FARMACEUTSKI FAKULTET, NOVI SAD

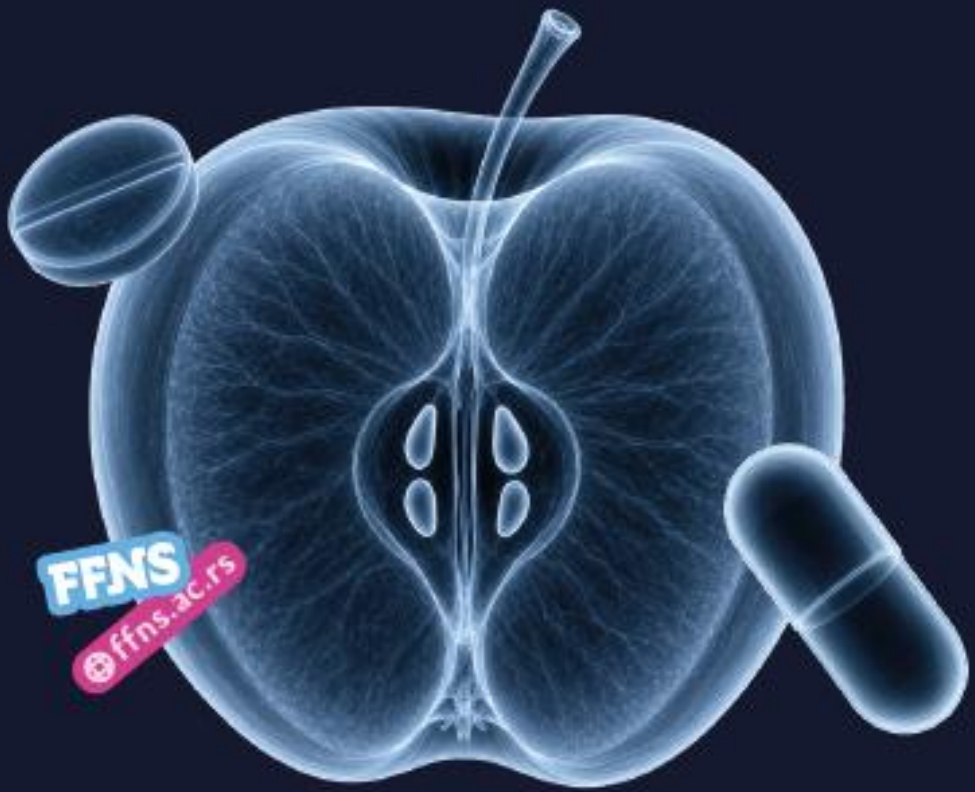
UNIVERZITET PRIVREDNA AKADEMIJA U NOVOM SADU

Prvi naučno-stručni skup sa međunarodnim učešćem

Nutricija danas:
NAUKA, INOVACIJE I PRAKSA

First scientific and professional conference with international participation

Nutrition Today:
SCIENCE, INNOVATION AND PRACTICE



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PREFACE

We are presenting the Book of Abstracts of the First Scientific and Professional Conference with international participation "Nutrition Today: Science, Innovation and Practice", organized by the Faculty of Pharmacy, Novi Sad, with funding provided through the Provincial Secretariat for Higher Education and Scientific Research, provided through the 2026 public call for co-financing the organization of scientific and professional conferences "Nutrition today: science, innovation and practice". The aim of this conference is to establish a tradition of bringing together scientists, professionals, educators, and students to exchange scientific knowledge, professional experience, and the latest advances in the field of nutrition. The Book of Abstracts contains 50 abstracts, including 4 plenary lectures, 3 oral presentations by young researchers, and 43 poster presentations. The contributions are organized into five thematic sessions:

- *Modern nutrition: challenges and perspectives* - plenary session;
- *Nutrition in the present and the future* - young researchers panel;
- *Public health, healthy nutrition and food safety* - poster presentation;
- *Nutritional support and targeted supplementation* - poster presentation;
- *Therapeutic aspects of nutrition and the biology of longevity* - poster presentation.

The thematic areas reflect the impact of nutrition on the health of modern-day individuals. The presented papers address public health, healthy dietary patterns, and food safety, as well as nutritional support and targeted supplementation, while also exploring the therapeutic potential of nutrition and its impact on longevity. These papers highlight the importance of nutrition and its contribution to disease prevention, health promotion, and the development of personalized approaches.

We would like to express our sincere gratitude to all authors, lecturers, and participants, as well as to the members of the Scientific and Organizing Committees, reviewers, and collaborators, whose expertise, dedication, and commitment contributed to the successful organization of this conference.

We extend our special appreciation to Provincial Secretariat for Higher Education and Scientific Research, pursuant to the public call for co-financing the organization of scientific and professional conferences in 2026 "Nutrition Today: Science, Innovation and Practice" for its valuable financial support, which contributed to the realization of this scientific and professional conference with international participation.

Novi Sad, 2026 *Editors of Book of Abstracts*

PREDGOVOR

Predstavljamo Zbornik sažetaka Prvog naučno-stručnog skupa sa međunarodnim učešćem „Ishrana danas: nauka, inovacije i praksa“, koju je organizovao Farmaceutski fakultet, Novi Sad, uz finansijsku podršku Pokrajinskog sekretarijata za visoko obrazovanje i naučnoistraživačku delatnost po osnovu javnog konkursa za sufinansiranje organizovanja naučnih i stručnih skupova u 2026. godini „Nutricija danas nauka, inovacije i praksa“. Cilj ovog skupa je da uspostavi tradiciju okupljanja naučnika, stručnjaka, edukatora i studenata radi razmene naučnih saznanja, stručnih iskustava i najnovijih dostignuća u oblasti nutricije. Zbornik obuhvata 50 sažetaka, od kojih su 4 plenarna predavanja, 3 oralne prezentacije mladih istraživača i 43 poster prezentacije. Radovi su organizovani u okviru pet tematskih sesija:

- *Savremena nutricija: izazovi i perspektive* - plenarna sesija;
- *Nutricija u sadašnjosti i budućnosti* - panel mladih istraživača;
- *Javno zdravlje, pravilna ishrana i bezbednost hrane* - poster prezentacija;
- *Nutritivna podrška i ciljana suplementacija* - poster prezentacija;
- *Terapijski aspekti ishrane i biologija dugovečnosti (longevity)* - poster prezentacija.

Tematske oblasti odražavaju uticaj ishrane na zdravlje savremenog čoveka. Prezentovani radovi obuhvataju javno zdravlje, zdrave obrasce ishrane i bezbednost hrane, kao i nutritivnu podršku i ciljanu suplementaciju, uz istovremeno razmatranje terapijskog potencijala ishrane i uticaja za dugovečnost. U ovim radovima istaknut je značaj ishrane i njen doprinos u prevenciji bolesti, unapređenju zdravlja i razvoju personalizovanih pristupa.

Izražavamo iskrenu zahvalnost svim autorima, predavačima i učesnicima, kao i članovima Naučnog i Organizacionog odbora, recenzentima i saradnicima, čija su stručnost, posvećenost i angažovanje doprineli uspešnoj realizaciji ovog skupa.

Posebnu zahvalnost upućujemo Pokrajinskom sekretarijatu za visoko obrazovanje i naučnoistraživačku delatnost po osnovu javnog konkursa za sufinansiranje organizivanja naučnih i stručnih skupova u 2026. godini „Nutricija danas nauka, inovacije i praksa“ na finansijskoj podršci koja je doprinela realizaciji ovog naučno-stručnog skupa sa međunarodnim učešćem.

Novi Sad, 2026. godine *Uredništvo Zbornika sažetaka*

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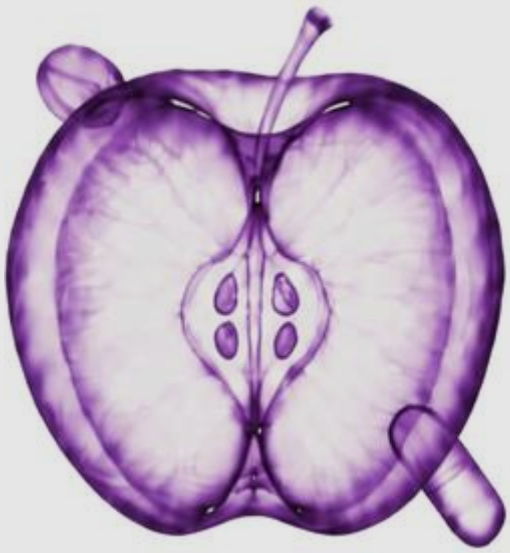
SAVREMENA NUTRICIJA: IZAZOVI I PERSPEKTIVE



PLENARY SESSION

MODERN NUTRITION: CHALLENGES AND PERSPECTIVES

PL-1

UTICAJ NUTRITIVNIH FAKTORA NA MIKROBIOTU U SMANJENJU RIZIKA NASTANKA GOJAZNOSTI

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Među vodećim oboljenjima iz kategorije hroničnih nezaraznih bolesti nalazi se gojaznost, čijem nastanku, pored smanjene fizičke aktivnosti, značajno doprinosi neadekvatna ishrana. Način ishrane koji podrazumeva veći unos masti i smanjen unos dijetnih vlakana dovodi do poremećaja u sastavu i aktivnosti gastrointestinalne mikrobiote, što se smatra jednim od ključnih faktora za razvoj gojaznosti. Istraživanja ukazuju na značajnu ulogu gastrointestinalne mikrobiote u regulisanju energetskog balansa i iskorišćenju energije iz hrane, kao i na različit sastav intestinalne mikrobiote kod gojaznih i normalno uhranjenih osoba. Dijetarne intervencije predstavljaju značajan deo strategije za smanjenje rizika nastanka hroničnih nezaraznih bolesti. Smanjenje energetskog unosa, uz preraspodelu odnosa makronutrijenata, odnosno smanjenje unosa ukupnih i zasićenih masti i ugljenih hidrata visokog glikemijskog indeksa, uz povećanje unosa dijetnih vlakana, može predstavljati dobru osnovu za redukciju telesne mase. Nova saznanja sugerišu da bi pristup u tretmanu gojaznosti mogao biti usmeren i ka modifikaciji sastava mikrobiote. Zbog toga se upotreba probiotika i prebiotika sve više može smatrati racionalnim izborom kao deo dijetarnih intervencija. Posebno su interesantna i fenolska jedinjenja, koja, pored antiinflamatornog efekta, mogu delovati modulatorno na mikrobiotu povećavajući broj korisnih bakterija u gastrointestinalnom traktu. Uticaj unosa pojedinih nutritivnih i biološki aktivnih jedinjenja na fiziološki odgovor organizma, naročito na nivou mikrobiote, predmet je mnogobrojnih istraživanja.

Ključne reči: gojaznost, mikrobiota, dijetarna vlakna, probiotici, prebiotici

PL-1

INFLUENCE OF NUTRITIONAL FACTORS ON THE MICROBIOTA IN REDUCING THE RISK OF OBESITY

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Obesity is among the leading chronic non-communicable diseases, and its development is significantly influenced by inadequate nutrition in addition to reduced physical activity. A dietary pattern characterized by a higher fat intake and a lower intake of dietary fiber leads to alterations in the composition and activity of the gastrointestinal microbiota, which is considered one of the key factors in the development of obesity. Research indicates an important role of the gastrointestinal microbiota in the regulation of energy balance and energy harvesting from food, as well as differences in the composition of the intestinal microbiota between obese and normal-weight individuals. Dietary interventions represent an important part of strategies aimed at reducing the risk of chronic non-communicable diseases. Reducing energy intake and redistributing macronutrient intake, including a lower intake of total and saturated fats and high-glycemic-index carbohydrates together with an increased intake of dietary fiber, may provide a good basis for body weight reduction. New findings suggest that an approach to obesity treatment may also be directed toward modifying microbiota composition. Therefore, the use of probiotics and prebiotics may increasingly be considered a rational component of dietary interventions. Phenolic compounds are also of particular interest because, in addition to their anti-inflammatory effects, they may modulate the microbiota by increasing the number of beneficial bacteria in the gastrointestinal tract. The effects of individual nutritional and biologically active compounds on physiological responses, particularly at the level of the microbiota, remain the subject of extensive research.

Keywords: obesity, microbiota, dietary fiber, probiotics, prebiotics

PL-2

BEZBEDNOST SUPLEMENTACIJE: KADA SUPLEMENTI POMAŽU, A KADA PREDSTAVLJAJU RIZIK?

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Suplementi (dodaci prehrani) su široko korišteni prehrambeni proizvodi koji se prometuju kao koncentrirane dozirne forme namijenjene dopunjavanju prehrane ili ostvarivanju korisnih efekata na jednu ili više funkcija organizma. To su lako dostupni proizvodi za koje u pravilu nisu obavezna klinička ispitivanja prije stavljanja u promet, kao ni postmarketinško praćenje sigurnosti proizvoda. Korisnici, pa i mnogi zdravstveni profesionalci smatraju ih sasvim sigurnim čak i u visokim dozama, iako čvrsti naučni dokazi za takav stav često nedostaju. Sigurna primjena suplemenata zahtjeva adekvatnu procjenu koristi i rizika. Nestručna ili nesavjesna procjena može imati posljedice u rasponu od najmanje ozbiljnih (nepotrebno finansijsko opterećenje, blage probavne smetnje), pa do onih najozbiljnijih (smrtni ishod). Izvori rizika kod primjene suplemenata uključuju: 1) Neadekvatnu primjenu (npr. kao zamjena za farmakoterapiju oboljenja), 2) Neadekvatnu dozu (preniska ili previsoka), 3) Interakcije s lijekovima, 4) Kontaminaciju (hemijska, mikrobiološka) i adulteracija (falsifikovanje) i 5) Neželjena djelovanja. Aktuelna regulativa, marketinške prakse kao i vjerovanja i ponašanje korisnika nisu optimalni. Raspoloživi podaci ukazuju na potrebu posebno za: boljom edukacijom o suplementima, počevši od samih zdravstvenih radnika (ljekari, farmaceuti); boljom kontrolom reklamiranja i oglašavanja, kao i kvaliteta splemenata; dodatnim istraživanjima (statusa i unosa nutrijenata, toksičnim efektima, interakcija s lijekovima); standardiziranim protokolima za komunikaciju sa pacijentima o primjeni suplemenata; obaveznim uvođenjem zvaničnog sistema postmarketinškog praćenja suplemenata (nutrivigilanca).

Ključne reči: dodaci prehrani, regulativa, kontrola, sigurnost

PL-2

FOOD SUPPLEMENTS SAFETY: WHEN DO SUPPLEMENTS HELP, AND WHEN DO THEY POSE A RISK?

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Food supplements are widely used food products marketed in concentrated dosage forms to supplement the diet or exert beneficial effects on one or more bodily functions. Unlike pharmaceuticals, supplements are readily accessible products that generally do not require pre-market clinical trials or mandatory post-market safety surveillance. Consumers, and even many healthcare professionals, often view them as entirely safe, even in high doses, despite a frequent lack of robust scientific evidence to support this view. Safe supplement use requires a proper risk-benefit assessment. Improper or negligent evaluation can lead to consequences ranging from minor issues, such as unnecessary financial burden or mild digestive upset, to life-threatening outcomes. Key sources of risk in supplement use include: 1) Inappropriate use (e.g., substituting supplements for prescribed medical therapies), 2) Incorrect dosing (either subtherapeutic or excessive doses), 3) Supplement-drug interactions, 4) Contamination and adulteration, and 5) Adverse effects. Current regulations, marketing practices, and consumer beliefs and behaviour remain suboptimal. Available data highlight an urgent need for: enhanced education on supplements, starting with health professionals (physicians and pharmacists); stricter quality control and tighter regulations on advertising and marketing; further research into nutrient status, intake levels, toxic effects, and interactions with drugs; standardized protocols for patient-provider communication regarding supplement use; mandatory implementation of official post-market surveillance systems (nutrivigilance).

Keywords: food supplements, regulation, quality control, safety

PL-3

ODRŽIVA PREHRANA: ZDRAVA ZA LJUDE, ODRŽIVA ZA PLANET

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Cilj ovog izlaganja je dati pregled trendova u prehrani vezanih uz održivost. Prehrambene navike imaju velik uticaj na okoliš a proizvodnja hrane uzrokuje 33 % globalne godišnje emisije stakleničkih plinova. Kako ljudska populacija eksponencijalno raste, a prirodni izvori se iscrpljuju alarmantnom brzinom, sve je veći broj potrošača zabrinut ne samo za prehranu i njezin uticaj na zdravlje već i za to kako i gdje je hrana uzgojena/proizvedena te jesu li pri tome primjenjivani principi održive proizvodnje. FAO održivu prehranu definira kao prehranu koja ima nizak utjecaj na okoliš, koja doprinosi sigurnosti hrane i prehrane te boljitku sadašnjih i budućih generacija. Posebno mjesto u konceptu održive prehrane ima tradicionalna hrana. Istovremeno, dio potrošača poistovjećuje organsku proizvodnju sa održivom proizvodnjom iako suvremeni standardi proizvodnje ne potvrđuju takav stav. Zbog toga je bitno educirati potrošače da i postupci poput kupovine namirnica u sezoni kada dospijevaju, od lokalnih proizvođača, sa što manje ambalažnog materijala i što manje dodanih sastojaka tijekom prerade, kao i kupovina namirnica u količini koja je zaista potrebna te minimiziranje otpada hrane također doprinose održivosti. U konačnici moramo si osvijestiti činjenicu da su potrošači zbunjeni mnoštvom deklaracija, da trebaju pojašnjenje što pojam održivosti zaista podrazumijeva te da svi skupa moramo reevaluirati mogućnosti prehrambene tehnologije da zadovolji potrebe za hranom. S ciljem pronalaska odgovora na sva otvorena pitanja potrebno je udruživanje potrošača, dobavljača, prehrambene industrije i vlasti.

Ključne reči: održiva prehrana, edukacija, potrošači
Zahvalnica: Financira Europska unija – NextGeneration EU, grant broj 581-UNIOS-93.

PL-3

SUSTAINABLE DIET: HEALTY FOR HUMANS AND SUSTAINABLE FOR THE PLANET

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The aim of this lecture is to give an overview of trends in nutrition regarding the sustainability. Eating habits have a major impact on the environment and food production is responsible for 33 % of the total annual emission of the greenhouse gasses globally. As the human population increases exponentially and natural sources disappear at an alarming rate, consumers are increasingly concerned not just with nutrition and its impact on the human health but also with how food was produced and weather sustainable agricultural practices were used. According the FAO sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Special position within the concept of sustainable diet belongs to traditional food. Current data show that some consumers perceive organic production and sustainability as one and the same, even though current production standards may not validate this concept. Therefore, consumers should be educated that buying foods in-season, from local sources, when possible, with minimal packaging and fewer ingredients, and in the amount which they really need to fulfil the needs and at the same time to minimise food waste also contribute to food sustainability. In conclusion, we need to be aware of the fact that consumers are very confused with too many labels, that they need explanation on what sustainable nutrition really means, and that we need to re-evaluate possibilities of food technology to keep up on satisfying demand of our food supply chains. And to find the answers to all remaining questions we need joint responsibility of consumers, retailers, food industry and governments.

Keywords: sustainable diet, education, consumers
Acknowledgement: This research was funded by the European union-Next Generation EU, grant number 581-UNIOS-93.

PL-4

DA LI POSTOJI NUTRITIVNA TERAPIJA KOJA ODGOVARA SVIMA?

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Gojaznost je javnozdravstveni problem pandemijskog karaktera koji je ekspanziji poslednjih četvrdeset godina na skoro svim kontinentima i koji, zbog velikog broja komorbiditeta koji proističu iz gojaznosti predstavlja izazov za različite specijalnosti koje učestvuju u lečenju osoba sa gojaznošću. Prvi korak nakon ustanovljavanja dijagnoze gojaznosti i postojanja pridruženih bolesti je promena navika u ishrani koje doprinose gojaznosti. Postoje različiti medicinski nutritivni režimi koji podrazumevaju restrikciju kalorijskog unosa, promenu nutritivnog sastava namirnica i/ili promenu ritma unošenja hrane. Uz medicinsku nutritivnu terapiju se preporučuje i umerena fizička aktivnost u trajanju od 150 do 180 minuta nedeljno, prilagođena eventualnim telesnim ograničenjima. Osnovna preporuka je da se kalorijski unos smanji oko 500kcal u odnosu na prethodni period, da bi se obezbedilo smanjenje prekomerne telesne mase oko 5% za 3 meseca. Vrsta nutritivne terapije zavisi od dominantnog metaboličkog poremećaja kod osobe sa gojaznošću. Mediteranska ishrana se preporučuje kod osoba sa postojanjem insulinske rezistencije, poremećaja glikoregulacije, kardiovaskularnim bolestima, aterosklerozom i crevnom disbiozom. Za osobe sa gojaznošću i imunološkim bolestima, kao što je multipla skleroza preporučuju se nutritivni režimi sa porpunim ili delimičnim ograničevanjem unosa pojedinih namirnica sa proinflamatornim efektom. Ishrana sa dominacijom pojedinih nutrijenata i sa podržavanjem autofagije može da se koristi samo uz strogu indikaciju lekara.

Ključne reči: gojaznost, medicinska nutritivna terapija, crevna disbioza

PL-4

IS THERE A NUTRITION THERAPY THAT FIT ALL?

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Obesity is a public health problem of a pandemic nature that has been expanding for the last forty years on almost all continents and which, due to the large number of comorbidities arising from obesity, represents a challenge for various specialties that participate in the treatment of people with obesity. The first step after establishing the diagnosis of obesity and the existence of associated diseases is to change the eating habits that contribute to obesity. There are different medical nutritional regimens that involve restriction of caloric intake, change in the nutritional composition of foods and/or change in the rhythm of food intake. In addition to medical nutritional therapy, moderate physical activity of 150 to 180 minutes per week, adapted to possible physical limitations, is also recommended. The basic recommendation is to reduce caloric intake by about 500 kcal compared to the previous period, in order to ensure a reduction of excess body weight by about 5% in 3 months. The type of nutritional therapy depends on the dominant metabolic disorder in the person with obesity. The Mediterranean diet is recommended for people with insulin resistance, glycoregulation disorders, cardiovascular diseases, atherosclerosis and intestinal dysbiosis. For people with obesity and immune diseases, such as multiple sclerosis, nutritional regimes with full or partial restriction of the intake of certain foods with a pro-inflammatory effect are recommended. A diet with a dominance of certain nutrients and supporting autophagy can only be used with the strict indication of a doctor.

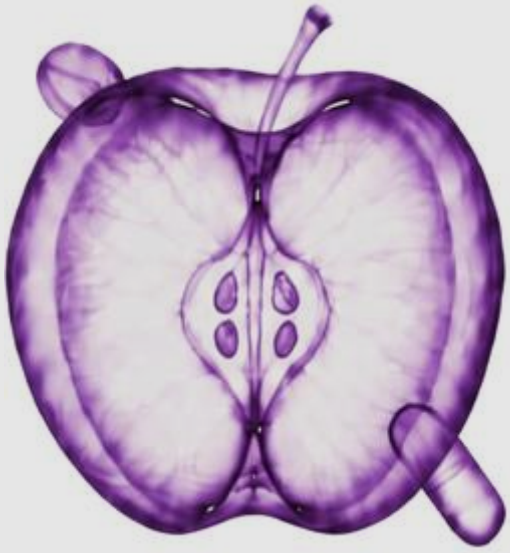
Key words: obesity, medical nutritional therapy, intestinal dysbiosis

PANEL MLADIH ISTRAŽIVAČA

NUTRICIJA U SADAŠNJOSTI I BUDUĆNOSTI

YOUNG RESEARCHERS' PANEL

NUTRITION IN THE PRESENT AND THE FUTURE



PMI-1

UPOTREBA SPORTSKIH SUPLEMENATA KOD ADOLESCENATA UZRASTA 14–18 GODINA: EDUKATIVNA INTERVENCIJA PUTEM DRUŠTVENIH MREŽA

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Upotreba sportskih suplemenata među adolescentima raste pod uticajem fitnes trendova i društvenih mreža, dok znanje o njihovoj bezbednoj primeni ostaje nedovoljno. Cilj rada bio je da se ispitaju obrasci upotrebe suplemenata i izvori informisanja srednjoškolaca u Vojvodini, kao i efekat edukativne intervencije putem društvenih mreža. U studiji sa jednom grupom i merenjem pre i posle intervencije, anonimni upitnik sa 21 pitanjem distribuiran je među 1000 učenika uzrasta 14–18 godina (808 odgovora pre i 650 posle intervencije). Intervencija je obuhvatila 56 kratkih video-snimaka (≈70 s) na Instagramu i *TikTok*-u o najčešće korišćenim suplementima (kreatin, proteini, kofein, energetska pića). Podaci su analizirani *McNemar-Bowker* testom simetrije. Približno dve trećine ispitanika bilo je fizički aktivno, najčešće kroz vežbanje u teretani i timske sportove. Većina započinje upotrebu suplemenata samostalno, bez konsultacije sa zdravstvenim radnicima ili odraslima. Najčešće su korišćeni vitamini i minerali, a energetska pića zauzela su visoko mesto. Posle intervencije značajno je porastao udeo ispitanika koji suplemente kupuju u apoteci (sa ~17% na ~28%; $p < 0,01$), a smanjilo se oslanjanje na *YouTube* i *Instagram* kao izvore informacija. Kratkotrajna intervencija imala je ograničen efekat, ali dugoročne kampanje na društvenim mrežama mogle bi doprineti bezbednijoj upotrebi sportskih suplemenata kod adolescenata.

Ključne reči: sportski suplementi, adolescenti, mladi sportisti, društvene mreže, edukacija
Zahvalnica: Istraživanje je finansirala Svetska antidoping agencija (WADA) u okviru programa Social Science Research Grant.

PMI-1

SPORT SUPPLEMENT USE IN 14-18-YEAR-OLD ADOLESCENTS: A SOCIAL MEDIA EDUCATIONAL INTERVENTION STUDY

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The use of sports supplements among adolescents is rising, driven by fitness trends and social media, while knowledge of their safe use remains insufficient. This study aimed to assess supplement use patterns and information sources among secondary school students in Vojvodina (Serbia), and the effect of a social media educational intervention. In a single-group pre-post study, a 21-item anonymous questionnaire was distributed to 1,000 students aged 14–18 (808 responses before and 650 after the intervention). The intervention comprised 56 short videos (≈70 s) on Instagram and TikTok on the most frequently used supplements (creatine, proteins, caffeine, energy drinks). Data were analysed using the McNemar-Bowker test of symmetry. Approximately two-thirds of participants were physically active, mostly through gym workouts and team sports. Most initiated supplement use independently, without consulting healthcare professionals or adults. Vitamins and minerals were used most often, while energy drinks ranked notably high. After the intervention, the proportion purchasing supplements in pharmacies increased significantly (from ~17% to ~28%; $p < 0.01$), and reliance on YouTube and Instagram as information sources decreased. The short-term intervention had a limited effect; however, long-term social media campaigns could promote safer use of sports supplements among adolescents.

Keywords: sport supplements, adolescents, young athletes, social media, education
Acknowledgement: This research was funded by the World Anti-Doping Agency (WADA) through its Social Science Research Grant Program.

PMI-2

SPOREDNI PROIZVODI VINSKE INDUSTRIJE KAO IZVOR BIOAKTIVNIH JEDINJENJA: OD PREHRAMBENE TEHNOLOGIJE DO NUTRICIJE I FARMACIJE

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Sporedni proizvodi vinske industrije predstavljaju izvor polifenola, dijetetskih vlakana, proteina i drugih komponenata sa potencijalnim nutritivnim i funkcionalnim značajem. Njihova valorizacija pruža mogućnost povezivanja održivog upravljanja resursima sa razvojem sastojaka za prehrambene, nutraceutske i kozmetičke proizvode. Cilj ovog rada je prikaz istraživačkog pristupa projekta *WineRest* i mogućnosti iskorišćenja sporednih proizvoda prerade Probusa i Grašca autohtonih sorti grožđa Vojvodine. Projekat obuhvata karakterizaciju odabranih materijala, razvoj zelenih tehnika ekstrakcije, ispitivanje funkcionalnih i bioloških svojstava dobijenih frakcija i razvoj prototipskih formulacija. Posebna pažnja posvećena je polifenolnim jedinjenjima, dijetetskim vlaknima i proteinskim i peptidnim frakcijama. Razmatraju se mogućnosti njihove primene kao funkcionalnih sastojaka hrane, izvora prirodnih antioksidanasa i potencijalnih antimikrobnih komponenti, kao i sirovina za nutraceutske i kozmetičke formulacije. Sastav i svojstva polaznih materijala, uslovi ekstrakcije i stabilnost izdvojenih komponenata predstavljaju ključne faktore za izbor odgovarajuće primene. Prevođenje ovog potencijala u proizvode namenjene čoveku zahteva procenu bezbednosti, bioraspoloživosti i dokaza o biološkim efektima, uz standardizaciju sastava i doziranja. Predstavljeni pristup povezuje prehrambenu tehnologiju, nutriciju i farmaciju i ukazuje na značaj sporednih proizvoda vinske industrije kao resursa za razvoj novih sastojaka u skladu sa principima održive proizvodnje.

Ključne reči: vinski sporedni proizvodi, bioaktivna jedinjenja, zelena ekstrakcija, funkcionalni sastojci, održivost
Zahvalnica: Rad je podržan od strane Pokrajinskog sekretarijata za visoko obrazovanje i naučnoistraživačku delatnost Autonomne pokrajine Vojvodine, u okviru projekta WineRest (2025–2028), broj 3863453 2025 09418 003 000000 001 04 004.

PMI-2

WINEMAKING BY-PRODUCTS AS A SOURCE OF BIOACTIVE COMPOUNDS: FROM FOOD TECHNOLOGY TO NUTRITION AND PHARMACY

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Winemaking by-products are a source of polyphenols, dietary fibre, proteins and other components with potential nutritional and functional value. Their valorisation offers an opportunity to combine sustainable resource management with the development of ingredients for food, nutraceutical and cosmetic products. This work presents the research approach of the WineRest project and explores the potential utilisation of by-products from processing autohtonus grape varieties in Vojvodina - Probus and Grašac grape. The project encompasses the characterisation of selected materials, the development of green extraction techniques, the assessment of functional and biological properties of recovered fractions, and the development of prototype formulations. Particular attention is given to polyphenolic compounds, dietary fibre, and protein and peptide fractions. Potential applications include functional food ingredients, sources of natural antioxidants and potential antimicrobial components, and raw materials for nutraceutical and cosmetic formulations. The composition and properties of the starting materials, extraction conditions and stability of recovered components are key considerations in selecting suitable applications. Translating this potential into products for human use requires safety and bioavailability assessment, evidence of biological effects, and standardisation of composition and dosing. This interdisciplinary approach connects food technology, nutrition and pharmacy, positioning winemaking by-products as resources for developing new ingredients consistent with sustainable production principles.

Keywords: winemaking by-products, bioactive compounds, green extraction, functional ingredients, sustainability
Acknowledgement: This work was supported by the Provincial Secretariat for Higher Education and Scientific Research of the Autonomous Province of Vojvodina through the WineRest project (2025–2028), project number 3863453 2025 09418 003 000000 001 04 004.

PMI-3

MIKROBNA BIOMASA: ODRŽIVI INOVATIVNI IZVOR PROTEINA I PIGMENATA

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Mikrobna biomasa, kao što su mikroalge i ljubičaste fototrofne bakterije, predstavlja alternativni izvor proteina, pigmenata i drugih biološki aktivnih jedinjenja. Pored nutritivne vrednosti, ovi mikroorganizmi privlače značajnu pažnju zbog svojih pozitivnih medicinskih svojstava, uključujući antioksidativno, antimikrobno i antiinflamatorno delovanje. Povećana potražnja za prirodnim izvorima bioaktivnih jedinjenja podstakla je razvoj efikasnih i ekološki prihvatljivih pristupa za izdvajanje vrednih bioaktivnih jedinjenja iz mikrobne biomase. Shodno tome, nove zelene ekstrakcione tehnologije predstavljaju alternativu konvencionalnim metodama ekstrakcije, i doprinose povećanoj efikasnosti uz smanjenje potrošnje rastvarača i negativnog uticaja na životnu sredinu. Inovativne tehnike kao što je ultrazvučna ekstrakcija pokazale su značajan potencijal za izdvajanje vrednih bioaktivnih jedinjenja iz mikrobnih izvora. U novijim istraživanjima, sve češće je zastupljena integracija inovativnih ekstrakcionih tehnologija sa eutektičkim rastvaračima (eng. *Natural deep eutectic solevnts - NADES*). NADES se smatraju zelenim rastvaračima zbog svoje niske isparljivosti, podesivih fizičko-hemijskih svojstava i potencijalne biorazgradivosti, pri čemu omogućavaju ekstrakciju širokog spektra bioaktivnih jedinjenja. Integracija NADES-a i inovativnih ekstrakcionih tehnika može dodatno poboljšati efikasnost ekstrakcije, stabilnost i funkcionalnost izolovanih jedinjenja. Shodno tome, primena zelenih ekstrakcionih tehnika predstavlja obećavajući pristup održivom iskorišćavanju mikrobne biomase i razvoju prirodnih, funkcionalnih i visokovrednih sastojaka kao što su pigmenti i proteini za primenu u prehrambenoj, biotehnološkoj industriji, kao i u proizvodnji suplemenata.

Ključne reči: mikrobna biomasa, pigmenti, proteini, zelene ekstrakcione tehnologije
Zahvalnica: Istraživanje je finansirano u okviru Programa Ministarstva prosvete, nauke i tehnološkog razvoja Republike Srbije, (Broj projekta: 451-03-33/2026-03/200134)

PMI-3

MICROBIAL BIOMASS: THE FUTURE SUSTAINABLE SOURCE OF PROTEINS AND PIGMENTS

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Microbial biomass such as microalgae and purple phototrophic bacteria represents promising alternative sources of proteins, pigments, and other biologically active compounds. Besides their nutritional value, these microorganisms have attracted considerable attention due to their potential health-promoting properties, including antioxidant, antimicrobial, and anti-inflammatory activities. The increasing demand for natural ingredients has encouraged the development of efficient and environmentally friendly approaches for the recovery of valuable compounds from microbial biomass. Consequently, novel green extraction technologies have emerged as promising alternatives to conventional extraction methods, offering improved efficiency while reducing solvent consumption and environmental impact. Among these approaches, ultrasound-assisted extraction has demonstrated considerable potential for the recovery of valuable bioactive compounds from microbial sources. Integrating advanced extraction technologies with natural deep eutectic solvents (NADES) has attracted growing scientific interest. NADES are considered promising green solvents due to their low volatility, tunable physicochemical properties, and potential biodegradability, while enabling the extraction of a wide range of bioactive compounds. Integration of NADES with innovative extraction techniques may further improve extraction efficiency, compound stability, and functionality. Overall, the application of green extraction strategies offers a promising approach for the sustainable valorization of microbial biomass and the development of natural, functional, and high-value ingredients such as proteins and pigments for food, nutraceutical, and biotechnological applications.

Keywords: microbial biomass, pigments, proteins, green extraction technologies
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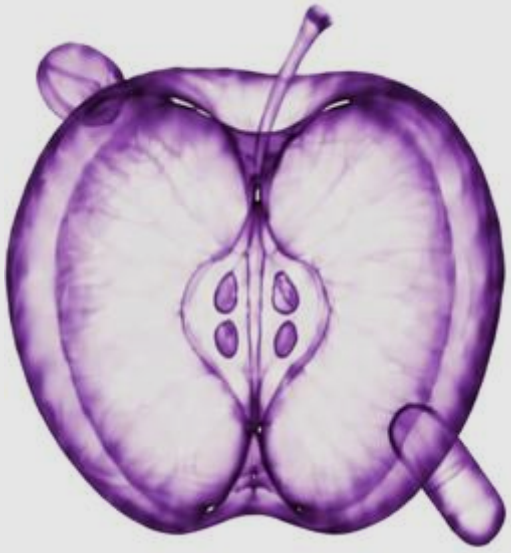
POSTER PREZENTACIJA

JAVNO ZDRAVLJE, PRAVILNA ISHRANA I BEZBEDNOST HRANE

POSTER PRESENTATION

PUBLIC HEALTH, HEALTHY NUTRITION AND FOOD SAFETY



PI-1

EMOCIONALNO JEDENJE: PSIHOLOŠKI FAKTORI I ZNAČAJ ZA PONAŠANJE U ISHRANI

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Emocionalno jedenje predstavlja obrazac ponašanja u ishrani pri kojem se hrana koristi kao odgovor na emocionalna stanja, a ne prvenstveno na fiziološku glad. Njegov značaj potvrđuju nalazi savremenih sistematskih pregleda i meta-analiza. Cilj rada bio je da se analiziraju psihološki faktori povezani sa emocionalnim jedenjem i njihov značaj za ponašanje u ishrani. Izvršen je narativni pregled relevantne literature u bazama *PubMed/MEDLINE*, *Scopus* i *Web of Science*, sa fokusom na sistematske preglede i meta-analize koje ispituju emocionalno jedenje, emocionalnu disregulaciju i stres u kontekstu ponašanja u ishrani. Nalazi više meta-analiza ukazuju na značaj emocionalnih faktora u ponašanju u ishrani. Prevalenca emocionalnog jedenja među osobama sa prekomernom telesnom masom ili gojaznošću procenjena je na 44,9%. Utvrđena je statistički značajna, umerena pozitivna povezanost između emocionalne disregulacije i emocionalnog jedenja (r pooled = 0,337; 95% CI: 0,279-0,396). Utvrđena je i statistički značajna, ali slaba pozitivna povezanost stresa sa ukupnim unosom hrane (*Hedgesov* g = 0,114), uz veći unos hrane nepovoljnog nutritivnog profila (g = 0,116) i manji unos hrane povoljnog nutritivnog profila (g = -0,111). Emocionalno jedenje predstavlja značajan aspekt ponašanja u ishrani sa potencijalnim javnozdravstvenim značajem. Prepoznavanje emocionalnih okidača i unapređenje strategija emocionalne regulacije treba da budu deo multidisciplinarnog pristupa prevenciji i tretmanu nepovoljnih obrazaca ishrane.

Ključne reči: emocionalno jedenje, emocionalna disregulacija, stres, ponašanje u ishrani

PI-1

EMOTIONAL EATING: PSYCHOLOGICAL FACTORS AND THEIR SIGNIFICANCE FOR EATING BEHAVIOR

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Emotional eating is a pattern of eating behavior in which food is used in response to emotional states rather than primarily to physiological hunger. Its significance is supported by findings from recent systematic reviews and meta-analyses. The aim of this study was to analyze psychological factors associated with emotional eating and their significance for eating behavior. A narrative review of relevant literature in PubMed/MEDLINE, Scopus, and Web of Science was conducted, focusing on systematic reviews and meta-analyses examining emotional eating, emotion dysregulation, and stress in the context of eating behavior. Findings from several meta-analyses indicate the importance of emotional factors in eating behavior. The prevalence of emotional eating among individuals with overweight or obesity was estimated at 44.9%. A statistically significant, moderate positive association was found between emotion dysregulation and emotional eating (r pooled = 0.337; 95% CI: 0.279-0.396). A statistically significant but small positive association was also found between stress and overall food intake (Hedges' g = 0.114), accompanied by increased consumption of foods with an unfavorable nutritional profile (g = 0.116) and decreased consumption of foods with a favorable nutritional profile (g = -0.111). Emotional eating represents an important aspect of eating behavior with potential public health significance. Identifying emotional triggers and improving emotion regulation strategies should be part of a multidisciplinary approach to the prevention and treatment of unfavorable eating patterns.

Keywords: emotional eating, emotion dysregulation, stress, eating behavior

PI-2

ZASTUPLJENOST I NUTRITIVNI ASPEKTI PRIMENE ZASLAĐIVAČA KOD PREHRAMBENIH PROIZVODA

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Zaslađivači predstavljaju značajnu grupu aditiva koji se koriste u prehrambenoj industriji kao zamena za šećer, sa ciljem postizanja slatkog ukusa uz manji energetski unos. Cilj rada bio je prikaz osnovnih karakteristika i klasifikacije zaslađivača, njihove regulative i zastupljenosti u prehrambenim proizvodima, kao i sagledavanje njihovih nutritivnih i zdravstvenih aspekata. Analizirani su najčešće korišćeni zaslađivači, njihova primena u različitim kategorijama prehrambenih proizvoda i bezbednosni aspekti upotrebe. Rezultati pregleda literature pokazuju da odobreni zaslađivači, kada se koriste u okviru propisanih dozvoljenih dnevnih unosa, ne predstavljaju rizik po zdravlje ljudi. Istovremeno, njihova primena može doprineti smanjenju energetskog unosa i predstavljati jednu od mera u prevenciji gojaznosti i drugih hroničnih nezaraznih bolesti povezanih sa prekomernom konzumacijom šećera. Ipak, upotreba zaslađivača ne treba da bude jedino rešenje za unapređenje ishrane, već deo šireg pristupa koji podrazumeva pravilne navike u ishrani, umerenost i izbor nutritivno vrednih namirnica. Može se zaključiti da zaslađivači imaju značajno mesto u savremenoj ishrani i proizvodnji hrane, ali da njihova primena treba da bude zasnovana na naučnim dokazima, zakonskoj regulativi i principima pravilne ishrane.

Ključne reči: zaslađivači, prehrambeni proizvodi, nutritivni aspekti, bezbednost hrane

PI-2

PREVALENCE AND NUTRITIONAL ASPECTS OF THE USE OF SWEETENERS IN FOOD PRODUCTS

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Sweeteners represent an important group of food additives used in the food industry as substitutes for sugar, with the aim of providing a sweet taste with lower energy intake. The aim of this study was to present the basic characteristics and classification of sweeteners, their regulation and prevalence in food products, as well as to consider their nutritional and health aspects. The most commonly used sweeteners, their application in different categories of food products, and safety aspects of their use were analyzed. A review of the literature indicates that approved sweeteners, when used within the prescribed acceptable daily intake levels, do not represent a health risk. At the same time, their use may contribute to reducing energy intake and may be one of the measures in the prevention of obesity and other chronic non-communicable diseases associated with excessive sugar consumption. However, the use of sweeteners should not be considered the sole solution for improving dietary quality, but rather as part of a broader approach that includes healthy eating habits, moderation, and the selection of nutritionally valuable foods. It can be concluded that sweeteners have an important role in modern nutrition and food production, but their use should be based on scientific evidence, legal regulations, and the principles of a balanced diet.

Keywords: sweeteners, food products, nutritional aspects, food safety

PI-3

OMEGA-3 INDEKS: VEZA IZMEĐU SUPLEMENTACIJE OMEGA-3 MASNIM KISELINAMA I PROCENE KARDIOVASKULARNOG RIZIKA

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Omega-3 indeks (O3I) predstavlja procenat eikozapentaenske (EPA) i dokozaheksaenske (DHA) kiseline u odnosu na ukupne masne kiseline u membrani eritrocita. Zbog prosečnog životnog veka eritrocita od oko 120 dana, O3I je biomarker statusa i nivoa ovih uslovno esencijalnih masnih kiselina. Cilj ovog rada jeste da kroz pregled literature prikaže značaj određivanja O3I u proceni kardiovaskularnog rizika i praćenju odgovora na unos omega-3 masnih kiselina putem ishrane ili dijetetskih suplemenata. Određuje se iz uzorka pune venske ili kapilarne krvi, a rezultat se izražava u procentima. Vrednosti oko ili iznad 8 % povezuju se sa nižim kardiovaskularnim rizikom, dok su vrednosti manje od 4 % povezane sa većim rizikom, ali granične vrednosti još uvek nisu standardizovane. Analiza se vrši gasnom hromatografijom sa različitim vrstama detektora. Opservacione studije su pokazale povezanost niskog O3I sa aterosklerotskim kardiovaskularnim događajima poput koronarne bolesti, infarkta miokarda, ishemijskog moždanog udara i kardiovaskularne smrtnosti. Povećanje promena O3I zavisi od njegove početne vrednosti, vrste omega-3 masnih kiselina, njihovog izvora (hrana ili suplement), količine i hemijskog oblika suplementa. Veće doze EPA ili DHA, približno oko 1000 mg dnevno ili više, u trajanju 8–12 nedelja dovode do većeg porasta O3I. Ograničenja šire primene O3I proizlaze iz opservacionog karaktera većine dostupnih istraživanja, nekonzistentnih dokaza o efektima suplementacije omega-3 masnim kiselinama i nedovoljne standardizacije analitičkih postupaka za njegovo određivanje. Omega-3 indeks je potencijalni biomarker kardiovaskularnog rizika, ali su potrebna dodatna istraživanja u pogledu definisanja optimalnih vrednosti u različitim populacijama.

Ključne reči: omega-3 indeks, kardiovaskularni rizik, suplementacija
Zahvalnica: Autori izjavljuju da za ovaj rad nisu primili specifična finansijska sredstva niti spoljnu podršku.

PI-3

OMEGA-3 INDEX: THE LINK BETWEEN OMEGA-3 FATTY ACID AND SUPPLEMENTATION AND CARDIOVASCULAR RISK ASSESSMENT

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The Omega-3 Index (O3I) represents the percentage of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) relative to total fatty acids in erythrocyte membranes. It serves as a biomarker of long-term omega-3 status due to the 120-day lifespan of red blood cells. The aim of this paper is to examine the clinical relevance of O3I in cardiovascular risk assessment and in monitoring patient responses to omega-3 intake from diet or supplementation. Measured from venous whole-blood or capillary samples via gas chromatography, O3I results are expressed as percentages. Target values near or above 8% correlate with significantly lower cardiovascular risk, whereas levels below 4% are linked to adverse outcomes, including coronary artery disease, myocardial infarction, ischemic stroke, and cardiovascular mortality, though precise cut-offs remain unstandardized. The rise in O3I depends on baseline levels, delivery source (food versus supplements), duration, and the specific chemical form of the supplement. Generally, higher doses of approximately 1000 mg of EPA and/or DHA daily administered for 8 to 12 weeks yield the most substantial increases in O3I values. The broader application of O3I is limited by the observational nature of most available studies, inconsistent evidence regarding the effects of omega-3 fatty acid supplementation, and insufficient standardization of analytical procedures for its determination. The Omega-3 Index is a potential biomarker of cardiovascular risk, however, further research is needed to define optimal values across different populations.

Keywords: omega-3 index, cardiovascular risk, supplementation
Acknowledgement: The authors declare that no specific funding or external support was received for this study.

PI-4

ODRŽIVA ISHRANA – NUTRITIVNA VREDNOST I UGLJENIČNI OTISAK HRANE

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Održiva ishrana predstavlja model potrošnje hrane koji osigurava prehrambenu sigurnost i zdravlje sadašnjih i budućih generacija, uz minimalan uticaj na životnu sredinu. Ugljenični otisak hrane obuhvata količinu gasova sa efektom staklene bašte generisanih tokom životnog ciklusa namirnica – od primarne proizvodnje, prerade i transporta, do krajnje potrošnje i otpada. Cilj rada bio je uporediti ugljenični otisak različitih grupa namirnica u odnosu na njihovu nutritivnu vrednost i sagledati njihov doprinos klimatskim promenama. Rad je koncipiran kao pregled naučno-stručne literature objavljene u poslednjih pet godina i podataka dostupnih u bazama. Analizirani su podaci o emisiji ugljen-dioksida ekvivalenta (CO_2-eq) po kilogramu različitih grupa namirnica, uz upoređivanje njihove nutritivne gustine. Pregled literature pokazuje da namirnice životinjskog porekla, naročito crveno meso, mesne prerađevine i mlečni proizvodi, uglavnom imaju veći ugljenični otisak. Njihova proizvodnja zahteva velike površine zemljišta i količine vode, a praćena je i visokim emisijama metana i ugljen-dioksida. Mahunarke, žitarice, voće i povrće uglavnom imaju niži ugljenični otisak. Proizvodnja biljnih izvora proteina u manjoj meri opterećuje ekosistem, zbog čega oni predstavljaju deo održive ishrane. Analizirani izvori ukazuju i da prelazak na fleksitarijanski ili pretežno biljni način ishrane, zajedno sa smanjenjem otpada od hrane, može doprineti smanjenju ugljeničnog otiska. Savremene smernice ukazuju na značaj pojedinih namirnica životinjskog porekla u prevenciji nutritivnih deficita. Održiva ishrana zahteva usklađivanje nutritivnih potreba čoveka sa očuvanjem životne sredine. Veća zastupljenost namirnica biljnog porekla, održivi lanci snabdevanja, edukacija i smanjenje bacanja hrane mogu doprineti zaštiti ekosistema i ublažavanju klimatskih promena.

Ključne reči: održivost, ishrana, nutritivnost, emisije, klima

PI-4

SUSTAINABLE DIETS – NUTRITIONAL VALUE AND THE CARBON FOOTPRINT OF FOOD

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Sustainable diets support food security and health for present and future generations while minimizing environmental impact. The carbon footprint of food comprises greenhouse gas emissions throughout its life cycle, from primary production and processing to transportation, consumption, and waste. This study aimed to compare the carbon footprint of different food groups in relation to their nutritional value and assess their contribution to climate change. The study reviewed scientific literature published over the past five years and data available in relevant databases. Data on carbon dioxide equivalent emissions (CO_2-eq) per kilogram of different food groups were analyzed and compared with their nutrient density. The review indicates that foods of animal origin, particularly red meat, processed meat products, and dairy products, generally have a higher carbon footprint. Their production requires extensive land and water resources and is associated with high methane and carbon dioxide emissions. Legumes, cereals, fruits, and vegetables generally have a lower carbon footprint. The production of plant-based protein sources places less strain on ecosystems, making them an important component of sustainable diets. Sources indicate that adopting a flexitarian or predominantly plant-based diet, together with reducing food waste, may contribute to lowering the carbon footprint. Guidelines recognize animal-derived foods as important for preventing nutritional deficiencies. Sustainable diets require a balance between meeting human nutritional needs and protecting the environment. Increasing the proportion of plant-based foods, developing sustainable supply chains, providing education, and reducing food waste may contribute to ecosystem protection and climate change mitigation.

Keywords: sustainability, diet, nutrition, emissions, climate

PI-5

PROCJENA IZLOŽENOSTI DOJENČADI POSTOJANIM ORGANSKIM POLUTANTIMA BIOMONITORINGOM MAJČINOG MLIJEKA

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Dojenčad predstavlja posebno osjetljivu populaciju na djelovanje okolišnih polutanata zbog intenzivnog rasta i razvoja, nedovoljne zrelosti metaboličkih i detoksikacijskih sistema te relativno visokog unosa hrane u odnosu na tjelesnu masu. Među posebno značajnim okolišnim polutantima izdvajaju se postojani organski polutanti (POP), koji zbog svoje dugotrajne postojanosti, lipofilnosti, bioakumulacije i biomagnifikacije mogu perzistirati u okolišu i organizmu duži vremenski period. Posebnu zabrinutost izazivaju zbog štetnih efektata na razvoj i zdravlje čovjeka. Ljudska populacija je ovim spojevima izložena prvenstveno putem hrane što dovodi do akumuliranja u organizmu majke. Sastav majčinog mlijeka te sadržaj lipida pogoduje akumulaciji lipofilnih polutanata čime dojenje može predstavljati značajan put izloženosti dojenčadi ovim polutantima. Majčino mlijeko stoga ima poseban značaj u biomonitoringu jer predstavlja jedinstven biološki matriks koji se lako uzorkuje (neinvazivna metoda) za procjenu izloženosti majke, ali i potencijalne izloženosti dojenčadi polutantima prisutnim u majčinom mlijeku. Biomonitoring majčinog mlijeka omogućava praćenje prisustva i nivoa postojanih organskih polutanata u populaciji, procjenu potencijalne izloženosti dojenčadi te identifikaciju promjena u opterećenju populacije kroz vrijeme. Kontinuirano i standardizirano praćenje POP u majčinom mlijeku ima poseban značaj za javno zdravlje, jer pruža osnovu za procjenu izloženosti, praćenje vremenskih i prostornih trendova, procjenu efikasnosti regulatornih mjera i pravovremeno prepoznavanje potencijalnih rizika za najosjetljivije članove populacije.

Ključne reči: biomonitoring, majčino mlijeko, postojani organski polutanti
Zahvalnica: Ministarstvo za nauku, visoko obrazovanje i mlade Kantona Sarajevo

PI-5

ASSESSMENT OF INFANT EXPOSURE TO PERSISTENT ORGANIC POLLUTANTS THROUGH HUMAN MILK BIOMONITORING

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Infants represent a particularly sensitive population to the effects of environmental pollutants due to their intensive growth and development, the immaturity of their metabolic and detoxification systems, and their high food intake relative to body weight. Among these, persistent organic pollutants (POPs), due to their long-term persistence, lipophilicity, bioaccumulation, and biomagnification, can persist in the environment and in the body for an extended period. They cause particular concern due to their harmful effects on human development and health. The human population is primarily exposed to these compounds through the diet, which leads to their accumulation in the mother's body. The composition of breast milk and its lipid content favor the accumulation of lipophilic pollutants, and breastfeeding can therefore represent a significant exposure pathway for infants to these pollutants. Breast milk therefore has special significance in biomonitoring because it represents a unique and easily accessible biological matrix for assessing the mother's exposure, as well as the potential exposure of infants to pollutants present in the breast milk. Biomonitoring of breast milk enables the monitoring of the presence and levels of persistent organic pollutants in the population, the assessment of potential exposure of infants, and the identification of changes in population burden over time. Continuous and standardized monitoring of POPs in breast milk is of particular importance for public health, as it provides the basis for assessing exposure, monitoring trends, evaluating the effectiveness of regulatory measures, and timely identifying potential risks to the most vulnerable members of the population.

Keywords: biomonitoring, breast milk, persistent organic pollutants
Acknowledgement: Ministry of Education, Science and Youth of Sarajevo Canton

PI-6

TRENDOVI ISTRAŽIVANJA ORALNIH BIOTIKA U DERMATOLOGIJI: BIBLIOMETRIJSKA ANALIZA PUBLIKACIJA OD 2016. DO 2025. GODINE

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Osa creva-koža predstavlja potencijalno mesto delovanja dodataka ishrani kod inflamatornih dermatoza. Metaanalize ukazuju na moguću korist oralnih biotika, odnosno pro-, pre-, sin-, para- i postbiotika, u tretmanu različitih inflamatornih dermatoza, uključujući, između ostalog, atopijski dermatitis, akne i psorijazu. Cilj je bio da se analizira desetogodišnji trend publikacija u pet kategorija oralnih biotika namenjenih dermatološkim indikacijama i identifikuju dominantne i nedovoljno istražene oblasti. U bazi *PubMed* pretražene su publikacije objavljene od 2016. do 2025. godine. Pretraga je obuhvatila pojmove koji se odnose na pet kategorija biotika, njihovu oralnu primenu i deset dermatoloških indikacija. U analizu su uključene publikacije u kojima su biotička intervencija i dermatološka indikacija navedene u naslovu, dok je oralna ili dijetetska primena morala biti potvrđena naslovom ili sažetkom. Uključeno je 122 jedinstvenih publikacija. Njihov godišnji broj povećan je sa 5 u 2016. na 21 u 2025. godini, uz složenu godišnju stopu rasta od 17,3%. Probiotici su zastupljeni u 101, prebiotici u 10, sinbiotici u 8, a postbiotici u 3 publikacije. Paraprobiotici nisu identifikovani primenom stroge terminologije. Najzastupljenije indikacije bile su atopijski dermatitis (64), akne (25) i psorijaza (18). U poslednjoj deceniji zabeležen je izražen porast naučnog interesovanja za oralne biotike u dermatologiji. Dosadašnje publikacije prvenstveno su usmerene na probiotike i atopijski dermatitis, dok su druge vrste biotika i dermatološke indikacije znatno manje zastupljene. Istraživanja treba usmeriti na raznovrsnije intervencije, širi spektar dermatoloških oboljenja i klinički relevantne ishode.

Ključne reči: oralni biotici, inflamatorne dermatoze, osa creva-koža

PI-6

RESEARCH TRENDS IN ORAL BIOTICS IN DERMATOLOGY: A BIBLIOMETRIC ANALYSIS OF PUBLICATIONS FROM 2016 TO 2025

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The gut-skin axis represents a potential site of action for dietary supplements in inflammatory dermatoses. Meta-analyses indicate possible benefits of oral biotics, namely probiotics, prebiotics, synbiotics, paraprobiotics, and postbiotics, in the treatment of various inflammatory dermatoses, including, among others, atopic dermatitis, acne, and psoriasis. The aim was to analyze ten-year publication trends concerning five categories of oral biotics intended for dermatological indications and to identify dominant and underexplored areas. PubMed was searched for publications issued between 2016 and 2025. The search included terms relating to five biotic categories, their oral administration, and ten dermatological indications. Publications were included if both the biotic intervention and dermatological indication were stated in the title, while oral or dietary administration had to be confirmed in the title or abstract. A total of 122 unique publications were included. The annual number increased from 5 in 2016 to 21 in 2025, corresponding to a compound annual growth rate of 17.3%. Probiotics were represented in 101 publications, prebiotics in 10, synbiotics in 8, and postbiotics in 3. No paraprobiotic publications were identified using strict terminology. The most frequently represented indications were atopic dermatitis (64), acne (25), and psoriasis (18). Over the past decade, scientific interest in oral biotics in dermatology has increased substantially. The available publications primarily focus on probiotics and atopic dermatitis, while other types of biotics and dermatological indications are considerably less represented. Future research should investigate a wider range of interventions and dermatological conditions and assess clinically relevant outcomes.

Keywords: oral biotics, inflammatory dermatoses, gut-skin axis

PI-7

PERCEPCIJA I UPOTREBA NOVE HRANE U OPŠTOJ POPULACIJI SA FOKUSOM NA BIOAKTIVNE MATERIJE I NUTRITIVNU VRIJEDNOST NOVE HRANE

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Nova hrana predstavlja značajan savremeni trend u oblasti ishrane zbog sve veće potrebe za održivim, nutritivno vrijednim i funkcionalnim prehrambenim proizvodima. Posebnu pažnju privlači zbog prisustva bioaktivnih materija koje mogu imati povoljne efekte i doprinijeti prevenciji hroničnih nezaraznih bolesti. Cilj ovog rada bio je da se ispita percepcija i upotreba nove hrane u opštoj populaciji, sa posebnim osvrtom na informisanost ispitanika o bioaktivnim materijama i nutritivnoj vrijednosti nove hrane. Istraživanje je sprovedeno na uzorku od 138 ispitanika starijih od 18 godina. Za prikupljanje podataka korišten je anonimni upitnik kreiran u Google Forms platformi. Rezultati su pokazali da je informisanost ispitanika o novoj hrani ograničena, iako su uglavnom iskazali pozitivne stavove prema potencijalnim zdravstvenim koristima ovih proizvoda. Kao najčešći izvori informacija izdvojili su se društvene mreže i internet portali, dok je cijena prepoznata kao značajan faktor prilikom kupovine nove hrane. Dobijeni rezultati ukazuju na potrebu za većom informisanošću potrošača o novoj hrani, njenoj nutritivnoj vrijednosti i bioaktivnim materijama.

Ključne riječi: nova hrana, bioaktivne materije, nutritivna vrijednost, percepcija, informisanost

PI-7

PERCEPTION AND CONSUMPTION OF NOVEL FOODS IN THE GENERAL POPULATION: FOCUS ON BIOACTIVE COMPOUNDS AND NUTRITIONAL VALUE

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Novel food represents an important contemporary trend in the field of nutrition due to the growing demand for sustainable, nutritionally valuable, and functional food products. Particular attention has been given to these products because of the presence of bioactive compounds that may have beneficial effects and contribute to the prevention of chronic non-communicable diseases. The aim of this study was to examine the perception and use of novel food in the general population, with a special focus on respondents' awareness of bioactive compounds and the nutritional value of novel food. The study was conducted on a sample of 138 respondents over the age of 18. Data were collected using an anonymous questionnaire created through the Google Forms platform. The results showed that respondents' awareness of novel food was limited, although they generally expressed positive attitudes toward the potential health benefits of these products. Social media and internet portals were identified as the most common sources of information, while price was recognized as an important factor influencing the purchase of novel food. The findings indicate a need for greater consumer awareness regarding novel food, its nutritional value, and bioactive compounds.

Keywords: novel food, bioactive compounds, nutritional value, perception, awareness

PI-8

ŽIVOTNE NAVIKE KAO VRATA ZDRAVLJA

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Prema podacima Svetske zdravstvene organizacije, masovne hronične nezarazne bolesti (HNB) označene su kao najveći zdravstveni i ekonomski izazov 21. veka. Četiri glavne grupe bolesti, koje izdvajaju zbog toga što nose najveći teret oboljevanja, su: kardiovaskularne, maligne, hronične respiratorne bolesti i dijabetes. Ističu i da je budući rast ovih bolesti direktna posledica modernog stila života, pa predviđaju dalji porast obolelih zbog upotrebe duvana, fizičke neaktivnosti, štetne upotrebe alkohola i nezdrave ishrane. Prema podacima iz 2024. godine 589 miliona odraslih (20 - 79 godina) živi sa dijabetesom, sa projekcijom da će do 2050. taj broj biti 853 miliona, uz trend oboljevanja u ranijem životnom dobu. Navedeni faktori rizika za oboljevanje predstavljaju u suštini životne navike, odnosno pogrešne izbore životnog stila. Da bi se stekao uvid u životni stil adolescenata, sprovedena je prospektivna studija na uzorku od 308 ispitanika uzrasta 17 - 18 godina. Studija koristi podatke koje su ispitanici sami prijavili u realnom vremenu kroz strukturirani papirni dnevnik životnog stila. Zadatak je bio da u toku jedne nedelje prate i beleže navike na dnevnom nivou vezane za: spavanje, vreme ispred ekrana, dnevni unos hrane i tečnosti i nivo fizičke aktivnosti. Dobijeni rezultati pokazuju da njihove navike u pogledu fizičke aktivosti uglavnom zadovoljavaju preporuke zdravog životnog stila, dok ostale navike, na žalost, više ili manje odstupaju od preporuka u negativnom smislu. Podsticanje razvijanja zdravih životnih navika od najranijeg životnog doba, u suštini, predstavlja prevenciju, odnosno, smanjuje rizik od HNB kasnije i povećava verovatnoću dužeg životnog veka.

Ključne reči: ishrana, fizička aktivnost, dužina života, navika
Zahvalnica: Realizacija prospektivne studije sprovedena je u drugom polugodištu školske 2025/2026. godine sa učenicima različitih obrazovnih profila Medicinske škole „Dr Miodrag Lazić“ Niš.

PI-8

LIFE HABITS AS A DOOR TO HEALTH

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According to World Health Organization, massive chronic non-communicable diseases (NCDs) have been designated as the greatest health and economic challenge of 21st century. Four main groups of diseases, which stand out because they bear greatest burden of illnesses, are: cardiovascular, malignant, chronic respiratory diseases and diabetes. They also point out that future growth of these diseases is direct consequence of modern lifestyle, so they predict further increase in number of patients due to use of tobacco, physical inactivity, harmful use of alcohol and unhealthy diet. According to data from 2024, 589 million adults (ages 20-79) live with diabetes, with projection that by 2050 that number will be 853 million, with trend of disease occurring earlier in life. Listed risk factors for disease essentially represent life habits, that is, wrong lifestyle choices. In order to gain insight into lifestyle of adolescents, prospective study was conducted on a sample of 308 respondents (ages 17-18). Study uses self-reported data in real time through structured paper lifestyle diary. Task was to monitor and record daily habits related to: sleep, time in front of screen, daily food and liquid intake and level of physical activity during one week. Obtained results show their habits in terms of physical activity generally meet recommendations of healthy lifestyle, while other habits, more or less deviate from recommendations in negative sense. Encouraging development of healthy lifestyle habits from an early age, in essence, is prevention, that is, it reduces the risk of NCDs later and increases likelihood of longer lifespan.

Keywords: diet, physical activity, length of life, habit
Acknowledgement: The implementation of the prospective study was carried out in the second semester of the 2025/2026 school year, with students of different educational profiles of the Medical School "Dr Miodrag Lazic" Niš.

PI-9

BAKTERIJSKI KONTAMINANTI INFANT FORMULA I PROCENA RIZIKA

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Formule za odojčad su zamena za majčino mleko i kategorisane su kao dijetetski proizvodi. Pored nutritivnih vrednosti, ovi proizvodi moraju biti bezbedni za upotrebu, što podrazumeva izuzetno niske limite teških metala, aflatoksina, pesticida, kao i mikrobiološku ispravnost proizvoda. U Republici Srbiji zdravstvena ispravnost je regulisana Pravilnikom o zdravstvenoj ispravnosti dijetetskih proizvoda i Pravilnikom o opštim i posebnim uslovima higijene hrane i mikrobiološkim kriterijumima za hranu. Mikrobiološki kriterijumi prihvatljivosti uključuju limit u ukupnom broju aerobnih bakterija koje formiraju kolonije, odsustvo specificiranih mikroorganizama (*Listeria monocytogenes, Salmonella spp., Cronobacter sakazakii (Enterobacter sakazakii)), Enterobacteriaceae,* i limit za *Bacillus cereus* u početnim formulama za odojčad, kao i limit rezidua njihovih toksina i metabolita. Cilj rada je analiza i sumiranje najčešćih bakterijskih kontaminanata i njihovih toksina i procena rizika. Prema slučajevima prijavljenim od strane Evropskog Centra za kontrolu i prevenciju bolesti (*European Centre for Disease Prevention and Control*, ECDC) i Evropske agencije za bezbednost hrane (*European Food Safety Authority*, EFSA), *C. sakazakii* je, iako vrlo redak, najznačajniji i najopasniji bakterijski kontaminant povezan sa praškastom formulom za ishranu odojčadi. Od ostalih kontaminanata su *B. cereus* i njegov emetični toksin cereulid, *E. coli, L. monocytogenes* i *C. botulinum.* Obzirom da se radi o vrlo osetljivoj populaciji sa još neformiranim crevnim mikrobiomom i nerazvijenim imunitetom, važna je procena rizika, brza identifikacija uzročnika kontaminacije i pravovremeni terapijski tretman odojčadi.

Ključne reči: infant formula; bakterijski kontaminanti; *Cronobacter sakazakii*; *Bacillus cereus*; procena rizika

PI-9

BACTERIAL CONTAMINANTS OF INFANT FORMULA AND RISK ASSESSMENT

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Infant formulas are intended as substitutes for breast milk and are classified as dietary products. In addition to meeting nutritional requirements, these products must also be safe for consumption, which entails the very low limits of contaminants such as heavy metals, aflatoxins, and pesticides, as well as microbiological safety of product. In the Republic of Serbia, the safety of infant formulas is regulated by the Rulebook on the Safety of Dietary Products and the Rulebook on General and Special Conditions of Food Hygiene and Microbiological Criteria for Food. The microbiological acceptance criteria include limits for the total number of aerobic colony-forming bacteria, the absence of specified pathogens (*Listeria monocytogenes*, *Salmonella spp*., *Cronobacter sakazakii* (*Enterobacter sakazakii*)), and *Enterobacteriaceae*, as well as limits for *Bacillus cereus* in first infant formula, together with the limit of residue of their associated toxins and metabolites. The aim of this study is to analyze and summarize the most common bacterial contaminants and their associated toxins, along with risk assessment. According to cases reported by the European Centre for Disease Prevention and Control (ECDC) and the European Food Safety Authority (EFSA), *C. sakazakii* although relatively rare, is the most significant and dangerous bacterial contaminant associated with powdered infant formula. Other relevant contaminants include B. cereus and its emetic toxin cereulide, *E. coli*, *L. monocytogenes*, and *C. botulinum*. Given the vulnerability of this population, characterized by an immature gut microbiome and underdeveloped immune system, in addition to risk assessment, quick identification of the cause of contamination and timely therapeutic treatment of infants is important.

Keywords: infant formula; bacterial contaminants; *Cronobacter sakazakii*; *Bacillus cereus*; risk assessment

PI-10

BEZBEDNOST GOTOVE HRANE

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Bezbednost hrane predstavlja jedan od fundamentalnih stubova javnog zdravlja. Prema podacima Svetske zdravstvene organizacije, globalna incidenca alimentarnih oboljenja iznosi oko 866 miliona slučajeva, uz 1 520 000 smrtnih ishoda godišnje. Institut za javno zdravlje Srbije „Dr Milan Jovanović Batut“ beleži više stotina epidemija godišnje. Cilj rada je prikaz bezbednih postupaka čuvanja termički pripremljenih jela, kroz primenu dvostepenog hlađenja, skladištenja na temperaturi do 5°C, kontrolisanog odmrzavanja i jednokratnog podgrevanja na minimum 75°C. U radu je analizirana relevantna stručna i naučna literatura objavljene u periodu od 2021. do 2026. godine. Pretraga relevantnih izvora i 10 odabranih studija izvršena je kroz naučnu bazu *PubMed*. Bezbednost hrane ne zavisi samo od odabira kvalitetnih namirnica, već i od načina na koji se postupa sa termički pripremljenom hranom. Temperatura i vreme su najvažniji faktori kontrole rasta mikroorganizama, a u opasnoj zoni od 5°C do 63°C generacijsko vreme bakterija zavisi od temperature i vrste bakterije. Nepravilno hlađenje, čuvanje, odmrzavanje i podgrevanje gotovih jela spadaju među vodeće uzroke alimentarnih oboljenja. Posledice su posebno teške kod dece, trudnica, starijih i imunokompromitovanih osoba. Ključne mere HACCP sistema (prema zahtevima standarda *Codex Alimentarius*) obuhvataju analizu opasnosti, određivanje kritičnih kontrolnih tačaka (hlađenje, zamrzavanje, podgrevanje), uspostavljanje kritičnih granica temperature i vremena, monitoring kalibrisanim termometrima, vođenje evidencije, korektivne mere i sprečavanje unakrsne kontaminacije. Dosledno i strogo poštovanje propisanih temperatura i vremenskih ograničenja u svim fazama rukovanja hranom neophodno je radi osiguranja bezbednosti hrane i efikasne prevencije mikrobiološkog rizika.

Ključne reči: bezbednost, hrana, hlađenje, HACCP, *Codex Alimentarius*

PI-10

SAFETY OF READY-TO-EAT FOOD

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Food safety is one of the fundamental pillars of public health. According to the World Health Organization (WHO), foodborne diseases cause approximately 866 million cases and 1,520,000 deaths globally each year. The Institute of Public Health of Serbia "Dr Milan Jovanović Batut" also records several hundred outbreaks annually. The aim of this paper is to present safe procedures for storing thermally prepared meals: two-stage cooling, storage at up to 5°C, controlled thawing, and single reheating to a minimum of 75°C. The paper applies content analysis of scientific and professional literature published between 2021 and 2026. Relevant sources and 10 selected studies were retrieved through the PubMed database. Food safety depends not only on the selection of quality ingredients, but also on how thermally prepared food is handled. Temperature and time are the key factors in controlling microbial growth; in the danger zone of 5°C to 63°C, the generation time of bacteria depends on the temperature and the type of bacteria. Improper cooling, storage, thawing, and reheating of prepared meals are among the leading causes of foodborne diseases, with particularly severe consequences in children, pregnant women, the elderly, and immunocompromised individuals. Key HACCP (*Codex Alimentarius*) measures include hazard analysis, determination of critical control points (cooling, freezing, reheating), critical temperature and time limits, monitoring with calibrated thermometers, record-keeping, corrective actions, and prevention of cross-contamination. Consistent adherence to prescribed temperatures and time limits at all stages of food handling is essential to ensure food safety and prevent microbiological risk.

Keywords: safety, food, cooling, HACCP, *Codex Alimentarius*

PI-11

PROCIJENJENI PREHRAMBENI UNOS VITAMINA D I KONZUMACIJA RIBE U ODRASLOJ POPULACIJI BOSNE I HERCEGOVINE

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Vitamin D ima važnu ulogu u održavanju zdravlja kostiju, regulaciji metabolizma kalcijuma i fosfora te funkciji mišićnog i imunološkog sistema. Osim endogene sinteze pod djelovanjem UVB zračenja, vitamin D se u organizam unosi i putem hrane. Cilj ovog rada bio je procijeniti prehrambeni unos vitamina D u odrasloj populaciji Bosne i Hercegovine, ispitati razlike prema polu i dobi te rezultate uporediti sa referentnim vrijednostima EFSA-e (Europska agencija za sigurnost hrane).Analizirana je baza podataka o prehrambenim navikama stanovništva BiH, koja je obuhvatila 855 odraslih osoba, 446 žena i 409 muškaraca. Podaci su obrađeni putem platforme *Diet Assess & Plan* (DAP), razvijene prema metodologiji EU Menu. Procijenjeni unos vitamina D odnosio se isključivo na unos putem hrane i nije predstavljao laboratorijski određenu koncentraciju vitamina D u krvi. Prema EFSA-i, adekvatan unos (AI) za odrasle iznosi 15 µg/dan. Prosječni unos vitamina D iznosio je 4,39 µg/dan (29,3 % AI). Kod muškaraca iznosio je 4,93 µg/dan (32,9 % AI), a kod žena 3,91 µg/dan (26,0 % AI). Vrijednost AI nije dostiglo 97,7 % ispitanika. Ribu i plodove mora konzumiralo je 18,9 % ispitanika, prosječno 75,9 g/dan. Konzumenti ribe imali su viši unos vitamina D (6,85 µg/dan) nego nekonzumenti (3,82 µg/dan). Rezultati ukazuju na nizak prehrambeni unos vitamina D, uz veći unos kod muškaraca nego kod žena. Niska konzumacija ribe kao važnog prehrambenog izvora vitamina D, može biti povezana sa ukupnim unosom ovog vitamina. Potrebna su dalja istraživanja faktora koji mogu uticati na status vitamina D.

Ključne riječi: vitamin D, prehrambeni unos, odrasla populacija, riba

PI-11

ESTIMATED DIETARY VITAMIN D INTAKE AND FISH CONSUMPTION IN THE ADULT POPULATION OF BOSNIA AND HERZEGOVINA

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Vitamin D plays an important role in maintaining bone health, regulating calcium and phosphorus metabolism, and supporting muscle and immune function. In addition to endogenous synthesis under UVB radiation, vitamin D is obtained through dietary intake. This study aimed to assess dietary vitamin D intake in adults in Bosnia and Herzegovina, examine differences by sex and age, and compare the results with EFSA (European Food Safety Authority) reference values. A dietary intake database comprising 855 adults, including 446 women and 409 men, was analyzed. Data were processed using the Diet Assess & Plan (DAP) platform, developed according to the EU Menu methodology. The estimated vitamin D intake referred exclusively to dietary intake and did not represent laboratory-measured serum vitamin D concentrations. According to EFSA, the adequate intake (AI) for adults is 15 µg/day. The mean vitamin D intake was 4.39 µg/day (29.3% of AI). Among men, intake was 4.93 µg/day (32.9% of AI), compared with 3.91 µg/day (26.0% of AI) among women. The AI was not met by 97.7% of participants. Fish and seafood were consumed by 18.9% of participants, with a mean intake of 75.9 g/day. Fish consumers had a higher vitamin D intake (6.85 µg/day) than non-consumers (3.82 µg/day). The results indicate a low dietary intake of vitamin D, with higher intake among men than women. Low fish consumption may contribute to the low dietary vitamin D intake. Further research is needed to investigate factors influencing vitamin D status.

Keywords: vitamin D, dietary intake, adult population, fish

PI-12

GOJAZNOST I DIJABETES MELITUS TIPA 2 – RASTUĆI JAVNOZDRAVSTVENI IZAZOV I PERSPEKTIVA MEDICINSKE NUTRITIVNE TERAPIJE

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Gojaznost i dijabetes melitus tipa 2 predstavljaju značajne javnozdravstvene izazove, povezane sa nepravilnom ishranom, prekomernim energetskim unosom i nedovoljnom fizičkom aktivnošću. Savremeni pristupi prevenciji naglašavaju značaj pravovremenih intervencija usmerenih na unapređenje kvaliteta ishrane, održavanje odgovarajuće telesne mase i usvajanje zdravih životnih navika, sa ciljem smanjenja rizika od razvoja i progresije ovih metaboličkih poremećaja. Njihova rastuća učestalost nameće potrebu za integrisanim pristupom prevenciji i lečenju. Cilj je bio da se prikažu savremeni epidemiološki pokazatelji gojaznosti i dijabetesa melitusa tipa 2 u Srbiji i Severnobačkom okrugu. Izvršena je deskriptivna analiza dostupnih zdravstveno-statističkih podataka Instituta za javno zdravlje Srbije „Dr Milan Jovanović Batut" i podataka za Severnobački okrug za 2025. godinu, uz pregled relevantne stručne i naučne literature. Prema podacima Batuta (2025), u Srbiji oko 440 000 osoba živi sa dijagnostikovanim dijabetesom, dok se procenjuje da još 246 000 osoba nema postavljenu dijagnozu. Prema poslednjem objavljenom Istraživanju zdravlja stanovništva Srbije (2021), 57,1% stanovništva uzrasta 15 i više godina bilo je prekomerno uhranjeno, uključujući 20,8% gojaznih. U Severnobačkom okrugu tokom 2025. godine registrovano je 915 novoobolelih od dijabetesa tipa 2, od kojih 464 muškarca i 451 žena. Najveći broj novoobolelih registrovan je u starijim uzrasnim grupama. Epidemiološki pokazatelji ukazuju na rastući javnozdravstveni značaj gojaznosti i dijabetesa melitusa tipa 2 i potrebu za intenziviranjem preventivnih aktivnosti usmerenih na pravilnu ishranu i kontrolu telesne mase. U tom kontekstu, medicinska nutritivna terapija predstavlja važnu perspektivu u sveobuhvatnom pristupu prevenciji i lečenju ovih stanja.

Ključne reči: gojaznost, dijabetes melitus tipa 2, prevencija, javno zdravlje, medicinska nutritivna terapija
Zahvalnica: Autorka izražava zahvalnost prof. dr sci. med. Svetlani Stojkov na stručnom usmeravanju, dragocenim sugestijama i podršci tokom izrade ovog rada.

PI-12

OBESITY AND TYPE 2 DIABETES MELLITUS – A GROWING PUBLIC HEALTH CHALLENGE AND THE PERSPECTIVE OF MEDICAL NUTRITION THERAPY

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Obesity and type 2 diabetes mellitus are major public health challenges associated with unhealthy diet, excessive energy intake, and insufficient physical activity. Their increasing prevalence requires timely preventive interventions focused on healthy nutrition, weight control, and lifestyle modification. The aim was to present epidemiological indicators of obesity and type 2 diabetes mellitus in Serbia and the North Bačka District. A descriptive analysis of health statistics from the Institute of Public Health of Serbia "Dr Milan Jovanović Batut" and data from the North Bačka District for 2025 was performed, with a review of relevant professional and scientific literature. According to Batut data (2025), approximately 440,000 people in Serbia have diagnosed diabetes, while an estimated 246,000 remain undiagnosed. According to the latest Health Survey of the Population of Serbia (2021), 57.1% of the population aged 15 years and older was overweight, including 20.8% who were obese. In the North Bačka District, 915 new cases of type 2 diabetes were registered in 2025, including 464 men and 451 women. The highest number of new cases was recorded among older age groups. The findings indicate a growing public health burden of obesity and type 2 diabetes mellitus and the need for stronger preventive activities focused on healthy nutrition and weight management. Medical nutrition therapy is an important component of comprehensive prevention and treatment.

Keywords: obesity, type 2 diabetes mellitus, prevention, public health, medical nutrition therapy
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PI-13

IZGUBLJENI U PREVODU: MEDITERANSKA ISHRANA IZMEĐU ŠPANSKOG GOVORNOG PODRUČJA I ZEMALJA SREDNJE EVROPE – JEZIK, KULTURA I JAVNO ZDRAVLJE

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Mediteranska ishrana predstavlja jedan od najbolje istraženih obrazaca zdrave ishrane, sa dokazanim potencijalom u prevenciji kardiovaskularnih i metaboličkih oboljenja, kao i drugih hroničnih nezaraznih bolesti. Međutim, njena implementacija izvan mediteranskog regiona ne zavisi isključivo od nutritivnih i ekonomskih faktora, već i od jezičke i kulturne prilagođenosti zdravstvenih preporuka. „Prevod“ mediteranske ishrane stoga predstavlja složen proces transfera ne samo terminologije, već i kulturnih značenja, vrednosti i obrazaca ponašanja. Cilj rada je analiza prenosa koncepta mediteranske ishrane iz španskog govornog područja u zemlje Srednje Evrope, sa posebnim fokusom na interakciju jezika, kulture i javnog zdravlja. Analizirana je dostupna naučna literatura, relevantne smernice i edukativni materijali, uz komparativno sagledavanje terminoloških i kulturoloških razlika u zdravstvenoj komunikaciji. Rezultati ukazuju da se mediteranska ishrana u španskom kontekstu definiše šire od nutritivnog obrasca i uključuje zajedničke obroke, sezonsku i lokalnu hranu, kulinarsku tradiciju i društvenu interakciju. U zemljama Srednje Evrope često se redukuje na izbor pojedinačnih namirnica, čime se zanemaruje njen sociokulturni kontekst. Takva redukcija može otežati razumevanje i praktičnu primenu preporuka. Zaključuje se da efikasna promocija mediteranske ishrane zahteva kulturno i jezički prilagođenu zdravstvenu komunikaciju, uz očuvanje njenih osnovnih principa i njihovu integraciju u lokalne prehrambene obrasce. Interdisciplinarni pristup koji povezuje nutricionizam, javno zdravlje, lingvistiku i kulturološke studije može doprineti unapređenju zdravstvene pismenosti i efikasnosti preventivnih intervencija.

Ključne reči: mediteranska ishrana, javno zdravlje, zdravstvena komunikacija, kulturna adaptacija, sociolingvistika

PI-13

LOST IN TRANSLATION: THE MEDITERRANEAN DIET BETWEEN THE SPANISH-SPEAKING CONTEXT AND CENTRAL EUROPEAN COUNTRIES – LANGUAGE, CULTURE, AND PUBLIC HEALTH

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The Mediterranean diet (MD) represents one of the most extensively studied dietary patterns, with established benefits for the prevention of cardiovascular and metabolic diseases, as well as other chronic non-communicable diseases. However, its implementation beyond the Mediterranean region depends not only on nutritional and economic factors but also on the linguistic and cultural adaptation of health recommendations. The "translation" of the MD therefore represents a complex process involving the transfer not only of terminology but also of cultural meanings, values, and behavioral patterns. The aim of this study is to analyze the transfer of the MD concept from the Spanish-speaking context to Central European countries, with particular emphasis on the interaction between language, culture, and public health. The available scientific literature, relevant guidelines, and educational materials were analyzed, with a comparative assessment of terminological and cultural differences in health communication. The findings indicate that, within the Spanish context, the MD is defined more broadly than a nutritional pattern and encompasses shared meals, seasonal and locally produced foods, culinary traditions, and social interaction. In Central European countries, it is often reduced to the consumption of selected foods, while its sociocultural context is largely overlooked. Such reduction may hinder the understanding and practical implementation of dietary recommendations. It is concluded that effective promotion of the MD requires culturally and linguistically adapted health communication, while preserving its fundamental principles and integrating them into local dietary patterns. An interdisciplinary approach combining nutrition, public health, linguistics, and cultural studies may contribute to improving health literacy and the effectiveness of preventive interventions.

Keywords: Mediterranean diet, public health, health communication, cultural adaptation, sociolinguistics

PI-14

NUTRICIJA BEZ GRANICA: KULTURNE I JEZIČKE BARIJERE U SAVETOVANJU O ISHRANI

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Savetovanje o ishrani predstavlja važnu komponentu promocije zdravlja i prevencije hroničnih nezaraznih bolesti. Njegova uspešnost ne zavisi isključivo od naučne utemeljenosti preporuka, već i od njihove jezičke, kulturne i socijalne prilagođenosti korisniku. U uslovima intenzivnih migracija i rastuće kulturne raznolikosti, nutricionisti i drugi zdravstveni profesionalci sve češće rade sa populacijama čiji se prehrambeni obrasci, zdravstvena uverenja i komunikacijske prakse razlikuju od dominantnog kulturnog konteksta. Navedene razlike mogu otežati razumevanje preporuka, smanjiti poverenje i uticati na njihovo pridržavanje. Cilj rada je da identifikuje ključne kulturne i jezičke barijere u nutricionističkom savetovanju i razmotri strategije za razvoj kulturno kompetentne i inkluzivne prakse. Analizirana je dostupna naučna literatura sa fokusom na interkulturalnu komunikaciju, zdravstvenu pismenost, prehrambene navike i prilagođavanje nutritivnih intervencija različitim populacijama. Nalazi ukazuju da kultura, religija, porodične norme i tradicionalni obrasci ishrane značajno oblikuju izbor i pripremu hrane, dok jezičke barijere mogu dovesti do pogrešnog tumačenja stručnih preporuka i smanjenog pridržavanja. Primena jednostavnog jezika, aktivnog slušanja, kulturno prilagođenih edukativnih materijala i profesionalnih prevodilaca može unaprediti komunikaciju i prihvatljivost intervencija. Zaključuje se da kulturna kompetencija treba da predstavlja sastavni deo savremene nutricionističke prakse. Integracija naučnih dokaza sa kulturnim i individualnim karakteristikama korisnika može doprineti efikasnijim nutritivnim intervencijama, većoj zdravstvenoj pismenosti i smanjenju zdravstvenih nejednakosti.

Ključne reči: nutricionističko savetovanje, kulturna kompetencija, jezičke barijere, zdravstvena komunikacija, multikulturalnost

PI-14

NUTRITION WITHOUT BORDERS: CULTURAL AND LINGUISTIC BARRIERS IN DIETARY COUNSELING

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Dietary counseling represents an important component of health promotion and the prevention of chronic non-communicable diseases. Its effectiveness depends not only on the scientific validity of recommendations but also on their linguistic, cultural, and social appropriateness to the individual. In the context of increasing migration and growing cultural diversity, nutritionists and other healthcare professionals increasingly work with populations whose dietary patterns, health beliefs, and communication practices differ from the dominant cultural context. Such differences may hinder the understanding of recommendations, reduce trust, and negatively affect adherence. The aim of this study is to identify key cultural and linguistic barriers in dietary counseling and to examine strategies for developing culturally competent and inclusive practice. The available scientific literature was analyzed, focusing on intercultural communication, health literacy, dietary patterns, and the adaptation of nutritional interventions to diverse populations. The findings indicate that culture, religion, family norms, and traditional dietary patterns significantly influence food choices and preparation, while linguistic barriers may result in misinterpretation of professional recommendations and reduced adherence. The use of clear and accessible language, active listening, culturally adapted educational materials, and professional interpreters may improve communication and the acceptability of nutritional interventions. It is concluded that cultural competence should be an integral component of contemporary nutrition practice. Integrating scientific evidence with the cultural and individual characteristics of service users may contribute to more effective nutritional interventions, improved health literacy, and reduced health inequalities.

Keywords: dietary counseling, cultural competence, linguistic barriers, health communication, multiculturalism

PI-15

VIRALNO ZDRAVLJE: MARKETING DODATAKA ISHRANI U ERI DRUŠTVENIH MREŽA

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Društvene mreže predstavljaju jedan od dominantnih kanala za diseminaciju informacija o zdravlju, ishrani i fizičkoj aktivnosti, ali istovremeno i značajno okruženje za promociju dodataka ishrani. Intenzivna primena influenser marketinga, personalizovanog i ciljanog oglašavanja, kao i algoritamski selektovanog sadržaja, može oblikovati stavove, percepciju i obrasce ponašanja potrošača. U takvom digitalnom okruženju razgraničavanje naučno utemeljenih informacija od komercijalnih poruka postaje sve zahtevnije. Cilj rada je da pruži pregled savremenih marketinških strategija koje se primenjuju u promociji dodataka ishrani na društvenim mrežama, sa posebnim osvrtom na njihov potencijalni uticaj na ponašanje potrošača i javno zdravlje. Analizirana je dostupna naučna literatura koja razmatra ulogu influensera, sadržaja generisanog od strane korisnika, ciljanog oglašavanja i emotivno-vizuelnih elemenata u formiranju percepcije efikasnosti, bezbednosti i opravdanosti primene dodataka ishrani. Nalazi ukazuju da izloženost promotivnim sadržajima može biti povezana sa povećanim interesovanjem za dodatke ishrani, naročito među adolescentima i mladim odraslim osobama, pri čemu odluke o njihovoj primeni nisu nužno zasnovane na naučnim dokazima ili preporukama zdravstvenih profesionalaca. Poseban izazov predstavljaju transparentnost sponzorisanog sadržaja, komunikacija zdravstvenih tvrdnji i regulatorni nadzor digitalnog marketinga. Prevazilaženje navedenih izazova zahteva multidisciplinarni pristup zasnovan na unapređenju zdravstvene i digitalne pismenosti, odgovornoj komunikaciji i efikasnijem regulatornom nadzoru.

Ključne reči: društvene mreže, dodaci ishrani, digitalni marketing, ponašanje potrošača, javno zdravlje

PI-15

VIRAL HEALTH: MARKETING OF DIETARY SUPPLEMENTS IN THE ERA OF SOCIAL MEDIA

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Social media platforms represent one of the dominant channels for disseminating information on health, nutrition, and physical activity, while simultaneously constituting an important environment for the promotion of dietary supplements. The intensive use of influencer marketing, personalized and targeted advertising, as well as algorithmically selected content, may shape consumers' attitudes, perceptions, and behavioral patterns. In such a digital environment, distinguishing scientifically grounded information from commercial messages is becoming increasingly challenging. The aim of this paper is to provide an overview of contemporary marketing strategies used to promote dietary supplements on social media, with particular emphasis on their potential impact on consumer behavior and public health. The available scientific literature was analyzed, focusing on the role of influencers, user-generated content, targeted advertising, and emotional and visual elements in shaping perceptions of the efficacy, safety, and appropriateness of dietary supplement use. The findings indicate that exposure to promotional content may be associated with increased interest in dietary supplements, particularly among adolescents and young adults, while decisions regarding their use are not necessarily based on scientific evidence or recommendations from healthcare professionals. Key challenges include transparency of sponsored content, communication of health claims, and regulatory oversight of digital marketing. Addressing these challenges requires a multidisciplinary approach based on improving health and digital literacy, promoting responsible communication, and strengthening regulatory oversight.

Keywords: social media, dietary supplements, digital marketing, consumer behavior, public health

PI-16

UTICAJ DRUŠTVENIH MREŽA NA PREHRAMBENE NAVIKE DECE – STAVOVI RODITELJA

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Društvene mreže značajno oblikuju životne navike dece, pri čemu sadržaji o ishrani i fizičkom izgledu direktno utiču na izbor namirnica. Uloga roditelja i zdravstvenih radnika ključna je u prepoznavanju i usmeravanju ovih uticaja. Cilj rada je istražiti stavove roditelja o uticaju društvenih mreža na prehrambene navike dece uzrasta od 5 do 18 godina, sa fokusom na uticaj influensera, upotrebu ekrana tokom obroka i edukativnu ulogu zdravstvenih radnika. U istražiavanju je primenjena studija preseka sprovedena od 17.08.2026. do 24.08.2026. godine u Dečijem dispanzeru Doma zdravlja Subotica na uzorku od 100 ispitanika. Korišćen je struktirarani upitnik konstruisan za potrebe ovog istraživanja sa pitanjima o učestalosti korišćenja društvenih mreža, izloženosti sadržajima o ishrani i stavovima roditelja. Popunjavanje upitnika bilo je anonimno i dobrovoljno. Prema rezultatima ove studije društvene mreže samostalno koristi 80% dece. Sadržaje influensera o ishrani prati 75% dece, dok je 68% roditelja navelo da je dete tražilo određeni proizvod viđen na mrežama. Tokom obroka mobilni telefon koristi 50 % dece. Izloženost „idealnom“ izgledu kao negativan faktor prepoznaje 40% roditelja. Potrebu za intenziviranjem edukacije roditelja i dece podržava 90% ispitanika. Rezultati potvrđuju da društvene mreže utiču na prehrambene izbore dece. Kroz edukaciju isavetodavni rad, zdravstveni radnici i roditelji mogu doprineti razvoju kritičkog odnosa dece prema digitalnim sadržajima. Neophodno je jačati kontinuiranu edukaciju dece, roditelja izdravstvenih radnika o uticaju digitalnih medija na zdravlje.

Ključne reči: društvene mreže, deca, roditelji, prehrambene navike, zdravstvena edukacija
Zahvalnica: Zahvaljujemo se svim roditeljima na izdvojenom vremenu i Dečjem dispanzeru Doma zdravlja Subotica na pomoći pri sprovođenju ove studije.

PI-16

THE IMPACT OF SOCIAL MEDIA ON CHILDREN'S DIETARY HABITS – PARENTS' PERSPECTIVES

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Social media significantly shapes children's lifestyle habits, where nutrition and physical appearance content directly influences food choices. The role of parents and healthcare professionals is vital in identifying and guiding these impacts. This cross-sectional study aimed to explore parents' attitudes regarding social media's impact on eating habits in children aged 5–18, focusing on influencer influence, screen use during meals, and the educational role of healthcare workers. Conducted from August 17 to August 24, 2026, at the Children's Dispensary of the Subotica Health Center, the study surveyed 100 participants via a structured, voluntary, and anonymous questionnaire. Key findings reveal that 80% of children use social media independently, and 75% follow nutrition-related content by influencers. Consequently, 68% of parents reported that their child requested specific products seen online, while 50% of children use mobile phones during meals. Exposure to "idealized" body image was recognized as a negative factor by 40% of parents, whereas 90% supported the need for intensified education for both parents and children. Results confirm that social media actively dictates children's food choices. Through guidance and education, healthcare workers and parents can foster children's critical thinking toward digital content. Continuous education on digital media's health impacts remains essential.

Keywords: social media, children, parents, eating habits, health education
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PI-17

SGLT2 INHIBITORI I ISHRANA SA VEOMA NISKIM SADRŽAJEM UGLJENIH HIDRATA: RIZIK OD EUGLIKEMIJSKE DIJABETIČKE KETOACIDOZE I ZNAČAJ SAVETOVANJA PACIJENATA

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Inhibitori natrijum-glukoznog kotransportera 2 (SGLT2) indikovani su u terapiji dijabetesa tipa 2 i kardiorenalnih bolesti, ali nose redak rizik od dijabetičke ketoacidoze (DKA) koja može nastati uz glikemiju <13,9 mmol/L (euglikemijska DKA). Izrazita restrikcija ugljenih hidrata smanjuje insulinsku sekreciju i podstiče ketogenezu, dodatno povećavajući rizik. Cilj rada je bio sagledavanje dokaza o riziku od euglikemijske DKA pri istovremenoj primeni SGLT2 inhibitora i ishrane sa veoma niskim sadržajem ugljenih hidrata i preporuke za savetovanje pacijenata. Sproveden je strukturisani pregled literature pretragom *PubMed/MEDLINE* baze (januar 2016 – avgust 2026) i aktuelnih smernica, uz primenu sledećih ključnih reči: SGLT2 inhibitori, ketoacidoza, ketogena ishrana i restrikcija ugljenih hidrata. Rezultati meta-analiza 22 randomizovana ispitivanja sa 80 235 pacijenata pokazali su povećan rizik od DKA uz SGLT2 inhibitore (RR 2,32; 95% CI 1,64–3,27). U kohorti osoba sa dijabetesom tipa 2 na ketogenoj ishrani incidenca DKA je 2,90/1000 pacijent-godina uz SGLT2 inhibitore naspram 0,37/1000 bez njih. U pregledu 13 prikaza slučajeva koji su obuhvatili 14 pacijenata, 13/14 pacijenata hospitalizovano je u prve četiri nedelje nakon započinjanja takve ishrane, uz prosečnu glikemiju 9,3 mmol/L. *ADA Standards of Care* (2026) preporučuju izbegavanje ovakvih obrazaca ishrane kod osoba na SGLT2 inhibitorima, uz edukaciju o simptomima i rizičnim situacijama. Može se zaključiti da je procena obrasca ishrane deo bezbedne primene SGLT2 inhibitora, uz ograničenja pretežno opservacione evidencije. Farmaceutsko savetovanje treba da obuhvati prepoznavanje rizičnih obrazaca ishrane i okidača (interkurentna bolest, gladovanje, alkohol, redukcija doze insulina), naglašen rizik u prve četiri nedelje, merenje ketona pri simptomima i činjenicu da normoglikemija ne isključuje DKA.

Ključne reči: SGLT2 inhibitori, dijabetička ketoacidoza, ketogena ishrana, savetovanje

PI-17

SGLT2 INHIBITORS AND VERY-LOW-CARBOHYDRATE DIETS: RISK OF EUGLYCEMIC DIABETIC KETOACIDOSIS AND THE IMPORTANCE OF PATIENT COUNSELING

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Sodium-glucose cotransporter 2 (SGLT2) inhibitors are indicated for type 2 diabetes and cardiorenal diseases but carry a rare risk of diabetic ketoacidosis (DKA), which may occur at blood glucose <13.9 mmol/L (euglycemic DKA). Very-low carbohydrate intake reduces insulin secretion and promotes ketogenesis, further increasing risk. The aim of this study was to review evidence on euglycemic DKA risk with SGLT2 inhibitors and very-low-carbohydrate diets and recommendations for patient counseling. A structured literature review was conducted through a PubMed/MEDLINE search (January 2016–August 2026) and review of current guidelines, using the following terms: SGLT2 inhibitors, ketoacidosis, ketogenic diet, and carbohydrate restriction. Results of meta-analysis of 22 randomized trials (80,235 patients) showed increased DKA risk with SGLT2 inhibitors (RR 2.32; 95% CI 1.64–3.27). In a cohort of people with type 2 diabetes on a ketogenic diet, DKA incidence was 2.90/1,000 patient-years with SGLT2 inhibitors versus 0.37/1,000 without. Among 14 patients from 13 case reports, 13/14 were hospitalized within four weeks of starting such a diet, with mean blood glucose 9.3 mmol/L. The 2026 ADA Standards of Care recommend avoiding such diets with SGLT2 inhibitors and education about symptoms and risk situations. In conclusion, assessment of dietary patterns is part of safe SGLT2 inhibitor use, although evidence is predominantly observational. Pharmacist counseling should include identification of high-risk dietary patterns and triggers (intercurrent illness, fasting, alcohol consumption, insulin dose reduction), increased risk during the first four weeks, ketone measurement when symptomatic, and awareness that normoglycemia does not exclude DKA.

Keywords: Sodium-Glucose Transporter 2 Inhibitors, diabetic ketoacidosis, diet, ketogenic, counseling

PI-18

ORALNI ALERGIJSKI SINDROM - PRIKAZ SLUČAJA

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Primarna, IgE-posredovana alergija na hranu anafilaktičkog tipa, karakteristična je više za pedijatrijski uzrast. Sa druge strane, novonastala preosetljivost na određene nutritivne alergene u odraslom dobu koja se manifestuje lokalnom reakcijom i senzacijama u usnoj duplji, dovodi se najpre u vezu sa postojanjem ukrštene alergije na inhalatorne alergene. Prikazana je pacijenktinja starosti 38 godina, sa ponavljanim tegobama u vidu osećaja svraba jezika, nepca i ušiju prilikom konzumacije sirovih lešnika. Takođe, anamnestički je dobijen podatak o višegodišnjim tegobama od strane gornjeg respiratornog trakta u vidu zapušenosti nosa, bistre sekrecije, svraba nosa i kijavice sezonskog karaktera najizraženijih u prolećnim mesecima. Sprovedena je relevantna laboratorijska i alergološka obrada, te je u nalazima verifikovana periferna eozinofilija i povišena serumska koncentracija ukupnog IgE koja ide u prilog atopijskoj konstituciji. Detektovana je povišena koncentracija specifičnog IgE na polene breze - klasa 3, dok je specifični IgE na komponente lešnika u refrentnom opsegu. U cilju potvrde sistemske senzibilizacije urađene su i *in vivo prick* kožne probe na standardne inhalatorne alergene i lešnik, te je potvrđena senzibilizacija na polen breze i lešnika. Kod pacijentkinje je na osnovu anamnestičkih podataka i rezultata alergološkog testiranja postavljena dijagnoza oralnog alergijskog sindroma uz preporuku za izbegavanje konzumacije lešnika koji nisu termički obrađeni, kao i savet za dalju terapiju alergijskog rinitisa. Može se zaključiti da je pojava preosetljivosti na sirove orašaste plodove u odraslom dobu kod pacijenata sa hroničnim alergijskim rinitisom je sekundarnog karaktera i u osnovi predstavlja ukrštenu alergiju između alergena polena drveća i strukturno sličnih komponenti orašastih plodova.

Ključne reči: alergija, orašasti plodovi, lešnik, breza, polen drveća

PI-18

ORAL ALLERGY SYNDROME - A CASE REPORT

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Primary, IgE-mediated food allergy of the anaphylactic type is mainly a characteristic of the pediatric age. On the other hand, newly developed hypersensitivity to certain nutritional allergens in adulthood, which is manifested by a local reaction and sensations in the oral cavity, is mostly associated with the existence of a cross-allergy to inhalant allergens. We have presented the patient aged 38, with repeated complaints in the form of an itchy sensation of the tongue, palate and ears when consuming raw hazelnuts. Also, the anamnestic data revealed long-standing, perennial complaints from the upper respiratory tract in the form of nasal congestion, clear secretions, nasal itching and seasonal sneezing, mostly pronounced in the spring months. The relevant laboratory and allergy work-up was performed, and the findings verified peripheral eosinophilia and the elevated serum concentration of total IgE, indicating the atopic constitution. The elevated concentration of specific IgE to birch pollen - class 3 was detected, while specific IgE to hazelnut components was in the reference range. In order to confirm systemic sensitization, *in vivo* skin prick tests were performed on standard inhalant allergens and whole hazelnut, and sensitization to birch pollen and hazelnut was confirmed. Based on the patient's anamnestic data and results of allergy testing, a diagnosis of oral allergy syndrome was made with a recommendation to avoid the consumption of hazelnuts that have not been thermally processed, as well as advice for further treatment of allergic rhinitis. The occurrence of hypersensitivity to raw nuts in adulthood in patients with chronic allergic rhinitis is secondary in nature and basically represents a cross-allergy between tree pollen allergens and structurally similar components of nuts.

Keywords: allergy, nuts, hazelnut, birch, tree pollen

PI-19

INTERMITENTNO GLADOVANJE KROZ PRIZMU REZULTATA KLINIČKIH STUDIJA

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Intermitentno gladovanje (IG) predstavlja vremenski ograničen režim ishrane koji podrazumeva cikličnu smenu perioda unosa hrane i perioda posta, bez nužno propisanog kalorijskog sastava ishrane. Najčešće primenjivani protokoli uključuju vremenski ograničeno jedenje (npr. 16:8) i alternativne režime redukovanog energetskog unosa (npr. 5:2 model). Fiziološki efekti intermitentnog gladovanja povezani su sa metaboličkim prelazom sa glukozne oksidacije na lipolizu i ketogenezu, što dovodi do povećane insulinske senzitivnosti, smanjene hiperinsulinemije i aktivacije autofagije na ćelijskom nivou. Kliničke studije ukazuju da intermitentno gladovanje može imati povoljan efekat na telesnu masu, lipidni profil i regulaciju glikemije, posebno kod osoba sa gojaznošću i metaboličkim sindromom. Ipak, dugoročna bezbednost i efikasnost ovog režima još uvek nisu u potpunosti razjašnjene, te se intermitentno gladovanje ne preporučuje određenim populacijama, uključujući trudnice, adolescente i osobe sa poremećajima u ishrani, bez medicinskog nadzora.

Ključne reči: intermitentno gladovanje, smanjenje telesne mase gojaznost, dijabetes

PI-19

INTERMITTENT FASTING THROUGH THE PRISM OF CLINICAL STUDY RESULTS

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Intermittent fasting (IF) is a time-limited diet regimen that involves a cyclic alternation of food intake and fasting periods, without necessarily being prescribed caloric composition. The most commonly used protocols include time-restricted eating (e.g., 16:8) and alternative reduced-energy regimens (e.g., 5:2 model). Physiological effects of intermittent fasting are associated with a metabolic transition from glucose oxidation to lipolysis and ketogenesis, leading to increased insulin sensitivity, decreased hyperinsulinemia, and activation of autophagy at the cellular level. Clinical studies suggest that intermittent fasting may have a beneficial effect on body weight, lipid profile, and glycemic regulation, especially in individuals with obesity and metabolic syndrome. However, the long-term safety and efficacy of this regimen are not yet fully understood, and intermittent fasting is not recommended for certain populations, including pregnant women, adolescents, and people with eating disorders, without medical supervision.

Keywords: intermittent fasting, weight reduction, obesity, diabetes

PI-20

UTICAJ HRANE NA MENTALNO ZDRAVLJE

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Ishrana je potencijali promjenjivi faktor koji može uticati na stanje mentalnog zdravlja. Cilj ovog rada je prikazati rezultate studija, te povezanost kvaliteta ishrane, depresivnih i anksioznih simptoma. Proveden je narativni pregled literature pretraživanjem baza *PubMed* i *Google Scholar* za period 2017–2023. U pregled je uključeno šest reprezentativnih radova sa opisanim uzorkom i ishodima mentalnog zdravlja: četiri randomizirane kontrolirane studije (SMILES, n=67; HELFIMED, n=152; Francis i sar., n=76; AMMEND, n=72), jedna prospektivna kohortna studija (n=31.712) i jedna meta-analiza 16 randomiziranih studija (45.826 učesnika). Nalazi su sintetizirani prema obrascu ishrane, populaciji i promjeni simptoma. U studiji SMILES, dvanaestosedmična individualna nutritivna podrška dovela je do remisije depresije kod 32,3% ispitanika, naspram 8,0% u kontrolnoj grupi (NNT=4,1). HELFIMED je pokazao smanjenje depresivnih simptoma mediteranskom ishranom uz riblje ulje, održano i šest mjeseci. Kod mladih odraslih, tromjesečna intervencija mediteranskom ishranom u studiji AMMEND je smanjila simptome depresije, dok je Francis i sar. zabilježio poboljšanje nakon tri sedmice. Meta-analiza randomiziranih studija utvrdila je mali, ali statistički značajan učinak nutritivnih intervencija na depresivne simptome, s većim učinkom uz stručnu podršku. U prospektivnoj kohorti žena najveći unos ultraprocesirane hrane bio je povezan sa 49% većim rizikom razvoja depresije u odnosu na najniži unos. Rezultati podržavaju ulogu prehrambenih obrazaca bogatih povrćem, voćem, integralnim žitaricama, mahunarkama, ribom, orašastim plodovima i nezasićenim mastima. Zaključak istraživanja je da kvalitetnija ishrana, posebno mediteranski obrazac, pokazuje potencijalno povoljan učinak na depresivne simptome, dok visok unos ultraprocesirane hrane može biti povezan s većim rizikom depresije.

Ključne riječi: ishrana, mentalno zdravlje, depresija, mediteranska ishrana, ultraprocesirana hrana

PI-20

THE IMPACT OF FOOD ON MENTAL HEALTH

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Diet is a potentially modifiable factor that may influence mental health. The aim of this study was to present the findings of relevant studies and examine the association between diet quality and depressive and anxiety symptoms. A narrative literature review was conducted by searching the PubMed and Google Scholar databases for studies published between 2017 and 2023. Six representative studies reporting sample characteristics and mental health outcomes were included: four randomized controlled trials (SMILES, n = 67; HELFIMED, n = 152; Francis et al., n = 76; AMMEND, n = 72), one prospective cohort study (n = 31,712), and one meta-analysis of 16 randomized controlled trials (45,826 participants). The findings were synthesized according to dietary pattern, study population, and changes in mental health symptoms. In the SMILES study, 12 weeks of individualized dietary support resulted in remission of depression in 32.3% of participants, compared with 8.0% in the control group (NNT = 4.1). The HELFIMED study demonstrated a reduction in depressive symptoms following a Mediterranean diet supplemented with fish oil, with the effects maintained at six months. Among young adults, a three-month Mediterranean diet intervention in the AMMEND study resulted in a reduction in depressive symptoms, while Francis et al. reported an improvement after three weeks. A meta-analysis of randomized controlled trials found a small but statistically significant effect of dietary interventions on depressive symptoms, with greater effects observed when professional support was provided. In a prospective cohort study of women, the highest intake of ultra-processed foods was associated with a 49% higher risk of developing depression compared with the lowest intake. Overall, the findings support the potential role of dietary patterns rich in vegetables, fruits, whole grains, legumes, fish, nuts, and unsaturated fats in promoting mental health. In conclusion, a higher-quality diet, particularly adherence to a Mediterranean dietary pattern, may have a beneficial effect on depressive symptoms, whereas a high intake of ultra-processed foods may be associated with an increased risk of depression.

Keywords: nutrition, mental health, depression, Mediterranean diet, ultra-processed food

PI-21

PRISTRASNI AGONIZAM GLP-1 RECEPTORA: OD MOLEKULARNIH MEHANIZAMA DO NOVE PARADIGME U TERAPIJI GOJAZNOSTI

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Gojaznost predstavlja složen metabolički poremećaj u čijoj patogenezi učestvuju brojni neuroendokrini, metabolički i inflamatorni mehanizmi. Agonisti receptora za glukagonu sličan peptid-1 (GLP-1R) postali su ključna terapijska opcija u lečenju gojaznosti zahvaljujući sposobnosti da regulišu apetit, telesnu masu i glukozni metabolizam. Međutim, savremeni pristupi razvoja lekova sve više se usmeravaju ka konceptu pristrasnog agonizma (*biased agonism*), kojim se nastoji postići selektivno usmeravanje receptorom posredovane signalizacije ka željenim terapijskim efektima. GLP-1 receptor, kao član porodice receptora spregnutih sa G-proteinima, može usvojiti različita aktivna konformaciona stanja i pokrenuti više intracelularnih signalnih puteva, uključujući Gs-posredovanu aktivaciju adenilat ciklaze i povećanje koncentracije cikličnog adenozin-monofosfata (cAMP), kao i regrutovanje β-arrestina, koji učestvuje u regulaciji signalizacije, internalizaciji i desenzitizaciji receptora. Različiti GLP-1R agonisti mogu pokazati različit stepen funkcionalne selektivnosti između ovih puteva, što predstavlja osnov molekularnog koncepta *biased signaling*-a. Pristrasni agonizam GLP-1R predstavlja novu paradigmu u farmakologiji gojaznosti, jer omogućava racionalni dizajn liganada sa potencijalno poboljšanim odnosom efikasnosti i bezbednosti. Usmeravanje signalizacije prema metabolički povoljnim putevima, uz ograničavanje mehanizama povezanih sa neželjenim efektima i desenzitizacijom receptora, predstavlja jedan od pravaca razvoja naredne generacije antiobezitetnih terapija. Integracija strukturne biologije, molekularne farmakologije i kliničkih istraživanja mogla bi omogućiti precizniji, personalizovani pristup lečenju gojaznosti zasnovan na selektivnoj modulaciji GLP-1R signalizacije.

Ključne reči: GLP-1 receptor, pristrasni agonizam, funkcionalna selektivnost, G-protein spregnuti receptori, terapija gojaznosti

PI-21

BIASED AGONISM OF THE GLP-1 RECEPTOR: FROM MOLECULAR MECHANISMS TO A NEW PARADIGM IN OBESITY THERAPY

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Obesity is a complex metabolic disorder whose pathogenesis involves numerous neuroendocrine, metabolic, and inflammatory mechanisms. Glucagon-like peptide-1 receptor (GLP-1R) agonists have become a cornerstone of obesity treatment owing to their ability to regulate appetite, body weight, and glucose metabolism. However, contemporary drug development is increasingly focused on the concept of biased agonism, which aims to selectively direct receptor-mediated signaling toward desired therapeutic effects. The GLP-1 receptor, a member of the G protein-coupled receptor (GPCR) family, can adopt multiple active conformational states and activate several intracellular signaling pathways, including Gs-mediated activation of adenylyl cyclase with a subsequent increase in cyclic adenosine monophosphate (cAMP) levels, as well as β-arrestin recruitment, which participates in the regulation of signaling, receptor internalization, and desensitization. Different GLP-1R agonists may exhibit varying degrees of functional selectivity between these pathways, forming the molecular basis of the concept of biased signaling. Biased agonism of the GLP-1 receptor represents a new paradigm in the pharmacology of obesity, as it enables the rational design of ligands with the potential to achieve an improved efficacy–safety profile. Selectively directing signaling toward metabolically beneficial pathways while limiting mechanisms associated with adverse effects and receptor desensitization constitutes one of the principal strategies for the development of the next generation of anti-obesity therapies. The integration of structural biology, molecular pharmacology, and clinical research may enable a more precise and personalized approach to obesity treatment based on the selective modulation of GLP-1R signaling.

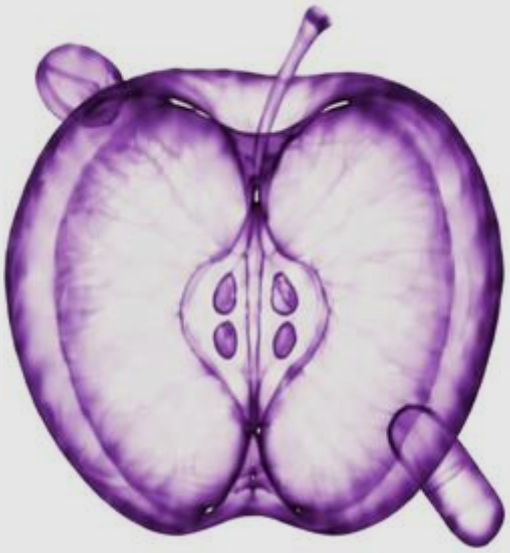
Keywords: GLP-1 receptor, biased agonism, functional selectivity, G protein-coupled receptors, obesity therapy

POSTER PREZENTACIJA

NUTRITIVNA PODRŠKA I CILJANA SUPLEMENTACIJA

POSTER PRESENTATION

NUTRITIONAL SUPPORT AND TARGETED SUPPLEMENTATION



PII-1

LJUŠTURA BODLJOBRADOG RAKA (*FAXONIUS LIMOSUS*) KAO IZVOR ASTAKSANTINA

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Astaksantin je karotenoid crvene boje, poznat po izraženoj antioksidativnoj aktivnosti. Zbog nižih troškova, oko 95% komercijalno proizvedenog astaksantina je sintetičkog porekla. Kako današnji potrošači sve više favorizuju prirodne antioksidanse, neophodno je pronalaženje novih metoda ekstrakcije astaksantina iz prirodnih izvora. Bodljobradi rak *Faxonius limosus* invazivna je vrsta, čije je prisustvo prvi put detektovano u Srbiji u Dunavu kod Apatina 2002.godine. Od tada njegova rasprostranjenost raste iz dana u dan. Kako bodljobradi rak pokazuje visok invazivni potencijal, posebno zbog sposobnosti prenošenja račje kuge koja je letalna za autohtonu vrstu raka, neophodno je pronalaženje rešenja za kontrolu i smanjenje njihove populacije. Jedan od potencijalnih pristupa je valorizacija ljušture bodljobradog raka radi ekstrakcije astaksantina. U ovom istraživanju u te svrhe korištena je ultrazvučna ekstrakcija uz etanol kao rastvarač. Optimizacijom procesa postignuta je koncentracija astaksantina od 689,12 μg/g pri optimalnim uslovima ekstrakcije, koji su obuhvatali masu ljušture od 123,14 mg, vreme ultrazvučne ekstrakcije od 28,14 min i koncentraciju etanola od 75,71%. Kako bi se procenio udeo astaksantina u ukupno ekstrahovanom materijalu, određena je selektivnost ekstrakcije. Vrednosti selektivnosti kretale su se od 0,03 do 4,78%, ukazujući na istovremenu ekstrakciju astaksantina i drugih komponenti prisutnih u ljušturi. Dobijeni rezultati ukazuju na potencijal ultrazvučne ekstrakcije za valorizaciju ljušture invazivnog raka *F. limosus* kao izvora prirodnog astaksantina, čime se istovremeno doprinosi iskorišćenju nusproizvoda i smanjenju negativnog uticaja ove invazivne vrste na autohtone rakove. Buduća istraživanja treba usmeriti ka povećanju selektivnosti ekstrakcije, kako bi se dobio ekstrakt sa većim udelom astaksantina u ukupnom ekstrahovanom materijalu.

Ključne reči: astaksantin, bodljobradi rak, selektivnost ekstrakcije, ultrazvučna ekstrakcija
Zahvalnica: Istraživanje je podržao Fond za nauku Republike Srbije, Br. projekta:7417, Smanjenje negativnog uticaja invazivnih rakova *Faxonius limosus* u Dunavu pametnom eksploatacijom njihovog mesa i ljuštura – DANUBEcare.

PII-1

SPINY-CHEEK CRAYFISH (*FAXONIUS LIMOSUS*) SHELLS AS A SOURCE OF ASTAXANTHIN

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Astaxanthin is a red-colored carotenoid with strong antioxidant activity. Due to its lower production costs, approximately 95% of commercially produced astaxanthin is synthetic. However, growing consumer interest in natural antioxidants has increased the need for new methods of obtaining astaxanthin from natural sources. The spiny-cheek crayfish, *Faxonius limosus*, is an invasive species that was first detected in the Danube in Serbia in 2002. Since then, its distribution has expanded, posing a threat to native crayfish species, especially because it can transmit crayfish plague. Therefore, new approaches are needed to help control its population. One possible approach is the use of *F. limosus* shells as a source of astaxanthin. In this study, ultrasound-assisted extraction with ethanol was used to recover astaxanthin from the shells. Optimization of the extraction process resulted in an astaxanthin concentration of 689.12 μg/g under the optimal conditions of 123.14 mg shell mass, 28.14 min extraction time, and 75.71% ethanol concentration. Extraction selectivity, which shows the proportion of astaxanthin in the total extracted material, ranged from 0.03 to 4.78%. This indicates that other compounds from the shells were also extracted. The results show that ultrasound-assisted extraction can be used to recover natural astaxanthin from *F. limosus* shells, while also supporting the use of this invasive species as a valuable resource. Future research should focus on improving extraction selectivity and obtaining extracts richer in astaxanthin.

Keywords: astaxanthin, spiny-cheek crayfish, extraction selectivity, ultrasound-assisted extraction
Acknowledgement: This research was supported by the Science Fund of the Republic of Serbia, #GRANT No. 7417; "Reducing the negative impact of invasive crayfish *Faxonius limosus* in the Danube by smart exploitation of their meat and shells" (DANUBEcare).

PII-2

ISTRAŽIVANJA ODNOSA STRUKTURE I AKTIVNOSTI ANTIOKSIDATIVNOG DEJSTVA POLIFENOLA

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Tokom redoks disbalansa u organizmu dolazi do stvaranja visokoreaktivnih vrsta kiseonika. Antioksidansi su jedinjenja koja, nakon reakcije sa slobodnim radikalima, ostaju stabilna i mogu usporiti ili sprečiti proces oksidacije. Polifenoli imaju antioksidativni karakter te pružaju zaštitu od razvoja većine bolesti povezanih sa oksidativnim stresom u ćelijama. Za antioksidativnu aktivnost polifenola ključno je prisustvo dve ili tri fenolne hidroksilne grupe, uz karbonilnu grupu u obliku laktona, halkona, flavanona ili flavona. Proširenje konjugovanog sistema u molekulu doprinosi efikasnijem dejstvu uklanjanja slobodnih radikala. Broj i raspored supstituenata koji doniraju elektrone (-OH, -OCH3) imaju značajan uticaj na antioksidativno dejstvo. Položaj treće hidroksilne grupe utiče na stepen aktivnosti, pri čemu je utvrđen sledeći redosled opadanja aktivnosti: 3 > 6 > 5 > 7. Glikozilacija flavonoida na poziciji 3 smanjuje antioksidativnu aktivnost. Metilacija važnih hidroksilnih grupa drastično smanjuje aktivnost flavonoida usled narušavanja konjugovanih sistema hinonske strukture. Takođe, pri visokim koncentracijama, polifenoli uglavnom gube svoju aktivnost. Iako su u novije vreme razvijeni određeni alati za predviđanje antioksidativne reaktivnosti, teško je porediti rezultate različitih laboratorija jer one koriste različite eksperimentalne uslove, poput vrste rastvarača, vremena inkubacije i temperature, kao i različite načine obrade dobijenih rezultata. Rad pruža uvid u kompleksnu relaciju strukture i antioksidativne aktivnosti za podršku efikasne upotrebe polifenola u ishrani i preventivi.

Ključne reči: SAR, structure-activity relationship, polyphenols
Zahvalnica: Ovaj rad je finansirao Pokrajinski sekretarijat za visoko obrazovanje i naučnoistraživačku delatnost Autonomne Pokrajine Vojvodine, Republika Srbija: 003873635 2025 09418 003 000 000 001 04 004

PII-2

STRUCTURE-ACTIVITY RELATIONSHIP STUDIES ON THE ANTIOXIDANT EFFECT OF POLYPHENOLS

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During redox imbalance in the body, highly reactive oxygen species are produced. Antioxidants are compounds that, after reacting with free radicals, remain stable; they can slow or deter the process of oxidation. Polyphenols, have antioxidative characteristics and represent protection from the development of diseases caused by cellular oxidative stress accordingly. For the antioxidant activity of polyphenols, the presence of two or three phenolic hydroxyl groups with a carbonyl group in the form of a lactone or a chalcone, flavanone, or flavone is essential. Extended conjugated systems in molecules exert greater scavenger activities. The number and configuration of electron-donating substituents (-OH, -OCH_3) have a major impact on the antioxidant effect. The position of a third hydroxyl group affects the degree of activity, with the declining activity rank order: 3 > 6 > 5 > 7. Glycosylation of flavonoids at the 3 position reduces the antioxidant activity. The methylation of important hydroxyl(s) dramatically lowered the activity of flavonoids due to the disruption of the quinone conjugated system. Moreover, polyphenols generally lose their activity at high concentrations. Although tools have been developed for predicting antioxidant reactivity, it is still difficult to compare the results of different laboratories because they use different experimental conditions, such as the solvent, incubation time, and temperature, and the manner in which the measurement results are processed. This paper provides insight into the complex relationship between structure and antioxidant activity to support the efficient use of polyphenols in diet and disease prevention.

Keywords: SAR, structure-activity relationship, polyphenols
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PII-3

NUTRITIVNI I BIOAKTIVNI PROFIL SUVE BUKOVAČE (*PLEUROTUS OSTREATUS*) KAO POTENCIJALNE FUNKCIONALNE NAMIRNICE

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Bukovača (*Pleurotus ostreatus*) predstavlja nutritivno vrednu jestivu gljivu koja, zahvaljujući povoljnom hemijskom sastavu i prisustvu bioaktivnih komponenti, može imati značajan potencijal za primenu u razvoju funkcionalne hrane. Cilj ovog rada bio je ispitivanje nutritivnog, mineralnog i bioaktivnog profila suve bukovače i procena mogućnosti njene primene kao funkcionalne sirovine. Osnovni hemijski sastav određen je standardnim analitičkim postupcima, mineralni elementi analizirani su primenom ICP-OES tehnike, dok je profil bioaktivnih jedinjenja ispitan LC–MS/MS metodom. Sveža bukovača sadržala je 89,3% vlage, dok je u osušenom uzorku utvrđeno 29% proteina i 2,58% masti, što ukazuje na visok sadržaj proteina uz nizak udeo masti. Mineralnim profilom dominirali su kalijum, fosfor i magnezijum, uz prisustvo nutritivno značajnih mikroelemenata, uključujući gvožđe, cink, bakar i mangan. Koncentracije analiziranih potencijalno toksičnih elemenata bile su niske. LC–MS/MS analizom utvrđen je kompleksan profil bioaktivnih jedinjenja, sa prisustvom fenolnih kiselina i flavonoidnih derivata, uključujući derivate kaempferola, kao i ferulsku, kafeinsku i hlorogenu kiselinu. Dobijeni rezultati ukazuju da suva bukovača predstavlja nutritivno vrednu sirovinu koja objedinjuje visok sadržaj proteina, povoljan mineralni sastav i raznovrstan profil bioaktivnih jedinjenja, što pruža osnovu za njenu dalju valorizaciju u razvoju funkcionalne hrane i proizvoda sa dodatom nutritivnom vrednošću.

Ključne reči: *Pleurotus ostreatus*, bukovača, funkcionalna hrana, ICP-OES, LC–MS/MS
Zahvalnica: Autori izražavaju zahvalnost Republici Srbiji, Ministarstvu nauke, tehnološkog razvoja i inovacija, na podršci ovom istraživanju kroz Program finansiranja naučnoistraživačkih projekata (br. 451-03-34/2026-03/200133)

PII-3

NUTRITIONAL AND BIOACTIVE PROFILE OF DRIED OYSTER MUSHROOM (*PLEUROTUS OSTREATUS*) AS A POTENTIAL FUNCTIONAL FOOD

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Oyster mushroom (*Pleurotus ostreatus*) is a nutritionally valuable edible mushroom whose favorable chemical composition and bioactive constituents indicate considerable potential for application in functional food development. The aim of this study is to evaluate the nutritional, mineral, and bioactive profile of dried oyster mushroom and assess its potential as a functional food ingredient. The approximate composition was determined using standard analytical procedures, mineral elements were analyzed by ICP-OES, while the profile of bioactive compounds was investigated by LC–MS/MS. Fresh oyster mushroom contained 89.3% moisture, whereas the dried sample contained 29% protein and 2.58% fat, indicating a high protein content combined with a low fat level. The mineral profile was dominated by potassium, phosphorus, and magnesium, accompanied by nutritionally relevant trace elements, including iron, zinc, copper, and manganese. The concentrations of the analyzed potentially toxic elements were low. LC–MS/MS analysis revealed a complex profile of bioactive compounds, including phenolic acids and flavonoid derivatives. Kaempferol derivatives, as well as ferulic, caffeic, and chlorogenic acids, were among the identified compounds. The obtained results indicate that dried oyster mushroom represents a nutritionally valuable raw material combining high protein content, a favorable mineral composition, and a diverse profile of bioactive compounds. These characteristics provide a basis for its further valorization in the development of functional foods and products with enhanced nutritional value.

Keywords: *Pleurotus ostreatus*, oyster mushroom, functional food, ICP-OES, LC–MS/MS
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PII-4

POVERENJE U OGLAŠAVANJE SUPLEMENATA: ZNAČAJ ZA SOCIJALNI MARKETING U SPORTU

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Poverenje u oglašavanje suplemenata može zavisiti od stavova o njihovoj upotrebi. Prepoznavanje povezanih karakteristika može doprineti ciljanoj zdravstvenoj edukaciji u socijalnom marketingu. Cilj rada bio je da se ispita povezanost stavova i obrazovanja sa poverenjem sportista i rekreativaca u reklame za suplemente radi segmentacije u socijalnom marketingu. Studija preseka sprovedena je tokom novembra 2025. na 227 ispitanika, koji su dobrovoljno i anonimno popunili strukturirani upitnik o poverenju u reklame, neophodnosti suplemenata za sportske performanse, dovoljnosti prirodnih izvora iz hrane i stečenom obrazovanju. Zbog malog broja odgovora „potpuno poverenje“, a koje se odnosi na reklame, delimično i potpuno poverenje objedinjeni su u kategoriju poverenja. Primenjeni su χ^2 test i binarna logistička regresija ($p<0,05$). Reklamama je delimično ili potpuno verovalo 57,3% ispitanika, dok 42,7% nije verovalo. Poverenje je izrazilo 70,5% ispitanika koji su suplemente smatrali neophodnim, 62,3% neodlučnih i 34,0% onih koji ih nisu smatrali neophodnim ($\chi^2(2)=16,24$; $p<0,001$). Regresioni model bio je značajan ($\chi^2(5)=17,57$; $p=0,004$; Nagelkerke $R^2=0,10$). U odnosu na poslednju grupu, izgledi za poverenje bili su veći kod delimičnog (OR=2,94; 95% CI: 1,48–5,85) i potpunog slaganja (OR=4,15; 95% CI: 1,69–10,16) da su suplementi neophodni. Dovoljnost prirodnih izvora nije bila značajno povezana sa poverenjem, niti se ono razlikovalo prema obrazovanju (χ^2 $p=0,946$; regresija $p=0,780$; OR=0,92). Stav o neophodnosti suplemenata povezan je sa većim poverenjem u oglašavanje i može biti značajan za segmentaciju socijalno-marketinških intervencija.

Ključne reči: socijalni marketing, poverenje, suplementacija

PII-4

TRUST IN SUPPLEMENT ADVERTISING: RELEVANCE FOR SOCIAL MARKETING IN SPORT

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Trust in supplement advertising may reflect attitudes towards its use. Identifying associated characteristics may support targeted health education in social marketing. The aim of this study was to examine associations between attitudes, education, and athletes' and recreational exercisers' trust in supplement advertising to identify social-marketing segmentation criteria. This cross-sectional study included 227 participants in November 2025, who voluntarily and anonymously completed a structured questionnaire on advertising trust, supplement necessity for sports performance, sufficiency of natural sources of food, and education. Because few reported complete trust in commercials, partial and complete trust were combined into one category. The χ^2 test and binary logistic regression were applied ($p<0.05$). Overall, 57.3% partially or completely trusted advertisements, whereas 42.7% did not. Trust was reported by 70.5% of participants who considered supplements necessary, 62.3% of those undecided, and 34.0% of those considering them unnecessary ($\chi^2(2)=16.24$; $p<0.001$). The regression model was significant ($\chi^2(5)=17.57$; $p=0.004$; Nagelkerke $R^2=0.10$). Compared with the latter group, the odds of trust were higher among participants who partially (OR=2.94; 95% CI: 1.48–5.85) or completely agreed (OR=4.15; 95% CI: 1.69–10.16) that supplements were necessary. Sufficiency of natural sources was not significantly associated with trust, which also did not differ by education (χ^2 $p=0.946$; regression $p=0.780$; OR=0.92). Perceived supplement necessity is associated with greater advertising trust and may inform the segmentation of social marketing interventions.

Keywords: social marketing, trust, supplementation

PII-5

PRAVILNA ISHRANA I CILJANA SUPLEMENTACIJA KOD OBOLELIH OD DIJABETESA U SUBOTICI

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Dijabetes melitus predstavlja jedan od vodećih javnozdravstvenih problema zbog visoke učestalosti, hroničnog toka i brojnih komplikacija koje narušavaju kvalitet života obolelih. Kontrola bolesti zahteva pravilnu ishranu, redovnu fizičku aktivnost i pridržavanje terapije. Pored standardnog lečenja, sve veće interesovanje postoji za primenu fitoterapije kao dopunske mere u regulaciji glikemije. Cilj rada je bio da ispita navike u ishrani obolelih od dijabetesa, sa posebnim fokusom na primenu lekovitog bilja kao dopunske mere u kontroli bolesti. Istraživanje je sprovedena kao studija preseka od februara do aprila 2025. godine među 30 odraslih članova Udruženja za borbu protiv šećerne bolesti Subotice. Podaci su prikupljeni anketnim upitnikom, a analizirani primenom deskriptivne statistike u programu SPSS 20. Ispitanici u proseku doručkuju 5,7, ručaju 5,8, imaju užinu 4,7 i večeraju 5,5 dana tokom radne nedelje. Voće konzumiraju 5,2, povrće 5,0, slatkiše 3,5, gazirana pića 2,0, a slane grickalice 2,3 puta nedeljno. Dodatke ishrani koristi 90% ispitanika, najčešće vitamin D, vitamin C i magnezijum (33%), zatim vitamin E, selen i cink (20%). Biljne preparate koristi 90% ispitanika, pri čemu se najčešće koriste nana (30%), čajevi od hajdučke trave, matičnjaka, hibiskusa, lipe, žalfije, nevena i bagrema, kao i kurkuma, cimet, đumbir, beli luk i origano (po 20%). Oboleli od dijabetesa često primenjuju preporuke pravilne ishrane i koriste dodatke ishrani i biljne preparate kao dopunu terapiji. Rezultati ukazuju na široku primenu fitoterapije i potrebu za dodatnom edukacijom o njenoj bezbednoj i dokazima zasnovanoj primeni.

Ključne reči: *diabetes mellitus*, pravilna ishrana, fitoterapija, suplementacija

PII-5

HEALTHY NUTRITION AND TARGETED SUPPLEMENTATION IN PATIENTS WITH DIABETES IN SUBOTICA

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Diabetes mellitus is a major public health problem due to its high prevalence, chronic course, and complications that impair quality of life. Disease management requires a balanced diet, regular physical activity, and adherence to therapy. Alongside standard treatment, interest in phytotherapy as a complementary approach to glycemic control is increasing. This study aimed to examine the dietary habits of people with diabetes, focusing on medicinal plants as a complementary measure in disease management. A cross-sectional study was conducted from February to April 2025 among 30 adult members of the Subotica Diabetes Association. Data were collected using a questionnaire and analyzed through descriptive statistics in SPSS 20. On average, participants ate breakfast on 5.7 days, lunch on 5.8 days, a snack on 4.7 days, and dinner on 5.5 days during the working week. They consumed fruit 5.2 times, vegetables 5.0 times, sweets 3.5 times, soft drinks 2.0 times, and salty snacks 2.3 times per week. Supplements were used by 90% of participants, most commonly vitamin D, vitamin C, and magnesium (33%), followed by vitamin E, selenium, and zinc (20%). Herbal preparations were also used by 90%, most frequently peppermint (30%), along with yarrow, lemon balm, hibiscus, linden, sage, marigold, and acacia teas, as well as turmeric, cinnamon, ginger, garlic, and oregano (20% each). Participants frequently followed healthy dietary recommendations and used supplements and herbal preparations alongside therapy. The findings indicate widespread phytotherapy use and the need for further education on its safe, evidence-based application.

Keywords: *diabetes mellitus*, healthy diet, phytotherapy, supplementation

PII-6

UPOTREBA SUPLEMENATA KOD SPORTISTA I REKREATIVACA IZ PERSPEKTIVE JAVNOZDRAVSTVENE EDUKACIJE

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Upotreba suplemenata je česta među sportistima i rekreativcima, a obrasci suplementacije zavise od brojnih faktora. Identifikovanje grupa sa učestalijom upotrebom važno je za prevenciju neadekvatne suplementacije i usmeravanje javnozdravstvene edukacije. Cilj istraživanja bio je ispitati učestalost upotrebe suplemenata kod ispitanika u zavisnosti od sporta kojim se bave i odrediti najčešće korišćene vrste suplemenata. Analitička studija preseka obuhvatila je 227 sportista i rekreativaca koji su dobrovoljno i anonimno popunili strukturirani upitnik. Sportovi su, uz mogućnost višestrukog izbora, klasifikovani kao sportovi snage, izdržljivosti, timski, estetski/telo–um i borilački. Analizirana je upotreba proteinskog praha, kreatina, aminokiselina, vitamina/minerala, omega-3 masnih kiselina, biljnih i energetskih preparata prema vrsti sporta. Razlike su ispitane χ^2 testom ($p<0,05$). Rezultati su pokazali da je suplemente koristilo 158 ispitanika (69,6%), najčešće vitamine/minerale (79,7%), proteinski prah (54,4%), omega-3 (36,7%) i kreatin (30,4%). Upotreba je bila najčešća u sportovima snage (80,9%), zatim izdržljivosti (73,8%), timskim (67,3%), estetskim/telo–um (65,7%) i borilačkim (61,9%). Sportisti snage koristili su ih češće od ostalih (80,9% prema 61,7%; $\chi^2=9,59$; $p=0,002$), dok razlike za ostale sportske kategorije nisu bile značajne ($p>0,05$). Suplementacija je veoma zastupljena, posebno među sportistima snage. Rezultati ukazuju na potrebu za ciljanim zdravstveno-edukativnim intervencijama koje promovišu racionalnu i bezbednu upotrebu suplemenata.

Ključne reči: suplementacija, sportisti, rekreativci, javno zdravlje, edukacija

PII-6

SUPPLEMENT USE AMONG ATHLETES AND RECREATIONAL EXERCISERS FROM A PUBLIC HEALTH EDUCATION PERSPECTIVE

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Supplement use is common among athletes and recreational exercisers, and supplementation patterns depend on numerous factors. Identifying groups with a higher prevalence of supplement use is important for preventing inappropriate supplementation and guiding public health education. The aim of this study was to examine the prevalence of supplement use among participants according to the type of sport they engage in and to identify the most commonly used types of supplements. This analytical cross-sectional study included 227 athletes and recreational exercisers who voluntarily and anonymously completed a structured questionnaire. Sports were classified as strength, endurance, team, aesthetic/body–mind, and combat sports, with multiple responses permitted. The use of protein powder, creatine, amino acids, vitamins/minerals, omega-3 fatty acids, herbal supplements, and energy products was analysed according to sport type. Differences were examined using the χ^2 test ($p<0.05$). Results indicate that supplements were used by 158 participants (69.6%), most commonly vitamins/minerals (79.7%), protein powder (54.4%), omega-3 fatty acids (36.7%), and creatine (30.4%). Use was highest in strength sports (80.9%), followed by endurance (73.8%), team (67.3%), aesthetic/body–mind (65.7%), and combat sports (61.9%). Strength-sport participants used supplements more frequently than others (80.9% vs. 61.7%; $\chi^2=9.59$; $p=0.002$), while differences for the remaining sport categories were not significant ($p>0.05$). Supplement use is highly prevalent and is most common among participants engaged in strength sports. These findings indicate the need for targeted health education interventions aimed at promoting the rational and safe use of supplements.

Keywords: supplementation, athletes, recreational exercisers, public health, education

PII-7

NUTRICIONISTIČKE NAVIKE SPORTISTA - ZNANJA, STAVOVI I PRAKSA

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Adekvatno nutricionističko znanje i njegova primena važni su za očuvanje zdravlja, oporavak i sportske performanse. Cilj istraživanja bio je procena nutricionističkog znanja, prehrambenih navika i praksi sportista, kao i njihovih stavova o značaju adekvatne ishrane za performanse i oporavak. Sprovedena je studija preseka primenom anonimnog anketnog upitnika na 203 fizički aktivna ispitanika (73,4% žena; 26,6% muškaraca), prosečne starosti 31,7 ± 7,6 godina. Ulogu proteina pravilno je prepoznalo 91,6% ispitanika, a ugljenih hidrata 68,5%. Sopstvene potrebe za proteinima poznaje 60,6%, a dnevne energetske potrebe 49,3% ispitanika. Nakon treninga, 76,8% redovno konzumira obrok, a 68,0% vodi računa o unosu proteina. Vreme obroka u odnosu na trening redovno planira 43,3%, dok 50,2% usklađuje dnevni unos hrane sa nivoom fizičke aktivnosti. Značaj adekvatne ishrane za sportske performanse prepoznaje 94,6%, a za oporavak 93,1% ispitanika. Istovremeno, 74,9% iskazuje potrebu za dodatnim unapređenjem znanja. Nalazi potvrđuju potrebu za daljom edukacijom sportista o individualnim nutritivnim potrebama, planiranju obroka i prilagođavanju ishrane zahtevima treninga, ukazujući na nesklad između visoke svesti o značaju ishrane i njene dosledne primene.

Ključne reči: sportska ishrana, nutricionističko znanje, prehrambene navike, sportske performanse, oporavak

PII-7

NUTRITIONAL HABITS OF ATHLETES: KNOWLEDGE, ATTITUDES, AND PRACTICES

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Knowledge of adequate nutrition and its application are important for maintaining health, supporting recovery, and enhancing sports performance. The aim of this study was to assess athletes' nutrition knowledge, dietary habits and practices, as well as their attitudes toward the importance of adequate nutrition for performance and recovery. A cross-sectional study was conducted using an anonymous questionnaire among 203 physically active participants (73.4% women; 26.6% men), with a mean age of 31.7 ± 7.6 years. The role of protein was correctly identified by 91.6% of participants and that of carbohydrates by 68.5%. Their own protein requirements were known by 60.6% of participants, while 49.3% knew their daily energy requirements. After training, 76.8% regularly consumed a meal, while 68.0% paid attention to their protein intake. Meal timing in relation to training was regularly planned by 43.3%, while 50.2% adjusted their daily food intake according to their level of physical activity. The importance of adequate nutrition for sports performance was recognized by 94.6% of participants and for recovery by 93.1%, while 74.9% expressed a need to further improve their nutrition knowledge. The findings confirm the need for further nutrition education among athletes regarding individual nutritional requirements, meal planning, and adapting dietary intake to training demands, highlighting a discrepancy between high awareness of the importance of nutrition and its consistent application.

Keywords: sports nutrition, nutrition knowledge, dietary habits, sports performance, recovery

PII-8

EMOCIONALNO JEDENJE: NUTRICIONISTIČKI PRISTUPI U TRETMANU I PREVENCIJI

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Emocionalno jedenje je unos hrane kao odgovor na emocionalna stanja i može otežati regulaciju telesne mase. Cilj rada bio je analizirati značaj nutricionističke podrške u tretmanu i mogućnost primene nalaza u prevenciji. Sproveden je narativni pregled tri sistematska pregleda sa meta-analizama objavljena 2023–2025. godine, uz poređenje intervencija, ishoda i dokaza. Intervencije su obuhvatale kognitivno-bihejvioralnu terapiju, terapije trećeg talasa, poput terapije prihvatanjem i posvećenošću, intervencije zasnovane na svesnoj pažnji i svesnom jedenju, standardne bihejvioralne intervencije (edukacija, preporuke u ishrani i načinu života i postavljanje ciljeva) i kombinacije. Smith i saradnici (2023), analizirajući 34 studije kod odraslih sa prekomernom telesnom masom ili gojaznošću, utvrdili su smanjenje emocionalnog jedenja i mali gubitak telesne mase. Power i saradnici (2025), u pregledu 47 studija i 6.729 ispitanika, utvrdili su smanjenje emocionalnog jedenja (SMD = −0,99; $p < 0,001$) i telesne mase (−4,09 kg; $p < 0,001$). Pet tehnika promene ponašanja, uključujući postavljanje i preispitivanje ciljeva, povratnu informaciju o ponašanju, razmatranje prednosti i nedostataka i rad na neusklađenim uverenjima, bilo je povezano sa povoljnijim ishodima, ali povezanost ne dokazuje da je pojedinačna tehnika odgovorna za efekat. Zbog preklapanja, pregledi ne predstavljaju nezavisne potvrde efekta. Kao i sar. (2025) nisu utvrdili značajan zbirni efekat intervencija zasnovanih na svesnoj pažnji na emocionalno jedenje ($g = −0,27$; $p = 0,070$). Nutricionistička podrška podrazumeva individualizovano savetovanje, procenu emocionalnih okidača, edukaciju o ishrani, zajedničko postavljanje ciljeva i praćenje ponašanja, uz saradnju sa psihologom kada je potrebna podrška. Nalazi se odnose na tretman, dok efikasnost u prevenciji ostaje nedovoljno razjašnjena.

Ključne reči: emocionalno jedenje, nutricionističko savetovanje, promena ponašanja, svesna pažnja

PII-8

EMOTIONAL EATING: NUTRITIONAL APPROACHES TO TREATMENT AND PREVENTION

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Emotional eating is food intake in response to emotional states and may complicate weight management. The aim was to analyze the role of nutritional support in treatment and the potential application of findings to prevention. A focused narrative review compared three systematic reviews with meta-analyses published in 2023–2025, considering interventions, outcomes, and evidence limitations. Interventions included cognitive behavioral therapy, third-wave approaches such as Acceptance and Commitment Therapy, mindfulness-based and mindful eating interventions, standard behavioral interventions (education, dietary and lifestyle recommendations, and goal setting), and combinations. Smith et al. (2023), reviewing 34 studies in adults with overweight or obesity, found reductions in emotional eating and small weight losses. Power et al. (2025), reviewing 47 studies and 6,729 participants, found reductions in emotional eating (SMD = −0.99; $p < 0.001$) and body weight (−4.09 kg; $p < 0.001$). Five behavior change techniques, including goal setting and review, feedback on behavior, pros and cons, and incompatible beliefs, were associated with more favorable outcomes, but this association does not establish that any single technique caused the effect. Because the reviews include overlapping studies, they do not provide independent confirmation of effects. Kao et al. (2025) found no statistically significant pooled effect of mindfulness-based interventions on emotional eating ($g = −0.27$; $p = 0.070$). Nutritional support refers to individualized counseling, assessment of emotional triggers, nutrition education, collaborative goal setting, and behavior monitoring, with cooperation with a psychologist when additional support is needed. Findings primarily concern treatment, while effectiveness in prevention remains insufficiently established.

Keywords: emotional eating, nutritional counseling, behavior change, mindfulness

PII-9

NUTRITIVNA PODRŠKA I CILJANA SUPLEMENTACIJA KOD PACIJENATA SA INFLAMATORNIM BOLESTIMA CREVA

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Inflamatorne bolesti creva (IBC) koje obuhvataju Kronovu bolest i ulcerozni kolitis, predstavljaju hronična inflamatorna oboljenja gastrointestinalnog trakta koja mogu značajno uticati na nutritivni status i kvalitet života obolelih. Ishrana ima važnu ulogu u kontroli simptoma, prevenciji i korekciji nutritivnih deficita, kao i u pružanju nutritivne podrške tokom aktivne bolesti i remisije. Brojna istraživanja ukazuju na povezanost određenih faktora ishrane sa rizikom za razvoj i tok IBC. Kod pacijenata se mogu javiti neuhranjenost i nedostaci makronutrijenata i mikronutrijenata usled smanjenog unosa hrane, povećanih nutritivnih potreba i malapsorpcije. Enteralna ishrana ima značajno mesto u nutritivnoj terapiji, dok se parenteralna ishrana primenjuje u specifičnim kliničkim situacijama, kada enteralni unos nije moguć ili je nedovoljan. Tokom remisije preporučuje se nutritivno adekvatna i individualno prilagođena ishrana, uz nadoknadu vitamina i minerala kada je utvrđen njihov deficit. Posebna pažnja može biti usmerena na vitamine A, C, E i B12, kao i na cink, magnezijum, selen, kalcijum, kalijum i folnu kiselinu. Kod određenih pacijenata, eliminacione dijete, uključujući eliminacionu dijetu za Kronovu bolest (*Crohn's Disease Elimination Diet*, CDED), koriste se za individualizaciju ishrane i smanjenje simptoma. Adekvatan nutritivni pristup predstavlja važan deo sveobuhvatnog zbrinjavanja pacijenata sa IBC.

Ključne reči: inflamatorne bolesti creva, ishrana, nutritivna podrška, suplementacija

PII-9

NUTRITIONAL SUPPORT AND TARGETED SUPPLEMENTATION IN PATIENTS WITH INFLAMMATORY BOWEL DISEASES

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Inflammatory bowel diseases (IBD), which include Crohn's disease and ulcerative colitis, are chronic inflammatory diseases of the gastrointestinal tract that can significantly affect the nutritional status and quality of life of sufferers. Nutrition plays an important role in symptom control, prevention and correction of nutritional deficits, as well as in providing nutritional support during active disease and remission. Numerous studies indicate the association of certain dietary factors with the risk for the development and course of IBD. Malnutrition and deficiencies of macronutrients and micronutrients may occur in patients due to reduced food intake, increased nutritional needs and malabsorption. Enteral nutrition has an important place in nutritional therapy, while parenteral nutrition is used in specific clinical situations, when enteral intake is not possible or insufficient. During remission, a nutritionally adequate and individually adapted diet is recommended, with the replacement of vitamins and minerals when their deficiency has been determined. Special attention can be directed to vitamins A, C, E and B12, as well as to zinc, magnesium, selenium, calcium, potassium and folic acid. In certain patients, elimination diets, including the Crohn's Disease Elimination Diet (CDED), are used to individualize nutrition and reduce symptoms. An adequate nutritional approach is an important part of the comprehensive management of patients with IBD.

Key words: inflammatory bowel diseases, nutrition, nutritional support, supplementation

PII-10

DIJETETSKI SUPLEMENTI U SVAKODNEVNOJ PRAKSI: ANKETA MEĐU PACIJENTIMA SA DIJABETESOM I KARDIOVASKULARNIM BOLESTIMA U SRBIJI

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Upotreba dijetetskih suplemenata kod osoba sa dijabetesom i/ili kardiovaskularnim bolestima je česta, što nosi rizik od interakcija i neželjenih dejstava. Cilj rada bio je da se ispita učestalost, obrasci korišćenja, bezbednost i stavovi pacijenata prema dijetetskim suplementima u Srbiji, u tom kontekstu sprovedena je anonimna anketna studija u sedam apoteka širom Srbije u junu i julu 2026. godine. Upitnik je popunilo 124 ispitanika (49 muškaraca, 75 žene; rođeni u periodu 1939–2002, najviše u periodu 1960–1969), od kojih 122 sa dijabetesom i/ili kardiovaskularnim bolestima (dijabetes 23, kardiovaskularne bolesti 65, oboje 34; bez ovih dijagnoza 2). Analizirani su socio-demografski podaci, terapijski režimi, upotreba suplemenata, neželjena dejstva i stavovi o informisanosti i novim komunikacionim platformama. Analizom prikupljenih podataka utvrđeno je da: većina ispitanika koristila je dijetetske suplemente (svakodnevno 57, povremeno 41), najčešće po preporuci lekara/farmaceuta (n=83), a dominantno vitamine i minerale (n=67). Neželjeno dejstvo povezano sa suplementima prepoznalo je 7 ispitanika. Ispitanici su procenili da pacijenti u Srbiji nisu dovoljno upoznati sa dejstvima dijetetskih proizvoda (najviše ocena 1–2), dok je 77 pacijenata smatralo da bi nove platforme i načini komunikacije bili korisni (ocena 4–5). Može se zaključiti da je široka upotreba dijetetskih suplementa uz poverenje u preporuku farmaceuta. Retka su prijavljena neželjena dejstva i percepcija nedovoljne informisanosti pacijenata. Rezultati ukazuju na potrebu za jasnijom edukacijom o prepoznavanju i prijavljivanju neželjenih reakcija, kao i za uvođenjem digitalnih alata u apotekarsku praksu radi bezbednije i racionalnije upotrebe suplemenata kod hroničnih bolesnika.

Ključne reči: dijetetski suplementi, dijabetes, kardiovaskularne bolesti, neželjena dejstva, digitalna edukacija.
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PII-10

DIETARY SUPPLEMENTS IN EVERYDAY PRACTICE: A SURVEY AMONG PATIENTS WITH DIABETES AND CARDIOVASCULAR DISEASES IN SERBIA

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The use of dietary supplements among individuals with diabetes and/or cardiovascular diseases is common, carrying a risk of interactions and adverse effects. This study aimed to investigate the frequency and patterns of dietary supplement use, their safety, and patients' attitudes towards dietary supplements in Serbia. An anonymous survey was conducted in seven pharmacies across Serbia in June and July 2026. The questionnaire was completed by 124 respondents (49 men and 75 women; born 1939–2002, with the largest proportion born 1960–1969), of whom 122 had diabetes and/or cardiovascular diseases (diabetes: 23, cardiovascular diseases: 65, both: 34; 2 had neither diagnosis). Sociodemographic characteristics, therapeutic regimens, supplement use, adverse effects, and attitudes towards information availability and new communication platforms were analysed. Most respondents used dietary supplements (57 daily and 41 occasionally), most commonly based on recommendations from physicians or pharmacists (n=83), with vitamins and minerals being predominant (n=67). Adverse effects associated with supplement use were reported by 7 respondents. Respondents considered patients in Serbia insufficiently informed about the effects of dietary products, with ratings of 1–2 being most common, while 77 patients considered new platforms and communication methods useful (ratings 4–5). The findings indicate widespread supplement use and considerable trust in pharmacists' recommendations, while adverse effects were rarely reported. There is a need for clearer education on recognising and reporting adverse reactions and for introducing digital tools into pharmacy practice to promote safer and more rational supplement use among patients with chronic diseases.

Keywords: dietary supplements, diabetes, cardiovascular diseases, adverse effects, digital education
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PII-11

VIŠE OD SUPLEMENTACIJE: POTENCIJALNA ULOGA SLC TRANSPORTERA U INTERINDIVIDUALNOJ VARIJABILNOSTI ODGOVORA NA UNOS UGLJENIH HIDRATA I PROTEINA, SUPLEMENTACIJU I FIZIČKU AKTIVNOST

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Transporteri rastvorenih supstanci (eng. *solute carrier*, SLC) čine obimnu i funkcionalno raznovrsnu superfamiliju membranskih proteina koji posreduju u transportu i raspodeli nutrijenata i biološki aktivnih jedinjenja kroz ćelijske membrane. Iako unos hranom diktira dostupnost nutrijenata, njihov fiziološki efekat zavisi od transporta kroz ćelijske membrane i daljeg iskorišćavanja u ćeliji. Stoga, SLC transporteri predstavljaju ključnu sponu između ishrane i ćelijskog metabolizma, pri čemu fizička aktivnost dodatno modifikuje metaboličke zahteve i njihovu regulaciju. U ovom preglednom radu analizirana je uloga ključnih SLC transportera u skeletnim mišićima i njihov uticaj na individualne razlike u odgovoru na ishranu, suplementaciju i vežbanje. Fokus je bio na transporterima odgovornim za promet glukoze, aminokiselina, kreatina i laktata: GLUT4 (SLC2A4), LAT1 (SLC7A5), SNAT2 (SLC38A2), SLC6A8, MCT1 (SLC16A1) i MCT4 (SLC16A3). Razmatrani su efekti unosa ugljenih hidrata i proteina, kao i suplementacije *whey* proteinima, kreatinom, glutaminom, β-hidroksi-β-metilbutiratom (HMB) i β-alaninom. Dodatno su analizirani potencijalni efekti berberina, α-lipoične kiseline, cimeta, hrom-pikolinata, omega-3 masnih kiselina i polifenola na regulaciju transportnih sistema i metabolički odgovor, kao i uticaj treninga izdržljivosti i snage na ekspresiju, lokalizaciju i funkciju SLC transportera. Podaci su obuhvatili nalaze od eksperimentalnih modela do kliničkih istraživanja. Dosadašnja saznanja ukazuju da SLC transporteri funkcionišu kao integrisana metabolička mreža, a ne kao izolovani transportni sistemi. Uprkos ograničenim i heterogenim kliničkim dokazima, varijacije u regulaciji i funkciji transportera mogu doprineti interindividualnim razlikama u metaboličkom odgovoru na unos nutrijenata, suplementaciju i fizičku aktivnost. Razumevanje ovih procesa pruža osnov za razvoj personalizovanih pristupa ishrani vežbača i nutritivnih strategija u trenažnom procesu.

Ključne reči: SLC transporteri, skeletni mišići, metabolička adaptacija, personalizovana ishrana, vežbanje

PII-11

BEYOND SUPPLEMENTATION: THE POTENTIAL ROLE OF SLC TRANSPORTERS IN INTERINDIVIDUAL VARIABILITY IN RESPONSE TO CARBOHYDRATE AND PROTEIN INTAKE, SUPPLEMENTATION AND EXERCISE

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Solute carrier (SLC) transporters constitute a large and diverse superfamily of membrane proteins that mediate the transport and distribution of nutrients and bioactive compounds across cellular membranes. Although diet determines nutrient availability, physiological effects depend on membrane transport and subsequent intracellular utilization. SLC transporters therefore represent an interface between nutrition and cellular metabolism, while exercise further modifies metabolic demands and transporter regulation. This review examined key SLC transporters in skeletal muscle and their contribution to interindividual variability in responses to carbohydrate and protein intake, dietary supplementation and exercise. Particular emphasis was placed on transporters involved in glucose, amino acid, creatine, and lactate transport, including GLUT4 (SLC2A4), LAT1 (SLC7A5), SNAT2 (SLC38A2), SLC6A8, MCT1 (SLC16A1), and MCT4 (SLC16A3). The effects of carbohydrate and protein intake, and supplementation with whey protein, creatine, glutamine, β-hydroxy-β-methylbutyrate (HMB), and β-alanine, were examined. In addition, the potential effects of berberine, α-lipoic acid, cinnamon, chromium picolinate, omega-3 fatty acids, and polyphenols on transport regulation and metabolic responses were assessed. Endurance and resistance training effects on SLC transporter expression, localization, and function were also considered. The evidence reviewed ranged from experimental models to clinical studies. Taken together, findings suggest that SLC transporters function as an interconnected metabolic network rather than isolated systems. Although clinical evidence remains limited and heterogeneous, differences in transporter regulation and function may contribute to interindividual variability in metabolic responses to nutrient intake, supplementation, and exercise. Understanding these mechanisms may provide a framework for individualized approaches to sports nutrition and exercise-related nutritional strategies.

Keywords: SLC transporters, skeletal muscle, metabolic adaptation, precision nutrition, exercise

PII-12

LEKOVIMA IZAZVANA HIPOMAGNEZEMIJA SA POSEBNIM OSVRTOM NA INHIBITORE PROTONSKE PUMPE: PROCENA RIZIKA I ZNAČAJ SAVETOVANJA PACIJENATA

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Hipomagnezemija je često neprepoznat neželjeni ishod farmakoterapije; procenjuje se da više od 50% opšte populacije ima granični deficit uz prosečan unos niži od preporučenih 320–420 mg/dan. Inhibitori protonske pumpe (IPP) smanjuju intestinalno preuzimanje magnezijuma posredovano TRPM6/TRPM7 kanalima, dok diuretici, aminoglikozidi, amfotericin B, cisplatin, inhibitori kalcineurina i anti-EGFR antitela povećavaju renalnu ekskreciju. Cilj rada je bio sagledavanje dokaza o riziku od hipomagnezemije izazvane lekovima, pre svega IPP, i formulisanje preporuka za praćenje i savetovanje pacijenata. Metodologija je zasnovana na strukturiranom pregledu literature (PubMed/MEDLINE, 2010–2026), aktuelnih smernica i regulatornih saopštenja. Rezultati meta-analiza 9 studija (115 455 pacijenata) pokazali su povećan rizik uz IPP (OR 1,78; 95% CI 1,08–2,92), a ažurirana meta-analiza 14 studija potvrdila je udruženost (RR 1,44; 95% CI 1,13–1,76). U studiji slučajeva i kontrola (366 hospitalizovanih, 1 464 kontrole) aktuelna primena IPP bila je udružena sa hipomagnezemijom (prilagođeni OR 1,43; 95% CI 1,06–1,93), izraženije uz diuretike (OR 1,73 naspram 1,25); za antagoniste H2 receptora udruženost nije nađena. Apsolutni rizik je mali (jedna dodatna hospitalizacija na 76 591 pacijenta lečenog IPP 90 dana), a FDA (2011) preporučuje merenje magnezijuma pre i periodično tokom dugotrajne terapije. Može se zaključiti da je rizik od hipomagnezemije uz IPP mali, ali klinički relevantan pri dugotrajnoj primeni i uz lekove koji povećavaju renalne gubitke. Savetovanje treba da obuhvati proveru opravdanosti dugotrajne primene IPP i racionalnost farmakoterapije, prepoznavanje simptoma (spazmi, parestezije, tetanija, aritmije, konvulzije), svest da hipokalemija i hipokalcemija refraktorne na suplementaciju ukazuju na hipomagnezemiju, kao i da je oralna suplementacija često nedovoljna bez prekida IPP.

Ključne reči: inhibitori protonske pumpe, hipomagnezemija, magnezijum, racionalna farmakoterapija, savetovanje

PII-12

DRUG-INDUCED HYPOMAGNESEMIA WITH PARTICULAR REFERENCE TO PROTON PUMP INHIBITORS: RISK ASSESSMENT AND THE IMPORTANCE OF PATIENT COUNSELING

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Hypomagnesemia is a frequently unrecognized adverse outcome of pharmacotherapy; over 50% of the general population is estimated to have marginal deficiency, with mean intake below the recommended 320–420 mg/day. Proton pump inhibitors (PPIs) reduce TRPM6/TRPM7-mediated intestinal magnesium uptake, while diuretics, aminoglycosides, amphotericin B, cisplatin, calcineurin inhibitors, and anti-EGFR antibodies increase renal excretion. We aimed to review evidence on the risk of drug-induced hypomagnesemia, primarily with PPIs, and formulate recommendations for monitoring and patient counseling. Methods comprised a structured literature review of PubMed/MEDLINE (2010–2026), current guidelines, and regulatory communications. A meta-analysis of 9 studies (115,455 patients) showed increased risk with PPIs (OR 1.78; 95% CI 1.08–2.92), and an updated meta-analysis of 14 studies confirmed the association (RR 1.44; 95% CI 1.13–1.76). In a case-control study (366 hospitalized cases, 1,464 controls), current PPI use was associated with hypomagnesemia (adjusted OR 1.43; 95% CI 1.06–1.93), more strongly with diuretics (OR 1.73 vs 1.25); H2 receptor antagonists showed no association. Absolute risk is small (one excess hospitalization per 76,591 patients treated with PPIs for 90 days), and the FDA (2011) recommends measuring magnesium before and periodically during prolonged therapy. The risk of hypomagnesemia with PPIs is small but clinically relevant with prolonged use and with drugs that increase renal losses. Counseling should include reviewing the justification for long-term PPI use and the rationality of pharmacotherapy, symptom recognition (cramps, paresthesia, tetany, arrhythmias, seizures), awareness that hypokalemia and hypocalcemia refractory to supplementation point to hypomagnesemia, and that oral supplementation is often insufficient without PPI discontinuation.

Keywords: proton pump inhibitors, hypomagnesemia, magnesium, rational pharmacotherapy, counseling

PII-13

PERSONALIZOVANA SUPLEMENTACIJA - TREND ILI MEDICINA BUDUĆNOSTI?

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Primjena dodataka prehrani sve je zastupljenija, ali univerzalni pristup njihovom odabiru i doziranju ne uzima uvijek u obzir individualne razlike u nutritivnim potrebama, zdravstvenom stanju, životnim navikama i metabolizmu. Razvoj personalizovane prehrane i dostupnost različitih biomarkera otvorili su mogućnost preciznijeg usmjeravanja suplementacije. U radu će biti razmotren potencijal personalizovane suplementacije, savremene mogućnosti njenog utemeljenja na individualnim karakteristikama te ograničenja postojeće primjene u kliničkoj i preventivnoj praksi. Analizirane su savremene publikacije i sistematski pregledi koji se bave biomarkerima, genetičkim i metaboličkim karakteristikama, nutrigenetikom i nutrigenomikom u kontekstu individualiziranog pristupa suplementaciji i prehrani. Utvrđeno je da individualizirani pristup može omogućiti preciznije prepoznavanje nutritivnih nedostataka i metaboličkih potreba te racionalniji izbor pojedinih dodataka prehrani, posebno kod osoba s povećanim rizikom od deficita ili specifičnim zdravstvenim potrebama. Međutim, dostupni dokazi su neujednačeni, a primjena genetičkih, metaboličkih i drugih biomarkera još uvijek nije dovoljno standardizirana za široku kliničku primjenu. Dodatno, nedostatak dugoročnih istraživanja i klinički validiranih algoritama ograničava procjenu stvarne koristi i sigurnosti ovakvog pristupa, dok rutinska primjena suplementa bez jasne indikacije može dovesti do nepotrebnih troškova i potencijalnih neželjenih efekata. Personalizovana suplementacija predstavlja perspektivan koncept, ali njena primjena treba biti zasnovana na validiranim biomarkerima, kliničkom kontekstu i dokazima o koristi, a ne isključivo na komercijalnoj dostupnosti novih testova i proizvoda.

Ključne reči: personalizovana suplementacija, biomarkeri, nutrigenetika, nutrigenomika

PII-13

PERSONALIZED SUPPLEMENTATION – TREND OR MEDICINE OF THE FUTURE?

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The use of dietary supplements is increasingly widespread, but a universal approach to their selection and dosage does not always take into account individual differences in nutritional needs, health status, lifestyle, and metabolism. The development of personalized nutrition and the availability of various biomarkers have opened the possibility of more precise approaches to supplementation. This paper considers the potential of personalized supplementation, current possibilities for basing supplementation on individual characteristics, and the limitations of its current application in clinical and preventive practice. Current publications and systematic reviews addressing biomarkers, genetic and metabolic characteristics, nutrigenetics, and nutrigenomics in the context of individualized supplementation and nutrition were analyzed. An individualized approach may enable more precise identification of nutritional deficiencies and metabolic needs and a more rational selection of dietary supplements, particularly in individuals at increased risk of deficiency or with specific health needs. However, the available evidence is inconsistent, and the use of genetic, metabolic, and other biomarkers is not yet sufficiently standardized for widespread clinical application. Furthermore, the lack of long-term studies and clinically validated algorithms limits the assessment of the actual benefits and safety of this approach, while routine supplementation without a clear indication may lead to unnecessary costs and potential adverse effects. Personalized supplementation represents a promising concept, but its application should be based on validated biomarkers, clinical context, and evidence of benefit, rather than solely on the commercial availability of new tests and products.

Keywords: personalized supplementation, biomarkers, nutrigenetics, nutrigenomics

PII-14

VITAMIN D - SAVREMENI PRISTUP SUPLEMENTACIJI I RACIONALNA PRIMJENA

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Vitamin D se široko primjenjuje u preventivnoj i suportivnoj praksi, ali rezultati novijih istraživanja nameću potrebu za preispitivanjem rutinske suplementacije i određivanja njegovog statusa kod zdravih osoba. Analizirati savremene spoznaje o opravdanosti primjene vitamina D, uključujući kriterije za suplementaciju, odabir režima doziranja, značaj mjerenja 25-hidroksivitamina D [25(OH)D] te moguće sigurnosne rizike. Analizirane su aktuelne kliničke smjernice, sistematski pregledi i meta-analize randomiziranih kontroliranih studija, uz fokus na efekte vitamina D u prevenciji bolesti i odnos koristi i potencijalnih rizika. Rezultati dostupnih istraživanja ne pokazuju jasnu korist od rutinske primjene vitamina D iznad preporučenih dnevnih unosa kod zdravih odraslih osoba mlađih od 75 godina u svrhu prevencije hroničnih bolesti. Nasuprot tome, određene populacijske grupe mogu imati korist od empirijske suplementacije, među kojima su djeca i adolescenti, trudnice, osobe u dobi od 75 godina i više te osobe s povećanim rizikom od predijabetesa. Rutinsko određivanje koncentracije 25(OH)D u opštoj populaciji također nije preporučeno, dok univerzalna ciljna vrijednost za prevenciju bolesti nije utvrđena. Poseban oprez potreban je pri primjeni visokih i povremenih doza bez jasno utvrđene indikacije, zbog mogućnosti pojave neželjenih efekata. Primjena vitamina D treba biti utemeljena na dostupnim dokazima i jasno definisanim indikacijama, uz izbor odgovarajućeg režima doziranja i procjenu odnosa koristi i rizika. Pri tome je važno razlikovati nadoknadu nutritivnog deficita od korištenja vitamina D kao opće preventivne mjere.

Ključne reči: vitamin D, suplementacija, prevencija

PII-14

VITAMIN D - CONTEMPORARY APPROACH TO SUPPLEMENTATION AND RATIONAL USE

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Vitamin D is widely used in preventive and supportive care, but recent research indicates a need to reconsider routine supplementation and assessment of vitamin D status in healthy individuals. To analyze current knowledge on the appropriate use of vitamin D, including criteria for supplementation, dosing regimens, the importance of 25-hydroxyvitamin D [25(OH)D] measurement, and potential safety risks. Current clinical guidelines, systematic reviews, and meta-analyses of randomized controlled trials were analyzed, focusing on the effects of vitamin D in disease prevention and the balance between benefits and potential risks. Available research does not show a clear benefit of routine vitamin D use above recommended dietary intakes in healthy adults younger than 75 years for chronic disease prevention. In contrast, certain population groups may benefit from empirical supplementation, including children and adolescents, pregnant women, adults aged 75 years and older, and individuals at increased risk of prediabetes. Routine 25(OH)D measurement in the general population is also not recommended, while no universal target concentration for disease prevention has been established. Particular caution is required with high-dose and intermittent regimens without a clear indication, due to potential adverse effects. Vitamin D use should be based on evidence and clearly defined indications, with an appropriate dosing regimen and assessment of benefits and risks. It is important to distinguish correction of nutritional deficiency from the use of vitamin D as a general preventive measure.

Keywords: vitamin D, supplementation, prevention

PII-15

SUPLEMENTACIJA KOD PACIJENATA OBOLELIH OD HAŠIMOTO TIREOIDITISA

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Autoimunske bolesti štitaste žlezde ubrajaju se u najčešće autoimunske bolesti. Hašimotov tireoiditis jeste jedna od najčešćih autoimunskih, ali i endokrinoloških bolesti današnjice. Neki mikronutrijenti i metaboliti su neophodni za metabolizam i sintezu hormona štitaste žlezde i njihov nedostatak može negativno uticati na funkciju štitaste žlezde. Cilj ovog rada bio je analiza najčešćih fiziološki aktivnih komponenti poreklom iz hrane i dijetetskih suplemenata koji mogu da utiču na rad i funkciju štitaste žlezde. Relevantna literatura je identifikovana pretragom baza *PubMed*, *Google Scholar* i *Scopus* korišćenjem termina: nutrijenti, ishrana, dodaci ishrani, goitrogeni, Hašimoto tireoiditis. U analizu su uključene studije koje su pružile dokaze o mehanizmima delovanja, i kliničke studije koje su uključivale ispitanike sa deficitom nekog od nutrijenata kako bi se ustanovio uticaj navedenog nutrijenta na funkciju štitaste žlezde. U rezultatima je analiziran i ustanovljen značajan uticaj vitamina D, minerala joda, selena, gvožđa i cinka, i metabolita mio-inozitola. Rezultati pokazuju da najnovija saznanja o efikasnosti suplementacije mikronutrijentima u prevenciji i podršci lečenju Hašimoto tireoiditisa i komorbiditeta nisu još uvek povezani sa konvencionalnom terapijom kod pacijenata sa Hašimoto tireoiditisom zbog nedostatka čvrstih dokaza o efektima različitih nutritivnih intervencija na simptome i tok bolesti. Iako zvanične smernice i protokoli suplementacije kod obolelih od Hašimoto tireoiditisa tek treba da budu definisani na osnovu naučnih dokaza, rezultati pokazuju da je ciljana individualna suplementacija opravdana, jer može doprineti prevenciji ili ublažavanju simptoma Hašimoto tireoiditisa, hipotireoze uzrokovane Hašimoto tireoiditisom i simptoma najčešćih komorbiditeta.

Ključne reči: nutrijenti, ishrana, dodaci ishrani, Hašimoto tireoiditis

PII-15

SUPPLEMENTATION IN PATIENTS WITH HASHIMOTO THYROIDITIS

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Hashimoto's thyroiditis is one of the most common autoimmune and endocrinological diseases today. Some micronutrients and metabolites are essential for the metabolism and synthesis of thyroid hormones and their deficiency can negatively affect thyroid function. The aim of this work was to analyze the most common physiologically active components originating from food and dietary supplements that can affect the function of the thyroid gland. Relevant literature was identified by searching the PubMed, Google Scholar and Scopus databases using the terms: nutrients, nutrition, nutritional supplements, Hashimoto's thyroiditis. The analysis included studies that provided evidence of the mechanisms of action, and clinical studies that included subjects with a deficiency of one of the nutrients in order to establish the impact of the specified nutrient on the thyroid gland function. The results analyzed and found a significant influence of vitamin D, iodine, selenium, iron and zinc, and myo-inositol. The results show that the latest knowledge about the effectiveness of micronutrient supplementation in the prevention and support of the treatment of Hashimoto's thyroiditis is not yet related to conventional therapy in these patients due to the lack of solid evidence on the effects of different nutritional interventions on the symptoms and course of the disease. Although official guidelines have yet to be defined based on scientific evidence, the results show that targeted individual supplementation is justified, as it can contribute to the prevention or mitigation of symptoms of Hashimoto's thyroiditis, hypothyroidism caused by Hashimoto's thyroiditis and symptoms of the most common comorbidities.

Keywords: nutrients, nutrition, nutritional supplements, Hashimoto's thyroiditis

PII-16

ISHRANA PACIJENATA NA HEMODIJALIZI

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Hronična bubrežna bolest i terminalna bubrežna insuficijencija predstavljaju značajan javnozdravstveni problem. Pored hemodijalize kao metode nadomestne terapije bubrežne funkcije, pravilna ishrana i adekvatan unos tečnosti i elektrolita imaju ključnu ulogu u prevenciji komplikacija i očuvanju kvaliteta života pacijenata. Cilj rada je bio da ispita nivo znanja, prehrambene navike i stepen pridržavanja preporuka o pravilnoj ishrani kod pacijenata na hemodijalizi, kao i da se proceni uloga medicinske sestre u njihovoj edukaciji. Istraživanje je sprovedeno kao deskriptivna, transverzalna studija u Opštoj bolnici u Subotici tokom juna i jula 2026. godine. Prigodnim uzorkom obuhvaćeno je 30 pacijenata na programu hemodijalize. Podaci su prikupljeni primenom strukturiranog, anonimnog anketnog upitnika i obrađeni metodama deskriptivne statistike. Rezultati su pokazali da većina ispitanika (90,0%) smatra da je ishrana važan deo lečenja. Visok nivo znanja utvrđen je u pogledu kontrole unosa tečnosti (83,3%), soli (80,0%) i kalijuma (76,7%), dok je znanje o kontroli fosfora bilo nešto niže (66,7%). Većina ispitanika uglavnom ili uvek poštuje preporučeni dijetetski režim, ali su prisutne povremene teškoće, naročito u ograničavanju unosa tečnosti. Medicinska sestra je za 43,3% ispitanika glavni izvor informacija o ishrani, dok 83,3% izražava potrebu za dodatnom zdravstvenom edukacijom. Može se zaključiti da pacijenti na hemodijalizi poseduju zadovoljavajući nivo znanja o dijetetskom režimu, ali postoji potreba za kontinuiranom i individualno prilagođenom edukacijom. Kontinuirani zdravstveno-vaspitni rad medicinskih sestara značajan je za unapređenje pridržavanja preporuka i prevenciju metaboličkih komplikacija.

Ključne reči: hemodijaliza, ishrana, dijetetski režim, edukacija

PII-16

NUTRITION OF PATIENTS UNDERGOING HEMODIALYSIS

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Chronic kidney disease and end-stage renal disease represent a significant public health problem. In addition to hemodialysis as a renal replacement therapy, proper nutrition and adequate intake of fluids and electrolytes play a key role in preventing complications and maintaining patients' quality of life. The aim of this study was assesment of the level of knowledge, dietary habits, and adherence to dietary recommendations among patients undergoing hemodialysis, as well as to evaluate the role of nurses in patient education. A descriptive, cross-sectional study was conducted at the General Hospital in Subotica during June and July 2026. The study included 30 patients undergoing hemodialysis, selected using a convenience sampling method. Data were collected using a structured, anonymous questionnaire and analyzed using descriptive statistical methods. Results have pointed that the majority of respondents (90.0%) considered nutrition an important part of treatment. A high level of knowledge was demonstrated regarding fluid intake restriction (83.3%), salt intake (80.0%), and potassium control (76.7%), while knowledge regarding phosphorus control was somewhat lower (66.7%). Most respondents reported generally or consistently adhering to the recommended dietary regimen; however, occasional difficulties were identified, particularly in restricting fluid intake. The nurse was identified as the main source of dietary information by 43.3% of respondents, while 83.3% expressed a need for additional health education. In conclusion, patients undergoing hemodialysis demonstrated a satisfactory level of knowledge regarding the dietary regimen; however, there is a need for continuous and individually tailored education. Continuous health education provided by nurses plays an important role in improving adherence to dietary recommendations and preventing metabolic complications.

Keywords: hemodialysis, nutrition, dietary regimen, education

PII-17

NUTRITIVNI PROTOKOL KOD SPORTISTA SA MIŠIĆNO-TETIVNIM POVREDAMA U USLOVIMA HIPERBARIČNE OKSIGENOTERAPIJE (HBOT)

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Povrede mišićno-tetivnog sistema predstavljaju jedan od najčešćih uzroka odsustva sportista sa treninga i takmičenja, produžene rehabilitacije i povećanog rizika od ponovnih povreda. Savremeni pristupi sportskoj medicini sve više integrišu metaboličke, nutritivne i oksigenacione strategije radi ubrzanja regeneracije tkiva. Cilj rada je prikaz značaja sinergijskog delovanja hiperbarične oksigenoterapije (HBOT) i ciljane nutritivne podrške u oporavku sportista sa mišićno-tetivnim povredama. HBOT, primenjena pri pritisku od 2,0–2,4 ATA, povećava količinu rastvorenog kiseonika u plazmi, poboljšava oksigenaciju hipoperfuziranih tkiva i podstiče angiogenezu, proliferaciju fibroblasta i sintezu kolagena, čime doprinosi efikasnijoj reparaciji tetiva i mišića. Istovremeno, adekvatan unos proteina (1,6–2,2 g/kg telesne mase), posebno aminokiselina poput leucina, glicina i prolina, obezbeđuje supstrate neophodne za sintezu mišićnih proteina i kolagena. Kombinacija hidrolizovanog kolagena i vitamina C dodatno podržava formiranje i stabilizaciju kolagenskih vlakana. Održavanje energetskog balansa i optimalan unos ugljenih hidrata doprinose očuvanju glikogenskih rezervi, dok omega-3 masne kiseline mogu modulirati inflamatorni odgovor i smanjiti prekomernu produkciju proinflamatornih citokina. Sinergijsko delovanje HBOT i nutritivnih intervencija omogućava brži prelazak iz inflamatorne u proliferativnu i fazu remodelovanja tkiva, što može skratiti vreme rehabilitacije i ubrzati bezbedan povratak sportskim aktivnostima. Zaključuje se da integracija hiperbarične oksigenoterapije i individualizovanog nutritivnog protokola predstavlja efikasan multidisciplinarni pristup u savremenoj sportskoj rehabilitaciji, sa potencijalom za unapređenje funkcionalnog oporavka, smanjenje rizika od rekurentnih povreda i optimizaciju sportskih performansi nakon povrede.

Ključne reči: HBOT, sportska medicina, mišićno-tetivne povrede, nutricija, kolagen

PII-17

NUTRITIONAL PROTOCOL FOR ATHLETES WITH MUSCLE–TENDON INJURIES UNDER HYPERBARIC OXYGEN THERAPY (HBOT)

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Muscle–tendon injuries are among the most common causes of athletes' absence from training and competition, prolonged rehabilitation, and an increased risk of recurrent injuries. Contemporary approaches in sports medicine increasingly integrate metabolic, nutritional, and oxygenation strategies to accelerate tissue regeneration. The aim of this paper is to present the importance of the synergistic effects of hyperbaric oxygen therapy (HBOT) and targeted nutritional support in the recovery of athletes with muscle–tendon injuries. HBOT, administered at pressures of 2.0–2.4 ATA, increases the amount of oxygen dissolved in plasma, improves the oxygenation of hypoperfused tissues, and stimulates angiogenesis, fibroblast proliferation, and collagen synthesis, thereby enhancing the repair of tendons and muscles. At the same time, adequate protein intake (1.6–2.2 g/kg of body weight), particularly amino acids such as leucine, glycine, and proline, provides the substrates necessary for muscle protein and collagen synthesis. The combination of hydrolyzed collagen and vitamin C further supports the formation and stabilization of collagen fibers. Maintaining energy balance and ensuring optimal carbohydrate intake help preserve glycogen stores, while omega-3 fatty acids may modulate the inflammatory response and reduce excessive production of pro-inflammatory cytokines. The synergistic interaction between HBOT and nutritional interventions facilitates a faster transition from the inflammatory phase to the proliferative and tissue remodelling phases, thereby shortening rehabilitation time and promoting a safe return to sports activities. It is concluded that the integration of hyperbaric oxygen therapy and an individualized nutritional protocol represents an effective multidisciplinary approach in contemporary sports rehabilitation, with the potential to enhance functional recovery, reduce the risk of recurrent injuries, and optimize post-injury athletic performance.

Keywords: HBOT, sports medicine, muscle–tendon injuries, nutrition, collagen

PII-18

IMPACT OF SUPPLEMENTATION ON THE TREATMENT OF ONCOLOGY PATIENTS

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Oncology pharmacy plays a key role in optimizing treatment outcomes and improving the quality of life of cancer patients through individualized pharmacotherapy, safety assessment of supplementation, and continuous patient counselling. In clinical practice, a large proportion of cancer patients use dietary supplements alongside oncologic therapy, often without adequate evaluation of interactions between anticancer treatment and supplements, as well as without proper assessment of treatment-related adverse effects. This may influence both the efficacy and safety of therapy. As an integral member of the oncology team, the pharmacist evaluates the clinical appropriateness of supplementation, identifies potential risks (pharmacokinetic and pharmacodynamic interactions, effects on immunotherapy, hepatotoxicity, alterations in drug metabolism), and provides personalized, evidence-based recommendations. Counselling includes nutritional status assessment, identification of symptoms that may be alleviated with targeted supplementation (e.g., vitamin D deficiency, malnutrition, gastrointestinal disturbances), and education on products that should be avoided during oncologic treatment. Integrating structured pharmaceutical assessment into routine oncology practice reduces the risk of adverse events, improves adherence, enhances patient quality of life, and directly influences treatment outcomes. This abstract presents a pharmacist-led counselling model connecting official therapy, rational supplementation, and personalized patient education, aiming to improve the safety and effectiveness of oncology treatment.

Keywords: oncology pharmacy, supplementation, counselling, adherence, treatment outcomes

PII-19

USE OF VITAMIN D IN ONCOLOGY PATIENTS

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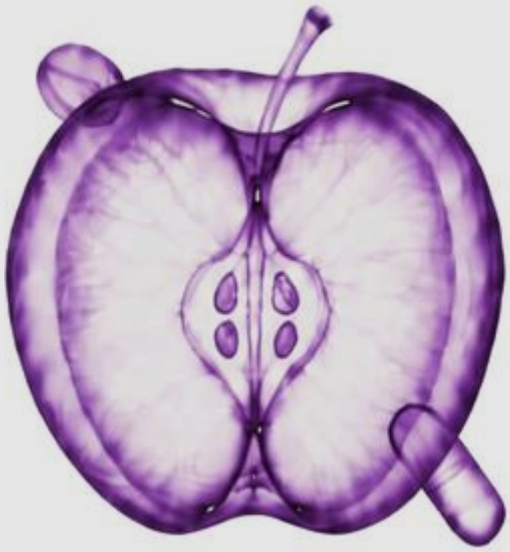
Vitamin D plays an important role in immune regulation, musculoskeletal health and metabolic processes, making it clinically relevant in the care of oncology patients. Vitamin D deficiency is common in this population due to reduced sun exposure, dietary changes, treatment-related adverse effects and systemic inflammation. Deficiency may worsen fatigue, muscle weakness, fall risk, quality of life and potentially influence treatment outcomes. The pharmacist plays a key role in assessing the need for supplementation, selecting appropriate dosing and monitoring safety. Assessment includes evaluation of laboratory values, comorbidities, nutritional status and potential interactions between vitamin D and oncologic therapies, particularly in patients receiving hormonal therapy, corticosteroids or immunotherapy. An individualized approach enables dose optimization, prevention of hypercalcemia and avoidance of inappropriate high-dose regimens. Counselling includes education on correct vitamin D use, importance of adherence, combination with calcium when indicated, and recognition of deficiency or overdose symptoms. Integrating pharmaceutical assessment into oncology practice contributes to better symptom control, reduced risk of complications and improved patient quality of life. This abstract presents a pharmacist-led model for managing vitamin D supplementation in oncology patients, emphasizing safety, individualized therapy and optimization of clinical outcomes.

Keywords: vitamin D, oncology patients, supplementation, pharmaceutical counselling, nutritional status

POSTER PREZENTACIJA

TERAPIJSKI ASPEKTI ISHRANE I BIOLOGIJA DUGOVEČNOSTI (LONGEVITY)



POSTER PRESENTATION

THERAPEUTIC ASPECTS OF NUTRITION AND THE BIOLOGY OF LONGEVITY

PIII-1

BILJNI ANTIMIKROBNI PEPTID MsDef2.1 IZ LUCERKE (*MEDICAGO SATIVA)* KAO POTENCIJALNI BIOAKTIVNI MOLEKUL U MODULACIJI FARMAKOTERAPIJE INFLAMATORNE BOLESTI CREVA

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Inflamatorne bolesti creva (IBD), koje obuhvataju ulcerozni kolitis i Kronovu bolest, predstavljaju hronične inflamatorne poremećaje u čijoj patogenezi učestvuju crevna disbioza, narušena intestinalna barijera i disregulacija imunskog odgovora. Defenzini, kao sastavni deo urođenog imuniteta, pored antimikrobnog delovanja, učestvuju u regulaciji inflamacije, održavanju mukozne barijere i interakciji sa crevnom mikrobiotom. Promene u ekspresiji humanih α- i β-defenzina opisane su kod pacijenata sa IBD, uz njihovu potencijalnu povezanost sa odgovorom na biološku terapiju. Cilj ovog preglednog rada je razmatranje biljnog antimikrobnog peptida MsDef2.1, poreklom iz lucerke (*Medicago sativa*), kao potencijalno bioaktivnog molekula za komplementarnu primenu uz standardnu farmakoterapiju IBD. MsDef2.1 pripada grupi biljnih defenzina bogatih cisteinom, sa strukturom stabilizovanom disulfidnim vezama. Njegova eksperimentalno potvrđena antimikrobna aktivnost predstavlja osnovu za razmatranje potencijalnog uticaja na crevnu mikrobiotu, što bi moglo uticati na inflamatorno okruženje mukoze creva i odgovor na farmakoterapiju IBD. Svojstva MsDef2.1 upoređuju se sa humanim defenzinima hBD2 i HD5, uz razlikovanje eksperimentalno potvrđenih svojstava od mogućih, nedovoljno istraženih efekata. Posebna pažnja posvećena je potencijalnoj primeni MsDef2.1 uz biološku terapiju, uključujući TNF-α inhibitore i vedolizumab, imajući u vidu različite mehanizme delovanja. Rad polazi od hipoteze da bi MsDef2.1, primenjen uz terapije usmerene na inflamatorne i imunološke mehanizme IBD, mogao doprineti njihovom ukupnom terapijskom efektu. Ova hipoteza nije eksperimentalno ispitana i predstavlja osnovu za dalja pretklinička istraživanja, uključujući procenu farmakokinetike, farmakodinamike, gastrointestinalne stabilnosti i bezbednosti peptida. Rasprostranjenost lucerke u Republici Srbiji otvara mogućnost njenog daljeg istraživanja kao izvora bioaktivnih peptida u nutritivnim i suplementacionim pristupima IBD.

Ključne reči: MsDef2.1, biljni defenzini, antimikrobni peptidi, inflamatorne bolesti creva, farmakoterapija

PIII-1

MsDef2.1, A PLANT-DERIVED ANTIMICROBIAL PEPTIDE FROM ALFALFA (*MEDICAGO SATIVA*), AS A POTENTIAL BIOACTIVE MOLECULE MODULATING INFLAMMATORY BOWEL DISEASE PHARMACOTHERAPY

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Inflammatory bowel disease (IBD), which includes ulcerative colitis and Crohn's disease, comprises chronic inflammatory disorders where intestinal dysbiosis, impaired barrier function, and immune dysregulation contribute to disease pathogenesis. Defensins, as components of innate immunity, exert antimicrobial activity and participate in the regulation of inflammation, maintenance of the mucosal barrier, and gut microbiota interactions. Altered expression of human α- and β-defensins has been reported in IBD, potentially influencing responses to biological therapy. The aim of this review is to examine the plant-derived antimicrobial peptide MsDef2.1, from alfalfa (*Medicago sativa*), as a potential bioactive molecule modulating IBD pharmacotherapy. MsDef2.1 is a cysteine-rich plant defensin with a structure stabilized by disulfide bonds. Its experimentally demonstrated antimicrobial activity provides a basis for considering potential effects on the gut microbiota, potentially influencing the inflammatory environment of the intestinal mucosa and response to pharmacotherapy. Its properties are compared with those of human defensins hBD2 and HD5, distinguishing experimentally established properties from potential effects that remain insufficiently investigated. Particular attention is given to its potential use alongside biological therapies, including TNF-α inhibitors and vedolizumab, due to their distinct mechanisms. We hypothesize that MsDef2.1, when administered alongside therapies targeting inflammatory and immune mechanisms involved in IBD, could contribute to their overall therapeutic effect. This hypothesis has not been experimentally tested and highlights the need for further preclinical investigation, including pharmacokinetics, pharmacodynamics, gastrointestinal stability, and safety. Alfalfa cultivation in Serbia provides an opportunity to investigate it as a source of bioactive peptides for nutritional and supplementation-based approaches to IBD.

Keywords: MsDef2.1, plant defensins, antimicrobial peptides, inflammatory bowel disease, pharmacotherapy

PIII-2

NATRIJUM-BUTIRAT U TERAPIJI INFLAMATORNIH BOLESTI CRIJEVA: POTENCIJAL MIKROENKAPSULIRANIH FORMULACIJA

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Inflamatorne bolesti crijeva (IBC), uključujući ulcerozni kolitis (UK) i Kronovu bolest (KB), predstavljaju hronične imunološki posredovane poremećaje koje karakteriše širok spektar manifestacija (bol u abdomenu, dijareja, subfebrilna temperatura i znaci malapsorpcije). Njihova multifaktorijalna patogeneza uključuje genetičke, imunološke i spoljašnje faktore, pri čemu crijevna disbioza ima značajnu ulogu. Shodno tome, crijevna mikrobiota se smatra ciljnim mjestom djelovanja. Postbiotici, naročito natrijum-butirat (engl. *sodium butyrate,* SB), pokazali su potencijal za unapređenje liječenja IBC-a smanjenjem inflamacije, modulacijom imunskog sistema, stabilizacijom crijevne flore i očuvanjem integriteta crijevne barijere. Natrijum-butirat ostvaruje antiinflamatorni efekat putem smanjenja ekspresije proinflamatornih citokina i gena uključenih u signalne puteve inflamacije. Drugi, dobro poznat mehanizam jeste epigenetičko djelovanje SB-a posredovano inhibicijom histon-deacetilaze (HDAC), čime se smanjuje ekspresija proinflamatornih gena, dok se istovremeno podstiče ekspresija gena uključenih u reparaciju i regeneraciju crijevnog epitela. Efekat suplementacije SB-om kod IBC-a u velikoj mjeri zavisi od formulacije, mjesta oslobađanja, kinetike oslobađanja i primijenjene doze. Istraživanja su pokazala da se SB može efikasno isporučiti primjenom tehnologije mikroinkapsulacije uz dodatak sredstava za umrežavanje, čime se omogućava kontrolisano oslobađanje duž gastrointestinalnog trakta, pri čemu se najveći dio SB-a oslobađa u distalnom dijelu tankog crijeva i kolonu. Primjena mikroinkapsulirane oralne formulacije SB-a reguliše crijevnu mikrobiotu podsticanjem rasta bakterija koji proizvode butirat, kao i drugih bakterijskih rodova koji proizvode kratkolančane masne kiseline, čime se omogućava ublažavanje simptoma kod pacijenata sa IBC. Mikroinkapsulirane formulacije SB-a predstavljaju obećavajući adjuvantni terapijski pristup i efikasnu strategiju u liječenju IBC.

Ključne reči: inflamatorne bolesti crijeva, natrijum-butirat, crijevna mikrobiota, mikroinkapsulacija

PIII-2

SODIUM BUTYRATE IN THE TREATMENT OF INFLAMMATORY BOWEL DISEASES: THE POTENTIAL OF MICROENCAPSULATED FORMULATIONS

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The inflammatory bowel diseases (IBD), including ulcerative colitis (UC) and Crohn's disease (CD), are chronic immune-mediated disorders characterized by a broad spectrum of manifestations (abdominal pain, diarrhea, low-grade fever, and features of malabsorption). Their multifactorial pathogenesis involves genetic, immunological, and environmental factors, with gut dysbiosis playing an important role. Consequently, the gut microbiota has emerged as a promising therapeutic target. Postbiotics, particularly sodium butyrate (SB), have shown potential in enhancing IBD treatment by reducing inflammation, modulating the immune system, stabilizing intestinal flora and maintaining the integrity of intestinal barriers. Sodium butyrate exerts broad anti-inflammatory effects by downregulating the expression of pro-inflammatory cytokines and genes involved in inflammatory signaling pathways. Another well-established mechanism is the epigenetic effect of SB mediated through the inhibition of histone deacetylase (HDAC), thereby reducing the expression of pro-inflammatory genes while promoting genes involved in intestinal epithelial repair and regeneration. The effect of SB supplementation in IBD is highly dependent on the formulation, site of release, release kinetics, and administered dose. Studies have shown that SB can be effectively delivered using microencapsulation technology with additional cross-linking agents, enabling controlled release throughout the gastrointestinal tract, with the majority of SB being released in the distal small intestine and colon. Supplementation of SB microencapsulated oral formulation modulates the gut microbiota by promoting the growth of butyrate-producing and other short-chain fatty acids-producing bacterial genera, thus providing symptomatic relief in IBD patients. Microencapsulated SB formulations represent a promising adjuvant therapeutic approach and an effective strategy for the management of IBD.

Keywords: inflammatory bowel diseases, sodium butyrate, gut microbiota, microencapsulation

PIII-3

UTICAJ NAČINA ISHRANE NA DUŽINU TELOMERA

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Dužina telomera (DT) predstavlja potencijalni biomarker biološkog starenja. Poznato je da su određeni načini ishrane povezani sa produženim životnim vekom i smanjenom smrtnošću, stoga je cilj ovog rada identifikacija takvih načina ishrane kao i procena dostupnih dokaza o njihovoj povezanosti sa DT. U naučnoj literaturi se mediteranska, japanska i nordijska ishrana, kao i ishrana zasnovana na biljkama, intermitentni post i kalorijska restrikcija, najčešće povezuju sa dugovečnošću. Metodološke razlike između studija rezultiraju slabije konzistentnim nalazima o povezanosti navedenih obrazaca ishrane sa dužinom telomera, čime se ograničava mogućnost njihovog direktnog poređenja i donošenja čvrstih zaključaka. Međutim, čini se da su mediteranska i ishrana zasnovana na biljkama najčešće povezane sa većom DT. Ova povezanost se, barem delimično, može pripisati unosu specifičnih mikronutrijenata (npr. flavonoida, polifenola, karotenoida, omega-3 masnih kiselina, vitamina C i E), koji mogu prevenirati skraćivanje telomera. Pri tumačenju rezultata studija takođe treba uzeti u obzir da određeni obrasci ishrane mogu biti praćeni određenim životnim stilom, koji bi podrazumevao subjektivno niži nivo stresa i pojačanu fizičku aktivnost, što samo po sebi može doprineti očuvanju dužine telomera. Generalno gledano, dostupni dokazi sugerišu da pridržavanje zdravog načina ishrane, naročito onog koji u većoj meri sadrži specifične mikronutrijente, može doprineti usporavanju procesa skraćivanja telomera. Neophodna su dodatna istraživanja i dobro dizajnirana, multicentrična, dvostruko slepa klinička ispitivanja radi jasne distinkcije uticaja isključivo faktora ishrane na dužinu telomera.

Ključne reči: dužina telomera, starenje, načini ishrane

PIII-3

THE IMPACT OF DIETARY PATTERNS ON TELOMERE LENGTH

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Telomere length (TL) represents a potential biomarker of biological aging. Certain dietary patterns have been associated with increased longevity and reduced mortality. Therefore, the aim of this study was to identify those dietary patterns and to assess the available evidence regarding their relationship with TL. In the scientific literature, Mediterranean, Japanese, and Nordic diets, as well as plant-based diets, intermittent fasting, and caloric restriction are most frequently associated with longevity. Methodological differences across studies contribute to less consistent findings regarding the association between the aforementioned dietary patterns and telomere length, thereby limiting the direct comparability of results and the ability to draw solid conclusions. However, Mediterranean and plant-based diets appear to be most frequently associated with longer TL. This association may, at least in part, be attributable to the intake of specific micronutrients (e.g., flavonoids, polyphenols, carotenoids, omega-3 fatty acids, vitamins C and E), which may prevent telomere shortening. The interpretation of these findings should also take into account that certain dietary patterns may be accompanied by certain lifestyle characteristics, including lower perceived levels of stress and higher levels of physical activity, which may themselves contribute to the preservation of TL. Overall, the available evidence suggests that adherence to healthy dietary patterns, particularly those rich in specific micronutrients, may help attenuate telomere shortening. Further research, including well-designed, multicenter, double-blind clinical trials, is needed to clearly distinguish the specific effects of dietary factors alone on telomere length.

Keywords: telomere length, aging, dietary patterns

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