □¹, accordingly. TPC in apple cider vinegars ranged from 35.30 ± 5.37 to 46.79 ± 2.19 mg GAE 100 ml □¹. A similar trend was found in determining antiradical activity by DPPH. Titratable acidity in conventionally available apple cider and black currant vinegar was 1.1 g 100 g □¹ and pH was 2.9. In other berry vinegars TA ranged from 0.6 – 0.9 g 100 g □¹ and pH 3.7. pH in red currant vinegar was 2.8, and in Japanese quince 2.7. The highest TSS was in gooseberry vinegar 14.8 Brix°, black currant 7.2 Brix°, in apple vinegars it ranged from 3.7 – 4.5 Brix°.

Apple cider vinegar contains approximately twice the concentration of LAB, compared to berry vinegars, but they still do not meet the minimum viable cell count required to be classified as a probiotic condiment.

Conclusions

The findings suggest that berry vinegars could be a valuable alternative to apple cider vinegar.

Project Nr. 5.2.1.1.i.0/2/24/I/CFLA/002/ Grant Nr.3.2.-10/191

Keywords

fermenting, acid, Northern berries, currant, Japanese quince

Comparison of the nutritional value of muesli products available in Latvia

Poster

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1. *LBTU,* ***2.*** *Latvia University of Life Sciences and Technologies*

Objectives

The aim of this research was to analyze the variety and nutritional value of muesli commercially available in Latvia and determine whether the indications on the product label comply with the principles of a balanced diet.

Materials and Methods

A total of 15 samples of cereal muesli (n=8) and muesli bars (n=7) from Latvian supermarkets were selected and their labels were analyzed to establish whether manufacturers pay attention to product nutritional content. All types of muesli will be compared to the Recommended Daily Allowance of nutrients for adults.

Results

Six of the investigated muesli products (n=15) had a very high sugar content (>29 g 100 g-1) and most of the muesli products (n=14) contained added sugars in the form of sucrose, glucose or honey. Only one muesli product did not contain any added sugar and could be labeled 'contains naturally occurring sugars'; none of the products comply with nutrient claim 'low sugar' (>5 g 100 g-1).

Salt content in eight muesli products was higher than 0,25 g 100 g-1, indicating an average-high salt content in the products according to the recommendations of the Health Ministry of Latvia; 'low sodium/salt' claim could be applied to seven muesli products (salt >0.3 g 100 g-1).

The analysis of dietary fiber content in muesli products showed that six samples were 'high fiber' products (>6 g 100 g-1) and four samples could be labeled 'source of fiber' (>3 g 100 g-1). The main ingredients in muesli products are cereals (wholegrain oat, barley wheat and buckwheat) which are rich in dietary fiber.

Conclusions

Muesli products available in Latvia only partially comply with the principles of a balanced diet. A large proportion of muesli and muesli bars contain high levels of added sugars and saturated fats, therefore not providing the population with products of high nutritional value. Most muesli products indicate an average-to- high salt content on the label.

Based on the results of the research, a new muesli with high fiber and polyunsaturated fatty acid content, low added sugar and salt will be developed which could potentially help lower LDL cholesterol levels.

Keywords

Muesli variety, nutritional value, recommended daily allowance.

Effect of berry washing on bacterial contamination

Poster

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Objectives

The study aims to find out whether there is a correlation between bacterial contamination in berries and different washing methods, and to ascertain respondents' knowledge of bacterial contamination in berries and berry washing.

Materials and Methods

Quantitative experimental cross-sectional study. The microbiological study was carried out in the laboratory of the Institute for Food Safety, Animal Health and Environment "BIOR", where the difference in bacterial, yeast and mold counts between washed and unwashed blueberries was calculated. A questionnaire was carried out to find out whether consumers are aware of bacterial contamination in berries and whether and how berries are washed before eating. Non-parametric methods were used to analyze results depending on the distribution of the data, cross-tables were analyzed using the *Pearson Chi-Square* test.

Results

Blueberries washed three times for 30 seconds, in a sterile bowl proved to be the most effective washing method, with a 95.9% reduction in colony forming units compared to unwashed berries. The study included 1217 participants aged 18-65 years (males n= 361 and females n= 856). More than half of the participants did not wash berries before eating 55.2% (n=672), while 88.6% (n=1078) did not process frozen berries before eating. As reasons for not washing berries before consumption, 44.5% (n=542) of the participants mentioned that the berries are already clean and do not need to be washed. 71.2% (n=866) of the participants are not aware of microbiological contamination in berries.

Conclusions

The study hypothesis that whether berries are processed before eating increases with the level of education of respondents was confirmed. Respondents are not aware of bacterial contamination in berries and most do not process them before eating. There are different perceptions among consumers, including that berries are already clean, safe to eat unwashed, too fragile or picked in the garden/forest, which serve as arguments for not washing the berries.

Keywords

Nutritional value of berries, sources of bacterial contamination, berry washing methods, microorganisms in berries.

Effect of biodegradable packaging on the quality of dairy products

Poster

Prof. Sandra Muizniece-Brasava [1], ***Ms. Renate Ruska*** [1], ***Dr. Sanita Sazonova*** [1], ***Dr. Sergii Verbytskyi*** [2], ***Dr. Antonina Minorova*** [2], ***Dr. Asnate Ķirse-Ozoliņa*** [1]

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Objectives

Nowadays, as the amount of packaging is increasing, the optimization of food packaging is still an urgent issue. One of the solutions is the use of biodegradable packaging.

Therefore, the aim of the work was to determine whether it is possible to ensure equivalent preservation of product quality during storage by substituting traditionally used packaging with biodegradable packaging in dairy products.

Materials and Methods

Research object – dairy products in packages selected by the manufacturers: 2% milk in LDPE pillow-shaped 1 liter package; 20% sour cream in LDPE 400 g pillow-shaped package; 3% natural yogurt in 400 g polypropylene cup; semi-hard cheese in a multi-layer vacuum cushion-shaped PE/PA 250 g package; 9% cottage cheese in a multi-layer thermoformed 275 g package; 82% butter in a 170 g composite material with a dominant metallized layer.

Three conventionally available biodegradable packaging types were tested: PLA coated with silicon oxide layer (sample #2), PLA containers (sample #3) and PLA film (sample #4).

Results

The best microbiological indicators close to milk control sample (3.61 log CFU g^{-1}) were shown by sample #2 (4.1240 log CFU g^{-1}), while samples #3 (4.993 log CFU g^{-1}) and #4 (4.193 log CFU g^{-1}) showed significant differences ($p<0.05$) in total plate count (TPC).

For cheese samples, sample #3 and #4 showed higher TPC; for curd, cream and yogurt samples #3 and #4 showed higher TPC indicators, but they did not show significant differences among themselves ($p>0.05$). Lactic acid bacteria count was higher in curd samples #3 (4.988 log CFU g^{-1}) and #4 (4.800 log CFU g^{-1}), but no significant differences were shown among the samples ($p>0.05$).

Larger moisture losses were observed for samples #3 and #4 compared to the other packages.

Conclusions

PLA packaging covered with silicon film (sample #2) was recognized as the most suitable biodegradable packaging alternative for all products, while packaging samples #3 and #4 performed worse.

Acknowledgments. This study was supported by Project: LV_UA/2023/10 (LBTU reg. No. 3.2.-10/55) Ukrainian-Latvian Joint Programme of Scientific and Technological Cooperation Project “Enhanced use of environment friendly biodegradable packages for dairy products (BIOPACK Dairy)”.

Keywords

Dairy products, biodegradable packaging, quality

Poster - SUSTAINABLE and FUNCTIONAL FOOD

A study on high protein beverages for patients with psychiatric disorders

Poster

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1. *LBTU*

Objectives

To create a beverage with a high protein and beneficial fatty acid profile, which would apply to the diet of patients with psychiatric disorders.

Materials and Methods

Organic pea protein isolate - PPI (Netherlands) with protein content 81.3 g 100^{-1} of the product; apple juice (Latvia); cedar nut - CNP, walnut - WNP, hemp powder - HP (Latvia). The amino acid content of the PPI was evaluated using HPLC-MS. The fatty acid profile of CNP, WNP, and HP was determined by gas chromatography. The nutritional value was calculated by the European Food Labeling Regulation No. 1169/2011. Composition of beverages: 20 g of PPI, 10 g of CNP or WNP or HP, 130 g of apple juice, 40 g of water. Three beverages were analyzed: PPI+CNP, PPI+WNP, PPI+HP.

Results

The amino acid content of PPI was 67.35 g 100 g^{-1} of DM with distribution of essential and unessential amino acids – 41.27% and 58.73%, respectively. The fat content of CNP was 8.98 g 100 g^{-1} of product with the distribution of SFA, MUFA, and PUFA – 13.87%, 31.05%, and 55.08%, respectively; WNP – 5.36±0.24 g 100 g^{-1} of product with distribution of SFA, MUFA, and PUFA – 17.63%, 18.69%, and 63.68%; HP – 7.77±0.45 g 100 g^{-1} of product with distribution of SFA, MUFA, and PUFA – 18.32%, 12.66%, and 69.01%. Nutritional value of beverages per 100g: PPI+CNP – protein 9.68 g, fat 0.50 g, SFA 0.06 g, MUFA 0.14 g, PUFA 0.25 g, carbohydrates 10.46 g. PPI+WNP – protein 10.68 g, fat 0.32 g, SFA 0.05 g, MUFA 0.05 g, PUFA 0.17 g, carbohydrates 9.36 g. PPI+HP – protein 10.63 g, fat 0.44 g, SFA 0.07 g, MUFA 0.05 g, PUFA 0.27 g, carbohydrates 10.07 g.

Conclusions

Designed beverages can be labeled with nutrition claims – high protein, since protein content makes 45-51% of the energy value of beverages, and saturated fat-free as the SFA content of beverages is below 0.1 g per 100 g.

The study was funded by project DG7 “Development of plant-based drink from pea protein isolate for nutritional supplementation in patients with psychiatric disorders”.

Keywords

pea protein isolate, amino acids, nutritional value.

Assessment of brewery spent grains composition depending on brewery size and technology applied

Poster

Ms. Elizabete Universa [1], ***Prof. Zanda Kruma*** [2], ***Prof. Tatjana Ķince*** [2], ***Mrs. Ilona Dabiņa-Bicka*** [2], ***Mr. Andrejs Banis*** [3]

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Objectives

Brewery spent grain (BSG) is a valuable by-product that can be used to extract high-value components. The quality of BSG is influenced by several factors, including brewery size, brewing technology, and the type of raw materials used. The brewing process itself, such as mashing time, temperature, and the ratio of water to grain, also impacts BSG composition. Variations in these factors can influence the levels of proteins, fibres, bioactive compounds, and antioxidant activity. The aim of this study is to assess the composition of BSG based on brewery size and the brewing technologies used, and to evaluate its potential for further applications.

Materials and Methods

This study involves analysing the composition of brewery spent grains collected from various breweries that differ in size and brewing technologies. A total of ten samples was selected and collected. The pH and moisture content of the fresh BSG is measured. Samples was freeze-dried prior to further analysis and processing. The nutritional composition (including total proteins, amino acid profile, fibre content etc.), bioactive compounds such as phenolic compounds, and antioxidant activity was determined. Data was analysed using ANOVA, with differences considered significant at $p < 0.05$. Multi-criteria decision analysis was employed to identify the most suitable BSG for further processing.

Results

Variations of BSG between different brewing technologies and the size of breweries is highlighted in the results. Before selecting samples for analysis, a preliminary study was conducted to investigate the types of BSG available in Latvia and availability of spent grains (total amounts). Brewing technology significantly influenced the chemical composition of the BSG. For the multi-criteria decision analysis, several factors were considered, including quantity, availability, and chemical composition and samples for further valorisation experiments were selected.

Conclusions

This research demonstrated the potential of brewery spent grains (BSG) as a valuable resource for producing bioactive compounds with functional properties. The findings will contribute to the development of innovative, high-value-added products from BSG, promoting more sustainable and efficient use of brewing by-products. These results could pave the way for new applications in the food industry. Research conducted as part of the project GreenAgroRes VPP-ZM-VRIIILA-2024/1-0002

Keywords

Brewery spent grains, phenolic compounds, protein, fibre.

Plant compatibility and development of innovative functional food

Poster

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Objectives

To increase the effectiveness of functional food, new previously unstudied plants and different combinations of their extracts are being created based of their declared activity. The use of rarely data on plant derivative biocompatibility provides new opportunities for creating innovative health products. *The aim* of the work was to evaluate the antimicrobial activity of plant extract combinations with the prospect of creating more effective food supplements.

Materials and Methods

Plant material screening was performed *in vitro* using an agar diffusion method. Three types of experiments were conducted to determine: antifungal (vs *Candida albicans*) activity of pairs of ethanol extracts of 10 plants and propolis; antibacterial activity of standardized extracts of blueberries, green tea and nettle leaves against *E.coli, P.aeruginosa, E.fecalis, St.pyogenes*; antibacterial activity of combinations of effective and ineffective plant extracts vs *Helicobater pylori*.

Results

Results. It was found that cloves and cinnamon have the maximum antifungal activity. For other pairs of extracts, the efficiency dropped to 40% or increased by 66%. In almost all cases (except licoricey), the combination with propolis was characterized by a synergistic effect.

The antibacterial activity of standardized plant extracts obtained from three different manufacturers ranged from “bactericidal action” to “stimulation of bacterial growth” without any patterns.

Despite the fact that low acidity of the environment is of decisive importance for the bactericidal effect on *H. pilory*, adding inactive extracts to the composition, regardless of pH, allows to increase (up to 7-8 times) the specific activity of the final product.

Conclusions

In the process of developing and manufacturing plant-based health food not only the botanical species of the ingredients is of great importance for achieving the required level of functionality. It is also important to take into account those indicators that are not reflected in the ingredient quality certificate: variety, growing zone, chemical composition, etc. Biocompatibility indicators allow to create a more competitive innovative food product.

Keywords

plant, food, biocompatibility, antimicrobial activity

POTENTIAL APPLICATON OF COD SKINS FOR COLLAGEN EXTRACTION

Poster

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Objectives

Fish by-products, or non-edible fish residues, contain abundant amounts of valuable organic and inorganic components such as proteins, carbohydrates, polyunsaturated fatty acids and minerals. Collagen or collagen peptides derived from the fish skin, bones, swim bladder and scales has been used as a functional food or dietary supplement (Shizuka et el., 2013). Fish collagen garnered significant academic and commercial focus in the last decades featuring prospective applications in a variety of health-related industries, including food, medicine, pharmaceutics, and cosmetics (Rajabimashhadi et al., 2023).

The aim of the study is to evaluate potential application of cod skins for collagen extraction. The objectives of the scientific research were as follows: 1) determine the chemical composition of cod skins, and evaluate quality indicators; 2) improve the method of collagen production or extraction and evaluate the effect of extraction parameters on collagen yield; 3) determine and evaluate collagen quality indicators - protein solubility, viscosity, denaturation temperature.

Materials and Methods

The object of analysis is Atlantic cod skin (*Gadus morhua*) received from SIA “Atlas Premium”. Acid-soluble collagen was experimentally extracted using acetic acid (CH_3COOH). Modifications were made to the selected extraction method and the effect of extraction parameters on the collagen yield after 24, 48 and 72 h aging in acetic acid solution was analysed. The cod skins were analysed for chemical and microbiological quality parameters. Accordingly, chemical (protein content) and physical (collagen yield, collagen solution viscosity and denaturation temperature, parameters were determined for the obtained collagen.

Results

By slight modifications and changing the ageing time in acetic acid (CH_3COOH) solution, different collagen yields can be obtained. The resulting collagen contains 96% protein. Different fish part can be used to obtain different collagen yields.

Conclusions

The optimum extraction time was 48 hours, as this treatment time resulted in the highest collagen yield. The amino acid composition of the resulting collagen could be further analysed, with applications in cosmetics, medicine and pharmaceuticals.

References:

1. Shizuka, Y., Hideaki, N., Masahiko. T., Nobuaki, T., Yoshihiko, H., & Mitsuo, Y. (2013).
2. Rajabimashhadi, Z., Gallo, N., Salvatore, L., & Lionetto, F. (2023).

Keywords

fish, collagen, protein, collagen peptides, sustainability.

Study on food waste reduction practices of Latvian households

Poster

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Objectives

Households are the biggest food wasters, responsible for more than 50% of all food loss, which has negative impacts on the environment, the economy, and society as a whole. The study aim was to evaluate the actions of Latvian households to reduce food waste, considering daily eating and shopping behaviour.

Materials and Methods

Using a survey based on the food-wasting behaviors questionnaire developed by Misiak et al. (2021), 1,009 respondents from across Latvia were surveyed. The survey was conducted online from June to August using the Google survey platform and was distributed via TV, radio, and social networks. The age distribution of respondents was as follows: 36.4% aged 28-43, 34.5% aged 44-59, 15.8% aged 18-23, and 14.1% aged 60 and over. Respondents were also categorized by household size: 29.7% had two members, 21.9% had four members, 20.8% had three members, 12.8% had one member, and 14.8% had five or more members. The data were processed using Microsoft Excel.

Results

Among the respondents, 18.5%—primarily those aged 44-59 and living in a two-member household—never throw out food they don't like. Only 16.1% of respondents give away food they can't eat, while 21.4% feed leftover food to their pets. A significant majority, 82.6%, reported buying food only when needed. This group mainly consists of two-member households (59.5%) aged 44-59 (36.6%) and 28-43 (34.1%). Additionally, 54.5% of respondents buy enough food for one week at a time, with two- and three-member households (31.3% and 23.3%, respectively) being the most common. These households are typically aged 44-59 (37.8%) and 28-43 (33.8%). Lastly, 55.2% of respondents make a shopping list before going to the grocery store.

Conclusions

Fewer than 60% of respondents have efficient shopping habits, such as shopping for a week's worth of groceries and making a shopping list in advance—actions that can help reduce food waste. However, many Latvian households are unsure of what to do with leftover food or food they don't like.

This study is part of the Ministry of Agriculture's subsidy project no. S499, "An in-depth assessment of a sustainable food system and actions to reduce food waste".

Keywords

shopping behaviour, eating behaviour, leftover food, wasters

THE BENEFITS OF TOMATOES

Poster

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Objectives

Tomatoes (*Solanum lycopersicum* L.) are well known vegetable and play an important role in nutrition because of their health benefits. The most important nutrients are vitamins, mineralelements essential amino acids, monounsaturated fatty acids, carotenoids and phytosterols. Tomatoes are also a source of different natural antioxidants, bioactive compounds - secondary metabolites who participate in prevention of cardiovascular diseases, cancer, and neurodegenerative diseases. They contain carotenoids (β-carotenoid and lycopene), ascorbic acid (vitamin C), tocopherol (vitamin E), phenolic compounds such as quercetin, kaempferol, naringenin and lutein, as well as caffeic, ferulic and chlorogenic acids. These compounds play beneficial roles in inhibiting reactive oxygen species (ROS) by scavenging free radicals, modulation of enzymatic activities, cytokine expression and signal transduction pathways. Chemical composition of tomato varies based on the tomato variety, size and color, growing conditions, as well as extraction procedures and analysis methods.

The aim of the present study was to determine the content of ascorbic acid, total phenolics, lycopene, β-carotene and soluble solids in different colored and size tomatoes.

Materials and Methods

UV spectrophotometer UV-1800 was used for the absorbance measurements - content of total phenolics, lycopene, β-carotene. The content of total soluble solids was determined refractometrically, but the content of vitamin C titrimetrically.

Results

The obtained results showed that there were significant differences in the mean values between analysed parameters.

The highest content of vitamin C (21.43±3.25 mg 100 g^{-1}) was observed in middle size orange tomatoes, but the highest content of total phenolic compounds was in red cherry tomato variety.

The content of lycopene changes from 0.15 mg $100g^{-1}$ (yellow tomatoes) till 7.12 mg 100 g^{-1} (cherry tomatoes), but regarding β-carotene the regularity is as follows: red cherry> middle size red>middle size yellow >middle size brown. Red cherry tomatoes also contain the highest content of soluble solids compared with other analysed tomatoes.

Conclusions

Middle size red and brown tomatoes are rich sources of well known antioxidant lycopene, but orange tomatoes showed the highest content of vitamin C. In general, cherry tomatoes are the best source of biological active compounds – total phenolics, β- carotene and lycopene.

Keywords

Biological active substances, *Solanum lycopersicum, lycopene, carotenoids.*

Tocopherol and tocotrienol homologues recovery from Hypericum perforatum L. and its extraction residues by aqueous ethanol solutions

Poster

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Objectives

Hypericum perforatum L. (St. John's Wort) is a medicinal herb used in traditional and modern phytochemical drugs. It is usually used to produce phloroglucinol (hyperforin, adhyperforin), naphtodianthrone (hypericin) and xanthone compound extracts for cosmeceuticals and the treatment of mild-moderate depression. Tocochromanols or Vitamin E related compounds represent another significant class of phytochemicals found in *Hypericum perforatum* L., beneficial for human health. While tocopherols are widely distributed in various plant sources, tocotrienols are rarely found in nature, yet they can be identified in Hypericum perforatum L. This rarity and health benefits associated with tocotrienols highlight the necessity for further research into extraction methods.

Materials and Methods

Tocochromanols were initially extracted from Hypericum perforatum L. by saponification as a reference method. Various ethanol-water mixtures (40:60 to 96.6:4.4, *v*/*v*) were then tested to determine the optimal ethanol concentration for yield optimization. Leftover residues from these extractions were processed with 96.6% ethanol to assess recovery from byproducts. Reversed-phase liquid chromatography with fluorescence detection (RPLC-FLD) was employed to separate and quantify tocochromanols.

Results

The highest extractability was obtained with saponification procedure. H. perforatum L. contained all four tocopherols and four tocotrienols, however, main homologues were found to be δ-T3, followed by α-T and α-T3. Extractability of tocochromanols increased along with the ethanol ratio during first ethanol extraction. Ethanol-water mixtures of 70:30 - 90:10 (v/v) can be considered as sufficient solvents for industrial tocotrienol-rich extract production. Re-extraction of tocochromanols with 96.6% ethanol is advised if first extraction was performed with ethanol ratio below 60%, as during the extraction of various hydrophilic compounds.

Conclusions

This study revealed that the pharmaceutical value of Hypericum perforatum is greater than previously estimated, attributed to the presence of tocotrienols. Efficient utilization of St. John's Wort biomass by multi-step extraction presents a superior alternative to discarding leftover post-extraction residues.

Keywords

Hypericaceae; Aerial parts; Environmentally friendly extraction; Lipophilic phytochemicals; Phytomedicine.

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