8th INTERNATIONAL CONGRESS OF
Nutritionists

BOOK OF ABSTRACTS

19th - 21st May 2022

ZAGREB

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Croatian Federation of Nutrition Associations

Co-organisers
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Association for applied nutritionism in Bosnia and Herzegovina
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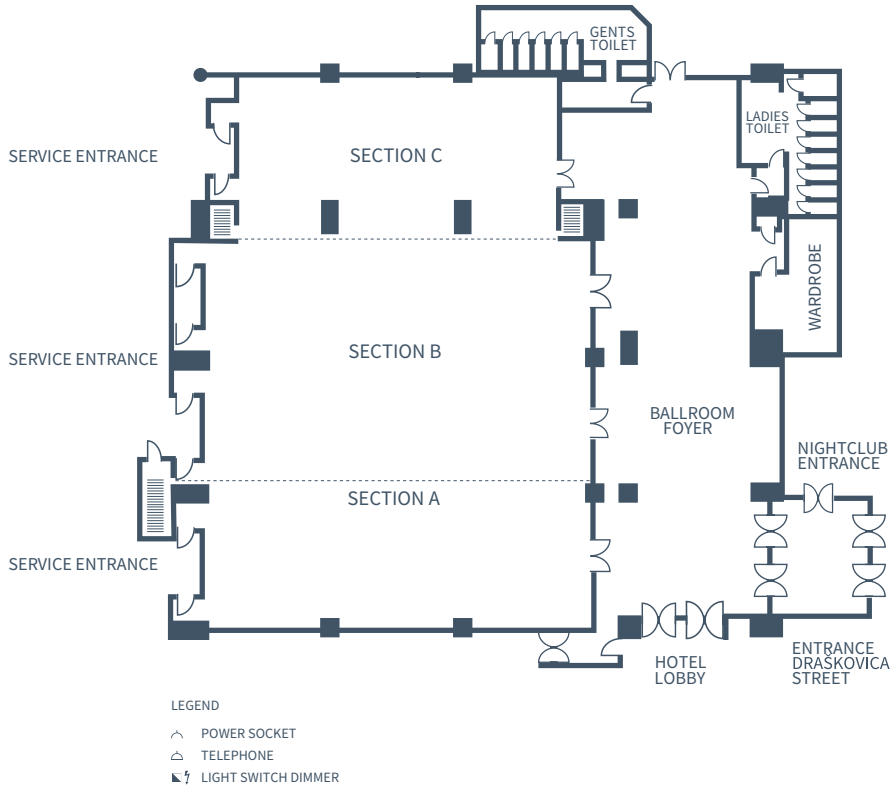

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BELUPO

Dear colleagues and friends,

on behalf of the Organizing Committee and the Croatian Federation of Nutrition Associations, it is my great pleasure to welcome you to the 8th International Congress of Nutritionists. After a year break due to the COVID-19 pandemic, our enthusiasm to prepare you a rich scientific program was even greater. Therefore, we hope that you will enjoy lectures and workshops providing the latest insights from the field of nutrition.

The Congress continues in its well-known multidisciplinary character, providing an opportunity for the communication between nutritionists and other professionals, where everybody's goal is to improve public wellbeing by promoting healthy dietary patterns and lifestyles. Moreover, in the belief that you are eager to socialize, the Congress includes social events where you will meet colleagues in a relaxed atmosphere and share your professional experiences.

We hope that this year, as in previous ones, we have justified your trust and fulfilled your expectations. The Organizing Committee is systematically working to increase the quality of the Congress, what is proved by cooperation with great international and domestic partners, as well as by an increasing number of registered delegates and abstract presenters. For this success, we can thank you and your suggestions, previous speakers and presenters, industry partners, sponsors, and supporters.

We are extremely happy that we are finally all gathered and continuing Congress tradition! Thank you for being part of the 8th International Congress of Nutritionists.

Ana Ilić, MSc

President of the Organizing Committee of the 8th International Congress of Nutritionists

Croatian Federation of Nutrition Associations

Croatian Federation of Nutrition Associations (CFNA) is a national organization which acts as an umbrella society of nutritionists and dieticians in Croatia. CFNA was founded in order to unite nutritionists and nutritionists' associations into a unique and powerful association that works together to promote, develop, improve and preserve the nutritists' and dietitian' professions which have a clearly defined education.

The Croatian Federation of Nutrition Associations is the organizer of the International Congress of Nutritionists which is held every year. This Congress is unique as it brings together not only nutritionists, but also experts from various fields of science with same interest and aim: food technologists and engineers, agronomists, medical doctors and other allied health professionals, pharmacists, kinesiologists, and psychologists and offers them the platform for exchanging the latest scientific knowledge related to nutritional science.

The vision of the Croatian Federation of Nutrition Associations is to bring together all the existing associations of nutritionists and/or dieticians in order to improve cooperation and support among nutritionists on the territory of Croatia in purpose to promote the social status of nutritionists in Croatia and creating high quality conditions for work, scientific research and international cooperation.

The mission of the Croatian Federation of Nutrition Associations is to improve the social status of nutritionists and their competences by taking care of their professional needs and interests as well as lifelong education and training, but also to promote, raise awareness and educate the public on the importance of proper nutrition in line with the campaigns of City, State, European and World healthcare institutions and organizations as well as food industry and educational institutions.

Welcome to the 8th International Congress of Nutritionists!

assist. prof. Tena Niseteo, PhD

Presiden of Croatian Federation of Nutrition Associations

Zagreb is the Croatian capital and relatively young middle-European metropolis with about 800.000 inhabitants. With urban agglomeration Zagreb has about 1.1 million, a quarter of the total population of Croatia. Zagreb covers a total area of 641 square kilometres. Commoners divide it as “old” and the “new” Zagreb with the river of Sava as its boundary. Everything is accessible on foot – from your hotel to the theatre, wandering around the old Upper Town or through the bustling streets of the more modern Lower Town, which has not lost an ounce of its charm despite the eternal march of time. It is therefore no wonder that in 2017 it won the prize for the most exciting European destination. Today, Zagreb is the political and cultural center of Croatia and is a thriving, energetic inland city with some of the country’s best museums, restaurants, and shopping.

Sheraton Zagreb Hotel is located in the heart of Zagreb close to main city attractions, completely renovated in 2015. Sheraton Zagreb Hotel is part of the HUP-ZAGREB hotel company that acts as the oldest in this area. All 306 spacious and light rooms and suites offer a pleasant and comfortable ambient with all the modern amenities and services. The elegant and multifunctional event venues are the ideal location for conferences, meetings and other events - 13 salons and meeting rooms that amount to a total of 1080 m^2 in congress spaces are the reason why in 2022 Sheraton was selected as the host for the 8th International Congress of Nutritionists.


ZET
USPINJAČA

CODE	TITLE
	CLINICAL NUTRITION
KP01	**NUTRITIONAL MANAGEMENT OF PAEDIATRIC CANCER PATIENTS – A CASE STUDY**
KP02	**PREVALENCE OF SWALLOWING DISORDERS AND MALNUTRITION AMONG NURSING HOME RESIDENTS**
KP03	**BODY IMAGE AND PREVALENCE OF ORTHOREXIA NERVOSA IN YOUNG POPULATION IN CROATIA**
KP04	**IMPACT OF BODY MASS INDEX ON COVID-19-RELATED HOSPITALIZATION AND IN-HOSPITAL MORTALITY IN PATIENT FROM DUBROVNIK-NERETVA COUNTY**
	FUNCTIONAL FOOD
FH01	**ANTIDIABETIC AND HYPOLIPIDEMIC EFFECTS OF BASIL EXTRACT (OCIMUM BASILICUM L.) IN ALLOXAN DIABETIC RATS**
FH02	**HUMAN MILK LEPTIN AND ADIPONECTIN HAVE AN IMPACT ON CHILD'S GROWTH AND BODY COMPOSITION FROM BIRTH TO SEVEN YEARS OF AGE: A PROSPECTIVE OBSERVATIONAL CLINICAL STUDY "MY-MILK"**
FH03	**ANTIOXIDANT POTENTIAL OF THE MOST FREQUENTY USED LAMIACEAE HERBAL TEAS**
FH04	**TOTAL ANTIOXIDANT CAPACITY AND PROXIMATE ANALYSIS IN KINDERGARTEN DAILY MEALS: A RANDOMIZED CONTROLLED EVALUATION**
	PUBLIC HEALTH
JZ01	**SELF-ASSESSMENT OF DISCARDED FOOD IN RESIDENTIAL BLOCKS IN MURSKA SOBOTA DURING THE COVID -19 PANDEMIC**
JZ02	**MULTIDISCIPLINARY PUBLIC HEALTH INTERVENTION AIMED AT REDUCING HEALTH RISK FACTORS AMONG EMPLOYEES OF PUBLIC INSTITUTIONS IN THE CITY OF ZENICA**

CODE	TITLE
	PUBLIC HEALTH
JZ03	**COUNTY COUNSELING SERVICE FOR PREVENTION OF NUTRITION ASSOCIATED HEALTH RISKS - INTERDISCIPLINARY APPROACH IN THE TREATMENT OF OBESITY**
JZ04	**DEVELOPMENT OF METHODS OF PROMOTING PROPER NUTRITION IN CHILDREN OF PRESCHOOL AND EARLY SCHOOL AGE**
JZ05	**DIFFERENCES IN THE FOOD CHOICE MOTIVES BEFORE AND DURING THE COVID-19 PANDEMIC DEPENDING ON INFECTION AND VACCINATION STATUS: A CROSS-SECTIONAL STUDY OF CROATIAN ADULTS**
JZ06	**SCHOOL AND HEALTH**
JZ07	**HOW THE NUMBER AND TYPE OF PRIMARY SCHOOL MEALS AFFECT FOOD VARIETY AND DIETARY DIVERSITY?**
	INDUSTRY
IND01	**CONSUMER'S ATTITUDES TOWARDS CONSUMATION OF PLANT-BASED FOODS**
IND02	**THE IMPACT OF SOCIAL MEDIA ON FOOD PURCHASES**
IND03	**POPULARITY OF AFRICAN FOODS AND DISHES IN CROATIA**

Thursday, 19th May 2022			
Time	**Hall**	**Workshop**	**Lecturer**
13:00 - 14:00		Student registration	
14:00 - 14:45 Group A 15:00 - 15:45 Group B	Zagreb	Student workshop I **Analysis and interpretation of food diary** Chair: Sara Sila	Lucija Marić
14:00 - 14:45 Group B 15:00 - 15:45 Group A	Split/ Dubrovnik	Student workshop II **Communication skills in nutrition** Chair: Ana-Marija Genc	Anđela Jelić
16:00 - 17:00 Both groups	Opatija/ Pula	Student workshop III **Discussion: How is food changing the world?** Chair: Iva Dorić	Marija Heffer Iva Kantolić
16:00 - 19:30		Registration	
16:15 - 16:45		Coffee break	
17:00 - 18:00	Split/ Dubrovnik	Workshop I **Indications for vitamin-mineral supplementation in children** Chair: Lucija Marić	Tena Niseteo
17:00 - 18:00	Opatija/ Pula	Workshop II **Dietary supplements in sports and health** Chair: Anja Vukomanović	Nikola Talan
17:00 - 18:00	Zagreb	Workshop III **Dietary protein, their metabolism and role throughout life** Chair: Iva Dorić	Lidija Šoher

Time	Hall	Workshop	Lecturer
18:00 - 18:30		Coffee break	
18:30 - 19:30	Split/ Dubrovnik	Workshop IV **Diet and hormones** Chair: Margita Zlatić	Sandra Krstev Barać
18:30 - 19:30	Opatija / Pula	Workshop V **Culinary workshop: Plant based diet** Chair: Marina Matković	Mirna Sarić
18:30 - 19:30	Zagreb	Workshop VI **Nutrition in patients with thyroid disorders - Case reports** Chair: Sara Sila	Karmen Matković Melki
20:00-24:00		Oeno-gastro event - **powered By Vindija**	

Friday, 20th May 2022	
Time	**Hall A & B**
08:00 - 09:15	**Breakfast symposium: BoomBox**
09:15 - 09:45	**Opening ceremony** Tena Niseteo, Sanja Musić Milanović
09:45 - 10:45	Plenary session **Health promotion and healthy nutrition choices - how we do it in Croatia** Sanja Musić Milanović **Osteosarcopenic adiposity syndrome with nutritional approaches for its prevention and management** Jasminka Z. Ilich Chairs: Sara Sila, Margita Zlatić
10:45 - 11:30	Coffee break

Time	Hall A	Hall B
11:30 - 13:30	**Omega-3 fatty acids: from lab to clinic; Vitamin D: new insights from physiology to clinical practice** Chairs: Dubravka Vitali Čepo Tena Niseteo	**Public health nutrition Great results!** Chairs: Jasenka Petrić Iva Dorić
11:30 - 11:55	**Vitamin D bioavailability - food VS supplements** Dubravka Vitali Čepo	**New forms of communicating science to public** Jasenka Petrić
11:55 - 12:20	**Role of vitamin D3 and Omega-3 fatty acids in dermatology** Lena Kotrulja	**CD SKILLS project - Improving celiac disease management** Zrinjka Mišak

Time	Hall A	Hall B
12:20 - 12:45	**Vitamin D intake and status globally and in Croatian population** Daniela Čačić Kenjerić	**Nestle for heathier kids program in Adriatic region - supporting healthier habits over 10 years** Koraljka Novina Brkić
12:45 - 13:10	**Role of omega-3 fatty acids and the Mediterranean dietary pattern in chronic fatigue syndrome** Jelena Helene Cvejić	**Value of nutrition education beyond the classroom** Francesca Scazzina
13:10 - 13:30		**Bitter food consumption is not significantly associated with bitter taste sensitivity** Davorka Gajari
13:30 - 15:00	**Lunch break** **Restaurant Fontana & Kralj Tomislav**	
15:00 - 17:30	**Nutrition for runners (recreational and athletic)** Chairs: Katarina Zupančič Marina Matković	**Organic, Eco and Bio food** Chairs: Renata Hanzer Margita Zlatić
15:00 - 15:30	**Particular features of nutrition for marathon runners** Roko Marović	**Organic, eco and bio food - synonyms or different meanings?** Branka Levaj
15:30 - 16:00	**The importance of protein intake for runners** Stella Mirić	**GMO in Croatia** Renata Hanzer
16:00 - 16:30	**Malnutrition in runners** Eva Peklaj	**Think in future: Environment protection is crucial for us, HiPP** Ladislava Klasić-Stanković

Time	Hall A	Hall B
16:30 - 17:00	**Supplementation, hydration and athletic performance of runners** Katarina Zupančič	**Organic, bio and eco food and pesticides** Adela Krivohlavek
17:00 - 17:30		**Past(IT)a** Sven Perec
Time	**Dvorana ZAGREB**	
17:30 - 19:00	**Croatian Federation of Nutritional Associations Annual Meeting (Members only)**	
20:00 - 02:00	**Gala dinner**	

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Saturday, 21st May 2022

09:00 - 12:00 **Registration**

Time	Hall A	Hall B
09:30 - 11:35	**Infant nutrition and long term health** Chairs: Evgen Benedik Lucija Marić	**Obesity from another angle** Chairs: Irzada Taljić Sara Sila
09:30 - 09:55	**Nutrition in the first 8000 days – why is it important?** Evgen Benedik	**Different side of story: Obesity pandemic as a business model** Vatroslav Zovko
09:55- 10:20	**Complementary feeding and development of chronic disease** Ana Močić Pavić	**Microbiota and obesity** Antonio Starčević
10:20 - 10:45	**Nutritional risk in infants with allergies** Ivona Višekruna Džidić	**Metabolic syndrome and microbiota connection, Omnibiotik** Karmen Matković Melki
10:45 - 11:10	**DHA in infant development, 4UPharma** Tena Niseteo	**Two pandemics together – COVID-19 and obesity** Irzada Taljić
11:10 - 11:35	**Feeding disorders in infants** Tihana Koren	**Intuitive eating and mindful eating** Kristina Beljan
11:35 - 12:15	**Brunch brake**	

Time	Hall B
12:15 - 13:00	**Oral presentation of 5 best posters** Chairs: Petra Vilčnik, Ela Kolak
13:00 - 14:00	**Future or past in nutrition science** Chairs: Ana-Marija Genc Marija Selak
13:00 - 13:10	**Breakfast cereals - product reformulation, Nestle** Koraljka Novina Brkić
13:10 - 13:35	**Nutrigenomics and personalized nutrition – are we ready?** Bojan Stojnić
13:35 - 14:00	**Cannabis sativa L. - From a Prohibited Drug to a Nutritional Supplement** Martina Jakovljević Kovač
14:00 - 15:15	**Clinical nutrition in practice:** **Diet therapy in oncology patients** Chairs: Frane Herenda Anja Vukomanović
14:00 - 14:25	**Ketogenic diet in oncology patients** Margareta Benković
14:25 - 14:50	**Phytotherapy in oncology patients** Frane Herenda
14:50 - 15:15	**Diet therapy in patients with colorectal cancer** Nevena Ćorić
15:15 - 16:00	**Award ceremony and Congress closure**

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Oeno-gastro event – Restaurant Fontana

Thursday, 19th May, 20.00 pm - 24.00 pm

We invite You to join us at an already traditional Oeno-gastro event and enjoy relaxing atmosphere with your colleagues. Assortment by Vindija, desserts from pastry shop Cukeraj and TRS Ilok quality wine will spice up your evening with a wealth of flavors.

Gala dinner - Hall A&B

Friday, 20th May, 20.00 pm - 02.00 am

Those who have already been can confirm… it is more than just Gala dinner - it is the perfect blend of delicious meals, dancing and entertainment with your colleagues and friends. Don't miss it!

We look forward to seeing you.

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1. WORKSHOP ABSTRACTS

ANALYSIS AND INTERPRETATION OF FOOD DIARY

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Abstract:
Food diaries can be highlighted among dietary assessment methods of the current diet for their interest and validity. It is a prospective, open-ended survey method collecting data about the foods and beverages consumed over a previously specified period. This dietary assessment approach does not rely on individual's memory since respondents are asked to record foods and beverages as they are consumed throughout the reporting day (a "real-time" accounting). Although implemented very simply, certain problems can occur that will affect the keeping of a food diary such as the tendency of subjects to report food consumption close to those socially desirable. Additional problems are related to the high burden posed on respondents. The method can also influence food behaviour in respondents to simplify the registration of food intake and some subjects can experience difficulties in writing down the foods and beverages consumed or in describing the portion sizes. Increasing the number of days observed reduces the quality of completed diet records.

Paper-based estimated food diaries are often used in research to collect dietary data, despite this method being burdensome for both participants and researchers. Such food diaries are often time consuming, labour intensive, and rely on participant literacy and therefore may lead to greater rates of under-reporting. For this reason, the use of various electronic tools such as mobile applications or software that make it easier for respondents to complete the food diary.

Workshop participants will be divided into several groups and will be given the task to interpret the already completed diet diary and make recommendations based on it.

Keywords: food diary, research, electronic tools

COMMUNICATION SKILLS IN NUTRITION

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Abstract:
Marketing and communication on nutrition topics are confronted with the challenge to attract an audience that is bombarded with information that is often superficial, difficult to process, or misleading. On the one hand, people nowadays are more sensitive to the need to be healthier, on the other hand, social representations and the media often depict health and well-being as an impossible question or as being difficult to attain quickly. Communication is one of the most crucial functions of daily life and one of the essences of the human condition, especially in today's world of online communication (Hargie & Dickson, 2004; Berry, 2007). In nutrition, without communication, it would not be possible to share information and knowledge, make interactions with clients or influence them to change their eating behaviors (Hybels &Weaver, 1998; Hargie & Dixon, 2004; Berry 2007). So, nutritionists need to understand the client's needs, beliefs, and goals using an effective communication strategy and create a confident relationship. Communication efficacy is important to enhance people's motivation and other skills to embrace healthy and sustainable eating behaviors. The present workshop aims to learn some effective communication strategies and how to use them to induce an eating behavior change, considering one of the clients' psychological features', such as self-efficacy. How we frame what we say (positively or negatively), may play a significant role in clients' attitudes, intentions, and future eating behaviors.

Keywords: psychology, nutrition comunication, eating behavior

HOW IS FOOD CHANGING THE WORLD?

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Abstract:
Medical recommendations on healthy diet underwent drastic changes throughout the twentieth century. Before World War II, their aim was to ensure healthy development of children. The emphasis was placed on milk and dairy products in support of livestock industry. Subsequently, they focused on preventing the development of diseases, especially cardiovascular disease (CVD). Misconceptions about the role of fats in the development of CVD led to their marginalization at the expense of carbohydrates, reflected in 1992 recommendations and a flood of non-fat products in the market. Misleading recommendations, non-fat products and life style changes contributed to the weight gain epidemic. In the following recommendations, dietary fats are recognized as an important protective component, but only in the form of vegetable oils, and omega fatty acids. Nevertheless, recent studies show that animal fats have a more beneficial effect on the body than hydrogenated vegetable oils, which have recently been withdrawn from the market due to their toxic and inflammatory effect – after almost a hundred years of aggressive marketing. However, the value of animal fats and proteins, especially those obtained from organic pig farming, is still not recognized in the market – despite being the so-called survival food particularly important during economic crises. At the same time, the market offers a wide range of foods high in anti-oxidants, i.e. 'superfoods' with unproven health value often leaving a large carbon footprint und even undermining self-sustainability of certain world regions. Nonetheless, the major issue concerning modern diet is low fibre processed foods.

Providing general and simple, widely applicable dietary recommendations as a convenient guidance for the entire food market is particularly problematic. Modern medicine strives to be predictive, preventive, personalized and participatory. Therefore, one-size-fits-all recommendations should not be taken for granted and pose a substantial environmental threat in the form of intensive agriculture. In the last ten years, medical recommendations have increasingly concerned the

microbiome health and range from probiotics and prebiotics to fermented foods and appreciation for individual differences that reflect genetic adaptation to life in a particular climate or bioregion and may contribute to more bio-conservational and self-sustainable economy.

Keywords: dietary recommendations, personalised medicine, bio-conservation

HOW IS FOOD IS CHANGING THE WORLD (or FOOD FOR HEALTHIER WORLD)

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Abstract:
Eating is one of the main psychological needs. But, eating isn't associated only with our body, but also with our mind. From the first days on Earth, process of eating gets linked with mother-infant attachment and feeling of security. Later, relationship to food shapes regarding role models in one's environment. Although relationship with food can be altered during the life, this close link between eating and fundamental feeling of security makes it very difficult for some people to change it. That is particularly problematic for the patients with chronic diseases. For many of them, changing their daily menu is key for better control of the disease and longer life because globally, 7 out of 10 deaths are due to noncommunicable diseases.

In general, chronic patients struggle with compliance, adherence and perseverance during lifelong treatment and lifestyle changes. Chronic patients are often told to go on some kind of elimination diet, but it is more important and sustainable to explore and change their eating patterns and their relationship with food. Another obstacle in dietary changes can be limited information provided from the healthcare professionals, insufficient knowledge for understanding such information and lack of social support. For many patients, first step in gathering information is going online, what opens up the possibility of coming across misinformation and disinformation, which become more frequent during the pandemic. Evidence

based strategies for better control of chronic diseases are based on appropriate education and interventions grounded in cognitive-behavioral therapy. Examples are web and mobile applications for behavioral change, patient support programs and digital therapeutics. Since the prevalence of chronic noncommunicable diseases increases during the years, changing eating patterns of chronic patients could really change the world.

Keywords: health literacy, relationship to food, adherence

INDICATIONS FOR VITAMIN-MINERAL SUPPLEMENTATION IN CHILDREN

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Abstract:
Malnutrition in terms of undernutrition and nutritive deficits are usually mentioned in the context of undeveloped and developing countries. However, unfortunately today we are witnessing the wide range of nutritive deficits in otherwise healthy children in developed countries. As a result of poor lifestyle and mostly westernized diet, the adult population is malnourished, and there are more and more women who are pregnant with nutrient deficiencies like folate, vitamin, iron, calcium, zinc and selenium deficiencies. This is why children experience malnutrition already in utero. During the growth children are consuming an unbalanced and nutrient deficient diet which is why today we know that there are deficits in iron, vitamin D, zinc and other micronutrients in children globally. This is why specific micronutrient supplementation is recommended for some children. In this workshop we will go through the cases of different nutrient deficiencies in children.

Keywords: vitamin-mineral supplementation, children nutrition

DIETARY SUPPLEMENTS IN SPORT AND HEALTH

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Abstract:
Dietary supplements are traditionally defined as products made of one or more essential nutrients such as vitamins, minerals, and proteins, but in recent times this definition was broadened to include almost any product intended for ingestion as a supplement to the standard diet. On the world market since 2001, there has been a steady growth of dietary supplements by 7-8% per year. In many developed countries of the world, the production and consumption of dietary supplements reached enormous proportions. Because of this fact Supplements are of evergrowing importance in the space of Nutrition Science. Nevertheless, the validity of their consumption remains controversial. Are they useful? Should everyone take them or are real whole foods enough to meet all our nutritional needs? These are some of the questions frequently being asked because of the lack of evidence-based information and the power of marketing in the fitness and supplements industry. Not only that, The amount of scientific evidence on dietary supplements varies widely—there is a lot of information on some and very little on others. Then there is the issue of safety since the regulation isn't as rigid as it ideally should be. Because of all the above, its easy to see why the general population is very confused when it comes to the topic of dietary supplements Athletes are particularly susceptible to marketing hype and subsequent consumption of a subtype of dietary supplement known as ergogenic aids whose sole purpose is to help with all aspects of sports performance. In this environment, we, as nutrition professionals, must be extremely well informed and cautious when giving advice. The best rule of thumb is the first do no harm approach, especially with athletes that undergo WADA testing. But, because it seems as though new supplements emerge daily and athletes have a lot of interest in using them to give themselves the competing edge in their respective sports, we must stay maximally up to date with the newest scientific data!

Keywords: Dietary supplement, Ergogenic aid, Athlete

DIETARY PROTEIN, THEIR METABOLISM AND ROLE THROUGHOUT LIFE

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Abstract:
Proteins as chains of amino acids are involved in almost every process in the human body. With a vast number of important functions such as enzymes, transcription factors, binding proteins, hormones, transmembrane transporters and channels, receptors, structural and signaling proteins adequate protein intake is essential at all stages of life. The most important role of dietary protein is to provide amino acids required for the synthesis of new proteins. Therefore, adequate protein intake is important at all stages of life.

This workshop aims to give an overview of dietary protein intake recommendations throughout the lifespan, from children to older adults, and to address specifics that come with a particular life stage. Does quantity over quality work in this case? Does distribution of protein intake throughout the day maters? Who wins in plant protein vs. animal protein comparison? Through interesting work assignments find the answers to these and other questions about dietary protein.

Keywords: deitary protein, life span, recommendations

DIET AND HORMONES

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Abstract:
Specific nutrients, dietary patterns, and overall nutrition may play either beneficial or detrimental roles in hormonal balance. Diet is important when it comes to hormones because the energy and nutrients obtained from food represent the raw materials to produce hormones . For example, all steroid hormones are derived from cholesterol, which is mainly obtained from one's diet. However, diet and specific nutrients are not only important in production of hormones, but also for hormone transport to target tissues, as well as cell sensitivity to the hormone signal and detoxification and excretion of the hormones. It is important to know diet's role in this pathways in order to identify points of leverage where health practitioner can apply individualized nutrition interventions to help restore hormonal balance and minimize or even avoid use of hormone replacement therapy (HRT).

For the purpose of this workshop and better understanding we will categorize hormones in three groups: adrenal hormones, thyroid hormones and sex hormones. The main aim will be to provide participants with tools on how to detect hormone imbalances using patient's current complaints, dietary and health history. Special emphasis will be on laboratory testing: which ones to order and how to interpret results in order to recognize different disruptions of hormone balance. In addition, practical part of this workshop will be focused on basic nutrition interventions and other lifestyle strategies, as well as order of priority in evaluating and treating hormone imbalances.

Keywords: adrenal, thyroid and sex hormones, laboratory tests interpretation

PLANT-BASED DIET IN PRACTICE

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Abstract:
More and more scientific evidence confirms the benefits of plant-based nutrition on human health, but the biggest challenge is to apply it in practice. At least once a week, omnivores should have one plant-based day, meals based on plant proteins. The main focus of the workshop is to raise awareness of traditional approaches to food and plant food preparation and turn them into simpler, more nutrient-rich preparation processes, and to raise awareness of the sensory experience of plant-based meals. The aim of the workshop is to get acquainted with the challenges of applying plant-based nutrition from the perspective of nutritionists and how to approach such clients in practice. Frequently asked questions will be further clarified – "What to keep in mind when creating a plant-based menu for the client?" and "How to prepare plant-based days of the week?". During the preparation of the dish, the nutritional significance of the prepared dishes will be explained, and the participants will taste the dishes and be able to ask questions that they can prepare in advance or feel in an instant. Two dishes will be made - raw soup and spread with crackers, but the details of the preparation and recipes can be found at the workshop.

Keywords: plant-based diet, gastronomy

NUTRITION IN THYROID DISORDERS - CASE REPORTS

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Abstract:
Application of specific dietary patterns and targeted individual supplementation can contribute to the prevention or alleviation of symptoms in thyroid disorders such as autoimmune Hashimoto's thyroiditis, hypothyroidism, hyperthyroidism and the symptoms of the most common secondary comorbidities. Emphasis is set on specific micronutrients for optimal thyroid function; iodine, selenium, iron and vitamin D, with increasing number of studies regarding their role in aetiology, prevention and treatment of thyroid disorders. Application of different dietary models has also been investigated, although there are still no official guidelines for nutritional support in thyroid patients.

The aim of this lecture is to give a systematic overview of the latest research results on possibilities of nutritional intervention in patients with thyroid disorders and to evaluate them as a justified complementary strategy for the prevention and treatment of thyroid disorders and their comorbidities. Occurrence of significant food/dietary supplements and levothyroxine interactions, significance of the intestinal microbiota on thyroid disease development are also emphasized. Tailored micronutrient supplementation for the correction of proven micronutritive deficiencies, as well as probiotic supplementation for the prevention or treatment of intestinal dysbiosis in patients with thyroid disorders is justified. The recommendation of time-separate administration of levothyroxine and food/dietary supplements to prevent clinically significant interactions that reduce drug absorption and effectiveness is confirmed. The most promising and justified nutritional intervention is Mediterranean diet, due to high patient adherence and proven benefits in the prevention and support in treatment of thyroid disorders and its comorbidities. Application of other nutritional interventions such as vegetarian diet, and various elimination diets (gluten-free diet, low FODMAP diet, LCHF / ketogenic, Paleo diet, autoimmune protocol) were found to be only partially justified on individual level under strict expert supervision. Nutritional interventions in thyroid patients should be implemented by a multidisciplinary

team (physician, dietitian, pharmacist, psychologist) and nutrition counselling of thyroid patients should be encouraged in clinical practice.

Keywords: thyroid disease, hypothyroidism, dysbiosis, nutritional intervention, micronutrition

2. LECTURE ABSTRACTS

HEALTH PROMOTION AND HEALTHY NUTRITION CHOICES – HOW WE DO IT IN CROATIA

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Abstract:
„Healthy Living" is the comprehensive, multi-sectoral Croatian National Health Promotion Program that was adopted by the Government in 2015. Its activities are implemented on a national level and aim to create accessible, healthier environments in local communities in addition to informing, educating, and raising awareness of the positive aspects of healthy lifestyles. The Program has five main components: Health Education, Health and Physical Activity, Health and Nutrition, Health and the Workplace and Health and the Environment. The Health and Nutrition component, as part of the holistic approach to health promotion, aims to make healthy nutritional choices easier by labeling food products with the front-of-package mark Healthy Living. The Healthy Living mark has a dual purpose - to help consumers identify and choose foods beneficial for health, as well as to stimulate product reformulation by the food industry. The driving force behind the label is a governmental institution, the Croatian Institute of Public Health. It is a positive directive front-of pack label that summarizes the 'healthiness' of a product without displaying any nutritional information and conveys a positive health message. Since the mark, a green cloud, is very similar to the logo of the entire Croatian "Healthy Living" program, it has become a symbol of healthy choices and healthy environments that is easily recognized by consumers in Croatia. The mark is voluntary, which means that food firms may choose whether or not to use the Healthy Living mark on-pack. As an intervention that is becoming increasingly recognized at the European level, the Healthy Living labelling system is just one of the responses to the public health challenges we are facing today. In Croatia, the country with the highest share of adults with overweight and obesity in the European Union that is estimated to have almost a million adults living with obesity by 2030, comprehensive multi-sectoral health promoting interventions are needed now more than ever. The new Croatian Action plan on the prevention of obesity

that is currently in preparation will hopefully summarize all the required efforts and prepare a strategic response to the public health crisis we are now facing.

Keywords: Healthy Living, front-of-pack labelling, health promotion

OSTEOSARCOPENIC ADIPOSITY SYNDROME WITH NUTRITIONAL APPROACHES FOR ITS PREVENTION AND MANAGEMENT

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Abstract:
Osteosarcopenic adiposity (OSA), manifested as a simultaneous bone, muscle, and adipose tissue impairment, is relatively-newly identified syndrome. Despite of it newness, it has been recognized and examined throughout the world in populations of diverse backgrounds, sex, and age. A common underlying condition and/or possible cause of OSA is a low-grade chronic inflammation (LGCI), often running undetected/unresolved. This paper gives the definition of OSA and addresses its main concepts, including the crosstalk among bone, muscle, and adipose tissues, each being an endocrine organ and affecting each other. Brief overview of state of the current knowledge about OSA (from published literature), and its prevalence, along with diagnostic criteria and technologies for its identification are addressed as well. Based on what is known so far, OSA has multiple causes including aging, LGCI, immobilization, stress, and some chronic diseases. Moreover, OSA has been associated with multiple adverse health outcomes, including functional impairment, systemic metabolic deregulation, increased risk of falls and fractures, vulnerability to chronic poor health, decreased quality of life, increased morbidity, and nursing home placement, assuring that health consequences of OSA with comorbidities are greater than the sum of its individual components (osteoporosis, sarcopenia, adiposity).

To our knowledge, there has been no clinical trials and interventional studies with nutritional supplementation in individuals with OSA. However, based on observational and epidemiological studies, we contemplate that both OSA and

LGCI could be prevented/managed by nutrition and lifestyle measures. Therefore, this paper addresses the role of both macro- (protein, carbohydrates, and fat) and micronutrients (selected minerals/vitamins) in the prevention/management of both OSA and LGCI. It provides recommendations of intake for each, emphasizing their roles (either beneficial or harmful) on OSA and its components as well as on LGCI. Special emphasis is on minerals: calcium, iron, magnesium, phosphorus, potassium, sodium, zinc and vitamins: A, C, D, K. However, in the absence of evidence-based research, the recommendations provided here, although reasonable (based on existing evidence), need to be validated by the large interventional studies in individuals with OSA representing different ages, sex, and ethnicities, which will better define any potential treatment or prevention for this condition.

Keywords: osteoporosis, sarcopenia, obesity, low-grade chronic inflammation, functional performance, nutrition, macronutrients, micronutrients

VITAMIN D BIOAVAILABILITY - FOOD VS SUPPLEMENTS

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Abstract:
According to recent data, average prevalence of vitamin D deficiency (<20 ng/mL 25(OH)D) in Europe has been estimated to range between 20 and 60% and therefore represents the major public health issue, especially for the high-risk subgroups. Even though, theoretically, enough vitamin D can be synthetised in the skin under sufficient UVB exposure, additional intake from food and supplement is needed in order to acquire optimal status (≥ 30 ng/mL 25(OH)D). Recommended dietary intake of vitamin D is 600 IU; however due to high prevalence of suboptimal status, preventive supplementation with doses up to 4000 IU often recommended. In case of established deficiency higher doses are used for several months, usually ranging from 6000 to 10000 IU. Bioavailability of orally administrated vitamin D depends on the food matrix, chemical form in the supplement (ergocalciferol or cholecalciferol), dosage and supplement formulation. Exact data on the comparative bioavailability of vitamin D from foods and different types of supplements can contribute to optimization of therapeutic outcomes in vitamin D deficient population.

Keywords: vitamin D, bioavailability, dietary intake

ROLE OF VITAMIN D3 AND OMEGA-3 FATTY ACIDS IN DERMATOLOGY

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Abstract:
Vitamin D is integrally connected to the skin for its synthesis, metabolism, and activity. Skin has the capacity to synthesize the biologically active vitamin D metabolite 1,25(OH)2D3, which regulates many physiological processes in the skin ranging from cellular proliferation, differentiation, and apoptosis to barrier maintenance and immune functions. Vitamin D plays an essential role in pathogenesis of different inflammatory and neoplastic dermatoses, it is related to severity, short and long-term prognosis, as well as recurrence of the disease. Consequently, vitamin D analogues have been introduced for the treatment of the hyperproliferative skin disease psoriasis. Recently, sebocytes were identified as 1,25(OH)2D3-responsive target cells, indicating that vitamin D analogues may be effective in the treatment of acne. Other functions of vitamin D analogues include profound effects on the immune system as well as in various tissues protection against cancer and other diseases, including autoimmune and infectious diseases. As vitamin D has the potential to suppress inflammatory responses, enhance antimicrobial peptide activity and promote the integrity of the permeability barrier, vitamin D supplementation provides a possible therapeutic intervention for atopic dermatitis. Maintaining a vitamin D serum concentration within normal levels is warranted in atopic dermatitis, psoriasis, vitiligo, polymorphous light eruption, alopecia areata, systemic lupus erythematosus, and melanoma patients.

Omega-3 polyunsaturated fatty acids (PUFAs) have various beneficial effects on inflammatory diseases. PUFAs from fish oil - eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) posseses the most potent immunomodulatory activities, and are known to demonstrate strong anti-inflammatory effects during allergic and inflammatory diseases. In clinical trials EPA and DHA improve the skin lesions, lower the hyperlipidemia from etretinates, and decrease the toxicity of cyclosporin in patients with psoriasis. There have been a number of clinical

trials assessing the benefits of dietary supplementation with fish oils in several inflammatory and autoimmune skin diseases such as psoriasis, aopic dermatitis and dscoid lupus erythematosus. Many of the placebo-controlled trials of fish oil in chronic inflammatory diseases reveal significant benefit, including decreased disease activity and a lowered use of anti-inflammatory drugs.

Keywords: vitamine D3, omega-3 fatty acids, skin disease

VITAMIN D INTAKE AND STATUS: GLOBALLY AND IN CROATIAN POPULATION

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Abstract:
Introduction: The vitamin D status depends on vitamin D intake through the diet or vitamin D supplements and the production of vitamin D3 in the skin under the influence of ultraviolet radiation. Depending on many factors, between 50 % and 90 % of vitamin D in the body is coming from the production in the skin and the other part is obtained by diet. The use of vitamin D supplements has increased substantially in the recent years.

Vitamin D status is the most commonly assessed by the serum 25-hydroxyvitamin D (25(OH)D) concentration. Serum 25-hydroxyvitamin D (25(OH)D) < 25/30 nmol/L is reflected as deficiency and values <50 nmol/L are reflected as inadequacy. Vitamin D testing has increased substantially in the recent years. Vitamin D status and intake data have been highlighted as a research priority for well over a decade.

Materials and Methods: A narrative literature review of the vitamin D status and intake reports.

Results: In general, serum 25(OH)D is lower with higher latitudes and with darker skin types, but there are exceptions. Studies in many countries worldwide report high prevalence of low vitamin D status. Overall, the prevalence of serum 25(OH)D < 25/30 and <50 nmol/L ranges from 5 up to 18 % and from 24 up to 49 % respectively;

being lower in South America, Oceania and North America and higher in Europe and Asia. Within Europe, vitamin D status usually is better in the Nordic countries than around the Mediterranean. Recent observational studies suggested that approximately 40 % of Europeans are vitamin D deficient and 13 % are severely deficient.

Dietary intake contributes with only the fifth of the recommended intake among Croatian students.

Conclusion and Implication: Vitamin D deficiency and inadequacy are still very common worldwide, especially in specific high-risk population groups.

Keywords: Vitamin D, dietary intake, status, serum 25(OH)D

ROLE OF OMEGA-3 FATTY ACIDS AND THE MEDITERRANEAN DIETARY PATTERN IN CHRONIC FATIGUE SYNDROME

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Abstract:
Chronic fatigue syndrome (CFS) is a debilitating and complex medical condition which has been emerging as a significant health issue worldwide. It is characterized by profound fatigue of unknown cause, which is permanent, and which limits the patient's functional capacity, producing various degrees of disability. Preliminary findings raise concern about a possible future CFS-like pandemic long after SARS-CoV-2 infection recovery, irrespectively of its severity and inflammatory features.

CFS underlying pathology involves the nervous system, energy metabolism, and the immune system. However, the common pathology denominator and initial trigger in these different systems remain unclear. As fatigue is commonly associated with conditions characterized by immune deficiency and/or inflammation, the low-grade inflammation and chronic pro-inflammatory status of CFS patients could cause or aggravate the symptoms of fatigue.

Taking into consideration diversity in potential etiologies and expressed CFS symptoms, diagnosis as well as the treatment of this condition remain challenging. An increasing number of studies indicate the potential of active components of natural foods as anti-fatigue agents pointing out the therapeutic potential of anti-inflammatory and antioxidant food ingredients. The concept of "anti-fatigue diet" includes whole grains, vegetables, fruits, and omega-3 polyunsaturated fatty acids (omega-3), ingredients included in the Mediterranean dietary pattern. Also, increased intake of unsaturated fatty acids and omega-3 through diet and supplementation is included in recommendations for a non-pharmacological approach to the relief of CFS symptoms.

The Mediterranean diet is believed to improve disease-related fatigue by expressing antioxidant activity, reducing inflammatory load and restoring the intestinal microbiota homeostasis. Consumption of omega-3 fatty acids is known to exert favorable health effects on several biological processes such as immune and neuromuscular function as well as cognition. These compounds have the potential to reduce inflammation and promote its resolution.

Promising results in relieving fatigue are likely to be achieved through the synergistic effect of omega-3 and other biologically active components included in the Mediterranean dietary pattern. Therefore, a moderate lifestyle change through the implementation of a Mediterranean dietary pattern, appropriate supplementation and balanced physical activity has the potential among therapeutic strategies for fatigue-sub-health.

Keywords: omega-3 LCPUFAs, Mediterranean diet, chronic fatigue

NEW FORMS OF COMMUNICATING SCIENCE TO PUBLIC

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Abstract:
The European food safety system is considered one of the safest in the world. The European Food Safety Authority (EFSA) collaborates with excellent scientists, and its experts are divided into ten scientific panels, depending on EFSA's area of work. Each panel is attended by 21 leading European scientists, and the panels also form their working groups consisting of experts from the Member States by the sub-topic under consideration. As a result of the growing interest of the general public in the topic of health and food, communicating the scientific insights of these experts has become both important and challenging.

In 2021, EFSA launched a multi-year communication campaign "EU Choose Safe Food". The national holder of the campaign is the Croatian Agency for Agriculture and Food (HAPIH), as EFSA's national contact point. Partners from other relevant institutions in the food safety system are also involved in the campaign (competent ministries, faculties, institutes of public health, Croatian Chamber of Economy, consumer association, nutritionist association, etc.).

The campaign aims to encourage citizens to think critically when choosing food, as well as to raise citizens' awareness of the science behind the high standards set for food safety in the European and Croatian markets. The campaign focuses on health, cooking, and an active lifestyle. The target population is from 25 to 45 years old, with an emphasis on women and young parents.

This campaign aims to utilize the latest insights from the field of communicating food safety to consumers and put a face on science and scientific facts. Therefore, it aims to reach the target population in an informative, simple, and easy-to-understand way. The main communication channels include digital and social media, with influencers as campaign ambassadors too.

The campaign covers various food safety topics and practical advice when buying food, from reading declarations and distinguishing between “best before” and “use by”, to discovering more about allergens, food hygiene, and food contaminants.

Keywords: food safety, science, communication

CD SKILLS PROJECT – IMPROVING CELIAC DISEASE MANAGEMENT

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Abstract:
Celiac disease is a lifelong immune mediated systemic disorder elicited by gluten and related prolamines in genetically susceptible individuals. The treatment is life-long gluten-free diet – a diet that strictly excludes gluten, a protein found in wheat, barley and rye. If untreated, celiac disease can cause severe both non-malignant and malignant complications. Celiac disease affects 1% of population. However, the burden of the disease is much larger: families, friends, kindergartens, schools, food producers, catering providers, and healthcare systems are all affected. This is especially true if patients are not diagnosed early or are not treated appropriately. In this case, they are exposed to higher risk of developing serious complications with additional negative effect on their health. It is estimated that about 80% of patients remain undiagnosed or are diagnosed with substantial delay, increasing a risk of complications, resulting in high morbidity and mortality, low school performance and high work absenteeism. Possible reasons are low awareness and knowledge about the disease, limited access to diagnostic tools, limited opportunities for innovative learning and inefficient information exchange.

CD SKILLS project (Interreg DTP CD SKILLS Improving celiac disease management in the Danube region by raising the awareness, improving the knowledge, and developing better skills) is addressing existing challenges in celiac disease management in the Danube region. Project objectives are to raise the awareness, to improve knowledge, skills and competences of all stakeholders involved in

celiac disease management. During the project, innovative e-learning tools for patients and for health care profesionals have been implemented. The aim is to improve competences of employees working in healthcare sector as well as to empower patients and increase their self-management capacities. In addition, in order to help patients, caregivers, food producing industry and catering services to ensure implementation of strict gluten-free diet, a registry of available gluten-free products has been developed. Gluten-free products available in project partner regions are being uploaded in this registry, which will be available for patients with celiac disease and other interested stakeholders. This will improve patients' quality of life and decrease the burden of the disease.

Keywords: celiac disease, gluten-free diet

VALUE OF NUTRITION EDUCATION BEYOND THE CLASSROOM

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Abstract:
Schoolchildren and adolescents need a good diet in order to grow, develop, be protected from disease and have the energy to study, learn and be physically active. Holistic and coherent school programmes and policies are key to achieve children's human rights to food, education and health. Education has a key role in reorienting students to the current environmental realities, as well as those that we cannot yet predict. In this light, health and sustainable education should not be considered as supplement to educational programming, but rather as a mean of reorienting school curricula. Nowadays it is extremely important to underline the value of education in these fields and to consider it one of the milestones of youth education.

Giocampus is a unique multidisciplinary educational project in Parma (Italy) that since 2002 promotes the well-being of future generations through a path of physical and nutritional education. The project involves children and adolescents throughout the school year and responds to the need for change towards sustainable food lifestyles. Giocampus is dedicated to children and young people in Parma, with the primary goal of promoting healthy lifestyles through structured paths of motor, food, and environmental education. In response to childhood obesity and diet-related health problems the City of Parma created a uniquely broad coalition of organizations ten years ago, where Giocampus plays the main role in promoting the well-being of future generations through a training course that combines physical and nutritional education: as a matter of facts its motto is "Fostering the wellbeing of future generations", a goal suitable for SDG n. 3 "good health and well-being". Another strength of Giocampus is the teaching methodology: the so-called Edutainment. Edutainment indicates forms of communication that make learning processes fun. In this contest, Madegus, acronym for Masters of Taste, in Italian "Maestri del Gusto", is an academic spin-off company that deals with food education and scientific playful dissemination in the field of nutrition. It studies, designs and implements courses, laboratories, educational interventions and special equipment for children in schools.

Keywords: nutrition education, children, adolescents

BITTER FOOD CONSUMPTION IS NOT SIGNIFICANTLY ASSOCIATED WITH BITTER TASTE SENSITIVITY

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Abstract:
Introduction: Bitter taste complexity has been subject of study for almost hundred years as it could impact on dietary preferences. Individuals who perceive bitterness stronger also perceive stronger the other sensory qualities of food. For phenotype

determination exist few methods, among the most often has usually used sensitivity to 6-n-Propylthiouracil (PROP) which represent measurement the suprathreshold of bitter component. Based on previous research, individuals are generally classified as non-tasters, medium tasters and supertasters (the highest sensitivity rate to bitterness). About 25% of western population belong to supertasters. Much research on sensitivity to bitter taste have sought to find connection with the dietary pattern. These findings revealed that variations of human in bitter taste perception, measured by PROP intensity perception have negative correlation with vegetable consumption, which means the more sensitivity to bitterness the less vegetables consumption. Consequently, responsiveness to PROP could predict some food preferences, specifically the bitter ones as the Cruciferous species (kale, broccoli, cabbage etc). The aim of this research was to find relation between PROP sensitivity and Cruciferous vegetable consumption.

Materials and Methods: In determination of taster status was used paper strips impregnated with 6-n-Propylthiouracil. Participants rated bitterness intensity on Label Magnitude Scale; based on result, 261 subjects were clustered in three groups. A self-administered Cruciferous Vegetable Food Frequency Questionnaire (CVFFQ) were aimed to give more information on food consumption and preferences.

Results: Results of this research revealed the approximate distribution of PROP taster groups among adult participants close to the findings of some previous research, almost a quarter of people were supertasters, around forty percent are medium tasters and thirty-five percent are nontasters. This study showed slightly less consumption cooked Cruciferous among supertasters compared to nontasters (53 vs. 56 g/day)

Conclusion: Individuals who tasted PROP as more bitter (supertasters) also perceived vegetables as more bitter but without significant impact on cruciferous consumption.

Keywords: PROP taster status, bitter taste, cruciferous vegetable

PARTICULAR FEATURES OF NUTRITION FOR MARATHON RUNNERS

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Abstract:

Endurance events have experienced a significant increase in growth in the new millennium and are popular activities for participation globally. The marathon is considered one of the most demanding endurance events, imposing an enormous amount of physiological stress on bodily structures, metabolic machinery, and organ systems. Scientific evidence has conclusively shown that marathoners require special nutritional strategies to maintain performance and health. The professionalization of a marathon as a sport must include an appreciation for how and where nutrition can positively affect training adaptation and/or competition performance. Marathon runners can uniquely benefit from nutritional strategies that support their training responses and/or maximize their performance during the actual race.

The most likely contributors to fatigue are dehydration and carbohydrate depletion, whereas gastrointestinal problems, hyperthermia, and hyponatremia can reduce endurance

exercise performance and are potentially health-threatening. Promising strategies during marathon training include the adequate provision of dietary energy, macronutrients, and selected micronutrients to meet the increased requirements of prolonged distance running. Given that muscle glycogen is limiting during a marathon race, optimizing carbohydrate (CHO) intake and delivery is of maximal importance so runners should implement carbohydrate loading strategies that serve to maximize pre-race muscle glycogen storage capacity.

A personalized and practiced pre-race and race nutrition plan should balance the benefits of fluid and CHO consumed within practical opportunities, against the time, cost, and risk of gut discomfort. Sports foods (drinks, gels, etc.) may assist

in meeting training/race nutrition plans, with caffeine, and, perhaps nitrate being used as evidence-based performance supplements.

Keywords: marathon, nutrition

THE IMPORTANCE OF PROTEIN INTAKE FOR RUNNERS

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Abstract:
For the human body, adequate protein intake is crucial. Proteins are essential components for structure and metabolism of muscle, bone and connective tissue. Proteins and amino acids also play key roles in cell metabolism, hormonal balance, the immune system and energy metabolism. In general, protein is often considered essential mostly for athletes involved in weight training in order to promote muscle growth. In relation to the endurance athlete however, protein intake is equally as important. In this situation the stress of endurance exercise creates a metabolic signal to instruct muscles to make new proteins involved in aerobic metabolism.

Endurance exercise also causes many of muscle proteins to actually break down (referred to as protein degradation). In the context of the endurance athlete, presence of adequate protein feeding is crucial for creating the enzymes that are required in order to provide energy from the breakdown of carbohydrate and fat as well as to promote muscle repair and growth.

Perhaps more important than total daily protein intake, however, is the pattern and timing of ingestion of protein throughout the day. In addition to high quality protein foods, protein supplements can be an extremely useful addition to the endurance athlete's toolkit.

Keywords: protein intake, endurance, nutrition

MALNUTRITION IN RUNNERS

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Abstract:
It is difficult to say that runners are malnourished, as we do not have a validated screening tool to identify runners who are nutritionally at risk nor a tool to diagnose malnutrition in runners like we have Global Leadership Initiative on Malnutrition (GLIM) criteria for patients. However, studies show that runners endanger their health due to inadequate energy intake. The health-related symptoms of insufficient energy intake in athletes are similar to those in malnourished patients.

In clinical practice, we see that majority of athletes' health-related problems are similar to clinical manifestations of malnutrition. Malnutrition leads to altered body composition, results in decreased physical and mental function, and worsens clinical disease outcomes in patient. Malnutrition has a negative impact on many bodily functions: cognitive, muscular, cardiac, renal, respiratory, immune and gastrointestinal function. Unfortunately, many of these organ systems are also affected in athletes with relative energy deficiency syndrome in sport (RED-S). RED-S is defined as impaired body functioning due to relative energy deficit. A key pathophysiological mechanism of RED-S is low energy availability (LEA). Athletes with a long-term LEA may develop nutritional deficiencies, chronic fatigue, and an increased risk for infectious diseases. Health-related complications are similar to the consequences of malnutrition: cardiovascular, gastrointestinal, endocrine, reproductive, skeletal, renal, nervous, endocrine systems and psychological disorders. Long-term LEA causes metabolic dysfunction shown by a reduced muscle protein synthesis and contributes to the development of dyslipidemias and endothelial dysfunction, thereby increasing the risk of cardiovascular disease.

In our study done on 150 Slovenian athletes (we also included runners), the majority (87%) of the athletes demonstrated at least one health-related symptom described by the RED-S-model. Long-distance runners are slightly more at risk for RED-S related health problems, as their body weight has a significant effect on

performance. Studies also showed the prevalence of LEA among elite long-distance male runners was 25% and in female runners 31%. As the prevalence is high, we urgently need a more specific and simple nutritional screening tool that will allow us to identify athletes at nutritional risk or athletes who have RED-S.

Keywords: malnutrition, runners, GLIM criteria, RED-S

SUPPLEMENTATION, HYDRATION AND ATHLETIC PERFORMANCE OF RUNNERS

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Abstract:
Supplementation and hydration play an important role in sports nutrition and preparing athletes to perform to their best abilities. Runners must, during training and race, endure numerous physiological stresses (substrate depletion, muscle damage). These problems can be assessed with proper nutritional management. In addition to the usual daily water athletes need to replace sweat losses. That is why water, potassium, calcium and magnesium are of key interest for best sports performance. Depending on the athlete, the type of exercise, and the environment, there are different approaches to this problem.

Keywords: hydration, supplementation, sprinters, endurance athletes

ORGANIC, ECO AND BIO FOOD - SYNONYMS OR DIFFERENT MEANINGS?

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Abstract:
The beginnings of organic farming in Germany date back almost a hundred years. It has been growing in popularity since the 1980s, and its popularity continues to grow, especially in the 21st century. Organic farming allows products to be obtained without residues of pesticides or other undesirable synthetic substances, as application of such agents is banned in organic production, while in non-organic farming it is allowed. This is considered more environmentally friendly and sustainable agriculture, which has been the focus of worldwide attention for some time. In addition, the number of health- and environment-conscious consumers is increasing, which leads to an overall growing interest in organic products. On the other hand, organic farming is characterized by lower yields and more complex production, which means that the products are more expensive, usually several times more expensive than non-organic products. Recently however, price has ceased to be the main criterion in food selection for a growing number of consumers, which contributes to an increase in demand for organic products despite their price. Accordingly, the organically farmed area has continuously increased and the number of producers has also increased, which has made it necessary to standardize production. Standardization also raises the question of terminology and methodology, because over time various agricultural concepts have been developed with the aim of sustainability and environmental protection, referred to as organic, organic-biological, biodynamic, organic, and so on. First, ecological agriculture was defined and then these principles were accepted in the regulation of the organic production system. According to the current European legislation, the different terminology is only a linguistic issue because the EU regulations define only organic production, but also list synonyms in other European countries (language), where it is stated for example: DE: ökologisch, biologisch. NL: biologisch. PL: ekologiczne. HR: ekološki. IT: biologico. EN: organic etc. Additionally, there are numerous scientific studies dealing with the comparison of crops from organic and

non-organic farming, their chemical composition, biological active compounds or sensory properties, and the results and conclusions are diverse. All these topics will be discussed in more detail in the presentation.

Keywords: organic food, history, European legislation

GMO IN CROATIA

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Abstract:
Since the start of commercialisation in 1994 we are dialling with the challenges of control and monitoring of genetically modified plants trough policies and laboratory analysis. The number of hectares under genetically modified crops around the world is constantly increasing, also the nuber of new techniques of genetic modification. The existing legislation is complex and based primarily on risk assessments and the demanding and longtherm authorization process for each modification.

The increasing number of genetically modified crops and the development of new types of genetic modifications pose a challenge for control and monitoring through both policies and laboratory analyzes. In accordance with national regulations, the Republic of Croatia uses all available mechanisms to preserve its agricultural and food production free from GMO's. Croatia have operationalised an EU "opt-out" clause in relation to the cultivation of genetically modified crops in all of their territory. In addition to restrictive legislation, one of the most important mechanisms is the national monitoring carried out by the official inspection bodies and the Ministry of Agriculture in cooperation with the Croatian Agency for Agriculture and Food. Trougt these activities since 2015 more than 4000 samples of seeds and green leafs have been analyzed.This approach allows seeing the real state of the Croatian market and agricultural production, which is expected to be completely free from the presence of genetically modified organisms.

Keywords: GMO, legislation, challenges

ORGANIC, BIO AND ECO FOOD AND PESTICIDES

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Abstract:
Organic food production in EU is defined in Council Regulation (EC) No 834/2007 of June 28, 2007 on the organic production and labeling of organic products as "The use of the production method compliant with the rules established in this Regulation, at all stages of production, preparation and distribution." By the definition organic production means a sustainable agricultural system respecting the environment and animal welfare, but also includes all other stages of the food supply chain. The 'eco' label on a product, means it was made according to the European regulation with no pesticides, transgenic or chemical fertilizers used during the production. The term 'bio' indicates products that have not been genetically modified and label 'organic' refers to a production process in which there were no kind of pesticides or chemical fertilizers involved. The EU's organic market has constantly expanded and is now worth about €37.4 billion per year. Although the EU's organic farmland has increased over the years, it still uses only 7.5% of the total agricultural area (in Croatia, 7.18% in 2019.). The EU plan is gaining it up to 25% till 2030. The difference between demand and production is covered by increasing imports from China, Ukraine, Dominican Republic and Ecuador which are the main EU trade partners for organic food imports. While the use of pesticides in organic agriculture is restricted and organic farmers are only allowed to use naturally-derived pesticides, made from plants, animals, microorganisms, or minerals residues, in conventional fruits and vegetables constitute the main source of human pesticide exposures. If compareing organic vs. conventional food production with respect to parameters important to human health organic food consumption may reduce the risk of allergic disease and of overweight and obesity. This evidence is not conclusive due to likely residual confounding, as consumers of organic food tend to have healthier lifestyles overall. Differences in the composition between organic and conventional crops are limited, such as a modestly higher content of phenolic compounds in organic fruit and vegetables, and likely also a lower content of cadmium in organic cereal crops.

Keywords: eco label, food, lifestyle, health, pesticides

PAST(IT)A

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Abstract:
How did I manage to combine IT and agriculture? Being a programmer and working on the land usually do not go together, but agriculture does not ask what time it is now, if you have free time, or if today is a holiday.

The answer was simple: technology will help me do agriculture. On our family farm, sweet potato is grown from the office. The technology is used to manage the lighting, humidity, irrigation and ventilation, wirelessly from the office. We produce sweet potato pasta. How did pasta come about? “Oh, you have a hole ...” “Oh, you’re bent ...” “Oh, you’re too big”.

As we grew, so did the quantities of second-class sweet potatoes. In pasta, every flaw is removed. Produced in a small plant with a lot of love. And it’s great.

Keywords: agriculture, sweet potato, pasta

NUTRITION IN THE FIRST 8000 DAYS – WHY IS IT IMPORTANT?

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Abstract:

Introduction and purpose: Aging is one of the greatest public health challenges today, and it has been shown to be influenced by nutrition in the first years of life. Genetic, nutritional, and environmental factors influence impaired gene expression, altered metabolite levels, and accumulated molecular damage. These changes are considered causative factors in aging and are thought to determine human lifespan. Therefore, nutrition in early childhood is a key component that influences our health and has the potential to extend lifespan.

Content presentation: There is growing awareness that healthy eating habits and lifestyle in the pre-pregnancy period (for both women and men), during pregnancy, breastfeeding, and up to the child's second year of life (the first 1000 days), and at the beginning of adulthood (the first 8000 days) determine optimal health throughout of the child's life (reducing the risk of obesity, diabetes, allergies, hypertension, cardiovascular and metabolic diseases). This effect has been observed not only during childhood but also beyond adulthood and is referred to as metabolic or nutritional programming.

However, addressing the chronic disease epidemic requires a comprehensive approach across the life course. In addition, a balanced diet high in whole grains, vegetables, fruits, and nuts is associated with a lower risk of all-cause mortality, whereas a high intake of (red) meat, especially processed meat, is positively related to all-cause mortality.

Conclusions: Although adequate nutrition is essential for good health, it remains unclear what impact different nutritional interventions may have on prolonging good quality of life. Nutrition interventions should be person-centered and

emphasize the need to better understand an individual's intrinsic capacity, his or her functional abilities at different stages of life, and the impact of the mental and physical health and environment in which he or she lives. We must also remember that the impact of nutrition on individuals begins before birth, so interventions should start with previous generations. The health and well-being of the next generations must therefore be a priority for all of us, as our current dietary habits help determine the fate of our descendants.

Keywords: nutrition in the first 8000 days, nutritional programming, healthy aging

COMPLEMENTARY FEEDING AND DEVELOPMENT OF CHRONIC DISEASE

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Abstract:
The complementary feeding period is the time when infants transition from an exclusively milk-based diet to an increasingly diversified diet with plant- and animalbased foods; the period ranges from approximately 6 to 24 months of life. It has been recognized as a window of opportunity for promoting health and for preventing acute and chronic disease. There is an increasing body of evidence addressing the pivotal role of nutrition, especially during the early stages of life, and its link to the onset of chronic non-communicable diseases, such as obesity, hypertension, diabetes, and allergic diseases. It is clear that the way in which a child is introduced to complementary foods may have effects on the individual's entire life.The incidence of certain noncommunicable, chronic diseases in childhood is increasing. Although chronic diseases historically have been considered more common in high-income economies, it is becoming clear that low- and middle-income countries are also affected by increasing rates of other chronic diseases. Therefore, it is of global importance to understand the potential relationship between early nutrition and the development of chronic disease.

Keywords: infants, complementary feeding, chronic disease

NUTRITIONAL RISK IN INFANTS WITH ALLERGIES

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Abstract:
Food allergy is an adverse immune-mediated response, which occurs reproducibly on exposure to a given food (food components, most likely proteins).

The most common food allergies in children are allergies to cow's milk, egg, wheat, soy, tree nuts, peanuts and fish, but can occur to any type of food allergens. Food allergy can be to one particular food allergens or to several (multiple food allergies).

The current guidelines of the leading European and American institutions for allergy and immunology about food allergy prevention are for all mothers to provide a normal diverse and high-quality diet without restrictions during pregnancy and lactation. It is recommended to support breastfeeding as much as possible (for at least during the first 4-6 months of infant's life) or if it is not possible, infants at high-risk of allergy can be recommended a hypoallergenic formula. It is also recommended not to postpone the introduction of allergenic foods after 6 months of age, irrespective of atopic background.

It is important to point out that food allergy itself carries a high risk of certain macro and micronutrients deficiency development, especially since this age group is particularly vulnerable. The slightest mistake, incomplete approach or unjustified diet can affect the occurrence of nutritional and/or energy deficits that might consequently endanger the proper growth, development and health of the child.

The most common risks of nutritional deficiency in infants can be to all macronutrients especially proteins, total and essential fatty acids, fat-soluble vitamins, B vitamins, calcium, magnesium, and iron, later on during weaning period.

If there is a suspicion or development of a food allergy (especially in children at increased risk of developing allergies), it is necessary to seek professional help from an allergist and their team that includes a nutritionist who deals with nutritional

allergies. The role of nutritionists in the diagnosis and dietotherapy of food allergies is multiple, especially when it comes to suspected nutritional allergies in infants and children, but also the monitoring and treatment of proven food allergies.

Recent studies show that oral immunotherapy is a promising treatment for food allergies and it is already carried out in hospitals under the guidance of allergy and immunology professional team, including nutricionists.

Keywords: food allergy, nutritional risk, infants

FEEDING DISORDERS IN INFANTS

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Abstract:
Normal feeding and eating development is a successful integration of various bio-physical functions, psychomotor development and interpersonal relationship development. It includes (1) signaling hunger and satiety to parent or caregiver, (2) transition to different feeding methods, tastes and food compositions and (3) mastering self-feeding techniques and it can be achieved only with successful communication with parent or caregiver. Problems in any of these factors (even one or more) can attribute to a disruption of the normal feeding development and cause feeding problems and/or feeding disorders. Avoidant/restrictive food intake disorder is an eating or feeding disturbance as manifested by persistent failure to meet appropriate nutritional and/or energy needs associated with one significant weight loss and nutritional deficiency, dependence on enteral feeding or oral nutritional supplements, marked interference with psychosocial functioning but not due to unavailability of food/cultural norms, medical condition or another mental disorder. The experience of feeding effects every child and parent, whether child has limited appetite, selective intake or fear of feeding, and depends of parent/caregiver feeding style. Assessment, diagnosis and treatment of the child's condition requires a multidisciplinary approach with team that includes a pediatrician, psychologist, dietitian, speech and language therapist or/

and occupational therapist, as well as other specialists if needed. The main goal is to break the vicious circle where parent puts focus and pressure on feeding while child resists and refuses to eat. Multidisciplinary team becomes “third part” in parent-child relationship with four main tasks: (1) to understand the feeding process from the perspective of the child and family as well to look at the problem from the wider perspective, (2) to identify and create strategies for the treatment that affect feeding or eating, (3) to help the child to master feeding skills with trust and inner motivation and to empower and (4) to support parents in their role of the one who cares about the child.

Keywords: primary feeding disorders, infants, multidisciplinary approach

DIFFERENT SIDE OF STORY: OBESITY PANDEMIC AS A BUSINESS MODEL

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Abstract:
Obesity is one of the key factors in the increased risk of morbidity and mortality in the population of developed and developing countries. That the situation was already recognized by the WHO as early as 1997, when obesity was declared a global pandemic. At the same time, it can be seen that the WHO, together with countries around the world (https://pubmed.ncbi.nlm.nih.gov/19136980/) is still unable to develop a sustainable strategy to promote more intense physical activity and the transformation of eating habits from a high-calorie to a low-calorie diet. Such a situation poses a major problem for public health systems around the world. However, when obesity is approached as a serious public health issue, the subject matter remains largely at the level of academic discussions within the circle of nutritionists and physicians.

From another, business perspective, obesity represents an opportunity to develop new business models that enable the sustainability of companies and the development of new economic niches that significantly contribute to the development of the global economy. When comparing budgets for marketing activities that are allocated by major food producers with the marketing budgets of health care systems, it is evident that health care systems are at a great disadvantage in order to respond to the challenges posed by the food industry. From that point of view, success of health prevention activities that would reduce obesity is illusionary.

This paper provides an overview of the food industry market that is placed in the context of the public health systems. An overview is given of the business models and marketing strategies applied by the food industry in the context of public health activities with the aim at prevention of the obesity pandemic. In conclusion, this paper points to possible future strategies that would enable the public health system to be more successful in combating obesity.

Keywords: obesity, marketing strategy, public health, food industry

MICROBIOTA AND OBESITY

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Abstract:
We all know that genetic and environmental factors are important underlying causes of obesity and other metabolic diseases, and because these factors are complex, it is difficult to find suitable and effective treatments. Gut microbiota such as bacteria (and other microorganisms present in other niches e.g. in the oral cavity) are also involved in the development of these pathologies, yet the mechanisms and precise causality are still mainly unknown. As species, us humans (and other mammals) are exceptionally good at keeping our bodies in balance even in cases when our environment changes dramatically. The thing which allows this is called homeostasis - a set of regulatory processes (essentially chemical interactions and reactions) that keeps us from falling apart. For this to work we need to shield our internal chemistry from the environment – we need a wall between us and whatever is outside that wall. Our "Great wall" is composed of two major barriers, skin and gut. On the other hand, single-celled organisms often have to secrete chemicals across their cell membranes to the outside in order to digest food by breaking it down on the outside in order to be able to transport it inside their cell. The interplay between us as a multi-cellular organism and our single-cell hitchhikers is called exochemistry. This "external" chemistry is something that was central to our evolution, all cells making up a complex organism communicate by sending chemicals across their membranes to receptors in the membranes of other cells. Our relationship with microbiota is also defined by such chemistry. Is it possible to identify key bacterial species and create a database of "healthy" bacteria, can we manipulate the bacterial community according to metabolic and clinical needs? These are some of the question science is eager to solve in order to provide microbiota based treatment for obesity and other related complications. In this short talk I will try to provide a critical outlook on these topics, address the therapeutic potential of microbiota in the treatment of obesity and share some ideas on how to tackle this complex microbiota-host interaction network.

Keywords: gut microbiota, obesity

TWO PANDEMICS TOGETHER - COVID-19 AND OBESITY

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Abstract:

Introduction: A pandemic is defined as "an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people" (Bonneux L, Van Damme W., 2010). Obesity has become pandemic owing to an obesogenic environment (inexpensive calorie dense food, technologies and structure of communities that reduce or replace physical activity, and inexpensive nonphysical entertainment) and excessive emphasis on low fat intake resulting in excessive intake of simple carbohydrates and sugar. With COVID-19 and its' lockdown measures which brought up other factors influencing obesity (fear, deprivation, emotional eating), those two pandemics became as autoimmune diseases, one is looking for / affecting the other.

Materials and Methods: The research method used is the analysis of literature sources on the topic: available scientific and professional literature, databases (Medline, Embase, Science Direct, PubMed) with the special review to the published data of #COVIDiet cross-national study.

Results: The most important findings showed that the higher odds of weight gain were associated with females, increased consumption of sugary drinks, homemade pastries and fried food, cooking at home and eating more than usual, increased snacking and alcohol consumption, decreased physical activity.

Conclusion: Dietary changes during the lockdown to a certain degree reflected pre-existing (un)healthy eating habits. Overweight, obese, and older subjects tended to gain weight more frequently, whereas those with underweight tended to lose it further. Findings highlight the need for organized nutritional support during future epidemic-related quarantines, particularly for the most vulnerable groups.

Keywords: pandemic, COVID-19, obesity, nutritional support

INTUITIVE EATING AND MINDFUL EATING

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Abstract:
Managing obesity with restrictive diets can help, but only temporarily. If there is no change in eating behaviour, it's easy to go back to old habits and get stuck in cyclic dieting which can result in a yo-yo effect. Obesity is often associated with an unhealthy relationship with food, emotional eating, stress eating and other types of disordered eating. Some studies suggest that Intuitive eating and Mindful eating can help in managing disordered eating and improving relationship with food, and therefore should be added in weight management programs.

Intuitive eating and Mindful eating are approaches to eating that can help in a long-term nutrition and lifestyle change. Intuitive eating consists of 10 principles, which are: 1) Reject the diet mentality, 2) Honour your hunger, 3) Make peace with food, 4) Challenge the food police, 5) Discover the satisfaction factor, 6) Feel your fullness, 7) Cope with your emotions with kindness, 8) Respect your body, 9) Movement - feel the difference, 10) Honour your health - gentle nutrition.

Mindful eating comes from mindfulness, which is a practice of deliberately paying attention, being fully aware of what is happening inside the body, heart, mind and in the environment. Mindfulness is awareness without criticism or judgement. Mindful eating is an experience that engages all of our senses, our emotions and our mind in choosing, preparing and eating food. There are five principles of mindful eating: 1) Eat slowly, 2) Hunger and satiety awareness, 3) Eat the right amount of food, 4) Reduce distractions while eating, 5) Savour food.

Although Intuitive eating and Mindful eating are two different approaches, they both serve the same purpose - to improve the relationship with food. The goal of these methods is not weight loss, although it is possible. Mindful eating interventions can be effective at treating disordered eating associated with weight gain. Intuitive eating is inversely associated with overweight and obesity, which supports its importance in weight management

Keywords: intuitive eating, mindful eating, obesity

NUTRIGENOMICS AND PERSONALIZED NUTRITION – ARE WE READY?

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Abstract:
We are currently not reaping all the benefits of the protective potential that diet has on development of chronic diseases. Dietary guidelines, DRIs and individual counseling that we are using in nutritional practice offer only partially individualized dietary advice. Further individualization of that advice th¬¬rough nutrigenomics might enhance its quality and benefit its recipients.

Nutrigenomics is a tool for dietary optimization through individualization. It is a prerequisite for personalized nutrition, nutrition tailored to our genes. It can also explain outliers, i.e. the individuals that fall outside of the norms regarding their response to dietary stimuli, and offer alternative solutions to their dietary problems.

Numerous gene-diet interactions have been documented. Those interactions are mostly correlative, without a confirmed causal relationship. Therefore, the knowledge is still fragmentary. Three main questions regarding nutrigenomics appear. The first question is whether we can correctly identify the causal interactions and create actionable advice based on the data. The second one is whether nutrigenomics can provide us with additional value over traditional advice given by nutrition professionals based on non-genetic dietary assessment. The third question is whether personalized nutrition adds value bigger than its cost at this moment in time.

Even though nutrigenomics and personalized nutrition are already in use, many scientists warn against their premature use. Genetic testing is currently for the most part an unregulated market with many unsupported claims and inadequate explanations of the results and their implications. Without a revolution in statistical methods and computational power, we won't be able to make the necessary breakthrough towards understanding the field and correctly implementing the advice it produces. We should be cautious about creating a bad rep for the field by using it before it matures.

Keywords: nutrigenomics, nutrigenetics, personalized nutrition

CANNABIS SATIVA L. – FROM A PROHIBITED DRUG TO A NUTRITIONAL SUPPLEMENT

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Abstract:
Cannabis sativa L., commonly called hemp represents a herbaceous anemophilous plant that belongs to the Cannabinaceae family with a long history of use as food, feed, fiber, oil, and medicine. Throughout its long history of use, from around 12 000 years ago to the present day, the Cannabinaceae family of plants has gone through many ups and downs, especially through the 20th century which included bans on the use of hemp in various areas. However, today, due to better knowing the composition of hemp, its effects on the body and the endocannabinoid system (ECS) hemp is increasingly used as an ingredient in food preparation, as well as a dietary supplement for the prevention and treatment of inflammatory and chronic degenerative diseases. Cannabinoids include more than 100 components of various positive health effects, the most famous of which are cannabidiol (CBD) and delta-9-tetrahydrocannabinol (THC), as the most psychoactive component that is one of the "culprits" for the bad reputation of cannabis.

In addition to that, it is important to note that Cannabis sativa L. has a high nutritional content, which is why all parts of the plant, including the stem, seeds, roots and flowers, have been used for food, feed, and therapeutic purposes for a long time. In today's market, hemp is used in a variety of food items, including bakery, confectionery, beverages and dairy, most often as plant or seeds. Due to a high market growth for hemp-containing products where bioactive components can be concentrated during production, it is important to optimize the possibility of positive health effects while at the same time reduce the possibility of safety hazards. The benefits but also possible disadvantages of such developed products must be examined using well-designed, randomized, placebo-controlled, double-blind research studies on which regulatory authorities should make decisions about products available on the market as well as their health claims.

Keywords: hemp, cannabinoids, health effects

KETOGENIC DIET IN ONCOLOGY PATIENTS

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Abstract

Cancer is one of the greatest public health challenges worldwide and we still lack complementary approaches to significantly enhance the efficacy of standard anticancer therapies. One of the essential strategies during cancer treatment is following a healthy diet program. The ketogenic diet (KD) has recently emerged as a metabolic therapy in cancer treatment, targeting cancer cell metabolism rather than a conventional dietary approach.

The KD is a very high-fat, low-carbohydrate diet that induces a pronounced shift in metabolism, leading to the production of ketone bodies. The predominant substrates for ketone synthesis are fatty acids, although a small proportion of ketones is synthesized from leucine and in phenylalanine-tyrosine metabolism. The macronutrient composition in KDs may vary, defining different ways to reach nutritional ketosis. Clinically used KDs mainly have a fat to carbohydrate and protein ratio of at least 2:1 to 3:1, meaning that the percentage of calories from fat is a minimum of 80%.

Most preclinical and some clinical studies support the use of the KD as an adjuvant cancer therapy. One clear benefit of the KD is its potential to increase the response to therapeutic drugs, which has been widely demonstrated in vitro and in vivo. Recent research findings showed potential effects of the KD in cancer including a growth-limiting effect on tumors, the protection of healthy cells against chemotherapy or radiation damage, promoting chemotherapeutic toxicity toward cancer cells, and a decrease in inflammation.

Based on the available evidence, KDs are overall safe and can improve patient's quality of life. In comparison with anticancer drugs and standard treatments, KD is inexpensive, well-tolerated and adequately easy to apply. However, use of the KD, especially in patients, should be meticulously planned and monitored by physicians and qualified dieticians.

Future clinical trials with a large number of patients are required to better understand the mechanisms behind KD therapy and its use in cancer management.

Keywords: ketogenic diet, adjuvant cancer therapy, anticancer diet

PHYTO-AROMATHERAPY AS SUPPORTIVE THERAPY IN ONCOLOGY PATIENTS

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Abstract:
Oncology patients often take supplements. These are usually various food supplements with minerals, vitamins or plant extracts. Understandably, patients with such diagnoses reach for different options in combination with conventional therapy. However, the question is how useful or harmful such supportive therapy is and whether those products have only good marketing developed through social media and forums.

Before even reaching for herbal or any other dietary supplement, we need to answer a few questions: whether a particular supplement should be used with the existing therapy or whether there is a possibility of interaction or contraindication, and is there some evidence that it can improve certain parameters or the general patient's condition.

In the lecture, we will consider the herbal origin of drugs used in oncology therapy and the problem of "panacea". Moreover, special emphasis will be put on various supplements that have some level of evidence and can help with certain conditions.

The presentation will introduce the possibilities with which we can influence certain parameters of the immune system. We will also discuss herbal therapies as options for preventing or reducing the side effects of chemotherapy or other forms of treatment.

Frequently used plants will be mentioned also, such as milk thistle (Silybum marianum), turmeric (Curcuma longa), narrow-leaved purple cornflower

(Echinacea angustifolia) and Mongolian milkvetch (Astragalus membranaceus). We will also talk about commonly used vitamins and other types of supplements such as beta-glucans and probiotics.

Keywords: Oncology, immunity, plants

DIET THERAPY IN PATIENTS WITH COLORECTAL CANCER

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Abstract:
Colorectal cancer is the third most common cancer in the world and it is one of the most common tumors in western countries. Bosnia and Herzegovina also do not lag far behind these statistics. This cancer has extremely high correlation with diet quality. The western diet, high in red meat and saturated fats and low in fiber, has long been implicated as an important risk factor in the development of colorectal cancer.

Eating problems during cancer treatment are common and contribute to malnutrition. It is known that weight loss before or during cancer treatment can negatively influence treatment outcomes, even in people who are overweight. Symptoms that usually experience patients with colorectal cancer are loss of appetite, feeling full too quickly, nausea, constipation, diarrhea and frequency of bowel movements and sometimes dry mouths.

Previous research has been stated that malnutrition and hypoalbuminaemia significantly increases the toxicity of chemotherapy/ chemoradiotherapy. In contrast, an early assessment of nutrition and implementation of nutritional support, if necessary, can bring significant clinical benefits. Personalized nutritional counseling and support for physical activity is also recommended by the European Society for Clinical Nutrition and Metabolism (ESPEN) Clinical Guideline on nutrition in cancer. The aim of nutritional support is to prevent malnutrition, to stabilize weight and prevent loss of muscle mass and function, to

improve treatment tolerance and outcomes including quality of life. Counseling is recommended to support dietary adaptation using regular foods, fortified foods and oral food supplements to achieve the intake of 25–30 kcal/kg/day and 1.2–1.5 g protein/kg/day or intake based on an estimate of energy needs. Most frequent challenges of nutritional counseling are how to explain reasons for and agree goals of nutritional recommendations and to motivate the patient to adapt to the nutritional demands of their cancer. Nutritional intervention should begin with a nutritional status assessment, anthropometric measurements, information on the patient's eating habits, current nutritional problems, and a specific treatment involved.

In conclusions, the evaluation of the baseline nutritional status of patients with CRC should be a part of routine clinical practice.

Keywords: diet therapy, colorectal cancer

3. POSTER SECTION

NUTRITIONAL MANAGEMENT OF PAEDIATRIC CANCER PATIENTS – A CASE STUDY

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Introduction: Cancer is considered a rare disease in children and adolescents, but its incidence is increasing and it is still the leading cause of death. Malnutrition at diagnosis and during cancer treatment is estimated to be as high as 50%. Therefore, the importance of nutritional status (NS) in paediatric cancer patients (PCP) concerns its potential impact on disease progression, survival, and quality of life of survivors, as well as predisposition to other chronic diseases. This fact emphasises the need for scientific management and early and appropriate NS by a clinical dietitian (CD).

Materials and Methods: A 13-year-old training judoka was diagnosed with a malignant peripheral nerve sheath tumour in 2021. Treatment included surgery, chemotherapy, and radiation. Clinical data on NS and dietary intake were collected using an in-house electronic health record system (ThinkClinical, Better, Slovenia) with integrated World Health Organisation (2006) growth charts and a 24-hour dietary recall. Body composition was measured with bioelectrical impedance analysis (Akern, BIA 101 BIVA). Nutritional management (NM) included weekly monitoring of anthropometric measures, including BIA, and estimation and optimization of her energy and protein requirements by appropriate enteral nutrition, according the osmolarity, nutritional value, volume and duration of continuous enteral feeding.

Results: The patient's body weight was 72 kg (BMI/age z-score>+3) at diagnosis and 58 kg (BMI/age z-score>+2) at hospital discharge. Within two months, she lost 14 kg of body weight, mainly at the expense of muscle mass, despite a good appetite and administration of oral nutritional oral supplements. She required parenteral nutrition (PN) until percutaneous endoscopic jejunostomy was indicated. With adequate NM and continuous monitoring, the patient maintained optimal NS without PN support and spent more time at home.

Conclusion: NS is an important component of multidisciplinary management of PCP, in which CD plays an important role. Regular attendance and monitoring of children NS by CD ensure appropriate and individualised nutritional care for PCP, which has a significant impact on reducing hospitalisation, hospital costs, and recurrences, and has decreased the use of PN.

Keywords: paediatric cancer patients, nutritional status, nutritional management, multidisciplinary team, clinical dietitian.

PREVALENCE OF SWALLOWING DISORDERS AND MALNUTRITION AMONG NURSING HOME RESIDENTS

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Introduction: Physiology of swallowing changes with aging. Swallowing disorders especially in elderly may lead to malnutrition or a disabling condition and may cause the inability of individual to self care from himself. This study aimed to investigate the prevalence of swallowing disorders and relate them to the nutritional status and possible malnutrition in the nursing homes residents.

Materials and Methods: The study included n=48 nursing home residents 82.1±6.4 years; body mass index (BMI) 31.5±10 kg/m2; 69% females. The swallowing abilities and nutritional status were assessed by validated questionnaires: The 10-item Eating Assessment Tool (EAT-10), Modified Swallowing Assessment (MSA) and Mini Nutritional Assessment Short (MNA). Nutritional status was assessed by the Mini Nutritional Assessment Short (MNA®-SF) and Long Form (MNA®-LF).

Results: Results of EAT-10 and MSA showed that 33% and 44% residents had difficulty swallowing, respectively. Based on the MNA®-SF, the prevalence of malnutrition was 8% and the risk for malnutrition was 42%. The prevalence of well nourished participants was 50%. However, administering the full MNA®-LF showed the prevalence of malnutrition of 4% and risk for malnutrition of 54%. The prevalence of well nourished participants was 42%.

Correlation analyses showed significant negative relations between EAT-10 and MNA®-LF (r=-0.429, p<0.01) and EAT-10 and MNA®-SF (r=-0.343, p<0.05)

Conclusion: Based on our results, residents with swallowing problems were at higher risk of malnutrition, indicating that dysphagia may lead to malnutrition or inadequate nutritional status among elderly nursing homes residents. Use of the full MNA®-LF might be more efficient for assessing nutritional status in nursing home residents.

Keywords: dysphagia, swallowing disorders, malnutrition, elderly, nursing home

BODY IMAGE AND PREVALENCE OF ORTHOREXIA NERVOSA IN YOUNG POPULATION IN CROATIA

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Introduction: The prevalence of eating disorders in young people is steadily increasing, which brings orthorexia nervosa into focus, especially in pandemic and stress-related periods. Therefore, the aim of this study was to determine the prevalence of orthorexia nervosa in young people and relate it to anthropometric parameters, eating habits and perception of body appearance.

Materials and Methods: This study included 191 participants aged 18-24 years, of which 85% females. Data on anthropometric parameters of the participants were collected (body mass and height, from which body mass index was calculated), while their eating attitudes were evaluated by using 5-point scale. The prevalence of orthorexia nervosa was assessed using the ORTO-15 questionnaire, while the Physical Appearance Comparison Scale - Revised (PACS-R) was used to assess participants appearance comparison tendencies with other people.

Results: It was found that 38.2% of the respondents had orthorexia nervosa. There were no significant differences in the body mass index between the participants with or without the diagnosis of orthorexia (p=0.276). Nevertheless, in the group of participants not diagnosed with orthorexia, those with adequate body weight

predominated (89.9%), while among subjects diagnosed with orthorexia the proportions of undernourished (8.2%) and overweight participants (15.1%) were higher. Participants with orthorexia found a healthy diet more important than subjects without orthorexia (p=0.001), while there were no differences in self-rated diet quality between the two groups (p=0.815). Furthermore, there was a negative correlation between the results of PACS-R and ORTO-15 (p<0.01). Ultimately, there was a difference in the results of PACS-R between participants with or without the diagnosis of orthorexia (p=0.032).

Conclusion and Implication: High share of participants was diagnosed with orthorexia nervosa. Even though young people who developed orthorexia nervosa mostly had normal body weight, they had a greater tendency to compare their physical appearance to the appearance of others, what indicated distorted perception of their own body image. This brings to attention the importance of educating young people, especially female, about healthy diet, and confirms the necessity of an interdisciplinary approach in treating orthorexia nervosa, including psychological support.

Keywords: eating disorder, orthorexia nervosa, ORTO-15, PACS-R

IMPACT OF BODY MASS INDEX ON COVID-19-RELATED HOSPITALIZATION AND IN-HOSPITAL MORTALITY IN PATIENT FROM DUBROVNIK-NERETVA COUNTY

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Introduction: Recently, the effects of obesity on the need for hospitalization and mortality have been observed in COVID -19 patients, but the effect is still unclear. Therefore, the aim of this study was to observe the association between obesity and the length of hospitalization and mortality in hospitalized COVID -19 patients from Dubrovnik-Neretva County.

Materials and Methods: The study was conducted on total of 352 (57.7% men) patients aged on average 69.4 ± 14.9 years with COVID-19 hospitalized in period from September 2020 to March 2021 in General Hospital Dubrovnik. Data on sex, date of birth, body weight, height, date of hospital admission, date of hospital discharge, and in-hospital death were taken from the medical record. Body weight and height were self-reported by the patients, and body mass index was calculated from the reported measurements. Body mass index cutoffs proposed by the World Health Organization were used to divide patients into normal weight, overweight, and obese groups.

Results: Results showed that 29% of patients were of normal weight, 45% were overweight, and 26% were obese. The length of hospitalization was significantly longer ($p = 0.008$) in obese patients (14.9 ± 12.6 days) compared to normal weight (10.6 ± 8.0 days) and overweight patients (11.7 ± 9.1 days). According to linear regression ($\beta = 0.278$; 95CI% 0.072 - 0.485, $p = 0.008$), high body mass index is associated with longer hospitalization duration. A total of 28 patients (8% of the total sample) died in the hospital, of whom 43% were normal weight, 25% overweight, and 32% obese. To estimate the association between in-hospital mortality and weight status, an unadjusted odds ratio was obtained using the Cochran-Mantel-Haenszel method. Accordingly, higher body mass index was not associated with increased risk of in-hospital mortality ($P = 0.096$).

Conclusion and Implication: The majority of hospitalized patients with COVID -19 were overweight and obese, which may influence the length of hospitalization. Further researches on association between weight status and in-hospital mortality are warranted, with age, sex and different comorbidity as potential effect modifiers.

Keywords: adiposity, COVID-19, hospitalization, in-hospital mortality, obesity

ANTIDIABETIC AND HYPOLIPIDEMIC EFFECTS OF BASIL EXTRACT (OCIMUM BASILICUM L.) IN ALLOXAN DIABETIC RATS

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Introduction: Basil (Ocimum basilicum L.) is one of the most important industrial and pharmaceutical crop species from the Lamiaceae family. It contains many antioxidant substances which contribute to its intense antiradical activity and could have potential human health benefits. The aim of the study was to examine the effect of the seven-day application of aqueous extract of basil on glycemia and the lipid status of healthy and diabetic animals.

Material and methods: Experiments were carried out for 7 days on 48 Wistar rats. Animals were randomly divided into 8 groups of 6 animals. Four groups were without alloxan pretreatment, and four groups were with alloxan-induced diabetes (130 mg/kg). All animals were treated in the same way, orally, with physiological saline solution (1 ml/kg), basil extract (200mg/kg), sodium salt of monoketocholic acid (MKC, 4 mg/kg) and with the combination of basil extract (200mg/kg) and sodium salt of monoketocholic acid (4 mg/kg). After a treatment, the animals were sacrificed by cardiopuncture and lipid status parameters were determined in the serum. Statistical processing of the obtained results was performed using the program IBM SPSS Statistics 20.0.

Results: Aqueous extract of basil showed statistically significant hypoglycemic activity in both normoglycemic and diabetic animals. In the group of diabetic animals, the hypoglycemic effect of basil is significantly potentiated by monoketocholic acid. In the group of diabetic animals, treatment with a combination of fixed doses of basil extract and monoketocholic acid regained the level of glycemic value prior to administration of alloxan. The seven-day application of aqueous basil extract led to a statistically significant increase in HDL cholesterol and a decrease in the triglyceride concentration in the group of diabetic animals compared to the control group, $p<0.01$. However, administration of monocetocholic acid led to a significant increase in HDL but also total cholesterol and triglyceride levels in the group of diabetic animals.

Conclusion: The treatment with basil extract has protective effects on glycemia and lipid status in both normoglycemic and diabetic animals.

Implication: These results indicate the possibility of using basil as a functional food according to its beneficial effects on blood glucose level and lipid status.

Keywords: basil, glycemia, lipid status, alloxan

HUMAN MILK LEPTIN AND ADIPONECTIN HAVE AN IMPACT ON CHILD'S GROWTH AND BODY COMPOSITION FROM BIRTH TO SEVEN YEARS OF AGE: A PROSPECTIVE OBSERVATIONAL CLINICAL STUDY "MY-MILK"

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Introduction: Human milk acts not only as a source of nutrients but also mediates transfer of numerous bioactive components affecting infant health and development. In this study, we investigated the associations of human milk leptin and adiponectin levels with child's growth and body composition.

Materials and Methods: We investigated n=61 mother-singleton infant pairs. Human milk samples were collected at one-month post-partum. Human milk leptin and adiponectin concentrations (ng/ml) in skimmed mature hindmilk were analysed using the enzyme-linked immunosorbent assay (BioVendor, Czech Republic). Infants were exclusively breastfed for at least one month. Anthropometric measurements of healthy term infants/children were performed at birth, 1, 3, 6, 12 months, 3, and 7 years of age. Multiple regression models were used to examine the relationships between human milk leptin and adiponectin concentrations and mass, length/height, body mass index for age Z-scores using the Child Growth Standards (WHO, 2006), and body fat percentage (calculated using measurements of 4 different skinfolds – biceps, triceps, subscapular, suprailiac) over time.

Results: Human milk leptin levels (mean± SD: 0.43±0.28 ng/ml) were negatively associated with mass gain in the first year of life ($p<0.05$), but no significant associations were found at age of 3 and 7 years. However, human milk adiponectin levels (14.3±23.1 ng/ml) were negatively associated with length/height for age Z-scores at 1, 3 and 6 months ($p<0.05$) and at 3 years of age ($p<0.01$). but it was positively associated with body fat percentage at 12 months ($p<0.05$) and mass gain from birth to 12 months ($p<0.05$). However, we found no significant associations between human milk leptin and adiponectin and anthropometric measurements at 7 years.

Conclusions and Implication: Our results suggest that human milk leptin and adiponectin play an important role in priming infant growth and body composition even up till the third year of life. Since the human milk hormone content could be subjected to the nutritional status of the mother, the preventive measures against obesity should start at the beginning of the reproductive period. This approach would benefit several generations, the potential parents, and their offspring.

Keywords: human milk hormones, growth, body composition, obesity

ANTIOXIDANT POTENTIAL OF THE MOST FREQUENTY USED LAMIACEAE HERBAL TEAS

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Introduction: The interest in a natural and healthy lifestyle has moved the functional food under the spotlight. Functional food provides the health advantages because of their physiologically active substances. The Lamiaceae family, as one of the most exploited, represent a rich source of phenolic acids and flavonoids which have positive impact on the treatment of different diseases. The aim of this study was to determine the content of total phenols and flavonoids in samples of selected plant species of Lamiaceae and to compare their yields in traditional infusions and microwave prepared extracts.

Material and methods: 10 the most frequently used plants (origano, lavender, basil, savory, garden thyme, wild thyme, sage, rosemary, lemon balm and mint) from the Institute "Dr Josif Pančić" were examined. Plant material was pulverized and extracts were prepared as infusion according to recommendations and instructions: 1 g of drug was poured with 200 ml of water and extracted for 10 minutes for traditional method for 5 minutes in microwave for modern extraction. The content of total phenols and flavonoids was determined spectrophotometrically and expressed as mg of gallic acid equivalents per g of dry extract (mg GAE /g SE) for phenols and mg of quercetin equivalents per g of dry extract (mg KE /g SE) for flavonoids.

Results: All extracts showed a significant antioxidant activity. The content of total phenols in traditional infusions ranged from 91,53±4,25-286,07±8,74 mg GAE /g dry extract, and in microwave extracts from 122,44±7,52-204,58±7,28 mg GAE /g dry extract. The content of total flavonoids in traditional infusions ranged from 24,14±1,25-166,18±4,85 mg KE /g of dry extract, and in microwave extracts from 51,12±2,57-163,27±7,15 mg KE /g of dry extract. The highest values for total phenols and flavonoid were found in oregano samples, in both traditional and modern extraction.

Conclusion: The high content of total phenols and flavonoids was determined in extracts prepared using both tested methods. Better results were obtained in microwave extracts. Household preparations of teas from the Institute "Dr Josif Pančić" provides significant content of active principles which can be explored in different market applications in the future.

Keywords: tea, household, antioxidant potential, extractio

TOTAL ANTIOXIDANT CAPACITY AND PROXIMATE ANALYSIS IN KINDERGARTEN DAILY MEALS: A RANDOMIZED CONTROLLED EVALUATION

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Introduction: High intake of dietary antioxidants (AOs) is associated with a low incidence of cardiovascular disease (CVD), obesity and lung disease. EU children spend in kindergartens up to 45 hours per week, consuming more than two thirds of their nutritional needs with meals there. The aim of our study was to design an antioxidant–rich, 5-day prototype kindergarten menu (breakfast, lunch, 2 snacks) and compare it with the ordinary kindergarten menu in terms of the proximate composition and content of free and bound antioxidants.

Methods: Six kindergartens participated in the study and were randomized into 2 groups- the prototype group (PG), which served the prototype menu (n=4) and the control group (CG), which served an ordinary menu (n=2). From each kindergarten, samples of all daily meals in the amounts corresponding to the portion size for one child were taken in duplicate for 5 consecutive days. Daily meals were combined in composite samples and homogenized prior to analysis. Proximate composition was determined according to AOAC methods, while Total Antioxidant Capacity (TAC) of free and bound antioxidants was evaluated using the FRAP and ABTS assays. TAC was expressed as vitamin C equivalent (VCE) per daily meal.

Results: The average proximate contents were more consistent in PG meals when compared to CG meals, by corresponding, on average, to more than 68 vs 53% of Dietary Reference Intake (DRI) for energy; 73 vs 45 % of DRI for total fat, 66% vs 59 % of DRI for carbohydrates and 110 vs 78 % of minimal DRI for dietary fibre. On average free AOs contributed significantly to higher TAC values of PG meals, while bound AOs made a major contribution to TAC levels in CG meals. The average

TAC was estimated to be 1369 mg vitamin C equivalent in PG meals, vs. 586 mg in CG meals(ABTS assay), or 1734 mg vs. 810 mg vitamin C equivalent (FRAP assay), respectively.

Conclusion: Adding foods rich in antioxidants to kindergarten menus can significantly improve their nutritional quality.

Keywords: kindergarten nutrition, free dietary antioxidants, bound dietary antioxidants, proximate composition, antioxidant capacity

SELF-ASSESSMENT OF DISCARDED FOOD IN RESIDENTIAL BLOCKS IN MURSKA SOBOTA DURING THE COVID -19 PANDEMIC

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Introduction: Reducing the amount of food waste is one of the biggest national and global challenges. The waste of food is namely associated with the loss of resources that were involved in its production, including water, land, energy, labour, and capital.

Materials and Methods: Basing our research on convenience sampling, we got a better insight in the problem of food waste in the selected local environment and foundation to formulate recommendations for effective action.

The authors conducted a telephone survey on food waste in 137 households that are part of the Murska Sobota residential blocks. The survey covered the period from October to December 2020, asking the respondents to compare their habits to the same period in 2019. The survey included basic demographic questions, questions about the frequency, quantity and type of food waste, the surplus food process, as well as shopping habits.

Results: During the pandemic, the proportion of respondents who very often or frequently produced food waste decreased from 30 % to 17 %. The respondents estimated that they the amount of their food waste decreased from 1.3 kg to approximately 1 kg per week. The surpluses of prepared food, leftover food from the plate, vegetables, bread and expired food were most often discarded. Older residents made the most rational use of food (freezing / eating leftovers from prepared meals the next day, using surplus bread and similar foods to prepare new meals…). More than half of the respondents went food shopping 1-2 times per week. 30% of respondents also shopped online occasionally or several times. About 80% of them utilised a shopping list. In families with children and both working parents, the frequency of purchasing prepared meals (pizza and other dishes) increased.

Conclusions and Implications: The reduction of food waste during the pandemic can be attributed to more rational purchases, housewives' cooking skills and more careful handling of food, especially by older persons due to the past experience and scarcity. Taking into account that approximately half of the discarded food comes from households, it is crucial to raise public awareness about the costs and challenges generated by it.

Keywords: discarded food, food waste, pandemic, COVID-19

MULTIDISCIPLINARY PUBLIC HEALTH INTERVENTION AIMED AT REDUCING HEALTH RISK FACTORS AMONG EMPLOYEES OF PUBLIC INSTITUTIONS IN THE CITY OF ZENICA

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Introduction: The aim of the project is to raise public awareness of the importance of proper nutrition and physical activity and preventive action on certain risk factors for health. The project was implemented in two stages. The pilot project, which lasted a month, involved 21 participants (all female). The main project, which also lasted a month, involved 100 employees of public institutions, of which 83 were women and 17 were men. All participants were exposed to sedentary work and physical inactivity in the workplace, as well as low to moderate activity outside the workplace. A multidisciplinary approach with a team of nutritionist, doctor of medicine and trainers has been applied. For each participant, the body mass analysis was performed in two measurements and an individual nutrition and training plan was made.

Methods and materials: Measurement methods, mathematical and statistical methods, descriptive methods and analyzes were used. ANOVA were used for comparing results between the groups, single-factor and combined.

Results: The study was completed by 76 people, of whom 16 were men and 60 women, aged 42.08±8.2. Measurements were performed before and after project implementation. One-factor analysis of repeated measurements compared BMI, body and visceral fat, body water and muscle mass before and after the intervention. A statistically significant difference was found in BMI (First measurement: Mean=29.518±5.14, Second: Mean=28.64±5.11, Δ=0.31, $p<0.05$), body fat mass First measurement: Mean=31.29±10.84, second: Mean=29.34±10.76, Δ=0.42, $p<0.05$), visceral fat index (First measurement: Mean=8,41±3.49, second: Mean=7.75±3.42 Δ=0.53, $p<0.05$, and body water percentage (Men: First measurement: Mean=0.5016±0.02114, other: Mean=0.51025±0.2497 Women: First measurement: Mean=0.4352±0.0371, second: Mean=0.4417±0.4378). No statistically significant difference was found in muscle mass at the beginning and at the end of the project.

Conclusions: The results of the public health intervention in the project were as follows: reduction of body mass index (on average by 2,98%), reduction of body fat (on average by 6,23%), reduction of visceral fat index (on average by 7,85%). Such public health interventions and programs can lead to an effective reduction in BMI and other obesity-related parameters, which would improve health and prevent long-term health consequences.

Keywords: multidisciplinary approach, proper nutrition, physical activity

COUNTY COUNSELING SERVICE FOR PREVENTION OF NUTRITION ASSOCIATED HEALTH RISKS - INTERDISCIPLINARY APPROACH IN THE TREATMENT OF OBESITY

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Introduction: Counselling service for prevention of nutrition-related health risks is an interdisciplinary counselling service in the Institute of Public Health of Varazdin County, which has been active since 2018. The counselling services are

free of charge and available to all interested parties. The aim of the research was to determine the interest of adults in controlled weight reduction and the success of interdisciplinary counselling in solving the problem of obesity.

Materials and methods: The counselling service works 4 hours a week and from June 2018 to December 2021, 95 adults sought counselling. 69 users (73 %) have a problem with obesity and the need for professional support to reduce their body weight. The age of the users ranges from 18 to 70 years. The visit to the counselling centre is voluntary, usually on the recommendation of thea family doctor or a specialist and the user of the counselling center. The problem-solving approach follows general health guidelines, with an individualized approach and monitoring. Weight loss treatment is based on a healthy lifestyle, which includes the principles of proper nutrition, such as an adapted Mediterranean diet, and regular physical activity, adapted to the health status of the user. The progress in weight reduction is monitored through the analysis of body composition according to the principle of bioelectrical impedance. During the treatment, users are supported not only by nutritionists, but also by public health doctors, psychologists and psychiatrists.

Results: Of the total number of adult users enrolled in body weight reduction, 71 % are women and 29 % are men. The largest proportion of women are aged 50 to 59 years (27 %) and 40 to 49 years (25 %). Among men, the 50 to 59 age group also dominates (35 %), followed by the 60+ age group (30 %). The largest percentage of women in the initial consultation had 2nd degree obesity (29 %) and men had 1st degree obesity (40%). After three months of treatment, a satisfactory reduction in body weight of more than 5 % was achieved in 81 % of users.

Conclusion and Implication: The results show that interest in controlled weight reduction is higher in women compared to men at a younger age, which can be associated with a greater interest not only in health but also in appearance. The results of successful weight reduction in several months of treatment confirm that interdisciplinary counselling is a good model to solve the problem of obesity.

Keywords: counselling, nutrition, interdisciplinary approach, obesity

DEVELOPMENT OF METHODS OF PROMOTING PROPER NUTRITION IN CHILDREN OF PRESCHOOL AND EARLY SCHOOL AGE

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Introduction: This study is aimed to develop learning methods for encouraging children to eat and learn about healthy food.

Materials and methods: Altogether 3850 children have participated in one or more various activities. Preschoolers (4-7 years old) have participated in the activities with a reward chart and picture book containing workshops like "Shopping", "My little chef", "Give me 5!" (N=600); in the "Food dance" (N=700) and 90 children have participated in “Try food”. School children aged 9-11 years, have participated in nutrition training and school snack training (N=2500), 30 children in workshops “Guess what you eat”, 90 of them in preparing food activities, 30 in challenge to try undesirable vegetables and evalute them. This is qualitative research defined by non-numerical data such as photographs and it is subjectively perceived.

Results: Preschoolers spark curiosity and creativity in "Food dance", "Shopping" and "My little chef", in which children try to classify different food groups and associate them with a specific dance movement or put them in a basket/plate. According to the parents, the "Give me 5!" workshop has multiple impacts on family eating behavior - motivates other family members to try 5 vegetables that day. Parent education can lead to significant results, and by participating in the workshops, children receive a gold medal stick on the reward chart.

Challenges such as vegetable tasting are popular among school children. Sensory evaluation along with recording scores on the evaluation sheet has proven to be an interesting method of analysis that can systematize organoleptic deficiencies, filter out undesirable characteristics, and better explain personal resistance to certain food characteristics. The possibility to taste the food repeatedly ensures a better acceptance of the food.

Conclusion: The essential importance of promoting proper nutrition among children lies in an appropriate approach, communication, engagement, interest, understanding, and interactivity. It is necessary to consider the child's age, socioeconomic factors, sensitivity, nature, and to ensure that prevention efforts do not cause harm.

In implementing and applying what is learned, it is necessary to focus on possible solutions rather than problems and difficulties and to make mealtimes an affirming and enjoyable event.

Keywords: preschool children, school children, proper nutrition, methods, promotion.

DIFFERENCES IN THE FOOD CHOICE MOTIVES BEFORE AND DURING THE COVID-19 PANDEMIC DEPENDING ON INFECTION AND VACCINATION STATUS: A CROSS-SECTIONAL STUDY OF CROATIAN ADULTS

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Introduction: Since its beginning, the COVID-19 pandemic has impacted numerous aspects of our everyday lives, including diet. However, little is known about the impact of the pandemic on the motives that determine food choices, especially in regard to infection and vaccination status. Therefore, the aim of the present study was to examine the differences in food choice motives before and during the COVID-19 pandemic in a sample of Croatian adults, depending on their vaccination status and previous infection with SARS-CoV-2.

Materials and Methods: The present cross-sectional study was conducted from 16 June 2021 until 30 June 2021 using an anonymous online questionnaire designed in Google Forms®. Changes in health and non-health food choice motives before and during the COVID-19 pandemic were evaluated using a validated 36-items (9 factors) Western Balkan Countries' version of the Steptoe et al.'s Food Choice Questionnaire.

Results: The final sample consisted of 890 women and 339 men from Croatia, aged ≥ 18 years. At the time of the data collection, 228 women (25.6%) and 114 men (33.6%) reported having been infected with SARS-CoV-2, while 445 women (50.0%) and 187 men (55.2%) were vaccinated (either with one or two doses). One-way analysis of variance revealed that mood, convenience and familiarity were significantly more important to men who have reported being infected with SARS-CoV-2, when compared to those not being infected, both before ($p = 0.014$, $p = 0.008$, $p = 0.009$, respectively) and during the COVID-19 pandemic ($p = 0.021$, $p = 0.003$, $p = 0.013$, respectively). Out of all nine factors, only the price was significantly more important to unvaccinated men, when compared to vaccinated, also both before ($p = 0.001$) and during the COVID-19 pandemic ($p = 0.003$). No statistically significant differences in food choice motives were found in women, depending neither on infection nor on vaccination status.

Conclusion and Implication: According to the results, statistically significant differences in the importance of certain food choice motives were found in regard to SARS-CoV-2 infection and vaccination status. Knowledge related to non-intentional change of these motives could have practical implications in dealing with future similar pandemics.

Keywords: COVID-19, Croatia, food choice motives, Food Choice Questionnaire, SARS-CoV-2

Acknowledgments: *This cross-sectional study formed part of an international project "The impact of COVID-19 pandemic on the determinants of food choice in the adult population of Croatia and Belgium (CFC CRO-BE)" conducted by the Centre for Applied Bioanthropology of the Institute for Anthropological Research, Zagreb, Croatia in cooperation with the Psychiatric Hospital Ugljan, Ugljan, Croatia and the Institute of Tropical Medicine, Antwerp, Belgium.*

SCHOOL AND HEALTH

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Introduction: Puberty is time when adolescent`s become independent. In this life`s phase they grow fast, gain muscles, get more physically active and become mature. By gaining right nutrition habits it is possible to effectively prevent chronic non - infections diseases, especially obesity, cardio vascular diseases and diabetes type 2. Adequate uptake of high value proteins, fats, carbohydrates, vitamins and minerals through food is crucial for cognitive effects like learning, thinking and cogitating.

Materials and methods: The research was taken in January and February 2019 in Electrical engineering School and Secondary school of Economics and Administration in Split. Research involved 437 subjects, 352 students and 85 teachers of both genders. Students are attendees of all classes (from 1st to 4th) and teachers are 26 to 62 years old. Subjects were given standardized questionnaire of eating and lifestyle habits. Questionnaire had 17 particles containing: demographical data, socio-cultural, eating habits, subject`s health and school food.

Results: Comparison between eating habits of teachers and students was done. Statistically significant number of male students choose food richer in protein (87%), while female students reach for carbohydrate food (74%). Statistically significant number of younger teachers (up to 30 years old), consume food reach carbohydrates and trans fatty acids (50 %) while older turn to a healthier diet, more fish and various stews (84%). Final grade students are in the lead in the consumption of alcoholic beverages, beer and wine (75%), while older teachers are in favor of choosing this type of liquid (58%). Teachers and students who sleep less than 5 hours a day have increased consumption of caffeine and thein and calorie-rich food (75%). The highest number of students have chosen milkmaker (87%) and most teachers chosen meal in school cantine or meal in near bistro (65%).

Conclusions: Since older teachers resort to lighter meals and stews, while younger teachers prefer fast food and trans fatty acids, this is a reflection of mature thinking about their health. Therefore, education of students and teachers should

be introduced in order to bring the awareness of proper nutrition closer to the younger population.

Keywords: school, health, school meal

HOW THE NUMBER AND TYPE OF PRIMARY SCHOOL MEALS AFFECT FOOD VARIETY AND DIETARY DIVERSITY?

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Introduction: School meals should encourage a varied and diverse diet, since children may eat up to three meals at school per day. The aim of this study was to assess food variety and dietary diversity among primary school children regarding the number and type of school meals.

Materials and Methods: Dietary records for three non-consecutive days were used to estimate the food variety score (FVS) and dietary diversity score (DDS) of 195 children (52.3% boys) aged 8-9 years from schools in the city of Zagreb. For analysis, children were divided into 5 groups according to the number and type of school meals consumed: non-consumers (23%), breakfast consumers (30%), lunch consumers (6%), breakfast and lunch consumers (13%), and breakfast, lunch and snack consumers (28%).

Results: The children had an average FVS of 14.3 (12.6 - 16.7) and DDS of 5.7 (5.0 - 6.0). The food group with the highest frequency of consumption was starchy staple (99.9% of children), while legumes, seeds, and nuts were consumed least frequently (15.4%). The number and type of school meals were moderately correlated ($r = 0.313$, $p < 0.001$) with FVS and weakly ($r = 0.230$, $p = 0.02$) with DDS. In addition, children who ate breakfast and lunch or breakfast, lunch, and snack from school meals had significantly higher FVS ($p < 0.001$) and DDS ($p = 0.027$) compared to children who ate fewer school meals or ate no school meal. Children (50%) who

ate breakfast, lunch, and snacks from school meals were more likely (p = 0.022) to consume dark green leafy vegetables.

Conclusion and Implication: The number of school meals may affect the food variety and dietary diversity, with children who eat more school meals having better quality. However, the values obtained by the index suggest that both parents and school food services should provide more varied meals in terms of different foods and food groups.

Keywords: adequacy ratio, children, dietary diversity, food variety, school meals

CONSUMER'S ATTITUDES TOWARDS CONSUMATION OF PLANT-BASED FOODS

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Introduction: A growing interest for eating foods of plant origin have been evidenced among consumers, connected with the motives of health, ethical issues, animal welfare and environmental protection. A plant-based diet is characterized by the exclusion of all types of meat, including fish, and very often eggs and dairy products and such consumers are considered vegetarians and/or vegans. The aim of this study was to determine the attitudes of the general population regarding the diet of plant origin (vegetarianism), prejudices, motives and social related factors.

Materials and Methods: The online survey included 695 respondents, 18+ years from Croatia.

Results: Based on the eating habits from the respondents' responses, two groups were formed for further analysis: group 1- omnivores and flexitarians (95.4%) and group 2 - vegetarians and vegans (4.6%). Group 1 do not agree that vegetarian diet is healthier (39.5%), nor that it can meet all nutrient needs (43.9%), unlike group 2 who mostly think the opposite. Both groups consider that vegetarianism is a modern trend (somewhat and completely agree with group 1 - 56.7% vs group 2 - 46.7%), while motives for animal's care and the environment were not evidenced among both groups. 64.4% of group 1 and 96.9% of group 2 disagree that vegetarians cannot do hard physical work or sports. Group 2 denied the prejudice to choose society according to the type of diet (87.5%). No correlation was statistically significant ($p < 0.05$).

Conclusion: The main results of both groups suggest that plant-based diet is more motivated by fashion than by health benefits, animal or environment protection. No prejudices observed related to lack of physical strength in a vegetarian, nor does the type of diet have anything with the socialization.

Implication: In the context of climate change and growing consumer interest in plant-based food/diet, the preliminary results of this study should be investigated on a more representative sample considering price, availability of plant-based food and omnivorous intention to switch to vegetarianism / veganism. This would have implications for public policies and the economy in protecting of the planet Earth and human health.

Keywords: plant-based foods, consumers, vegetarians, attitudes

THE IMPACT OF SOCIAL MEDIA ON FOOD PURCHASES

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Introduction: Recently, the use of social networks by users and companies around the world is constantly increasing. Social networks like Facebook and Twitter are a powerful marketing tools used as a means of communication among users to share data and information on the latest topics related to market issues. The aim of this study was to investigate the impact of social networks on food purchases in Croats and other nationalities.

Materials and methods: A total of 2,383 respondents of all ages participated in the survey, it was conducted using online questionnaires (Google Forms) that respondents completed anonymously and independently. The questionnaire consisted of eight questions on the impact of social networks on food choice and sociodemographic characteristics of respondents.

Results: The largest number of respondents is in the age group of 15 to 24 (Croatian citizens - 66.4%, foreign citizens - 48.4%). Almost half (47%) of respondents from the offered social networks use Instagram the most (47%), followed by Facebook (34.3%) and Youtube (14.4%). The largest number of respondents receive information

about nutrition through news portals (25%) and by following content on Instagram (18.4%), while at least 5% get information about nutrition by communicating with other people via Facebook. The vast majority of respondents (72%) trust the nutrition advice given by experts the most. 65% of them state that they believe in people due to their expertise in a certain field, followed by trust caused by the physical appearance of the person (1.2%). Furthermore, a correlation was observed with advertised weight loss products, older the respondent more advertised weight loss products are bought. There was a correlation between age and consumption of sweets/carbonated drinks/fast food, for example the younger the respondent higher the consumption of those products. The same goes for Croatian and foreign citizens. Respondents who have decided to pursue a new diet more often consume products to improve sports performance and to improve health.

Conclusion: With this research, we found out that there is a link between social networks and their impact on shopping, but to confirm this, additional research is needed.

Keywords: social networks, nutrition, shopping

POPULARITY OF AFRICAN FOODS AND DISHES IN CROATIA

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Introduction: Traditional African cuisine uses a combination of locally available fruits and vegetables, grains, milk and meat. Food used in meal preparation is rich in nutrients and naturally poor in undesirable sugar, saturated and trans fatty acids, and sodium. The aim of this study was to determine the popularity of African foods and dishes in Croatia among the student population, and also to explore whether and how many African restaurants are there in Croatia.

Materials and Methods: The study included a total of 115 participants (81.7% women) of the student population. Data were collected using a questionnaire created using Google form for the period from October 21st, 2021 to October 24th, 2021. The questionnaire contained 26 open-ended and closed-ended questions. The first part of the questionnaire collected data on gender and age, while the second part was related to consumption and knowledge of African groceries and dishes.

Results: Of the total number of participants, 82.8% did not consume African foods and dishes. When asked about their knowledge of African fruit, 96.6% of participants said they know dates, and 79.3% know kiwano. As far as knowledge of vegetables is concerned, 59.5% of participants know white mustard, and 45.7% know okra. When asked about their knowledge of non-alcoholic African drinks, 35.1% of participants have heard of Rooibos tea. Of the known African dishes, most participants consumed plantains (14.7%). 94.8% of participants said they would like to try African dishes (Nhopi, Melokhia, Matata, Sasaties, Bobotie, plantains), and 97.4% of participants believe that the African diet is not popular in Croatia. The research has shown that there is only one African restaurant in Croatia.

Conclusion and Implication: According to the results of this study African foods and dishes are not popular among the student population in Croatia. Participants, although unfamiliar with African cuisine, showed interest in trying new African dishes. The problem they will encounter is that the only African restaurant in Croatia, located in Zagreb, is poorly promoted and thus unknown to a large number of people.

Keywords: african foods and dishes, student population, fruits and vegetables

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