ISSN 2566-3054

UNIVERZITET U SARAJEVU

UNIVERSITY OF SARAJEVO

VIII Studentski Kongres

„HRANA-ISHRANA-ZDRAVLJE“

sa međunarodnim učešćem

KNJIGA SAŽETAKA

Sarajevo, novembar 2023.

Naslov/Title:
8. Studentski Kongres „Hrana-Ishrana-Zdravlje“ sa međunarodnim učešćem
8th Student Congress „Food-Nutrition-Health“ with international participation

Glavni urednik/Editor in Chief
Faruk Čaklovica

Tehnički urednici/Technical Editors: Aleksandra Porobić

Izdavač/Published by
Univerzitet u Sarajevu-Veterinarski Fakultet, Sarajevo, BiH
University of Sarajevo-Veterinary Faculty, Sarajevo, BiH

Za izdavača/For Publisher:
Muhamed Smajlović

Oblikovanje i prijelom/Design & DTP: Aleksandra Porobić

Štampa/Printed by
Štamparija Fojnica d.d., Fojnica

Tiraž/Edition
50

8. Studentski Kongres „Hrana-Ishrana-Zdravlje“
sa međunarodnim učešćem

KNJIGA SAŽETAKA

8th Students Congress „Food-Nutrition-Health“
with international participation

BOOK OF ABSTRACTS

Sarajevo, 2023

Univerzitet u Sarajevu-Veterinarski fakultet, Sarajevo, BiH
Univerzitet u Sarajevu-Farmaceutski fakultet, Sarajevo, BiH
Univerzitet u Sarajevu-Pedagoški fakultet, Sarajevo, BiH
Univerzitet u Sarajevu-Fakultet zdravstvenih studija, Sarajevo, BiH
Univerzitet u Sarajevu-Stomatološki fakultet sa stomatološkim kliničkim centrom, Sarajevo, BiH
Univerzitet u Sarajevu-Medicinski fakultet, Sarajevo, BiH
Univerzitet u Sarajevu-Prirodno-matematički fakultet, Sarajevo, BiH

organizuju

8. Studentski Kongres „Hrana-Ishrana-Zdravlje“ sa međunarodnim učešćem

09.-11. novembar 2023. godine, Sarajevo, Bosna i Hercegovina

University of Sarajevo-Veterinary Faculty, Sarajevo, BiH
University of Sarajevo-Faculty of Pharmacy, Sarajevo, BiH
University of Sarajevo-Faculty of Educational Sciences, Sarajevo, BiH
University of Sarajevo-Faculty of Health Studies, Sarajevo, BiH
University of Sarajevo-Faculty of Dentistry with dental clinical center, Sarajevo, BiH
University of Sarajevo-Faculty of Medicine, Sarajevo, BiH
University of Sarajevo-Faculty of Science, Sarajevo, BiH

organize

8th Student Congress „Food-Nutrition-Health“ with international participation

November 09-11, 2023, Sarajevo, Bosna and Hercegovina

Organizacioni/Koordinacioni odbor
Organizing/Coordination Committee

Predsjednik/Chairman
Faruk Čaklovica-BiH

Članovi/Members

Jasmina Đeđibegović-BiH
Kenan Čaklovica-BiH
Lejla Redžepagić Vražalica-BiH
Emina Kiseljaković-BiH
Sanja Soče-BiH
Elvira Nikšić-BiH
Edina Lazović-BiH
Nusret Drešković-BiH
Savić-Radovanović Radoslava-Srbija
Danijela Đukić-Ćosić-Srbija
Sara Mujić-BiH
Arman Hodžić-BiH
Iman Pojskić-BiH
Mirza Belko-BiH
Nejla Valjevčić-BiH
Aldina Đerlek-BiH
Danijel Maestro-BiH
Lidija Kozačinski-Hrvatska
Çaklovica-Küçükkaya İlvana-Turska
Sertaç Küçükkaya-Turska
Danijela Petrović-BiH
Sanja Furmeg-Hrvatska
Vesna Jaki-Tkalec-Hrvatska

Naučni odbor/Scientific Committee

Predsjednica/Chairwoman
Aleksandra Porobić

Članovi/Members

Aida Lugušić
Alisa Tiro
Vildana Džemidžić
Amela Dervišević
Enida Članjak-Kudra
Sanela Rustempašić
Irma Ćehić
Saida Ibragić
Zarema Obradović
Dženita Pašalić
Elma Opačin
Junuzović Maid
Almina Zahirović
Danyijah Karić
Sajra Husaković

Tehnički odbor/Technical Committee

Predsjednica/Chairwoman
Elma Hrustemović

Članovi/Members

Sanel Sefer
Indira Mujić-Jahić
Ajla Osmančević
Kanita Zaimović
Harun Spahić
Neira Ćurović
Sumeja Goharian
Nejla Valjevčić
Semina Hamzić
Amir Čaušević
Miralem Kmetaš
Hena Musić
Matea Mikuljan
Neira Fazlović
Selma Hrnčić
Kristijan Karamatić

PREDGOVOR

Čast mi je i zadovoljstvo predstaviti sadržaj osmog po redu studentskog kongresa „HRANA-ISHRANA-ZDRAVLJE – HIZ 2023“. Kongres je proizvod suradnje sedam fakulteta grupacije medicinskih, prirodno-matematičkih, te humanističkih nauka Univerziteta u Sarajevu kao suorganizatora, a realizira se uz podršku Univerzitetskog teleinformatičkog centra UTIC, Akademije scenskih umjetnosti i Muzičke akademije Univerziteta u Sarajevu. Već sama ovakva koncepcija organizacije jedinstvena je odlika HIZ kongresa na prostoru Bosne i Hercegovine, ali i u regionu. S ponosom ističem da ovako široka interdisciplinarna suradnja s kontinuitetom koji opravdava atribut tradicionalnog akademskog događaja zasigurno predstavlja suvremeni model akademskog djelovanja koji integrira različite perspektive, tehnološke i metodološke pristupe u istraživanju i rješavanju izazova poveznice hrane, ishrane i zdravlja kao jednom od ključnih segmenata života.

U okviru VIII Kongresa „HRANA-ISHRANA-ZDRAVLJE“ predstavljena su 63 studentska rada u pet naučnih sekcija, kako slijedi: 1. Primarna proizvodnja i prerada hrane; 2.. Toksikologija i sigurnost hrane i okoliša; 3. Ishrana tokom životnog ciklusa, 4. Dijetoterapija i 5. Savremena dijagnostika i analitika hrane. Kratke sažetke radova predstavljamo u ovoj Knjizi sažetaka.

Pored izlaganja oralnih i poster prezentacija radni dio programa kongresa uključuje tradicionalno i dodatne aktivnosti, koje su kroz prethodne godine imale formu okruglog stola, a ove godine su u formi radionica. Stomatološki fakultet sa stomatološkim kliničkim centrom predstavio se radionicom “Oralna higijena, Ishrana i zdravlje”, a Medicinski fakultet radionicom “Reanimacija kao prva opcija”.

Ovom prilikom se zahvaljujem i učesnicima svih odbora bez čijeg požrtvovanog rada ne bi bilo moguće realizovati ovaj sada već tradicionalni događaj.

Iznimnu zahvalnost upućujem i sponzorima/donatorima, posebno Ministarstvu za obrazovanje, nauku i mlade Kantona Sarajevo, Federalnom ministarstvu poljoprivrede, vodoprivrede i šumarstva, Centru za napredne studije, te kompanijama Bosnalijek d.o.o., Salveo d.o.o. i ProtonSystem/Abela Pharm, koji su prepoznali značaj i vrijednosti Kongresa i kontinuirano podržavaju realizaciju istog. Agenciji za sigurnost hrane Bosne i Hercegovine zahvaljujem na kontinuiranom aktivnom učešću na Kongresu.

dr sci. Faruk Čaklovica, professor emeritus, predsjednik Organizacionog odbora

FOREWORD

It is honor and pleasure for me to present the content of the eighth consecutive student congress "FOOD-NUTRITION-HEALTH - HIZ 2023". The congress is the product of the collaboration of seven faculties of the group of medical, natural and humanistic sciences of the University of Sarajevo as co-organizers, and is realized with the support of the University Teleinformatics Center UTIC, the Academy of Performing Arts and the Music Academy of the University of Sarajevo. This conception of the organization is a unique feature of the HIZ Congress in Bosnia and Herzegovina, but also in the region. I am proud to point out that such broad interdisciplinary cooperation with continuity that justifies the attribute of a traditional academic event certainly represents a modern model of academic activity that integrates different perspectives, technological and methodological approaches in research and solving the challenges of food, nutrition and health as one of the key segments of life.

Within the VIII Congress "FOOD-NUTRITION-HEALTH" 63 student works were presented in five scientific sections, as follows: 1. Primary production and processing of food; 2. Food and environment toxicology and safety; 3. Nutrition through the life cycle, 4. Dietotherapy and 5. Modern food diagnostics and analysis. We present short summaries of the works in this Book of Abstracts.

In addition to oral and poster presentations, the working part of the congress program traditionally includes additional activities, which in previous years took the form of a round table, and this year are in the form of workshops. The Faculty of Dentistry with the Dental Clinical Center presented itself with the workshop "Oral Hygiene, Nutrition and Health", and the Faculty of Medicine with the workshop "Reanimation as the first option".

On this occasion, I would also like to thank the participants of all committees, without whose dedicated work it would not be possible to realize this now traditional event.

I am also very grateful to the sponsors/donors, especially the Ministry of Education, Science and Youth of Sarajevo Canton, the Federal Ministry of Agriculture, Water Management and Forestry, Center for Advanced Studies and the companies Bosnalijek d.o.o., Salveo d.o.o. and ProtonSystem/Abela Pharm, who recognized the importance and values of the Congress and continuously support its implementation. I would like to thank the Food Safety Agency of Bosnia and Herzegovina for their continued active participation in the Congress.

dr sci. Faruk Čaklovica, Professor emeritus, Chairman of the Organizing Committee

Sadržaj/Contents

Plenarno predavanje

Mikrobiološka kontaminacija u proizvodnji mleka u prahu

Marija PAJIĆ[1]* Radoslava SAVIĆ RADOVANOVIĆ[2] Čaba ČORBA[3]

[1]Univerzitet u Novom Sadu, Poljoprivredni fakultet, Katedra za veterinarsku medicinu, Srbija

[2]Univerzitet u Beogradu, Fakultet veterinarske medicine, Katedra za higijenu i tehnologiju namirnica animalnog porekla, Srbija

[3]Pokrajinski sekretarijat za obrazovanje, propise, upravu i nacionalne manjine – nacionalne zajednice, Novi Sad, Srbija

*Autor za korespondenciju: Marija Pajić, marija.pajic@polj.uns.ac.rs

Sažetak

Mleko u prahu je proizvod od mleka, koji se dobija isparavnjem vode iz termički obrađenog mleka, čime se produžava održivost u odnosu na tečno mleko, nije potrebno čuvanje pri temperaturama hlađenja, zahteva mnogo manje prostora za pakovanje i skladištenje. Proizvodi od mleka u prahu u svakodnevnoj upotrebi su punomasno mleko u prahu, obrano mleko u prahu, formula za bebe u prahu i mnogi drugi. Sušenje je način konzerviranja hrane poznat vekovima. Savremene tehnike sušenja pretvaraju mleko u prah bez gubitka nutritivne vrednosti, ali zahtevaju mnogo energije kao nijedna druga proizvodnja u mlekarskoj industriji. U proizvodnji mleka u prahu potrebno je uništiti sve patogene, maksimalno smanjiti broj mikroorganizama koji izazivaju kvarenje mleka u prahu, kao i sprečiti rekontaminaciju. U slučaju grešaka u proizvodnji, mleko u prahu može da sadrži sporogene aerobne i anaerobne mikroorganizme, plesni, mikrobakterije i koliformne bakterije. Termorezistentne bakterije u mleku u prahu mogu poticati iz mleka, a svi ostali mikroorganizmi su posledica rekontaminacije. Mikroorganizmi, koji se nalaze na opremi, mogu imati sposobnost formiranja biofilma i/ili biti multirezistentni na antimikrobne lekove, predstavljaju veliki izazov u postrojenjima za proizvodnju mleka u prahu. Redovna analiza rizika i stalna poboljšanja higijene procesa, kao i primena odgovarajućih korektivnih mera, doprinose bezbednosti mleka u prahu i javnom zdravlju uopšte.

Ključne reči: *higijena procesa prozvodnje, bezbednost hrane, analiza rizika, korektivne mere*

Plenary lecture

Microbial contamination in milk powder production

Marija PAJIĆ[1]* Radoslava SAVIĆ RADOVANOVIĆ[2] Čaba ČORBA[3]

[1]University of Novi Sad, Faculty of Agriculture, Department for Veterinary Medicine, Serbia

[2]University of Belgrade, Faculty of Veterinary Medicine, Department for Food Hygiene and Technology, Serbia

[3]Provincial Secretary for Education, Regulations, Administration and National Minorities – National Communities, Novi Sad, Serbia

*Corresponding author: Marija Pajić, marija.pajic@polj.uns.ac.rs

Summary

Milk powder is dairy product obtained by evaporating the water from thermically processed milk, which extends the shel life compared to fluid milk, does not require storage at refrigeration temperatures, requires much less space for packaging and storage. Milk powder products in everyday use are whole milk powder, skim milk powder, infant formula powder and many others. Drying is a method of food preservation known for centuries. Modern draying techniques convert the milk to powder without any loss in nutritive value, but they require lot of energy like no other production in the dairy industry. In milk powder production, it is necessary to destroy all pathogens, to reduce, as much as possible, the number of microbes that cause spoilage of dried milk powder and to prevent recontamination. In case of production failure, milk powder could contain sporogenous aerobic and anaerobic microbes, moulds, microbacteria and colifrms. Thermoresistant bacteria in milk powder can originate from milk, and the presence of other microbes is due to recontamination. Microbes on equipment, which can have the biofilm-forming ability and/or be multiresistant to antimicrobials, represent a great challenge in milk powder plants. Regular risk assessment and permanent process hygiene improvements, as well as use of appropriate corrective measures, are there to contribute to milk powder safety and the public health in general.

Keywords: *process hygiene, food safety, risk assessment, corrective measures*

1. PRIMARNA PROIZVODNJA I PRERADA HRANE

PRIMARY PRODUCTION AND PROCESSING OF FOOD

1-O-1

Biološka raspoloživost mikronutrijenata iz voća i povrća

Almira AVDIĆ

Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, Odsjek za Prehrambene tehnologije; Smjer Nutricionizam

*Autor za korespondenciju: Almira Avdić, almira.avdic@ppf.unsa.ba

Sažetak

Biološka raspoloživost mikronutrijenata iz voća i povrća ima značajan utjecaj na njihovu nutritivnu vrijednost i sposobnost zadovoljavanja prehrambenih potreba ljudskog organizma. Razumijevanje procesa apsorpcije, transporta i iskorištavanja mikronutrijenata iz ovih namirnica ključno je za promicanje zdrave prehrane i planiranje deficita mikronutrijenata. Ovaj rad istražuje faktore koji utječu na bioraspoloživost mikronutrijenata iz voća i povrća. Mikronutrijenti iz voća i povrća mogu se apsorbirati putem aktivnog transporta ili difuzije u crijevnom zidu. Ovaj proces apsorpcije ovisi o različitim faktorima kao što su: oblik nutrijenta, prisutnost drugih tvari u hrani i individualne karakteristike organizma. Na primjer, prisutnost vlakana u hrani može usporiti apsorpciju određenih mikronutrijenata, dok neki su nutrijenti bolje apsorbirani u prisustvu masti. Različiti mikronutrijenti imaju različite razine bioraspoloživosti iz voća i povrća. Na primjer, vitamini poput vitamina C i E imaju visoku bioraspoloživost, jer se lako apsorbiraju i iskorištavaju u organizmu. S druge strane, neki minerali kao što su željezo, cink i kalcij imaju nižu bioraspoloživost zbog mogućih interakcija s drugim tvarima u hrani koju mogu ometati njihovu apsorpciju. Dodatni faktori koji utiču na bioraspoloživost mikronutrijenata iz voća i povrća uključuju npr. prisutnost fitata, oksalata i drugih spojeva koji mogu za sebe vezati određene minerale i otežati njihovu apsorpciju. Kombinacija nutrijenata u obroku može povećati ili smanjiti bioraspoloživost određenih mikronutrijenata. Metode pripreme hrane kao što su kuhanje, blanširanje ili fermentacija također utječu na bioraspoloživost mikronutrijenata. Biološka raspoloživost mikronutrijenata iz voća i povrća ima izravan utjecaj na zdravlje ljudi, a manjak ili nedostatak određenih mikronutrijenata može dovesti do različitih poremećaja i bolesti. Stoga je važno osigurati adekvatan i optimalan unos bioraspoloživost mikronutrijenata iz voća i povrća kako bi se održalo zdravlje organizma.

Ključne riječi: *bioraspoloživost, dijetetika, mikronutrijenti, makronutrijenti, nutricionizam*

1-O-1

Biological availability of micronutrients from fruits and vegetables

Almira AVDIC

University of Sarajevo, Faculty of Agriculture and Food Sciences, Department of Food Technologies; Department of Nutrition

*Corresponding author: Almira Avdić, almira.avdic@ppf.unsa.ba

Summary

The biological availability of micronutrients from fruits and vegetables has a significant impact on their nutritional value and ability to meet the nutritional needs of the human body. Understanding the process of absorption, transport and utilization of micronutrients from these foods is essential for promoting a healthy diet and planning for micronutrient deficits. This paper investigates the factors that influence the bioavailability of micronutrients from fruits and vegetables. Micronutrients from fruits and vegetables can be absorbed through active transport or diffusion in the intestinal wall. This process of absorption depends on various factors such as: the form of the nutrient, the presence of other substances in the food and the individual characteristics of the organism. The presence of fiber in food can slow the absorption of certain micronutrients, while some nutrients are better absorbed in the presence of fat. Different micronutrients have different levels of bioavailability from fruits and vegetables. Vitamins such as vitamins C and E have high bioavailability because they are easily absorbed and utilized by the body. On the other hand, some minerals such as iron, zinc and calcium have lower bioavailability due to possible interactions with other substances in food that can interfere with their absorption. Additional factors that affect the bioavailability of micronutrients from fruits and vegetables include i.e. the presence of phytates, oxalates and other compounds that can bind certain minerals and make their absorption difficult. The combination of nutrients in a meal can increase or decrease the bioavailability of certain micronutrients. Food preparation methods such as cooking, blanching or fermentation also affect the bioavailability of micronutrients. The biological availability of micronutrients from fruits and vegetables has a direct impact on human health, and the deficiency or deficiency of certain micronutrients can lead to various disorders and diseases. Therefore, it is important to ensure adequate and optimal intake and bioavailability of micronutrients from fruits and vegetables in order to maintain the health of the organism.

Keywords: *bioavailability, dietetics, micronutrients, macronutrients, nutrition*

1-O-2

Ispitivanje sposobnosti *Pseudomonas* vrsta da stvaraju biofilm

Tanja DUMIĆ, Radoslava SAVIĆ RADOVANOVIĆ

Univerzitet u Beogradu, Fakultet veterinarske medicine, Srbija

*Autor za korespondenciju: Tanja Dumić, tanjadumic0208@gmail.com

Sažetak

Rod *Pseudomonas* je heterogena i ekološki značajna grupa mikroorganizama, koja obuhvata aerobne, pokretne Gram negativne štapiće rasprostranjene u vodi i spoljnoj sredini, ubikvitarne prirode, koji nisu zahtevni u pogledu hranjivih sastojaka potrebnih za rast. *Pseudomonas* vrste mogu da naseljavaju brojne ekološke niše i kolonizuju/inficiraju organizme a često se izoluju iz hrane, zemlje, štalskog đubriva i sa kože životinja. Imaju višestruki značaj kako u veterinarskoj i humanoj medicini, sa aspekta higijene namirnica i sposobnosti ovih mikroorganizama da stvaraju biofilm, što se ističe kao značajan faktor virulencije za uspostavljanje perzistentnih infekcija. Cilj ovog rada je bio da se ispita sposobost izolata da stvaraju biofilm. Ukupno 108 izolata *Pseudomonas* spp. je ispitano, od kojih je 60 izolovano iz hrane tokom rutinskog ispitivanja zbirnog mleka, a 48 kliničkih izolata je izolovano kod pacijenata u bolnicama širom Srbije Izolati bakterija su identifikovani primenom standardnih laboratorijskih metoda, ispitivanjem fenotipskih osobina, dok je PCR amplification korišćena za potvrdu ovih izolata sa *P. aeruginosa* specifičnim prajmerima. Za ispitivanje sposobnosti izolata Pseudomonas spp. da stavaraju biofilm su korišćene Crystal Violet metoda na mikrotitar pločama. Od ukupno 108 izolata *Pseudomonas* spp. 98 (90,74%) je pokazalo sposobnost stvaranja biofilma, od kojih je 54 (55,10%) izolata bilo poreklom iz mleka, a 44 (44,90%) su bili klinički izolati poreklom od ljudi. Ukupno 10 (9,26%) izolata nije stavaralo biofilm. Najveći broj izolata, 68 (69,39%) se mogao svrstati u grupu osrednje-adherentnih, a 8 (8,16%) izolata u jako-adherentne. Može se zaključiti da mikrorganizmi *Pseudomonas* vrsta lako stvaraju biofilm na površinama doprinoseći povećanju rezistencije na antimikrobna sredstva i mogućnosti kontaminacije hrane tokom proizvodnje i posledično pojavi kvara.

Ključne riječi: *Pseudomonas* spp., *biofilm*

1-O-2

Investigation of biofilm forming ability in *Pseudomonas* spp. isolates

Tanja DUMIĆ, Radoslava SAVIĆ RADOVANOVIĆ

Univesity of Belgrade, Faculty of Veterinary Medicine

*Corresponding author: Tanja Dumić, tanjadumic0208@gmail.com

Summary

The genus *Pseudomonas* is a heterogeneous and ecologically significant group of microorganisms, which includes aerobic, motile Gram-negative rods distributed in water and environment, ubiquitous in nature, not demanding in nutrients required for growth. *Pseudomonas* species can inhabit numerous ecological niches and colonize/infect organisms and are often isolated from food, soil, manure and animal skin. Microorganisms of *Pseudomonas* speceies have multiple significance, both in veterinary and human medicine, as well from the aspect of food hygiene and the ability of these microorganisms to produce biofilm, which is emphasized as a significant virulence factor for the establishment of persistent infections. The aim of this research was to examine the ability of *Pseudomonas* spp. isolates to produce biofilms. Total of 108 nonrepetative isolates of *Pseudomonas* spp. were included in the research, of which 60 were isolated from food, during routine examination of bulk tank milk and 48 clinical isoaltes were isolated from patients admitted to four tertiary care hospitals throughout Serbia. Bacterial isolates were identified using standard laboratory methods by examining the phenotypic characteristics, while PCR amplification was performed to verify these isolates with *P. aeruginosa* specific primers. The *Crystal Violet* assay on the microtiter plates was used to examine the ability of the isolates to form biofilm. Out of 108 *Pseudomonas* spp. isolates, 98 (90,74%) showed ability to produce biofilm, 54 isolates (55.10%) originated from milk and 44 (44,90%) were human clinical isolates. In total 10 (9,26%) isolates did not produce biofilm. Most number of isolates, 68 (69,39%) could be classified as moderate-adherent and 8 (8,16%) as strong-adherent. It can be concluded that microorganisms of *Pseudomonas* species are easy producers of biofilm on surfaces contributing to an increase in antimicrobial resistance and the potential for contamination of food during processing and consequently the occurenece of spoilage.

Keywords: *Pseudomonas* spp., *biofilm*

1-O-3

Ishrana teladi u neonatalnom periodu i određivanje fizioloških i biohemijskih parametara u farmskom sistemu držanja

Mirjana GAJIĆ, Ljubomir JOVANOVIĆ

Univerzitet u Beogradu, Fakultet veterinarske medicine, Srbija

*Autor za korespondenciju: Mirjana Gajić, mirjanafvm@gmail.com

Sažetak

Neonatalni period predstavlja najkritičniji period u razvoju fizioloških funkcija teladi. Tokom ovog perioda, koji obuhvata vremenski raspon od prvog dana do 15. dana života teladi, javlja se najveća stopa morbiditeta i mortaliteta. Kritičan period, odnosno tačan dan u neonatalnom životu teladi kada se najčešće pojavljuju klinički oblici bolesti se razlikuje od farme do farme i na njega utiču menadžment farme (manipulacija sa životinjama, grupisanje životinja, promena načina ishrane) kao i vremenski uslovi (toplotni stres tokom letnjih meseci). Kako bi se ovi gubici smanjili u farmskim uslovima neophodno je stalno praćenje fizioloških parametara kao što su temperatura, broj respiracija i puls u cilju izdvajanja životinja koje pokazuju odstupanja od fizioloških vrednosti. Cilj ovog istraživanja bio je da se odrede fiziološki parametri (temperatura, frekvenca pulsa i disanja), biohemijski parametri i uticaj promene načina ishrane kod teladi holštajn-frizijske rase različite starosti.Telad su podeljena u tri numerički jednake grupe (n=6) na osnovu prosečne starosti: NM grupa (2,33±1,36 dana); SR grupa (6,33±0,98 dana); ST (11,33±1,36 dana). Od ispitivane teladi su uzeti uzorci venske krvi za određivanje biohemijskih parametara. Dobijeni rezultati ukazuju da telad iz ST grupe značajno odstupaju po fiziološkim parametrima, balansu elektrolita, i koncentraciji ukupnih proteina u odnosu na telad ostalih grupa što se pripisuje mendžmentu farme odnosno promeni smeštaja i ishrane.

Ključne reči: *telad; fiziološki parametri; biohemijski parametri; neonatalni period*

1-O-3

Nutrition of calves in the neonatal period and determination of physiological and biochemical parameters in the farming system

Mirjana GAJIĆ, Ljubomir JOVANOVIĆ

Univesity of Belgrade, Faculty of Veterinary Medicine

*Corresponding author: Mirjana Gajić, mirjanafvm@gmail.com

Summary

The neonatal period represents the most critical period in the development of the calf's physiological functions. During this period, which includes the time span from the first day to the 15th day of the calf's life, the highest rate of morbidity and mortality occurs. The critical period, or the exact day in the neonatal life of calves when clinical forms of the disease most often appear, is different from farm to farm and is influenced by farm management (manipulation of animals, grouping of animals, change in diet) as well as weather conditions (heat stress during summer months). In order to reduce these losses in farm conditions, it is necessary to constantly monitor physiological parameters such as temperature, number of respirations and heart rate in order to single out animals that show deviations from physiological values. The aim of this research was to determine the physiological parameters (temperature, pulse and breathing frequency), biochemical parameters and the influence of the change in diet in Holstein-Friesian calves of different ages. The calves were divided into three numerically equal groups (n=6) based on average age: NM group (2.33±1.36 days); SR group (6.33±0.98 days); ST (11.33±1.36 days). Venous blood samples were taken from the examined calves for the determination of biochemical parameters. The obtained results indicate that the calves from the ST group differ significantly in terms of physiological parameters, electrolyte balance, and total protein concentration compared to the calves of the other groups, which is attributed to the management of the farm, or more precisely the change in housing and nutrition.

Keywords: *calves; physiological parameters; biochemical parameters; neonatal period*

1-O-4

Ispitivanje antibakterijskog djelovanja ulja klinčića (*Syzygium aromaticum*) i trave ive (*Teucrium montanum*) na rast bakterija *Escherichia coli* i *Salmonella* spp.

Lamija GORO

Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakukultet, Sarajevo, Bosna i Hercegovina

Autor za korespondenciju: Lamija Goro, lamija.goro@ppf.unsa.ba

Sažetak

Porast rezistencije prema antibioticima i nedostatak novih antimikrobnih sredstava su rezultairali razvojem novih efikasnih i pristupačnih metoda za spriječavanje mikrobnih infekcija koje su nastale konzumacijom kontaminiranog svjezeg voća i povrća, posebno u zemljama u razvoju, gdje je 10% smrtnih ishoda povezano sa infektivnim bolestima. Pojava izolata bakterija *Escherichia coli* i *Salmonella spp*. Sa većim brojem fenotipova otpornih na antibiotike smatra se ozbiljnim zdravstvenim problemom. Proizvodi prirodnog porijekla, koji imaju antimikrobno djelovanje, privlače komercijalnu pažnju jer predstavljaju dobru alternativu sintetičkim proizvodima. Do sada je poznat veliki broj biljnih ulja koji su pokazali dobre rezultate u suzbijanju rasta bakterija *Escherichia coli* i *Salmonella spp*. Cilj ovog rada bio je ispitivanje uticaja ulja trave ive (*Teucrium montanum*) i klinčića (*Syzygium aromaticum*) na rast ovih bakterija. Biljke u sušenom obliku su pomiješane sa hladno cijeđenim, ekstra djevičanskim maslinovim uljem u omjerima 50:50 i 50:100. Čiste kulture bakterija *Escherichia coli* i *Salmonella spp.,* zasijane su na podlogu *Mueller–Hinton*. Ispitivanje rasta ovih bakterija praćeno je test-difuzijskom metodom gdje su diskovi od filter papira prečnika 6 mm impregnirani maceratom i postavljeni na hranljivu podlogu. Inkubacija je obavljena na temperaturi od 37°C u trajanju od 24h.

Ključne riječi: *trava iva, klinčić, test-difuzijska metoda, antibakterijsko djelovanje*

1-O-4

Testing the antibacterial effect of clove oil (Syzygium aromaticum) and mountain germander (Teucrium montanum) on the growth of Escherichia coli and Salmonella spp.

Lamija GORO

University of Sarajevo; Faculty of Agriculture and food science, Bosnia and Herzegovina;

Corresponding author: Lamija Goro, lamija.goro@ppf.unsa.ba

Summary

The increase in antibiotic resistance and the lack of new antimicrobial agents have led to the development of new effective and affordable methods for preventing microbial infections that arise from the consumption of contaminated fresh fruits and vegetables, especially in developing countries, where 10% of mortality is associated with infectious diseases. The emergence of isolates of *Escherichia coli* and *Salmonella* spp. with a higher number of antibiotic-resistant phenotypes is considered a serious health concern. Naturally derived products with antimicrobial properties are gaining commercial attention as they represent a good alternative to synthetic products. A large number of plant oils have shown promising results in suppressing the growth of *Escherichia coli* and *Salmonella* spp. The aim of this study was to investigate the effects of mountain germander (*Teucrium montanum*) and clove (*Syzygium aromaticum*) oils on the growth of these bacteria. The dried plants were mixed with cold-pressed, extra virgin olive oil in ratios of 50:50 and 50:100. Pure cultures of *Escherichia coli* and *Salmonella* spp. bacteria were inoculated on Mueller-Hinton agar. The bacterial growth was examined using the disk diffusion method, where filter paper disks with a diameter of 6 mm were impregnated with the macerate and placed on the nutrient agar. Incubation was carried out at a temperature of 37°C for 24 hours.

Keywords: *mountain germander, clove, test-diffusion method, antibacterial effect*

1-O-5

Fizičke osobine i nutritivne vrijednosti nojevog mesa

Nadža KAPO[1*], Anela MUŠANOVIĆ[1]

Univerzitet u Sarajevu, Veterinarski fakultet, Katedra za higijenu i tehnologiju namirnica, BiH

[*]Autor za korespondenciju: Nadža Kapo, nadzakapo@gmail.com

Sažetak

Nojevo meso je sve popularnija namirnica koja izaziva znatiželju zbog svojih različitih nutritivnih karakteristika. Ovo istraživanje se fokusira na analizu ključnih fizičkih osobina i nutritivnih vrijednosti nojevog mesa, uključujući boju, okus i aromu, mekoću mesa, pH vrijednost, sposobnost zadržavanja vode i nutritivni sastav. Meso noja se svrstava u kategoriju crvenog mesa, a njegova karakteristična crvena boja potiče od visokog sadržaja željeza. U usporedbi s drugim vrstama mesa, okus nojevog mesa se opisuje kao blag, što je rezultat visokog pH i niske količine masti u mišićima. Mekoća ovog mesa je posljedica niskog udjela masti i kolagena, što ga čini lako probavljivim. Osim navedenih karakteristika, nojevo meso ima iznimnu sposobnost zadržavanja vode, što ga čini poželjnim za razne vrste prerađevina. Nojevo meso obiluje niskomasnim proteinima, željezom, cinkom i višestruko nezasićenim masnim kiselinama, čineći ga vrijednim dodatkom uravnoteženoj prehrani.

Ključne riječi*: nojevo meso, noj, pH, nutritivne vrijednosti*

1-O-5

Nutritional characteristics of ostrich meat

Nadža KAPO[1*], Anela MUŠANOVIĆ[1]

University of Sarajevo, Faculty of Veterinary Medicine, Department of Food Hygiene and Technology

[*]Corresponding author: Nadža Kapo, nadzakapo@gmail.com

Summary

Ostrich meat is an increasingly popular food that arouses curiosity due to its various nutritional characteristics. This research focuses on the analysis of key physical properties and nutritional values of fresh meat, including color, flavor and aroma, meat tenderness, pH value, water holding capacity, and nutritional composition. Ostrich meat is classified as red meat, and its characteristic red color comes from its high iron content. Compared to other types of meat, the taste of ostrich meat is described as mild, which is a result of the high pH and low amount of fat in the muscles. The softness of this meat is due to the low content of fat and collagen, which makes it easily digestible. In addition to the mentioned characteristics, new meat has an exceptional ability to retain water, which makes it desirable for various types of processed products. Ostrich meat is rich in low-fat proteins, iron, zinc, and polyunsaturated fatty acids, making it a valuable addition to a balanced diet.

Keywords: *ostrich meat, ostrich, pH, nutritional value*

1-O-6

Mikroorganizmi uzročnici kvarenja hrane

Radovan MARČETIĆ, Radoslava SAVIĆ RADOVANOVIĆ

Fakultet veterinarske medicine, Univerzitet u Beogradu, Bulevar oslobođenja 18,

11 000 Beograd, Srbija

Sažetak

Proizvodnja hrane ima veliki značaj u snabdevanju stanovništva i predstavlja značajnu privrednu delatnost, a kvar hrane ima za posledicu velike ekonomske gubitke usled odbacivanja hrane kao neupotrebljive za ishranu i troškova uklanjanja organskog otpada. Prema novijim istraživanjima 30% proizvedene hrane završi na svetskim deponijama, gde podleže truležnim procesima i raspadanju, pri čemu se oslobađaju gasovi među kojima i metan. Prema definiciji kvar hrane predstavlja različite procese, koji uzrokuju da hrana bude nepoželjna ili neprihvatljiva za ljudsku upotrebu zbog promene senzornih karakteristika. Kvar hrane se može definisati i kao "svaka senzorna promena (taktilna, vizuelna, olfaktivna ili promena ukusa)" koju konzument smatra da je neprihvatljiva. Kvar može nastati u bilo kojoj fazi lanca hrane („*from farm to fork*“). Sve vrste kvara se mogu svrstati u sledeće grupe: biohemijski (enzimski), mikrobiološki, hemijski i tehnološki kvar. Mikrobiološki kvar hrane može biti prouzrokovan uzročnicima kao što su bakterije, kvasci i plesni. Hemijski kvar podrazumeva promene prouzrokovane hemijskim i fizičko-hemijskim reakcijama koji nastaju usled štetnog uticaja faktora spoljne sredine (visoke temperature, vazduh, vlaga, svetlosta, pH itd.). Često je teško utvrditi da li se radi o isključivo hemijskom, biohemijskom ili mikrobiološkom kvaru, jer se promene odvijaju paralelno. Pod pojmom „tehnološki kvar“ podrazumeva se u širem smislu kvar prouzrokovan greškama tokom tehnološkog procesa dobijanja hrane. Najčešći uzočnici kvara hrane su bakterije i gljivice. Zbog svog hemijskog sastava hrana, posebno hrana životinjskog porekla (mleko i proizvodi od mleka; meso i proizvodi od mesa) predstavlja dobru sredinu za rast i razmnožavanje mikroorganizama, stoga je za cilj ovog rada postavljeno da se ukaže na značaj mikroorganizama, koji mogu da dovedu do kvara hrane. U radu će biti opisane vrste mikroorganizama, njihove karakteristike i promene koje dovode u hrani životinjskog porekla. Jedan od najvećih izazova za savremenu industriju hrane jeste kako sačuvati namirnice od kvara.

Ključne reči: *kvar, hrana, mikroorganizmi*

1-O-6

Microorganisms causative of food spoilage

Radovan MARČETIĆ, Radoslava SAVIĆ RADOVANOVIĆ

Faculty of Veterinary Medicine, University of Belgrade, Bulevar oslobođenja 18,

11 000 Belgrade, Serbia

Summary

Food production is of great importance in supplying the population and represents a significant activity in the economy, and food spoilage results in large economic losses due to the rejection of food as unusable and the costs of disposing of organic waste. According to recent research, 30% of the food produced ends up in the world's landfills, where undergoes putrefaction and decomposition, releasing gases, including methane. By definition, food spoilage represents various processes, which cause food to be undesirable or unacceptable for human use due to a change in sensory characteristics. Food spolage can also be defined as "any sensory change (tactile, visual, olfactory or aroma change)" that the consumer considers unacceptable. Spoilage can occur at any stage of the food chain („*from farm to fork*“). All types of spoilage can be classified into the following groups: biochemical (enzymatic), microbiological, chemical and technological spoilage. Microbiological spoilage of food can be caused by pathogens such as bacteria, yeasts and molds. Chemical spoilage means changes caused by chemical and physico-chemical reactions that occur due to the harmful influence of environmental factors (high temperatures, air, humidity, light, pH, etc.). It is often difficult to determine whether it is a strict chemical, biochemical or microbiological spoilage, because the changes take place in parallel. The term "technological spoilage" means in a broader sense a spoilage caused by mistakes during the technological process in food production. The most common food spoilage microorganisms are bacteria and moulds. Due to its chemical composition, food, especially food of animal origin (milk and dairy products; meat and meat products) is a good environment for the growth and multiplication of microorganisms, so the aim of this review is to point out the importance of microorganisms that can cause to food spoilage. The paper will describe the types of microorganisms, their characteristics and the changes in the food of animal origin. One of the biggest challenges for food industry today is how to save food from the spoilage.

Keywords: *spoilage, food, microorganisms*

1-O-7

Biosinteza nanočestica srebra iz ekstrakta listova bosiljka (*Ocimum basilicum*) i određivanje njihove antibakterijske aktivnosti

Adaleta ŠABIĆ

Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet

Autor za korespondenciju: Adaleta Šabić, sabicadaleta@gmail.com

Sažetak

Povećana rezistentnost bakterija na antibiotike predstavlja ozbiljan problem za javno zdravstvo. Patogene bakterije *Escherichia coli* i *Salmonella* spp. su razvile rezistentnost na neke od često korištenih baktericida te se zbog toga testiraju novi antibakterijski proizvodi. Osobine nanočestica omogućavaju širok spektar primjene kao što je borba protiv mikroba, razvoj novih lijekova te zaštita od stvaranja biofilmova. Srebro je poznato po svojim antimikrobnim osobinama i kao takvo ima veliki potencijal u nanotehnologiji. Ovaj rad ima za cilj istražiti antibakterijsko djelovanje hemijski sintetiziranih nanočestica srebra i nanočestica srebra sintetiziranih iz ekstrakta lista bosiljka na bakterije *Escherichia coli* i *Salmonella* spp. Sintetizirane nanočestice su karakterizirane vidljivom promjenom boje i korištenjem UV-Vis spektrofotometrije. Čiste kulture bakterija *Escherichia coli* i *Salmonella* spp., zasijane su na podlogu Mueller-Hinton. Test-difuzijskom metodom procijenjeno je antimikrobno djelovanje nanočestica srebra. Prosječna vrijednost promjera zone inhibicije, za uzorak nanočestica srebra sintetiziranih zelenom sintezom iznosi 13 mm. Dobiveni rezultati su pokazali da ispitivani mikroorganizmi nisu osjetljivi na antimikrobno djelovanje nanočestica srebra, osim u slučaju bakterije *Escherichia coli* koja je intermedijarno (umjereno) osjetljiva na nanočestice srebra sintetizirane iz ekstrakta lista bosiljka.

Ključne riječi: *nanočestice srebra, bosiljak, zelena sinteza, hemijska sinteza, antimikrobna aktivnost*

1-O-7

Biosynthesis of silver nanoparticles from basil leaf extract (*Ocimum basilicum*) and determination of their antibacterial activity

Adaleta ŠABIĆ

University of Sarajevo, Faculty of Agriculture and Food Sciences

Corresponding author: Adaleta Šabić, sabicadaleta@gmail.com

Summary

The increased resistance of bacteria to antibiotics is a serious problem for public health. Pathogenic bacteria *Escherichia coli* and *Salmonella* spp. have developed resistance to some of the commonly used bactericides, and therefore new antibacterial products are being tested. The properties of nanoparticles enable a wide range of applications such as fighting microbes, the development of new drugs and protection against the formation of biofilm. Silver is known for its antimicrobial properties and has great potential in nanotechnology. The aim of this work is to investigate the antibacterial activity of chemically synthesized silver nanoparticles and silver nanoparticles synthesized from basil leaf extract on bacteria *Escherichia coli* and *Salmonella* spp. Synthesized nanoparticles were characterized by a visible color change and using UV-Vis spectrophotometry. Cultures of pure bacteria *Escherichia coli* and *Salmonella* spp. were planted on Mueller-Hinton medium. The antimicrobial effect of silver nanoparticles was evaluated using the disk diffusion method test. The average value of the diameter of the inhibition zone, for the sample of silver nanoparticles synthesized by green synthesis, is 13 mm. The obtained results showed that the tested microorganisms are not sensitive to the antimicrobial activity of silver nanoparticles, except in the case of *Escherichia coli*, which is intermediately sensitive to silver nanoparticles synthesized from basil leaf extract.

Keywords: *silver nanoparticles, basil, green synthesis, chemical synthesis, antimicrobial activity*

1-O-8

Uticaj aditiva na rast bakterije *Escherichia coli*

Mirza VALJEVAC[1], Berina IMAMOVIĆ[1], Saud HAMIDOVIĆ[1]

[1]Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, Sarajevo, BiH

Sažetak

Sve češća pojava rezistentnih bakterija prema antibioticima i ostalim sredstvima koja imaju antimikrobni uticaj, te nedostatak novih antimikrobnih sredstava rezultirali su razvojem novih pristupačnih i adekvatnih metoda za suzbijanje kontaminacija poljoprivrednih proizvoda fekalnim bakterijama. Indikator fekalne kontaminacije bakterijske vrste *E. coli* sa brojnim fenotipovima rezistentnim na određene antibiotike postala je prijetnja po javno zdravlje. Kako bi se izbjegla ova pojava danas se sve više primjenjuju preparati biljnog porijekla koji su pokazali određeno antibakterijsko djelovanje. U ovom radu vršeno je ispitivanje uticaja aditiva (Emulgator, Konzervans, Antioksidans, Sojin koncentrat, Polifosfat, Stabilizator) na rast bakterije *Escherichie coli*. Napravljeni su rastvori aditiva sa vodom koncentracije 2 %, dok je čista kultura bakterije zasijana na podlogu Muller-Hinton u petrijeve posudice. Za ova istraživanja korištena je test difuziona, Kirby-Bauerova metoda. Inkubacija je obavljena na temperaturi 37 °C u trajanju od 24 sata. Rezultati su pokazali da je najveću zonu inhibicije imao aditiv Emulgator (23 mm), a najmanji Stabilizator (9,5 mm). Zona inhibicije kod ostalih aditiva se kretala između 9,6 mm i 18,5 mm.

Ključne riječi*: aditivi, test difuzna metoda, antimikrobna aktivnost*

1-O-8

The effect of additives on the growth of *Escherichia coli* bacteria

Mirza VALJEVAC[1], Berina IMAMOVIĆ[1], Saud HAMIDOVIĆ[1]

[1]University of Sarajevo, Faculty of Agriculture and Food, Sarajevo, BiH

Summary

The increasingly frequent appearance of resistant bacteria to antibiotics and other agents that have an antimicrobial effect, and the lack of new antimicrobial agents, have resulted in the development of new accessible and adequate methods for combating the contamination of agricultural products with fecal bacteria. An indicator of fecal contamination, the bacterial species *E. coli* with numerous phenotypes resistant to certain antibiotics has become a threat to public health. In order to avoid this phenomenon, preparations of plant origin that have shown a certain antibacterial effect are increasingly being used today. In this work, the effect of additives (Emulsifier, Preservative, Antioxidant, Soy concentrate, Semiphosphate, Stabilizer) on the growth of *Escherichia coli* bacteria was tested. Additive solutions were made with water at a concentration of 2%, while a pure bacterial culture was seeded on the Muller-Hinton medium in petri dishes. The diffusion test, Kirby-Bauer method, was used for these studies. Incubation was carried out at a temperature of 37 °C for 24 hours. The results showed that the Emulsifier additive had the largest zone of inhibition (23 mm), and the Stabilizer had the smallest zone (9.5 mm). The zone of inhibition with the other additives ranged between 9.6 mm and 18.5 mm.

Keywords: additives, test diffuse method, antimicrobial activity

1-O-9

Kakvoća goveđeg mesa i sastavni dijelovi mesa

Nermin Zekić[1]*, Amna Brkan[1] ,Jozo Grbavac[1,2]

[1]Sveučilište u Mostaru, Fakultet zdravstvenih studija

[2]Sveučilište u Mostaru, Agronomski i prehrambeno-tehnološki Fakultet

Autor za korespondenciju: Nermin Zekić, nerminzekic444@gmail.com

Sažetak

Meso je najvredniji stočarski proizvod jer je jedan od glavnih izvora bjelančevina za ljudsku prehranu. Kvaliteta mesa može se ocijeniti prema sljedećim parametrima: pH, sadržaj mliječne kiseline, hlapivih masnih kiselina, vezana voda, topljivost bjelančevina, boja i mekoća. Sastav mesa i fizikalna svojstva mišića karakterizirani su za osiguravanje poboljšane kvalitete prehrane. Stoga je svrha ovog rada bila sagledati glavna kemijska i fizikalno-kemijska svojstva mesa te, ujedno, njegova svojstva kakvoće i čimbenike koji utječu na kvalitetu mesa. Brojne strukturne značajke mesa poput vezivnog tkiva, mišićnih vlakana i tetiva koje pričvršćuju mišić za kost vidljive su u mesu zglobova pregledanom golim okom. Voda je kvantitativno najvažnija komponenta mesa koja čini do 75% težine. Meso se također sastoji od aminokiselina, masnih kiselina, vitamina, minerala i drugih važnih sastojaka. Čimbenici kvalitete koje potrošači percipiraju povezani su sa senzornim atributima (npr. boja, nježnost i okus), nutritivnim svojstvima (npr. kalorije, sadržaj vitamina i profil masnih kiselina) i izgledom (npr. izlučivanje, mramornost i vidljivost količina masti). Međutim, kvaliteta svježeg mesa može se definirati instrumentalno uključujući sastav, hranjive tvari, boju, sposobnost zadržavanja vode, mekoću, funkcionalnost, okuse, kvarenje i kontaminaciju. Za analizu kakvoće mesa koristi se vizualni pregled temeljen na senzorskim svojstvima kakvoće i različite kemijske metode. Druge metode kao što su računalni vid i slikovna spektroskopija, plinska kromatografska analiza, bliska infracrvena tehnologija, dvoenergetska rendgenska apsorpciometrija i kompjuterizirana tomografija također se koriste u mesnoj industriji. Dakle, cilj ovog pregleda je sagledati svojstva kakvoće goveđeg mesa i njegovih sastavnih dijelova.

1-O-9

Beef quality and meat components

Nermin Zekić[1*], Amna Brkan[1], Jozo Grbavac[1,2]

[1]University of Mostar, Faculty of Health Studies

[2]University of Mostar, Faculty of Agriculture and Food Technology

Corresponding author: Nermin Zekić, nerminzekic444@gmail.com

Summary

Meat is the most valuable livestock product because it is one of the main sources of protein for human consumption. Meat quality can be evaluated according to the following parameters: pH, content of lactic acid, volatile fatty acids, bound water, protein solubility, color and softness. Meat composition and muscle physical properties are characterized to ensure improved nutritional quality. Therefore, the purpose of this work was to review the main chemical and physical-chemical properties of meat, as well as its quality properties and factors that influence meat quality. Numerous structural features of the meat such as connective tissue, muscle fibers and tendons that attach the muscle to the bone are visible in the meat of joints examined with the naked eye. Water is quantitatively the most important component of meat, making up to 75% of its weight. Meat also consists of amino acids, fatty acids, vitamins, minerals and other important ingredients. Quality factors perceived by consumers are related to sensory attributes (eg colour, tenderness and flavour), nutritional properties (eg calories, vitamin content and fatty acid profile) and appearance (eg secretion, marbling and fat visibility). However, fresh meat quality can be defined instrumentally including composition, nutrients, color, water holding capacity, tenderness, functionality, flavors, spoilage and contamination. For meat quality analysis, a visual inspection based on quality sensory properties and different chemical methods are used. Other methods such as computer vision and imaging spectroscopy, gas chromatographic analysis, near-infrared technology, dual-energy X-ray absorptiometry and computed tomography are also used in the meat industry. So, the aim of this review is to look at the quality characteristics of beef and its components.

1-P-1

Uticaj stresa prije klanja na kvalitetu mesa

Franka DUSPER, Mejrema KADRIĆ

Univerzitet u Sarajevu, Veterinarski fakultet

Sažetak

Stres kod životinja prije klanja ima određene posljedice na kvalitetu mesa i izaziva opravdanu zabrinutost kako proizvođača tako i potrošača, uz istaknute dugotrajne i kratkotrajne stresne faktore. Dugotrajni stres, prisutan 12 do 48 sati prije samog klanja, rezultira iscrpljenjem mišićnog glikogena i dovodi do pojave mesa sa višom pH-vrijednosti, tamnijom bojom te povećanom suhoćom (DFD). Suprotno tome, kratkotrajni akutni stres neposredno prije klanja, poput uzbuđenja ili borbe između životinja, potiče proizvodnju mliječne kiseline, rezultirajući mesom s nižom pH-vrijednosti, svjetlijom bojom, smanjenom sposobnošću zadržavanja vode i potencijalno mekanom teksturom (PSE meso). Osim što se proizvođači mesa suočavaju s izazovima u vezi s kvalitetom proizvoda, zabrinutost će se u određeno vrijeme pojaviti i na strani potrošača. Nepoželjne karakteristike mesa, poput tamne boje, suhoće i tvrdoće, dovode do izbjegavanja takvog mesa od strane potrošača, često s pogrešnim pretpostavkama da potiče od starijih ili bolesnih životinja. Od velikog je značaja razumijevanje i rješavanje problema stresa prije klanja u industriji proizvodnje mesa. Stres ne utiče samo na kvalitetu mesa, već dovodi u pitanje samu dobrobit životinja kao i do potencijalnih financijskih gubitaka za industriju. Potrebno je uzeti u obzir izazove koji se javljaju u stvarnim uvjetima kako bi se unaprijedila kvaliteta mesa i zadovoljstvo potrošača.

Ključne riječi: *stres, kvaliteta mesa, dobrobit, klaonica*

1-P-1

The influence of pre-slaughter stress on meat quality

Franka DUSPER, Mejrema KADRIĆ

University of Sarajevo, Faculty of Veterinary Medicine

Summary

Stress in animals before slaughter has certain consequences on meat quality and raises justified concerns for both producers and consumers, with highlighted long-term and short-term stress factors. Long-term stress, present 12 to 48 hours before slaughter, depletes muscle glycogen and leads to meat with higher pH values, darker color, and increased dryness (DFD meat). On the other hand, short-term acute stress, like excitement or fighting among animals, stimulates the production of lactic acid, resulting in meat with lower pH values, lighter color, reduced water-holding capacity, and potentially a softer texture (PSE meat). In addition to facing challenges regarding product quality, meat producers also have concerns about consumer perception. Undesirable meat characteristics, such as dark color, dryness, and toughness, lead to consumer avoidance, often with misconceptions that it comes from older or sick animals. Understanding and addressing pre-slaughter stress issues in the meat industry is crucial, as it not only affects meat quality but also animal welfare and potential financial losses for the industry. It is important to consider the challenges that arise in real conditions to improve meat quality and consumer satisfaction.

Keywords: *stress, meat quality, well-being, slaughterhouse*

1-P-2

Ozračivanje hrane kao način sterilizacije

Maida SABITOVIĆ*, Azra EFENDIĆ

Univerzitet u Sarajevu, Veterinarski fakultet

Sažetak

Hladna sterilizacija je jedan od najbezbjednijih i najčistijih načina da se vijek trajanja hrane produži i učini bezbjednijom za korištenje. U ovom procesu kosristi se izvor zračenja, koji najčešće emituje gama zrake. Korisni efekti zračenja namirnica su radapertizacija, radurizacija, radicidacija i dezinfestacija. Odnosno, zračenje hrane je proces sigurnosti hrane koji uništava bakterije koje izazivaju bolesti i smanjuje rizik od bolesti koje se prenose hranom. Zračenje hrane se također koristi za produženje roka trajanja hrane i održiva je metoda kontrole štetočina, koja osigurava fitosanitarnu sigurnost za svježe proizvode kojima se trguje sprječavajući razvoj i razmnožavanje insekata i drugih štetočina. Zračenje hrane je bezbjedno, a njegovu bezbjednost i efikasnost su potvrdile različite federalne agencije i međuvladine organizacije. Ne mijenja teksturu ili izgled hrane i ne čini hranu radioaktivnom. Ozračenje hrane ima iste prednosti kao kada se zagrijava, hladi, zamrzava ili tretira hemikalijama, ali bez promjene temperature ili ostavljanja rezidua. Nakon dugogodišnjeg istraživanja i razvoja domaćih i međunarodnih standarda, više od 60 zemalja širom svijeta ima propise koji dozvoljavaju korištenje zračenja za jedan ili više prehrambenih proizvoda.

Ključne riječi: *hladna sterilizacija, zračenje, sigurnost hrane*

1-P-2

Irradiation of food as a method of sterilization

Maida SABITOVIĆ*, Azra EFENDIĆ

University of Sarajevo, Faculty of Veterinary Medicine

Summary

Cold sterilization is one of the safest and cleanest ways to extend the shelf life of food and its safer use. In this process, a radiation source is used that most often emits gamma rays. The beneficial effects of food irradiation are radiopertization, radurization, radicidation and disinsection. That is, food irradiation is a food safety process that destroys disease-causing bacteria and reduces the risk of foodborne illness. Food irradiation is also used to extend the shelf life of food and is a sustainable method of pest control, which ensures phytosanitary safety for fresh produce sold by preventing the development and reproduction of insects and other pests. Food irradiation is safe, and its safety and effectiveness have been confirmed by various federal agencies and intergovernmental organizations. It does not change the texture or appearance of food and does not make food radioactive. Irradiating food has the same benefits as when it is heated, cooled, frozen or treated with chemicals, but without changing the temperature or leaving residues. After many years of research and development of domestic and international standards, more than 60 countries around the world have regulations that allow the use of radiation for one or more food products.

Keywords: *cold sterilization, radiation, food safety*

2. TOKSIKOLOGIJA I SIGURNOST HRANE I OKOLIŠA
FOOD AND ENVIRONMENT TOXICOLOGY AND SAFETY

2-O-1

Falsifikovanje dodataka prehrani farmakološki aktivnim supstancama u EU

Amila HAJDAREVIĆ[1*]

[1]Univerzitet u Sarajevu, Farmaceutski fakultet, Bosna i Hercegovina

*Amila Hajdarević, amilahajdarevic@ffsa.unsa.ba

Sažetak

Popularnost dodataka prehrani dramatično je porasla u zadnjih nekoliko godina među potrošačima iz Evropske Unije (EU) koji često vjeruju da su dodaci prehrani, naročito biljni, zdraviji i sigurniji od lijekova. Prema evropskoj regulativi, dodaci prehrani se smatraju prehrambenim proizvodima i za razliku od lijekova, ne podliježu strogoj sigurnosnoj kontroli prije puštanja na tržište. Proizvođači dodataka prehrani često zloupotrebljavaju njihovu slabiju kontrolu kako bi falsifikovali sastav svojih proizvoda, a koji se ogleda kroz dodavanje veće količine aktivnog sastojka od naznačene ili dodavanje sintetičke aktivne supstance u (biljne) dodatke prehrani, a u svrhu poboljšanja njihove efikasnosti. Uslijed toga potrošači su izloženi riziku od neželjenih učinaka ili mogućih interakcija dodataka prehrani s drugim lijekovima ili dodacima prehrani. Zemlje članice Evropske Unije uglavnom vrše testiranja dodataka prehrani nakon što isti dospiju na tržište, a pronađena odstupanja prijavljuju nadležnim autoritetima koji poduzimaju daljnje akcije. Kako bi se osigurala učinkovita razmjena informacija o zdravstvenim opasnostima u vezi s hranom i stočnom hranom između zemalja članica Evropske Unije, razvijen je Sistem brzog uzbunjivanja za hranu i stočnu hranu (RASFF) koji omogućava njihovo koordinirano djelovanje na zdravstvene opasnosti. Cilj ovog rada je analizirati obavijesti o dodacima prehrani koje su zabilježene putem RASFF-a u razdoblju od 2018. do 2022. godine, naročito one zabilježene tokom zadnje tri godine, kako bi se ukazalo na potrebu za promjenom regulative ili poboljšanja kontrole dodataka prehrani radi maksimalne zaštite potrošača.

Ključne riječi: *dodaci prehrani, falsifikovanje dodataka prehrani, RASFF*

2-O-1

Adulteration of food supplements with pharmacologically active substances in the EU

Amila HAJDAREVIĆ[1*]

[1]University of Sarajevo, Faculty of Pharmacy, Bosnia and Herzegovina

*Amila Hajdarević, amilahajdarevic@ffsa.unsa.ba

Summary

The popularity of food supplements has dramatically increased among consumers in the European Union in recent years, who often believe that food supplements, especially herbal ones, are healthier and safer than medications. According to European regulations, food supplements are considered food products and, unlike medications, they are not subject to strict safety controls before being placed on the market. Manufacturers of food supplements often exploit their weaker control to manipulate the composition of their products by adding higher amounts of active ingredients than indicated or incorporating synthetic active substances into herbal food supplements to enhance their effectiveness. As a result, consumers are exposed to the risk of adverse effects or potential interactions between food supplements and other medications or food supplements. Member states of the European Union typically conduct testing of food supplements after they have entered the market, and any deviations found are reported to the competent authorities, who take further action.To facilitate effective exchange of information on health hazards related to food and animal feed among member countries, the Rapid Alert System for Food and Feed (RASFF) has been developed, enabling coordinated actions against health threats. The goal of this study is to analyze the notifications regarding food supplements recorded through RASFF from 2018 to 2022, with a particular focus on the last three years, in order to highlight the need for regulatory changes or improved control of food supplements to ensure maximum consumer protection.

Keywords: *food supplements, food supplement adulteration, RASFF*

2-O-2

Odnos zastupljenosti plijesni i aflatoksina M1 u mliječnim proizvodima

Amir IBRAHIMAGIĆ[1*], Emilija HRAPOVIĆ[2]

[1]Prof. dr. sc. Amir Ibrahimagić, dipl. ing. MLD, Služba za hemijsku dijagnostiku, Institut za zdravlje i sigurnost hrane Zenica, BiH

[2]Emilija Hrapović, MA dipl. ing., Sveučilište/Univerzitet "VITEZ" Vitez, Travnik BiH

Sažetak

Konzumiranjem kontaminirane hrane preživači unose u organizam aflatoksin B1 (AFLB1) koji se potom razgrađuje u aflatoksin M1 (AFM1) i izlučuje u mlijeko. Kontaminirano se mlijeko koristi u procesima proizvodnje mliječnih proizvoda. EU je propisala maksimalno dopuštene količine (MDK) za AFM1 u mlijeku od 0,05 μg/kg te u mlijeku za dojenčad od 0,025 μg/kg. U mliječnim proizvodima nisu propisane MDK vrijednosti za AFM1, ali neke su zemlje definirale vlastite razine. Cilj rada je predstaviti odnos zastupljenosti plijesni i aflatoksina M1 u mliječnim proizvodima. Ukupno 60 uzoraka (30 sireva i 30 jogurta) analizirano je prema međunarodnim standardima za detekciju plijesni (ISO 21527-1/21527-2:2009). Za otkrivanje aflatoksina M1 korišten je imunoenzimski test (ELISA). U 60 uzoraka (30 uzoraka sira i 30 uzoraka jogurta) ispitana je prisutnost plijesni i AFL M1. AFM1 je bio prisutan u 71,4% uzoraka sireva u rasponu od 0,011 do 0,433 μg/kg i u 96,7% uzoraka jogurta u rasponu od 0,010 do 0,608 μg/kg. Dva uzorka sira imala su višu razinu AFLM1 (0,154 i 0,433 μg/kg), i pet uzoraka jogurta (0,060, 0,117, 0,222, 0,553 i 0,608 μg/kg). Plijesni su detektovane u jednom uzorku sira (450 cfu/g) i u tri uzorka jogurta u rasponu od 6110 do 2400 cfu/g. Niže razine plijesni pronađene su u drugim uzorcima (<10 cfu/g). Prisutnost AFM1 u mliječnim proizvodima predstavlja veliki rizik za zdravlje potrošača, jer se ti proizvodi u velikoj mjeri konzumiraju i pojavljuje se potreba za revidiranjem Pravilnika o kontaminatima u mliječnim proizvodima, kao što su sirevi i jogurti.

Ključne riječi: *higijena-proizvodnja, „Jedno zdravlje", mikotoksini*

2-O-2

Relationship and presence of molds and aflatoxin M1 in dairy products

Amir IBRAHIMAGIĆ[1*], Emilija HRAPOVIĆ[2]

[1]Ass. prof. Amir Ibrahimagić, ing. MLD, Department for Chemical Diagnostics, Institute for Health and Food Safety, Zenica, BiH

[2]Emilija Hrapović, MA ing., University "VITEZ" Vitez, Travnik BiH

Summary

When ruminants consume contaminated feed, AFB1 enters into the gastrointestinal tract, is metabolised into aflatoxin M1 (AFM1) and secreted into milk. This contaminated milk is then used in the production of dairy products. In the EU, the maximum residue level (MRL) of AFM1 in milk is set to 0.05 μg/kg and for infant milk to 0.025 μg/kg. However, there is no EU MRL for AFM1 in dairy products, though some countries have defined national limits. The aim of the paper is to present the relationship between molds and aflatoxin M1 in dairy products. A total of 60 samples (30 cheeses and 30 yogurts) were analyzed according to International standards for detection of Molds (ISO 21527-1/21527-2:2009). Enzyme-linked immunosorbent assay (ELISA) was used to detect aflatoxin M1. Among 60 samples (30 cheese samples and 30 yogurt samples) were studeid for the presence of molds and AFL M1. AFM1 was present in 71.4% of cheese samples in the range of 0.011 to 0.433 μg/kg and in 96,7% of yogurt samples in the range of 0.010 to 0.608 μg/kg. Two cheese samples were higher level of AFLM1 (0.154 and 0.433 μg/kg) and five yogurt samples were higher level of AFLM1 (0.060, 0.117, 0.222, 0.553 and 0.608 μg/kg). Molds were detected in one cheese sample (450 cfu/g) and in three yogurt samples in the range from 6110 to 2400 cfu/g. Lower molds levels were found in other samples (<10 cfu/g). The presence of AFM1 in dairy products poses a major risk to the health of consumers, as these products are largely consumed and we need to revise appears the current rulebook on contaminants present in dairy products such as cheeses and yogurts.

Keywords: *hygiene-production, "One health", mycotoxins*

2-O-3

Laboratorijsko praćenje intoksikacije aflatoksinima i identifikacija riziko fakora povezanih sa hepatocelularnim karcinomom

Amela IBIŠEVIĆ[1*], Emsel PAPIĆ[1], Sabina ŠEČIĆ[2], Sabina ŠEGALO[1]

[1]Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Laboratorijske tehnologije
[2]Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Zdravstveni nutricionizam i dijetetika

*Autor za korespondenciju: Amela Ibišević, amela.ibisevic@fzs.unsa.ba

Sažetak

Aflatoksini su mikotoksini koje proizvode određene vrste gljiva, od kojih je najznačajniji rod *Aspergillus*. Najbolji uslovi za stvaranje aflatoksina su visoke temperature okoliša, uz nisku vlažnost vazduha, što može rezultirati kontaminacijom hrane u svim fazama uzgoja, skladištenja i transporta. Direktna ili indirektna izloženost kontaminiranoj hrani vodi ka nastanku intoksikacija, dok profesionalnu izloženost karakterizira perkutani unos ili inhalacija spora. Zbog različitih modaliteta prenosa, uzorci koji se koriste za procjenu izloženosti u najvećem broju istraživanja su urin i krv. U odnosu na vrstu uzorka, ciljanog metabolita i geografskog područja, najširu primjenu u laboratorijskoj dijagnostici imaju tečna hromatografija visokih performansi (HPLC) i enzimski povezani imunosorbentni test (ELISA). Aflatoksin M-1 (AFM1) je marker akutne, dok aflatoksin B1-albumin (AFB1-Alb), zbog dužine poluživota, ima ulogu markera hronične izloženosti. S obzirom na dužinu trajanja izloženosti aflatoksinima zabilježeni su slučajevi akutnih i hroničnih aflatoksikoza, što uz udružene faktore rizika može dovesti do razvoja teških kliničkih stanja, poput hepatocelularnog karcinoma (HCC). Utvrđeno je da su veće koncentracije metabolita AFB1-Alb u pozitivnoj korelaciji sa bržim razvojem bolesti, stoga bi isti zbog dužine poluživota u cirkulaciji trebao biti marker izbora u procjeni dugotrajne izloženosti, ali i marker u procjeni rizika aflatoksinom induciranog HCC. Pored aflatoksina kao faktora rizika u razvoju bolesti, važnu ulogu igraju infekcija hepatitis B virusom, zatim spol i dob. Na osnovu svega navedenog, laboratorijsko praćenje izloženosti aflatoksinima kao etiološkim uzročnicima spektra oboljenja različite težine i sinergije sa brojnim faktorima rizika, posebno je značajno u procjeni rizika, kao i kreiranju preventivnih modela u područjima i profesijama sa visokom izloženosti.

Ključne riječi: *aflatoksini, mikotoksini, hepatocelularni karcinom, izloženost, laboratorijska dijagnostika*

2-O-3

Laboratory monitoring of aflatoxin intoxication and identification of risk factors associated with hepatocellular carcinoma

Amela IBIŠEVIĆ[1*], Emsel PAPIĆ[1], Sabina ŠEČIĆ[2], Sabina ŠEGALO[1]

[1]University of Sarajevo, Faculty of Health Studies, Laboratory Technologies

[2]University of Sarajevo, Faculty of Health Studies, Health Nutrition and Dietetics
*Corresponding author: Amela Ibišević, amela.ibisevic@fzs.unsa.ba

Summary

Aflatoxins are mycotoxins produced by certain fungi and the most important is the species *Aspergillus*. The best conditions for the formation of aflatoxins are high ambient temperatures with low humidity, which can lead to contamination of food at all stages of cultivation, storage and transportation. Direct or indirect exposure to contaminated food leads to intoxication, while occupational exposure is characterized by percutaneous intake or inhalation of spores. Due the different routes of transmission, urine and blood samples are mostly commonly used to assess exposure. In terms of sample type, target metabolite, and geographic area, high-performance liquid chromatography (HPLC) and enzyme-linked immunosorbent assay (ELISA) are widely used methods in laboratory diagnostics. Alphatoxin M-1 (AFM1) is a marker of acute exposure, while alphatoxin B1-albumin (AFB1-Alb) is a marker of chronic exposure. Due to the duration of exposure to aflatoxins, cases of acute and chronic aflatoxicosis have been recorded, which, together with associated risk factors, may lead to the development of severe clinical disease, particulary hepatocellular carcinoma (HCC). Higher concentrations of AFB1-Alb metabolites have been found to be positively correlated with more rapid disease development. Therefore, due to its long half-life in the bloodstream, it should be the marker of choice when assessing long-term exposure and the risk of aflatoxin-induced HCC. In addition to aflatoxin as a risk factor for developing the disease, hepatitis B virus infection also plays an important role, followed by gender and age. Based on all this, laboratory monitoring of exposure to aflatoxins as etiologic agents of a spectrum of diseases of varying severity and synergy with multiple risk factors is particularly important for risk assessment as well as for establishing prevention models in areas and occupations with high exposure.

Keywords: *aflatoxins, mycotoxins, hepatocellular carcinoma, exposure, laboratory diagnostics*

2-O-4

Ehinokokoza – zanemarena zoonoza

Emina ŠIŠIĆ*, Semina KANDIĆ, Nejla HUREM, Sabina ŠEČIĆ, Emira OSMANOVIĆ

Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Sanitarno inžinjerstvo, BiH

*Autor za korespondenciju: Emina Šišić, e-mail: emina.sisic@fzs.unsa.ba

Sažetak

Prema svjetskoj zdravstvenoj organizaciji (SZO), ehinokokoza je svrstana u zanemarene zoonoze. Ehinokokoza je parazitarna zoonoza koja nastaje invazijom i razvojem larvalne forme cestoda iz roda *Echinococcus*, a manifestuje se kao hidatidna cista (unilokulami ehinokok) ili kao alveolarni (multilokulami) oblik. Prenošenje oboljenja je najčešće fekalno-oralnim putem, direktnim kontaktom sa izmetom pasa ili posredno preko voća, povrća ili preko predmeta zagađenih izmetom pasa. Cilj ovog rada je pregledno ukazati na geografsku rasprostranjenost ehinokokoze u svijetu, te zastupljenost oboljenja kod ljudi u odnosu na spol i dob. Rad je urađen pregledom naučne i stručne literature publicirane u dostupnim relevantnim bazama podataka (*PubMED, Scholar*) upotrebom ključnih riječi „ehinokokoza“, „zoonoze“, dob“. Dosadašnji rezultati upućuju da je do danas identifikovano 64 745 slučajeva cistične ehinokokoze kod ljudi u 40 zemalja Evrope. Prema podacima, prosječna stopa incidence na godišnjoj razini u proteklih 20 godina iznosila je 0,64 slučajeva na 100 000 stanovnika unutar Evrope. Trenutni region žarišta cistične ehinokokoze je na području jugoistočne Evrope. Podaci Svjetske zdravstvene organizacije ukazuju da u endemskim mediteranskim područjima stopa cistične ehinokokoze iznosi iznad 50 oboljelih na 100.000 ljudi. Prema studijama, od zabilježenih slučajeva cistične ehinokokoze, 51% bile su žene prosječne dobi 25-44 godine, dok je 53% muškaraca imalo zabilježen slučaj alveolarne ehinokokoze prosječne starosti 65 godina. Ehinokokoza kao sama bolest je zapostavljena tema u današnjem vremenu, te zbog toga sama bolest zahtijeva bolji nadzor i kontrolu, sa posebnim akcentom na „*one health*„ pristup i saradnju veterinarskog i humanog sektora u prevenciji oboljenja.

Ključne riječi: *ehinokokoza, zoonoze, dob*

2-O-4

Echinococcosis – a neglected zoonosis

Emina ŠIŠIĆ*, Semina KANDIĆ, Nejla HUREM, Sabina ŠEČIĆ, Emira OSMANOVIĆ

University of Sarajevo, Faculty of Health Studies, Sanitary Engineering, BiH

*Author for correspondence: Emina Šišić, e-mail: emina.sisic@fzs.unsa.ba

Summary

According to the World Health Organization (WHO), echinococcosis is classified as a neglected zoonosis. Echinococcosis is a parasitic zoonosis caused by the invasion and development of the larval form of a cestode from the genus Echinococcus, manifesting as a hydatid cyst (uniloculami echinococcus) or as an alveolar (multiloculami) form. Transmission of the disease usually occurs via the fecal-oral route, direct contact with dog feces, or indirectly via fruit, vegetables, or objects contaminated with dog feces. The aim of this work is to outline the geographical distribution of echinococcosis in the world and the prevalence of the disease in humans according to sex and age. For the work, scientific and professional literature published in available relevant databases was reviewed using the keywords "echinococcosis", "zoonosis", "age" and "sex". Available literature not older than 10 years was used for the preparation of the paper. Results to date show that 64,745 cases of cystic echinococcosis were identified in humans in 40 European countries. According to the data, the average annual incidence rate over the past 20 years has been 0.64 cases per 100,000 population in Europe. The current focus region of cystic echinococcosis is in southeastern Europe. World Health Organization data show that in the endemic areas of the Mediterranean region, the rate of cystic echinococcosis exceeds 50 patients per 100,000 population. According to studies, 51% of recorded cases of cystic echinococcosis were women with an average age of 25-44 years, while 53% of men had a recorded case of alveolar echinococcosis with an average age of 65 years. Echinococcosis as a disease itself is a neglected issue nowadays, and therefore the disease itself requires better surveillance and control, focusing on the "One Health" approach and collaboration between the veterinary and humanitarian sectors in disease prevention.

Keywords: *echinococcosis, zoonotic diseases, age*

2-O-5

Uticaj električne cigarete/vejpa na oralno zdravlje

Antonela ANTUNOVIĆ, Naida KULOVAC, Merima KAROVIĆ,
Dženita KURTOVIĆ, Vildana DŽEMIDŽIĆ

Univerzitet u Sarajevu, Stomatološki fakultet sa stomatološkim kliničkim centrom Bosna i Hercegovina

Sažetak

Elektronske cigarete (e-cigarete) i vejp uređaje mnogi vide kao bezopasnu alternativu klasičnim duhanskim cigaretama. Osim toga, veliki broj mladih osoba koje nisu ranije koristile cigarete, koriste električne ili vejp uređaje. Od 2004. godine, uz sve veću upotrebu društvenih medija, e-cigarete su postale popularnije u cijelom svijetu i njihova se upotreba eksponencijalno povećava. Električne cigarete su uređaji na baterije u kojima se zagrijava duhan, a vejp u kojima se zagrijava tekućina koji ne sadrži katran, ali i dalje sadrže nikotin, arome i druge hemikalije. Tijekom isparavanja e-tekućina, toksini, karcinogeni i razne druge hemikalije mogu se osloboditi i udahnuti od strane korisnika. Postoje ograničeni podaci o potencijalnom učinku izlaganja e-parama na zdravlje. Oralna tkiva su prvo mjesto izravne interakcije sa komponentama udahnute pare. Rezultati mnogih istraživanja potvrđuju da elektične cigarete i vejp na oralno zdravlje utiču tako što izazivaju: paradontalna oštećenja, osjećaj suhih usta, povećanu percepciju boli, peckanje jezika te oštećenje okusnih papila, bojenje zuba, stvaranje kisele sredine pogodne za razvoj karijesa. Opsežna oštećenja zuba kao posljedica eksplozije e-cigareta također su zabilježena. Ovo istraživanje ima za cilj sistemski pregledati dosadašnja istraživanja o uticaju električnih cigareta i vejpa na oralno zdravlje te dati odgovor da li je ova vrsta konzumacije nikotina zdravija po opće i oralno zdravlje u odnosu na korištenje cigareta.

Ključne riječi: *oralno zdravlje, vejp, električne cigarete, nikotin*

2-O-5

Impact of Electronic Cigarettes/Vaping Devices on Oral Health

Antonela ANTUNOVIĆ, Naida KULOVAC, Merima KAROVIĆ,
Dženita KURTOVIĆ, Vildana DŽEMIDŽIĆ
University of Sarajevo, Faculty of Dental Medicine with Clinics, Bosnia and Herzegovina

Summary

Electronic cigarettes (e-cigarettes) and vaping devices are regarded as a safe alternative to classic tobacco cigarettes by many people. Besides that, a huge number of young people, who did not use cigarettes previously, use electronic cigarettes or vaping devices. Since 2004, through the increased use of social media, e-cigarettes have become more popular in the whole world and their use is exponentially rising. Electronic cigarettes are battery-operated devices that heat up tobacco, and vapes are devices that heat up liquid that does not contain tar but still contains nicotine, aromas, and other chemicals. During the vaporization of e-liquids, toxins, carcinogens, and many other chemicals can be released and inhaled by users. There is limited data about the potential impact that exposure to e-vapors might have on health. Oral tissues are the first place of direct interaction with the ingredients of inhaled vapor. Research confirms that electronic cigarettes and vaping devices impact oral health by causing paradental damage, feeling of dry mouth, increased pain perception, tingling tongue, as well as damage of lingual papillae, tooth discoloration, and increase of mouth acidity that is prone to development of cavities. Larger tooth damage as the consequence of the e-cigarette explosion was also recorded. This research aims to do a systematic overview of the previous research about the impact of e-cigarettes and vaping devices on oral health and to answer whether this kind of nicotine consumption is healthier for general well-being and oral health, in comparison to the use of cigarettes.

Keywords: *oral health, vape, electric cigarettes, nicotine*

2-O-6

Pametna ambalaža – novi stepen sigurnosti i kvalitete hrane

Adin MEHMEDOVIĆ*, Josip ŠUTALO, Karlo LOVRIĆ, Daniel MAESTRO

Univerzitet u Sarajevu - Fakultet zdravstvenih studija, BiH

*Autor za korespondenciju: Adin Mehmedović, adin.mehmed@gmail.com

Sažetak

Cilj ovog preglednog rada je istražiti i predstaviti nova rješenja koja unapređuju sigurnost i kvalitetu hrane kroz primjenu pametnih ambalaža. Fokus ovog rada bit će na razmatranju novih tehnologija i inovacija koje se koriste u pametnoj ambalaži. Pametna ili inteligentna ambalaža sadrži vanjske ili unutarnje faktore kojima se određuje kvaliteta proizvoda. Tipični primjer inteligentne ambalaže sadrži faktore vremena i temperature, a učvršćuje se na površinu ambalaže. Pametna ambalaža predstavlja onu koja, osim svoje primarne uloge u zaštiti proizvoda, obavlja i dodatne funkcionalnosti. Postoje dvije temeljne podvrste pametne ambalaže: aktivna i inteligentna. Pametna ambalaža koristi tehnologiju poput senzora, QR kodova, NFC čipova i aplikacija kako bi potrošačima omogućila pristup relevantnim informacijama o proizvodu, uključujući nutritivne vrijednosti, porijeklo, alergene i rok trajanja. Primjenom ove ambalaže može se pridonijeti redukciji količine odbačene hrane, pojačati sigurnost prehrambenih proizvoda, osigurati veća praktičnost za konzumente, osigurati dobra kvalitetu proizvoda i pružiti informacije o prehrambenom proizvodu. Da bi se postigla optimalna ravnoteža između konceptualizacije i implementacije sustava za pakovanje, potrebno je dalje provesti mnoga istraživanja i unaprijediti tehnologiju pakiranja hrane.

Ključne riječi: *ambalaža, sigurnost hrane, tehnologija pakiranja*

2-O-6

Smart Packaging - A New Level of Food Safety and Quality

Adin MEHMEDOVIĆ*, Josip ŠUTALO, Karlo LOVRIĆ, Daniel MAESTRO

University of Sarajevo, Faculty of Health Studies, BiH

*Corresponding author: Adin Mehmedović, adin.mehmed@gmail.com

Summary

The aim of this review paper is to explore and present new solutions that enhance the safety and quality of food through the application of smart packaging. The focus of this paper will be on discussing new technologies and innovations used in smart packaging. Smart or intelligent packaging includes external or internal factors that determine the quality of the product. A typical example of intelligent packaging includes factors such as time and temperature, which are embedded on the packaging surface. Smart packaging goes beyond its primary role in product protection and performs additional functionalities. There are two fundamental subtypes of smart packaging: active and intelligent. Smart packaging utilizes technologies such as sensors, QR codes, NFC chips, and applications to provide consumers with access to relevant product information, including nutritional values, origin, allergens, and expiration dates. The application of this packaging can contribute to reducing food waste, enhancing the safety of food products, providing greater convenience for consumers, ensuring product quality, and offering information about the food product. To achieve an optimal balance between conceptualization and implementation of food packaging systems, further research and improvement of food packaging technology are necessary.

Keywords: *packaging, food safety, packaging technology*

2-O-7

Hepatotoksično dejstvo hlorpirifosa prilikom peroralnog aplikovanja pacovima i protektivni efekat vitamina B_1

Aleksa MIJATOVIĆ

Univerzitet u Beogradu, Fakultet veterinarske medicine

Sažetak

Hlorpirifos (CPF) se primenjuje u poljoprivredi i jedan je od najčešće korišćenih insekticida u svetu. Zbog ovako široke primene, on predstavlja hazard koji se lako može uključiti u lanac ishrane i dospeti u hranu za životinje i ljude. Ovaj organofosfatni insekticid pored svog primarnog mehanizma toksičnosti, inhibicije acetilholinesteraze, dovodi i do inflamatornih procesa u jetri i indukovanja oksidativnog stresa. Akutna faza inflamacije regulisana je proinflamatornim citokinima, prvenstveno interleukinom 1β (IL-1β) i 6 (IL-6). Usled inflamatornih procesa dolazi do povećanja stepena oštećenja biomakromolekula i aktivacija signalnih puteva koji uvode ćeliju u proces apoptoze. Ovakva oštećenja u jetri manifestuju se i patološkim promenama tkiva. Cilj istraživanja je ispitivanje promena u jetri koje nastaju prilikom tretiranja pacova hlorpirifosom i mogući zaštitni efekat vitamina B1. Pacovi soja Wistar, starosti 3-4 nedelje (180-200g) su podeljeni u tri grupe: kontrolnu, grupu p.o. tretiranu sa 30 mg/kg tm CPF i grupu p.o. tretiranu sa 30 mg/kg tm CPF i 100 mg/kg tm vitamina B1 i.m. tokom 7 dana. Određene su koncentracije Il-1β i Il-6 ELISA testom i koncentracije malondialdehida i karbonilnih grupa spektrofotometrijski. Imunohemijskim metodama je određena ekspresija Bcl-2 . Patohistološke promene praćene su bojenjima: hematoksilin eozin, perjodna kiselina Schiff-ov reagens bojenje, Masson trihromatsko i Gomori bojenje. Dobijeni rezultati kod grupe pacova tretirane CPF ukazuju na izrazite inflamatorne procese, oštećenje lipida i proteina i potvrđuju indukciju apoptoze. Međutim, tretman vitaminom B1 smanjuje toksične efekte CPF i time se potvrđuje svoje protektivno dejstvo.

Ključne reči: *hlorpirifos, vitamin B1, organofosfati, patohistologija, apoptoza*

2-O-7

Hepatotoxic effect of perorally administred chlorpyrifos in rats and protective effect of vitamin B_1

Aleksa MIJATOVIĆ

Universtiy of Belgrade, Faculty of veterinary medicine

Summary

Chlorpyrifos (CPF) found its application in agriculture and it is one of the most commonly used pesticides worldwide. For such broad utilization, this hazard can be easily integrated in food chain and contaminate food and feed. In addition to its primary toxicological mechanism, inhibition of acetylcholinesterase, this organophosphate insecticide also affects liver by inducing inflammatory processes and oxidative stress. Acute phase response is regulated via proinflamatory cytokines, principally by interleukins 1β (IL-1β) i 6 (IL-6). Further, inflammation is responsible for biomacromolecule damage and activation of signaling pathways leading to apoptosis. Described liver damage is causing pathological changes in tissue. The research aim is to determine changes originated from CPF rat treatment and possible defensive potential of vitamin B1. Wistar rats (3-4 weeks old, 180-200g) were separated in three groups: control, CPF treated group (p.o., dose 30 mg/kg bw) and vitamin B_1 treated group (i.m., 100 mg/kg bw) after CPF administration (same dose as previous group). Treatment lasted 7 days. Il-1β and Il-6 concentrations were determined via ELISA test and malondialdehyde and carbonyl groups concentrations were determined using spectrophotometry. Expression of Bcl-2 was analyzed using immunochemical method. Pathohystological changes were monitored via hematoxylin eosin, periodic acid Schiff's reagent, Masson trichromatic and Gomori staining. Research findings have shown lipid and protein damage and high inflammation level in CPF treated group and confirming apoptotic signaling pathways activation. As a contrast of that, vitamin B_1 treatment reduces toxicological effects of CPF thus comfirming its protective effect.

Keywords: *chlorpyrifos, vitamin B_1, organophosphates, patohistology, apoptosis*

2-O-8

Mikrobiološka ispravnost leda u ugostiteljskim objektima na području Kantona Sarajevo

Amina MUMINOVIĆ[1*], Amina ELEZOVIĆ[1], Emina FILAN[1], Lamija DŽEVLAN[1], Daniel MAESTRO[1]

Univerzitet u Sarajevu - Fakultet zdravstvenih studija, BiH

[*]Autor za korespondenciju: Amina Muminović, muminovicamina23@gmail.com

Sažetak

Svjetska zdravstvena organizacije navodi da led koji je namijenjen za konzumaciju ili je u neposrednom kontaktu s hranom, treba biti jednake kvalitete i jednako siguran za ljude kao i voda za piće. Zbog široke upotrebe u ugostiteljstvu, led ima veliki javnozdravstveni značaj i potrebno je osigurati njegovu mikrobiološku ispravnost. Konzumacija namirnica koje su bile u kontaktu s kontaminiranim ledom može rezultirati prenosom patogenih mikroorganizama na ljude, što može dovesti do pojave hranom prenosivih bolesti. Naše istraživanje se sastojalo od uzorkovanja leda u ugostiteljskim objektima na području Kantona Sarajevo, te mikrobiološke analize uzoraka prema parametrima Smjernica za mikrobiološke kriterije za hranu. U svim ugostiteljskim objektima uzeti su brisevi ledomata i lopatice za led, izmjerena je trenutna temperatura zamrzivača za skladištenje leda, te je provedeno popunjavanje anketnog upitnika. Cilj istraživanja bio je utvrditi mikrobiološku ispravnost uzoraka leda i briseva površina u skladu sa parametrima navedenih Smjernica. Rezultati su pokazali da više od polovine (51%) uzroka leda ne odgovara parametrima Smjernica za mikrobiološke kriterije za hranu. Kod čak 39% analiziranih uzoraka je izolovana *Escherichia coli*, dok je *Pseudomonas aeruginosa* izolovan u četvrtini (26%) ispitanih uzoraka leda. U petini (20%) ugostiteljskih objekata na uzorkovanim brisevima površina su izolovane *Enterobacteriaceae*, kod njih 12% *Staphylococcus aureus*, dok ih je skoro četvrtina (24%) sadržavala aerobne bakterije u vrijednostima iznad preporučenih. Ovim istraživanjem je ustanovljeno da postoji rizik od pojave bolesti uzrokovanih konzumacijom leda neodgovarajuće mikrobiološke ispravnosti, te da je potrebno usmjeriti inspekcijske nadzore u ovu oblast, kako bi se u ugostiteljskim objektima obezbjedilo provođenje dobrih higijenskih praksi.

Ključne riječi: *led, ugostiteljski objekti, mikrobiološka ispravnost, hranom prenosive bolesti*

2-O-8

Microbiological correctness of ice in catering facilites in Sarajevo Canton

Amina MUMINOVIĆ[1*], Amina ELEZOVIĆ[1], Emina FILAN[1], Lamija DŽEVLAN[1], Daniel MAESTRO[1]

Univerity of Sarajevo - Faculty of Health Studies, BiH

[*]Author for correspondence: Amina Muminović, muminovicamina23@gmail.com

Summary

The World Health Organization states that ice intended for consumption or in direct contact with food should be the same quality and as safe for humans as drinking water. Due to its wide use in catering, ice has great public health significance and it is necessary to ensure its microbiological correctness. Eating foods that have been in contact with contaminated ice can result in the transmission of pathogenic microorganisms to humans, which can lead to foodborne illnesses. Our research consisted of ice sampling in catering facilities in the Sarajevo Canton area, and microbiological analysis of the samples according to the parameters of the Guidelines for Microbiological Criteria for Food. In all catering establishments, swabs of ice machines and ice scoops were taken, the current temperature of the ice storage freezer was measured, and a survey questionnaire was filled out. The purpose of the study is to determine the microbiological correctness of ice samples and surface swabs in accordance with the parameters of the Guidelines. The results showed that more than half (51%) of the causes of ice do not correspond to the parameters of the Microbiological Guidelines for Food. *Escherichia coli* was isolated in as many as 39% of the analyzed samples, while *Pseudomonas aeruginosa* was isolated in a quarter (26%) of the tested ice samples. *Enterobacteriaceae* were isolated from sampled surface swabs in a fifth (20%) of catering establishments, *Staphylococcus aureus* in 12% of them, while almost a quarter (24%) contained aerobic bacteria in values above the recommended values. This research determined that there is a risk of diseases caused by the consumption of ice of inadequate microbiological correctness, and that it is necessary to direct inspection supervision in this area, in order to ensure the implementation of good hygiene practices in catering facilities.

Keywords: *ice, catering facilities, microbiological correctness, food-borne diseases*

2-O-9

Rizici povezani sa korištenjem lijekova u trudnoći i dojenju

Ajla RIZVIĆ, Nermina ŠEČIĆ, Ajla ŠEHOVIĆ, Hena TAHMAZ*

Univerzitet u Sarajevu-Farmaceutski fakultet, Katedra za toksikologiju, BiH

*Autor za korespodenciju: Hena TAHMAZ, henatahmaz@ffsa.unsa.ba

Sažetak

Uprkos sve većoj dostupnosti informacija o teratogenim rizicima, upotreba lijekova tokom trudnoće još uvijek izaziva nesigurnost i zabrinutost kod trudnica i zdravstvenih radnika. Propisivanje i korištenje lijekova tokom trudnoće i dojenja u stalnom je porastu. Budući da lijekovi mogu djelovati štetno na plod u bilo kojem razdoblju trudnoće, pri izboru lijeka liječnik se treba odlučiti za lijekove koji su često propisivani u trudnoći i za koje se pokazalo da su sigurni. Važno je znati da se malformacije javljaju u 3% trudnoća bez obzira da li je trudnica uzimala lijekove tokom trudnoće ili ne. Teratogeni su tvari koje uzrokuju urođene poremećaje u embriju ili fetusu u razvoju, a mogu povećati rizik od pobačaja, prijevremenog porođaja ili rađanja mrtvog djeteta. Neki od najpoznatijih teratogena su antiepileptični lijekovi, antibiotici, antikoagulansi, vitamin A, hormonalni lijekovi. Uprkos činjenici da se mnogi lijekovi, za koje se smatra da bi mogli imati štetne učinke, izlučuju u majčinom mlijeku u preniskim kocentracijama, mnoge žene koje koriste lijekove ne doje upavo zbog krive pretpostavke o odnosu koristi i rizika. Lijekovi koji se u majčinom mlijeku izlučuju u količini manjoj od 10% ukupne majčine doze smatraju se sigutnim za dojenje. Međutim, postoje i iznimke kao što su citostatici, koji se bez obzira na procenat izlučivanja u majčino mlijeko ne smiju koristiti za vrijeme dojenja.

Ključne riječi*: trudnoća, dojenje, teratogeni*

2-O-9

Risks associated with the use of drugs during pregnancy and breastfeeding

Ajla RIZVIĆ, Nermina ŠEČIĆ, Ajla ŠEHOVIĆ, Hena TAHMAZ*

University of Sarajevo, Faculty of Pharmacy, Department of Toxicology, BiH

*Corresponding author: Hena TAHMAZ, henatahmaz@ffsa.unsa.ba

Summary

Despite the increasing availability of information on teratogenic risks, the use of drugs during pregnancy still causes uncertainty and concern among pregnant women and health workers. The prescription and use of drugs during pregnancy and breastfeeding is constantly increasing. Since drugs can have a harmful effect on the fetus at any period of pregnancy, when choosing a drug, the doctor should choose drugs that are often prescribed during pregnancy and have been proven to be safe. It is important to know that malformations occur in 3% of pregnancies, regardless of whether the pregnant woman took medication during pregnancy or not. Teratogens are substances that cause congenital disorders in the developing embryo or fetus, and can increase the risk of miscarriage, premature birth or stillbirth. Some of the most well-known teratogens are antiepileptic drugs, antibiotics, anticoagulants, vitamin A, hormonal drugs. Despite the fact that many drugs, which are considered to have harmful effects, are excreted in breast milk in very low concentrations, many women who use drugs do not breastfeed because of a false assumption about the ratio between benefits and risks. Drugs that are excreted in breast milk in an amount less than 10% of the total maternal dose are considered safe for breastfeeding. However, there are exceptions such as cytostatics, which, regardless of the percentage of excretion in breast milk, should not be used during breastfeeding.

Keywords: *pregnancy, breastfeeding, teratogens*

2-O-10

Znanja, stavovi i prakse studenata UNSA o skladištenju i odlaganju neiskorištenih lijekova

Džejna ĆULOV, Adna MULAIMOVIĆ, Arnela OBRALIJA, Lea TOMIĆ, Lejda UZUNOVIĆ*

Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za toksikologiju, BiH,

*Autor za korespondenciju: Lejda Uzunović, lejdauzunovic@ffsa.unsa.ba

Sažetak

Farmaceutski otpad odnosi se na sve neiskorištene lijekove ili lijekove kojima je istekao rok trajanja, kao i materijale korištene za pakiranje i izdavanje tih lijekova. Ispravno zbrinjavanje farmaceutskog otpada ključno je za zaštitu okoliša i javnog zdravlja, kao i za sprječavanje mogućnosti zloupotrebe i preusmjeravanja tih tvari, a može se postići metodama kao što su povratna distribucija i program povrata iz apoteka. Nepravilno zbrinjavanje farmaceutskog otpada može dovesti do kontaminacije rijeka i tla, kao i moguće zloupotrebe lijekova. Procjenjuje se da se oko 25% svih lijekova ne koristi prema namjeni, što dovodi do stvaranja velikih količina otpada. U ovom radu ćemo spomenuti opasnosti nepropisnog odlaganja farmaceutskog otpada, kao i važnost pravilnog zbrinjavanja i dati kritički osvrt na znanja, stavove i prakse studenata UNSA o istim jer je neophodno imati uvid u razvijenost njihove svijesti o opasnostima koje predstavlja nepravilno odlaganje neiskorištenih lijekova. U ovu svrhu provedena je anketa među 200 studenata Univerziteta u Sarajevu kojom su ispitani znanja, stavovi i prakse koje studenti imaju i provode u cilju pravilnog odlaganja farmaceutskog otpada.

Ključne riječi: *farmaceutski otpad, neiskorišteni lijekovi, zloupotreba, zaštita okoliša, kontaminacija, rok trajanja*

2-O-10

Knowledge, attitudes, and practices of UNSA students on storage and disposal of unused medicines

Džejna ĆULOV, Adna MULAIMOVIĆ, Arnela OBRALIJA, Lea TOMIĆ, Lejda UZUNOVIĆ*

Faculty of Pharmacy Sarajevo, University of Sarajevo, Department of Toxicology, BiH

*Corresponding author: Lejda Uzunović, lejdauzunovic@ffsa.unsa.ba

Summary

Pharmaceutical waste refers to all unused or expired medicines, as well as materials used to package and dispense these medicines. Proper disposal of pharmaceutical waste is critical to protecting the environment and public health, as well as preventing the potential for misuse and diversion of these substances. It can be achieved through methods such as redistribution and pharmacy take-back programs. Improper disposal of pharmaceutical waste can lead to contamination of rivers and soil, as well as possible drug abuse. It is estimated that about 25% of all medicines are not used as intended, which leads to the creation of large amounts of waste. In this paper, we will mention the dangers of improper disposal of pharmaceutical waste, as well as the importance of proper disposal, and give a brief overview of the knowledge, attitudes, and practices of UNSA students regarding the aforementioned, because it is necessary to have an insight into the development of their awareness of the dangers posed by improper disposal of unused medicines. A survey was conducted among 200 students of the University of Sarajevo on the question of knowledge, attitudes and practices that students have and implement in order to properly dispose of pharmaceutical waste.

Keywords*: pharmaceutical waste, unused drugs, drug abuse, environmental protection, contamination, expiration date*

2-O-11

Toksičnost hemikalija i bezbedna primena različitih proizvoda: Gde opšta populacija traži ključne informacije?

Jovana ŽIVANOVIĆ[1,2*], Katarina BARALIĆ[1,2], Danijela ĐUKIĆ-ĆOSIĆ[1,2]

[1] Univerzitet u Beogradu – Farmaceutski fakultet, Katedra za toksikologiju ,,Akademik Danilo Soldatović", Republika Srbija

[2] Udruženje toksikologa Srbije, Republika Srbija

[*]Autor za korespondenciju: Jovana Živanović, jzivanovic@pharmacy.bg.ac.rs

Sažetak

Svakodnevna izloženost sve većem broju hemikalija putem različitih proizvoda uz često nepouzdane informacije o njihovoj toksičnosti putem medija i društvenih mreža, izaziva sve veću zabrinutost opšte populacije. Kako bi se ispitalo razumevanje informacija o toksičnosti, sprovedeno je anketno ispitivanje opšte populacije Republike Srbije. Cilj ovog rada bio je analizirati odgovore na pitanje gde se traži savet o bezbednoj upotrebi proizvoda koji sadrži toksičnu supstancu, uz ponuđene odgovore od farmaceuta, lekara, na internetu i mogućnost dopisivanja drugog načina informisanja. Anketni upitnik je popunilo 745 punoletnih ispitanika, pretežno visokog obrazovanja (75%, n=559), uglavnom osobe ženskog pola (78,7%, n=586). Na osnovu analize odgovora, uočeno je da najveći broj ispitanika savete o bezbednoj primeni hemikalija traži od farmaceuta (45,8%, n=341) i na internetu (36,9%, n=275), dok se manji broj njih informiše kod lekara (9,5%, n=71). Neki ispitanici su se izjasnili da savete potražuju u relevantnim naučnim bazama i rezultatima istraživanja, pri čemu se, verovatno radi o studentima biomedicinskih nauka koji u okviru studija uče o pravilnom načinu pretrage literature dostupne na internetu. Nekoliko ispitanika se izjasnilo da proizvode koji sadrže toksične supstance neće uzimati, a svega jedan odgovor glasio je da će se informisati čitanjem etikete. Uzimajući u obzir da je veći broj anketnih upitnika popunjen od strane ispitanika medicinske struke, očekivano je da će savete o bezbednoj upotrebi hemikalija potražiti od zdravstvenih radnika. Međutim, kako bi se dobio bolji uvid u načine informisanja opšte populacije o bezbednoj primeni toksičnih hemikalija, potrebno je nadalje usmeriti se na ispitanike koji nisu medicinske struke. (MeeTox projekat: 2022-1-RS01-KA210-ADU-000083718)

Ključne reči*: toksičnost, informisanje, hemikalije, anketa*

2-O-11

Chemical toxicity and safe use of various products: Where does the general population look for key information?

Jovana ŽIVANOVIĆ[1,2*], Katarina BARALIĆ[1,2], Danijela ĐUKIĆ-ĆOSIĆ[1,2]

[1] University of Belgrade – Faculty of Pharmacy, Department of Toxicology ”Akademik Danilo Soldatović“, Republic of Serbia

[2] Serbian Society of Toxicology, Republic of Serbia

[*]Corresponding author: Jovana Živanović, jzivanovic@pharmacy.bg.ac.rs

Summary

The general population is becoming increasingly concerned about daily exposure to an expanding number of chemicals through various products, as well as unreliable information regarding their toxicity spread through the media and social networks. A survey of the Republic of Serbia's general population was conducted to analyze the understanding of toxicity. This study aimed to compare the responses regarding the advice on the safe use of products containing toxic substances sought from pharmacists, doctors, the Internet, and other potential sources. The questionnaire was completed by 745 adults, mostly highly educated (75%, n=559) and female (78.7%, n=586). The largest number of respondents sought advice on the safe use of chemicals from pharmacists (45.8%, n=341) and on the Internet (36.9%, n=275), while a smaller number sought information from doctors (9.5%, n=71). Some respondents, likely biomedical science students familiar with effective literature search techniques, sought guidance from relevant scientific databases and literature available online. Several respondents indicated they would not use products containing toxic substances, while only one relied on reading the label for information. Considering the predominance of survey responses from the medical field, it was expected that they would turn to health professionals for advice on the safe use of chemicals. However, in order to acquire a better understanding of how to advise the general community about the safe use of toxic substances, a greater focus on non-medical responses is required. (MeeTox project: 2022-1-RS01-KA210-ADU-000083718)

Keywords: *toxicity, information, chemicals, survey*

2-O-12

Mehanizmi djelovanja dezinficijensa na mikroorganizme

Arman HODŽIĆ[1*], Maid JUNUZOVIĆ[1]

[1]Veterinarski fakultet, Univerzitet u Sarajevu, Zmaja od Bosne 90, 71000 Sarajevo

*Autor za korespondenciju: arman.hodzic@student.vfs.unsa.ba

Sažetak

Mikrobiološka kontaminacija predstavlja najveći izazov u prehrambenoj industriji, te zahtjeva razvoj efikasnih sredstava za dezinfekciju kao i planova njihove primjene. Cilj tih mjera jeste očuvanje sigurnosti i kvalitete hrane, a samim tim i zdravlja i povjerenja potrošača. U ovom radu će biti obrađeni procesi proizvodnje i primjene najčešće korištenih dezinfekcionih sredstava u prehrambenoj industriji kao i njihovi mehanizmi djelovanja protiv najučestalijih bakterijskih, gljivičnih i virusnih kontaminanata duž cijelokupnog lanca proizvodnje. Biti će analizirana važnost dezinfekcionih sredstava u održavanju sigurnosnih standarda koji su ključni za izgradnju povjerenja kod kupaca kao i njhova efikasnost I primjenjivost u različitim fazama proizvodnje. Na koncu, biti će obrađene nove metode dezinfekcije kao i njihova uloga u borbi protiv budućih izazova u osiguravanju sigurnosti hrane na globalnom tržištu.

Ključne riječi: *dezinficijensi, mikrobiološka kontaminacija, sigurnost hrane*

2-O-12

Mechanisms of action of disinfectants against microorganisms

Arman HODŽIĆ[1*], Maid JUNUZOVIĆ[1]

[1]Veterinary faculty, University of Sarajevo, Zmaja od Bosne 90, 71000 Sarajevo

* Corresponding author: arman.hodzic@student.vfs.unsa.ba

Summary

Microbiological contamination represents the greatest challenge of the food industry, requiring the development of effective disinfection agents and plans for their implementation to preserve food safety and quality. The goal of these measures is protect the health and trust of consumers. This article will address the processes of production and application of the most commonly used disinfection agents in the food industry, as well as their mechanisms of action against the most prevalent bacterial, fungal, and viral contaminants throughout the entire production chain. The importance of disinfection agents in maintaining safety standards, which are crucial for building consumer trust, has been analysed, along with their effectiveness and applicability in different production stages. Finally, new methods of disinfection and their role in combating future challenges of maintaining food safety in the global market will been discussed.

Keywords: *disinfectants, microbiological contamination, food safety*

2-P-1

Praćenje i procjena kvaliteta vazduha u Zeničko-dobojskom kantonu

Sumeja HADŽALIĆ*, Alema HUSILOVIĆ, Emina GANIJA

Univerzitet u Sarajevu, Farmaceutski fakultet Sarajevo, Katedra za toksikologiju, BiH

*Autor za korespondenciju: Sumeja Hadžalić, sumejahadzalic@ffsa.unsa.ba

Sažetak

U Zeničko-dobojskom kantonu (ZDK), prisustvo potencijalnih zagađivača vazduha, uključujući saobraćaj, kućna ložišta i brojne industrije, često rezultira nezdravim kvalitetom vazduha, što ima ozbiljne posljedice na zdravlje ljudi. U tom smislu, cilj ovog rada bio je da se istraži kvalitet vazduha u Zeničko-dobojskom kantonu te prikaže procenat zagađujućih materija u vazduhu za mjesec decembar 2022. godine. U svrhu procjene kvaliteta vazduha za posmatrani desetodnevni period (od 17.12.2022. do 26.12.2022.) praćene su vrijednosti azotnih oksida, sumpor dioksida, ugljen monoksida, ozona te PM10 i PM2.5 lebdećih čestica, na osnovu kojih je izračunat indeks kvalitete vazduha i izvršena procjena. Rezultati ukazuju da je vazduh sve dane bio nezdrav za sve skupine stanovništva. U posmatranom periodu kvalitet vazduha bio je najlošiji u Maglaju, gdje su vrijednosti AQI bile uvijek više od 190, na gornoj granici klasifikacije vazduha kao vrlo nezdravog.

Ključne riječi: *Zeničko-dobojski kanton, decembar, kvalitet vazduha, zagađujuće materije, AQI, referentne vrijednosti*

2-P-1

Monitoring and assessment of air quality in Zenica-Doboj Canton

Sumeja HADŽALIĆ*, Alema HUSILOVIĆ, Emina GANIJA

University of Sarajevo, Faculty of Pharmacy Sarajevo, Department of Toxicology, Bosnia and Herzegovina,

*Corresponding author: Sumeja Hadžalić, sumejahadzalic@ffsa.unsa.ba

Summary

In the Zenica-Doboj Canton (ZDK), the presence of potential air pollutants, including traffic, household heating, and numerous industries, often results in unhealthy air quality, which has serious consequences for human health. In this regard, the aim of this study was to investigate air quality in the Zenica-Doboj Canton and to present the percentage of air pollutants for the month of December 2022. To assess air quality for the observed ten-day period (from December 17, 2022, to December 26, 2022), values of nitrogen oxides, sulfur dioxide, carbon monoxide, ozone, as well as PM10 and PM2.5 particulate matter were monitored, based on which the air quality index was calculated and an assessment was conducted. The results indicate that the air was unhealthy for all population groups throughout the observed period. During this period, air quality was worst in Maglaj, where the AQI values were consistently above 190, at the upper limit of the classification of very unhealthy air.

Keywords: *Zenica-Doboj Canton, December, air quality, air pollutants, AQI, reference values*

3. ISHRANA TOKOM ŽIVOTNOG CIKLUSA
NUTRITION THROUGH THE LIFECYCLE

3-O-1

Blagotvorni efekti konzumacije sjemena bundeve

Kenan ABDAGIĆ

Univerzitet u Sarajevu-Farmaceutski fakultet

Sažetak

Sjeme bundeve je često zastupljeno u ishrani čovjeka, stoga je bitno ukazati na moguće pozitivne efekte njegove konzumacije. Zbog visokog sadržaja omega 3 masnih kiselinama, ali i oleinske kiselinom, snižava vrijednost LDL holesterola, pa se smatra da konzumacija sjemena bundeve može prevenirati infarkt miokarda i začepljenje krvnih sudova. Esencijalni minerali, željezo, cink i magnezij, neophodni za funkcionisanje organizma i biohemijske procese, prisutni su u ovim sjemenkama. Zbog visokog sadržaja cinka, preporučuje se muškarcima zrele dobi da unose sjeme bundeve, jer se time može spriječiti hiperlazija prostate. Cink ulazi u sastav kostiju, te unos sjemena bundeve, može biti značajan kod osoba s osteoporozom. Sjeme bundeve je bogato glutamatom, aminokiselinom, važnom u procesu sinteze gama aminobuterne kiseline, te bitno utiče na raspoloženje. Prisustvo triptofana, može poboljšati san, i okrijepiti organizam. Nizak nivo šećera, čini ih pogodnim u prehrani dijabetičara, a njihova konzumacija može i pospiješiti gubitak kilograma. Vitamin E i omega 3 masne kiseline, daju koži sjaj i elasticitet. Prisustvo antioksidanasa, značajno je u prevenciji i liječenju kancera. Sjeme bundeve je odličan izvor esencijalnih nutrijenata, lako je dostupno, te pozitivno djeluje na glavne organske sisteme.

Ključne riječi*: sjeme bundeve, minerali, omega 3 masne kiseline*

3-O-1

Beneficial effects of pumpkin seed consumption

Kenan ABDAGIĆ

University of Sarajevo-Faculty of Pharmacy

Summary

Pumpkin seeds are often represented in the human diet, therefore it is important to point out the possible beneficial effects of consumption. Since, the seeds are rich in omega 3 fatty acids, and also in oleic acid, they help reduction of LDL cholesterol, so it is believed that consumption of pumpkin seed can prevent heart attacks and blockage of blood vessels. Essential minerals, Iron, zinc, and magnesium, necessary for the functioning of the organism and biochemical processes , are present in the seed. Because it has high level of zinc, it is recommended for men of mature age to consume pumpkin seeds, as this can prevent prostate hyperplasia. Zinc enters the composition of bones, so the intake of pumpkin seeds can be significant for people with osteoporosis. Pumpkin seeds are rich in glutamate, an amino acid important in the synthesis of gamma-aminobutyric acid, which significantly affects mood. The presence of tryptophan can improve sleep and invigorate the body. The low level of sugar makes them suitable for the diet of diabetics, and also their intake can accelerate weight loss. Vitamin E and omega 3 fatty acids give the skin shine and elasticity. The presence of antioxidants is important in the prevention and treatment of cancer. Pumpkin seeds are an excellent source of essential nutrients, easily available, and have a positive effect on the main organ systems.

Keywords*: pumpkin seeds, minerals, omega 3 fatty acids*

3-O-2

Hrana i emocije

Suana DŽANANOVIĆ[1*], Esma BEZDROB[1], Hanan VELIĆ[1]

Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, Odsjek: Prehrambene tehnologije, Smijer: Nutricionizam

[*]Autor za korespondenciju: Suana Džananović, suana.dzananovic@ppf.unsa.ba

Sažetak

Humani probavni sistem i um su u neprestanoj komunikaciji i povezani su međusobno. Nemirni um može uzrokovati stres u tijelu, što može izazvati nelagodu ili neravnotežu u želucu. Slično tome, problemi u želucu i probavnom sistemu mogu uticati na mentalni sklad. Dakle, mozak, želudac i crijeva su usko povezani, a važno je uzeti u obzir ne samo fizičko stanje tijela kada se istražuju probavni problemi, već i ulogu stresa i emocionalnog stanja. Želučani živci igraju ključnu ulogu u kontroli probave, regulirajući pokrete želuca i lučenje želučane kiseline. Iako su ove funkcije želuca neophodne, mogu dovesti do negativnih posljedica. Želudac sadrži približno jednaki broj živčanih stanica kao i ljudska kičmena moždina, što ga čini snažno povezanim s mozgom i informacijama koje mozak šalje. Na želučani živčani sistem znatno utiču dvije grane autonomnog živčanog sistema: simpatički dio, koji smanjuje lučenje želučanih sokova i inhibira pokrete želuca, te parasimpatički dio, koji potiče cirkulaciju krvi i poboljšava lučenje želučanih sokova te pokrete želuca. Kada je organizam izložen stresu ili prolazi kroz traumatično iskustvo, simpatički živčani sistem često postaje preaktivan, što može rezultirati mučninom, osjećajem punog želuca, pritiskom u želucu, nadutošću i žgaravicom. Također, hrana poput masnoća i slatkiša često se naziva "tugofilnim" namirnicama, jer ih ljudi često konzumiraju tokom emocionalnih trenutaka tuge ili stresa. Hrana i emocije često su usko povezane, jer emocionalni trenuci i stanja mogu uticati na prehrambene navike svake osobe. Razumijevanje ove veze može pomoći u boljem upravljanju prehrambenim navikama i emocionalnim stanjima, te potaknuti zdrav odnos prema hrani i emocijama. Stoga je cilj ovog rada bio da se istraži na koji način emocionalna stanja utječu na prehrambene navike. U svrhu realizacije postavljenog cilja proveden je sveobuhvatan pregled dostupne literature kako bi se identificirale dosadašnje spoznaje i istraživanja koja se bave vezom između hrane i emocija.

Ključne riječi: *emocije, obrok, stres, želudac, nervni sistem, crijeva*

3-O-2

Food and Emotions

Suana DŽANANOVIĆ[1], Esma BEZDROB[1], Hanan VELIĆ[1]

University of Sarajevo, Faculty of Agriculture and Food Sciences, Department: Food Technology, Major: Nutrition

Corresponding author: Suana Džananović, suana.dzananovic@ppf.unsa.ba

Summary

Human digestive system and mind are in constant communication and interconnected. A restless mind can cause stress in the body, which may lead to discomfort or imbalance in the stomach. Similarly, issues in the stomach and digestive system can affect mental well-being. Therefore, the brain, stomach, and intestines are closely linked, and it is essential to consider not only the physical state of the body when investigating digestive problems but also the role of stress and emotional states. Gastric nerves play a crucial role in controlling digestion by regulating stomach movements and gastric acid secretion. While these stomach functions are essential, they can lead to negative consequences. The stomach contains roughly the same number of nerve cells as the human spinal cord, making it strongly connected to the brain and the information it transmits. The gastric nervous system is significantly influenced by two branches of the autonomic nervous system: the sympathetic division, which reduces gastric juice secretion and inhibits stomach movements, and the parasympathetic division, which stimulates blood circulation, enhances gastric juice secretion, and stomach movements. When exposed to stress or having gone through traumatic experiences, the sympathetic nervous system often becomes overactive, leading to symptoms such as nausea, a feeling of fullness, stomach pressure, bloating, and heartburn. Additionally, foods like fats and sweets are often referred to as "comfort foods" because people frequently consume them during emotional moments of sadness or stress. Food and emotions are closely intertwined, as emotional moments and states influence dietary habits of every individue. Understanding this connection can help in better managing eating habits and emotional states and promote a healthy relationship with food and emotions. So the am of this work was to explore how do emotional states affect dietary habits. In that sense, we conducted a comprehensive review of available literature to identify previous findings and studies concerning the connection between food and emotions.

Keywords: *emotions, meal, stress, stomach, nervous system, intestines*

3-O-3

Aspartam u ishrani

Lejla ČOLAK, Šejma DŽIHO*

Univerzitet u Sarajevu - Farmaceutski fakultet

*Autor za korespondenciju: Šejma Džiho, sejmadziho@ffsa.unsa.ba

Sažetak

Aspartam je umjetni zaslađivač, njegova upotreba je široko rasprostranjena. Može se pronaći u različitim proizvodima, uključujći dijetalne napitke, slatkiše, mliječne proizvode, žvakaće gume, paste za zube i lijekove kao što su pastile i vitamini. Činjenica da je oko 200 puta slađi od šećera, dok mu je kalorijska vrijednost gotovo jednaka nuli, svrstala ga je među najčešće korištene zaslađivače današnjice. Prema FDA, prihvatljivi dnevni unos aspartama za ljude je 40 mg/kg tjelesne težine u Evropi i 50 mg/kg tjelesne težine u Sjedinjenim Američkim Državama i za djecu i za odrasle. Posljednjih decenija mnogi naučnici su izrazili zabrinutost zbog mogućih štetnih efekata aspartama i drugih vještačkih zaslađivača na zdravlje. U decembru 2013., EFSA objavljuje potpunu procjenu rizika aspartama, zaključujući da su aspartam i njegovi produkti razgradnje sigurni za opću populaciju. Na sastanku održanom u junu 2023., međunarodna stručna radna grupa klasifikovala je aspartam kao grupu 2B, "moguće kancerogen za ljude". Ova kategorija se koristi kada postoje ograničeni, ali ne uvjerljivi, dokazi za rak kod ljudi ili uvjerljivi dokazi za rak kod eksperimentalnih životinja, ali ne oboje. Mnoge studije o aspartamu su dale kontradiktorne rezultate, pa je njegova sigurnost jos uvijek kontroverzna tema. Neka istraživanja pokazuju da upotreba aspartama u ishrani može imati negativan utjecaj na gojaznost. Druga istraživanja pokazuju da upotreba aspartame može povećati rizik za dobivanje dijabetes mellitusa tipa 2. Međutim, veza između aspartama i drugih oboljenja ostaje nejasna.

Ključne riječi: *aspartam, rak, ishrana, EFSA*

3-O-3

Aspartame in diet

Lejla ČOLAK, Šejma DŽIHO

University of Sarajevo – Faculty of Pharmacy

*Corresponding author: Šejma Džiho, sejmadziho@ffsa.unsa.ba

Summary

Aspartame is an artificial sweetener widely used in various products, including diet drinks, sweets, dairy products, chewing gums, toothpaste and medications such as cough drops and vitamins. The fact that it is about 200 times sweeter than sugar, while its calorific value is almost zero, has made it one of the most used sweeteners nowadays. According to the FDA, the Acceptable Daily Intake (ADI) of aspartame for humans is 40 mg/kg bodyweight in Europe and 50 mg/kg bodyweight in the United States for both adults and children. In the last decades many scientists have raised concerns about possible health effects of aspartame and other artificial sweeteners. In december 2013, EFSA publishes a full risk assessment of aspartame, concluding that aspartame and its breakdown products are safe for the general population. At a June 2023 meeting, an international expert working group classified aspartame as Group 2B, “possibly carcinogenic to humans.” This category is used when there is limited, but not convincing, evidence for cancer in humans or convincing evidence for cancer in experimental animals, but not both. Many studies about aspartame have had contradictory results, so its safety is still controversial. Some studies suggest that using aspartame in diet can have negative effects on obesity. Other studies suggest that using aspartame can increase the risk for getting type 2 diabetes mellitus. However, the link between aspartame and other diseases remains unclear.

Keywords: *aspartame, cancer, diet, EFSA*

3-O-4

Komparativna analiza jelovnika predškolskih ustanova i internata za djecu sa teškoćama u razvoju

Hena FAJIĆ[1*], Sara TRAPARA[1], Sanela Merjem RUSTEMPAŠIČ[3], Irma ČEHIĆ[1.2.3]

[1]Univerzitet u Sarajevu, Pedagoški fakultet, Odsjek za edukaciju i rehabilitaciju, BiH

[2]Univerzitet u Sarajevu, Pedagoški fakultet, Odsjek za predškolski odgoj, BiH

[3]Univerzitet u Sarajevu, Pedagoški fakultet, Odsjek za razrednu nastavu, BiH

* Autor za korespondenciju: Hena Fajić: fajichena@gmail.com

Sažetak

Ishrana ima značajnu ulogu u cjelokupnom razvoju svakog djeteta. Potrebno je da sadrži energiju, bjelančevine, vitamine i minerale, ali ona utiče i na razvoj čula okusa, dodira, mirisa, vida i razvoj motorike. Djeca koja ne unose dovoljno nutritivno vrijedne hrane sporije rastu, sklonija su infektivnim oboljenjima, a imaju i visok rizik od hroničnih oboljenja u odrasloj dobi. Za razvoj navika zdrave prehrane najznačajniju ulogu imaju obitelj i vrtići. U institucionalnom predškolskom odgoju i obrazovanju djeca imaju obavezna tri obroka u toku jednog dana: doručak, ručak i užinu. Jelovnik u J.U. „Djeca Sarajeva“, najvećoj predškolskoj ustanovi u Satajevu, se priprema u saradnji sa nutricionistima i javno je dostupan roditeljima na web stranici ustanove, kao i oglasnim pločama pojedinčanih vrtića. Također, prepremaju se različiti jelovnici po mjesecima za djecu jasličkog i vrtičkog uzrasta. Djeca koja su uključena u specijalni odgoj i obrazovanje, vrtić, školu, produženi boravak i školovanje internatskog tipa, također imaju obavezne obroke. Njihovoj ishrani je potreban poseban pristup kako bi se osiguralo da individualne nutritivne potrebe budu zadovoljene. To uključuje dijetalne restrikcije, alergije na hranu i druge medicinske uvjete koji utječu na njihovu prehranu. Nutricionisti i kuhari surađuju kako bi osigurali da svako dijete dobije hranu koja je sigurna i nutritivno bogata. Ovim istraživanjem nastojali smo ispitati sličnosti i razlike u jelovnicima u redovnim i specijalnim ustanovama u odnosu na uzrast, te specifične potrebe djece sa teškoćama.

Ključne riječi: *prehrana, vrtić, internat za djecu s teškoćama u razvoju, jelovnik*

3-O-4

Comparative analysis of menus of preschool institutions and boarding schools for children with developmental difficulties

Hena FEJIĆ[1], Sara TRAPARA[1], Sanela Merjem RUSTEMPAŠIČ[3], Irma ČEHIĆ[1.2.3]

[1]University of Sarajevo, Faculty of Educational Sciences, Department of Education and Rehabilitation, Bosnia and Herzegovina

[2]University of Sarajevo, Faculty of Educational Sciences, Department of Preschool Education, Bosnia and Herzegovina

[3]University of Sarajevo, Faculty of Educational Sciences, Department of Elementary Education, Bosnia and Herzegovina

* Corresponding author: Hena Fajić: fajichena@gmail.com

Summary

Nutrition plays a significant role in the overall developmet of every child. It needs to ptovide energy, proteins, vitamins and minerals, but it also influences the development of tast, touch, smell, vision and motor skills. Children who don't consume enough nutritionally valuable food grow more slowly, are more prone to infectious diseases, and have higher risk of chronic diseases in adulthood. Family and preschool educators have the most important role in developing healthy eating habits. In institutional preschool education, children have three mandatory meals during a day: breakfast, lunch and a snack. The menu in „Children of Sarajevo“, the largest preschool institution in Sarajevo, is prepared in collaboration with nutritionists and is publicly available to parents on the institution's website as well as on notice boards of individual kindergartens. Additionally, different menus are prepared for infants and preschool-age children on monthly basis. Children involved in special education, kindergarten, school, day care and boarding school, also have mandatory meals. Their nutrition requires a special approach to ensure that their individual nutritional needs are met. This includes dietary restrictions, food allergies and other medical conditions that affect their diet. Nutritionists and cooks collaborate to ensure that each child receives safe and nutritionally rich food. With this research we aimed to examine the similarities and differences in menus in regular and special institutions based on age and the specific needs of children with difficulties.

Keywords: *nutrition, kindergarten, boarding school for children with developmental difficulties, menu*

3-O-5

Depresija i hrana

Belma KIČIN[1] *, Melisa HODŽIĆ[1]*, Adna HUSOVIĆ[1], Amir ČAUŠEVIĆ[1]

[1]Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Odsjek za zdravstveni nutricionizam i dijetetiku Sarajevo, BiH

[*]Autori za korespondenciju: Belma Kičin, belmakicin@fzs.unsa.ba i Melisa Hodžić melisahodzic@fzs.unsa.ba

Sažetak

Depresija spada u poremećaje afekta ili raspoloženja, kod kojih je primarni simptom promjena raspoloženja a sekundarni, poremećaji nagona i kognicije. Cilj našeg rada je definisati važnosti depresije koja je usko povezana sa obrascem prehrane, kvaliltetom sna, fizičkom aktivnošću i načinom življenja. Rad je urađen pregledom dostupne naučne literature publicirane u relevantnim bazama podataka kao što su: e-knjige, znanstveni i stručni časopisi, te istraživački radovi, upotrebom ključnih riječi *"depression", "diet", physical activity","obesity"* i *"health"*. Simptomi poremećaja raspoloženja dijele se na: emocionalne, motivacijske, ponašajne, tjelesne i kognitivne. Obilježja depresije su konstantni osjećaj tuge, gubitak koncentracije, osjećaj umora te poremećaj sna ili apetita. Traumatični događaji kao što su smrt ili gubitak voljene osobe, finansijski problemi, međuljudske poteškoće i sukobi su primjeri stresora koji mogu izazvati depresiju. Izbor hrane, količina i učestalost obroka su pod utjecajem emocija koje depresija izaziva, a koje nisu nužno povezane sa fiziološkim potrebama depresivne osobe. Razlikuju se tri obrasca prehrane: kognitivno suzdržavanje kao svjesno ograničenje unosa hrane s ciljem kontrole tjelesne mase ili gubitka iste, nekontrolisano jedenje izazvano subjektivnim osjećajem gladi te emocionalno jedenje koje predstavlja nemogućnost odupiranja emocionalnim znacima. Depresija može da se pojavi kao posljedica nepravilnog načina života koji prati gojaznost uzrokovanu smanjenom tjelesnom aktivnošću, nepravilnom ishranom i upotrebom antidepresiva koji uveliko doprinose dobijanju na tjelesnoj masi. Pojedine namirnice ispoljavaju različite efekte te mogu pozitivno ili negativno utjecati na depresiju. Namirnice koje negativno utječu na depresiju su šećeri i njihovi proizvodi, kofein, prerađene namirnice, te brojni konzervisani i fermentirani proizvodi. Na stanje depresivne osobe pozitivan efekat imaju namirnice bogate složenim ugljikohidratima, te sirove namirnice koje su bogate vitaminima.

Ključne riječi: *depresija, ishrana, gojaznost, zdravlje, fizička aktivnost*

3-O-5

Depression and food

Belma KIČIN[1]*, Melisa HODŽIĆ[1]*, Adna HUSOVIĆ[1] , Amir ČAUŠEVIĆ[1]

[1]University of Sarajevo, Faculty of Health sciences, Department for Health nutrition and dietetics Sarajevo, BiH

* Correponding authors: Belma Kičin, belmakicin@fzs.unsa.ba and Melisa Hodžić melisahodzic@fzs.unsa.ba

Summary

Depression is a disorder of affect or mood, in which the primary symptom is mood swings and secondary, disorders of instinct and cognition. The goal of our work is to define the importance of depression which is closely related to diet pattern, sleep quality, physical activity, and way of life. The paper was reviewed by available scientific literature published in relevant databases such as e-books, scientific and professional journals, and research papers, using the keywords “depression”, “diet”, physical activity”, “obesity” and “health”. Symptoms of mood disorders are divided into emotional, motivational, behavioral, physical, and cognitive. Characteristics of depression are a constant feeling of sadness, loss of concentration, feeling tired, and a disorder of sleep or appetite. Traumatic events such as the death or loss of a loved one, financial problems, interpersonal difficulties, and conflicts are examples of stressors that can cause depression. The choice of food, quantity, and frequency of meals are influenced by the emotions that depression causes, which are not necessarily related to the physiological needs of a depressed person. We distinguish three patterns of diet: cognitive restraint as a conscious restriction of food intake with the aim of controlling the body’s mass or losing it, uncontrollable eating caused by a subjective sense of hunger, and emotional eating which is an inability to resist emotional signs. Depression can occur as a result of an irregular lifestyle that accompanies obesity caused by reduced physical activity, improper nutrition, and the use of antidepressants that greatly contribute to gaining weight. Some foods have different effects and can have a positive or negative effect on depression. Foods that negatively affect depression are sugars and their products, caffeine, processed foods, and a number of canned and fermented products. The condition of a depressed person has a positive effect on foods rich in complex carbohydrates, and raw foods that are rich in vitamins.

Keywords: *depression, nutrition, obesity, health, physical activity.*

3-O-6

Uticaj ishrane na poremećaj hiperaktivnosti i deficita pažnje

Hana KUSTURA*, Lamija KULOVIĆ, Mia KOTAREVIĆ, Sabina ŠEČIĆ

Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Sarajevo, Bosna i Hercegovina

*Autor za korespondenciju: Hana Kustura , hana.kustura@fzs.unsa.ba

Sažetak

Poremećaj hiperaktivnosti i deficita pažnje (eng. *Attention Deficit Hyperactivity Disorder* - ADHD) jedan je od najčešćih neurorazvojnih poremećaja u adolescentskom i dječijem dobu. Smatra se poremećajem multifaktorijalne prirode kojem doprinose brojni (epi)genetski faktori, te okolinski faktori. Prehrana je jedan od okolinskih faktora rizika koji ima ključnu ulogu u razvoju ADHD-a. Stoga, posljednjih godina se velika pažnja posvećuje specifičnim dijetetskim intervencijama kod ovog stanja, posebno nakon bezuspješne medikamentozne terapije. Cilj rada je pregledom dostupne literature prikazati uticaj prehrane na razvoj ADHD-a, te dijetetske intervencije značajne za njegovo regulisanje. Dostupna literatura za potrebe neeksperimentalnog kvalitativnog tipa istraživanja pregledana je u širokom opsegu elektroničkim putem kroz dostupne relevantne baze podataka kao što su PubMed (Medline), Scopus i Web of Science. Pretraživanje je izvršeno pomoću ključnih riječi koje su vezane za temu i ciljeve ovog rada na engleskom jeziku: *„ADHD", „nutrition", "children"*. Rezultati sugerišu da zapadnjački način prehrane predstavlja primarnu problematiku za progresiju oboljenja. Rafinisani šećeri, umjetne boje za hranu, konzervansi, te zasićene masne kiseline doprinose povećanom riziku za razvoj ADHD-a. Nasuprot tome, pravilna prehrana značajno je smanjila izglede za progresiju oboljenja do 37%. Eliminacijske/oligoantigene dijete i adekvatan unos vitamina D, omega-3 masnih kiselina, cinka i željeza značajnih za neurotransmisiju doprinose smanjenju simptoma ADHD-a. Istraživanje iz 2020. godine je na uzorku od 162 djece (5-12 god.) sa dijagnosticiranim ADHD-om pokazalo da je eliminacijska dijeta bila efikasna u smanjenju simptoma kod 30% djece. Veća pažnja posvećena obrazovanju roditelja, djece i školskog osoblja o pravilnoj prehrani, individualan pristup, te promovisanje zdravih stilova života ključni su koraci za tretman djece sa poremećajem hiperaktivnosti i deficita pažnje.

Ključne riječi: *ADHD, prehrana, djeca*

3-O-6

The influence of nutrition on hyperactivity and attention deficit disorder

Hana KUSTURA*, Lamija KULOVIĆ, Mia KOTAREVIĆ, Sabina ŠEČIĆ

University of Sarajevo, Faculty of Health Studies, Sarajevo, Bosnia and Herzegovina

*Author for correspondence: Hana Kustura, hana.kustura@fzs.unsa.ba

Summary

Attention deficit hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders in adolescents and children. It is considered to be a disorder of multifactorial nature to which numerous (epi-)genetic and environmental factors contribute. Nutrition is one of the surrounding risk factors that plays a key role in the development of ADHD. Therefore, in recent years, much attention has been focused on specific dietary interventions in this disorder, especially after unsuccessful drug therapy. The aim of this article is to review the available literature to highlight the influence of diet on the development of ADHD and the dietary interventions that are important for the regulation of the disorder. The available literature on the need for nonexperimental qualitative research is available electronically in relevant databases such as PubMed (Medline), Scopus, and Web of Science. The search was performed using keywords related to the topic and objectives of this work in English: *"ADHD"*, *"nutrition"*, *"children"*. The results suggest that the Western diet is the main problem for the progression of the disease. Refined sugar, artificial food colors, preservatives, and saturated fat contribute to an increased risk of developing ADHD. In contrast, a proper diet reduces the likelihood of disease progression by up to 37%. Elimination/oligoantigen diets and adequate intake of vitamin D, omega-3 fatty acids, zinc, and iron, which are important for neurotransmission, help reduce ADHD symptoms. A 2020 study of a sample of 162 children (aged 5-12 years) diagnosed with ADHD showed that elimination diets led to a reduction in symptoms in 30% of children. More attention to educating parents, children, and school staff about proper nutrition, an individualized approach, and promoting healthy lifestyles are important steps in treating children with attention deficit hyperactivity disorder.

Keywords: *ADHD, nutrition, children*

3-O-7

Uticaj oralnih kontraceptiva na parodontalno zdravlje kod mlade populacije – komparativna studija

Dženita LAPANDIĆ*, Emina DERVIŠEVIĆ, Indira MUJIĆ JAHIĆ Arma MUHAREMOVIĆ, Sanja HADŽIĆ, Mirjana GOJKOV-VUKELIĆ

Univerzitet u Sarajevu, Stomatološki fakultet sa stomatološkim kliničkim centrom, Katedra za oralnu medicinu i parodontologiju, BiH

*Autor za korespodenciju: Dženita Lapandić. dzenita.lapandic@sf.unsa.com

Sažetak

Hormonska neravnoteža u organizmu kao etiološki faktor u nastanku mnogih bolesti oralne sluzokože odavno je poznata. Pored fizioloških stanja kao što su trudnoća, pubertet i menstruacija, istraživanja pokazuju da kontracepcijske pilule podižu nivoe estrogena i progesterona u organizmu, a povezani su sa upalom desni, parodontalnom bolešću, smanjenom mineralnom gustinom kostiju, suvom dupljom i TMD. Cilj rada je ispitati uticaj oralnih kontraceptiva na oralno zdravlje kod mlade ženske populacije. Metode i materijali: Istraživanje je provedeno među studenticama koje uzimaju oralne kontraceptive i studenticama koje ne uzimaju oralne kontraceptive, ali i dalje imaju upalu gingive, starosti 18-25 godina na Univerzitetu u Sarajevu, Bosna i Hercegovina. Studija se sastojala od intervjua i oralnog pregleda uključujući indeks oralne higijene, indeks gingive, indeks krvarenja papiloma i parodontalni indeks zajednice i TN. Rezultati istraživanja su naknadno statistički obrađeni i prodiskutovani. Zaključak rada izveden je iz rezultata, i odgovora zadatom cilju rada uz primijetne razlike u rezultatima između eksperimentalne i kontrolne grupe.

Ključne riječi: *parodontalno zdravlje, oralni kontraceptivi, hormonalni disbalans*

3-O-7

The influence of oral contraceptives on periodontal health in the young population - a comparative study

Dženita LAPANDIĆ*, Emina DERVIŠEVIĆ, Indira MUJIĆ JAHIĆ, Arma MUHAREMOVIĆ, Sanja HADŽIĆ, Mirjana GOJKOV-VUKELIĆ

University of Sarajevo, Faculty of Dentistry with dental clinical center, Department of oral medicine and periodontology, BiH

*Corresponding author: Dženita Lapandić, dzenita.lapandic@sf.unsa.com

Summary

Hormonal imbalance in the body as an etiological factor in the occurrence of many oral mucosa diseases has long been known. In addition to physiological conditions such as pregnancy, puberty, and menstruation, research shows that birth control pills raise estrogen and progesterone levels in the body and are associated with gum inflammation, periodontal disease, decreased bone mineral density, dry socket, and TMD. This comparative study aimed to investigate the potential association between oral contraceptive use and periodontal disease among young females. Methods and Materials: A Study was conducted among female students taking oral contraceptives and female students who are not taking oral contraceptives but still have gingival inflammation, aged 18-25 at the University of Sarajevo, Bosnia and Herzegovina. Study consisted of an interview and oral examination including Oral Hygiene Index, Gingival Index, Papillae bleeding Index, and Community Periodontal Index and TN. The research results were subsequently statistically processed and discussed. The conclusion is derived from the results and responds to the stated goal of the work with noticeable differences in the results between the experimental and control groups.

Keywords: periodontal health, oral contraceptives, hormonal imbalance

3-O-8

Zastupljenost i motivi za vegansku prehranu među studentima UNSA

Mirela LIČINA*[1], Lamija AHMETSPAHIĆ[1], Hana HODŽIĆ[1],
Hana POPARA[1], Amina SPORIŠEVIĆ[1]

[1]Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za bromatologiju i nutriciju, BiH

*Autor za korespodenciju: Mirela Ličina, e-mail: mirelalicina@ffsa.unsa.ba

Sažetak

Veganstvo predstavlja uravnotežen stil života, osjećaj istančanog okusa i smisla za život, a ne samo prehranu koja je bazirana na voću i povrću. Veganstvo nije tema o kojoj se tek počelo raspravljati, već ima i svoje korijene u dalekoj prošlosti. Bez obzira na razlike, zajedničko svim tipovima veganstva je upravo pozitivan utjecaj na ljudski organizam, kao što su prevencija kardiovaskularnih bolesti, smanjenje pojave nekih vrsta karcinoma, smanjenje holesterola u krvi, kao i smanjen rizik od razvoja Diabetes mellitus tip II. Prema nekim pokazateljima u BiH trećina potrošača ili konzumenata su vegani. Cilj ovog rada bio je istražiti zastupljenost i motive veganske prehrane među studentima/studenticama UNSA. U tu svrhu provedena je anketa, u kojoj je učestvovalo 82 ispitanika, od kojih je 71 (86,6 %) bilo ženskog spola, a 11 (13,4%) muškog. Anketa se sastojala od nekoliko setova pitanja, koji su se odnosili na razlikovanje osnovnih pojmova (veganstvo, vegetarijanstvo), poznavanje benefita veganskog načina prehrane, motivaciju, ponudu u okruženju, poznavanje udjela proteina u namirnicama biljnog porijekla. Rezultati istraživanja ukazuju da je mali broj vegana među anketiranom studentskom populacijom. Uzroke bi mogli pronaći u neadekvatnoj ponudi, lošoj ekonomskoj situaciji, te predrasudama okoline, koja u velikoj mjeri nije upoznata s benefitima ovakvog načina prehrane. No, osvrćući se na saznanja o stanju u regiji, primjetan je porast broja studenata u veganskoj populaciji, kao i aktivnosti koje se provode u cilju poboljšanja ponude za istu.

Ključne riječi: *veganstvo, pozitivan utjecaj na ljudski organizam, student, BiH*

3-O-8

Representation and motivations for a vegan diet among UNSA students

Mirela LIČINA*[1], Lamija AHMETSPAHIĆ[1], Hana HODŽIĆ[1],
Hana POPARA[1], Amina SPORIŠEVIĆ[1]

[1]University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and nutrition, BiH

*Corresponding author: Mirela Ličina, e-mail: mirelalicina@ffsa.unsa.ba

Summary

Veganism represents a balanced lifestyle, a sense of refined taste and meaning for life, and not just a diet based on fruits and vegetables. Veganism is not a topic that has just begun to be discussed, but also has its roots in the distant past. Regardless of the differences, all types of veganism have in common a positive impact on the human body, such as prevention of cardiovascular diseases, reduction of the occurrence of some types of cancer, reduction of cholesterol in the blood, as well as a reduced risk of developing diabetes mellitus type II. According to some indicators, a third of consumers in Bosnia and Herzegovina are vegans. The aim of this work was to investigate the representation and motive of vegan diet among UNSA students. For this purpose, a survey was conducted, in which 82 respondents participated, of which 71 (86.6%) were female, and 11 (13.4%) were male. The survey consisted of several sets of questions, which were related to distinguishing basic concepts (veganism, vegetarianism), knowledge of the benefits of a vegan diet, motivation, offer in the environment, knowledge of the proportion of protein in foods of plant origin. The results of the research indicate that there are few vegans among the surveyed student population. The causes could be found in an inadequate offer, a bad economic situation, and the prejudices of the environment, which is largely unaware of the benefits of this way of eating. No, looking back at the knowledge about the situation in the region, there is a noticeable increase in the number of students in the vegan population, as well as the activities that are carried out in order to improve the offer for the same.

Keywords: *veganism, positive influence on the human body, student, Bosnia and Herzegovina*

3-O-9

Povezanost između evolutivnih promjena orofacijalnog sistema i načina ishrane kroz vrijeme

Sara Mujić, Lejla Redžepagić-Vražalica

Univerzitet u Sarajevu, Stomatološki fakultet sa stomatološkim kliničkim centrom

Sažetak

Hrana koja se konzumira u periodu odrastanja ima veliki uticaj na razvoj kostiju, vilica i lica. Danas postoje tačni podaci koji pokazuju da moderna ishrana - kašasta, mekana, u kombinaciji sa drugim faktorima povezanim sa modernim načinom života, dovodi do abnormalnih promjena u razvoju lobanje i lica. Žvakanje tvrde, čvrste hrane je veoma važno jer aktivira koštane ćelije zubne alveole, te time omogućava razvoj fizioloških vilica sa adekvatnom funkcijom i prostorom za smještaj zuba. Način života današnjeg društva drastično se razlikuje od onog naših predaka. Prikupljanje hrane i lov su bili osnova prehrane, a tek prije otprilike 12,000 godina ljudi su počeli uzgajati biljke i životinje. Studije nam omogućavaju rekonstrukciju snabdijevanja hranom, načina života i prehrambenih navika: od najranijih primata, kroz lovce-sakupljače paleolita, zajednice koje se bave poljoprivredom do industrijske ere i sadašnjosti. Pregledom literature izdvajaju se rezultati u smislu uzroka evolutivnih i adaptivnih promjena lica koji se odnose na patološke promjene infantilnog gutanja, deficit mikronutrijenata zbog iscrpljenosti tla, razne metaboličke promjene u našoj ishrani i okolini, povišen nivo alergija i osjetljivosti na hranu, nedovoljnu upotrebu i stimulaciju vilica, disbiozu mikrobioma, te povećan nivo kongenitalnih defekata kod novorođenčadi. Evolucija, genetika, ishrana i medicina predstavljaju kolektivno rješenje za ovakav problem današnjice.

Ključne riječi: *ishrana, evolutivne promjene, orofacijalni sistem*

3-O-9

A Link Between the Orofacial System Evolutionary Changes and Nutrition Styles Through Time

Sara Mujić, Lejla Redžepagić-Vražalica

University of Sarajevo, Faculty of Dentistry with dental clinical center

Summary

The food that we are consuming when growing up has a great impact on bones, jaws and face development. Today, there is exact data that says that modern diet – soft foods combined with the other factors linked to modern lifestyle can lead to abnormal changes in skull and face development. Chewing on firm and solid foods is very important because it activates dental alveolus bone cells that enables physiological jaw development which will have adequate function and space for teeth placement. Human lifestyle of today is very different from the lifestyle of our ancestors. Collecting food and hunting were the main sources of diet, so people started to grow plants and animals to survive, but only 12,000 years ago. Lots of studies are giving us the reconstruction of food supplies, lifestyles and eating habits: from the primates, through paleo hunters-gatherers, agriculture communities to industrial era and present. Searching the literature, some results stand out – in terms of the causes of evolutionary and adaptive face changes that are related to pathological infantile swallowing, micronutrients deficit due to soil depletion, metabolic disruptors in our diet and environment**,** increased allergies and food sensitivities, Insufficient use and stimulation of the jaws, microbiome dysbiosis, increased level of congenital defects in newborns. Today, evolution, genetics, nutrition and medicine are representing the collective solution for this type of problem.

Keywords: *Nutrition, Evolutionary Changes, Orofacial System*

3-O-10

Uticaj pravilne ishrane i fizioterapijskih vježbi u trudnoći

Aida OMERAGIĆ[1], Šejla ŠILJEVIĆ[1], Samra SULJIĆ[1], Fahira IMAMOVIĆ[1], Adela EROVIĆ VRANEŠIĆ[1]

[1] Univerzitet u Sarajevu, Fakultet zdravstvenih studija, studijski program Babičarstvo/Primaljstvo, BiH

[*]Autor za korespondenciju: Aida OMERAGIĆ, e-mail:aida.omeragic@fzs.unsa.ba

Sažetak

Zdrava prehrana, ima pozitivan uticaj tokom fizioloških promjena u trudnoći u cilju omogućavanja rasta i razvoja ploda, zbog čega i raste potreba za hranjivim nutrijentima. Potreba fetusa za hranjivim nutrijentima javlja se najviše tokom prvog tromjesečja, kada dolazi do 90% rasta fetusa. Fizioterapijske vježbe nisu samo prevencija već i terapija u trudnoći. Fizioterapija je u početku bila usmjerena na edukaciju trudnica i probleme tokom trudnoće, a poslije se proširila i na područje ginekološke fizioterapije.Istraživanje ima za cilj definisati dejstvo pravilne ishrane, fizioterapijskih vježbi na zdravlje trudnice i razvoj fetusa. Rad je urađen kao pregledni članak, za čiju izradu su korišteni radovi iz relevantnih baza podataka (Google Scholar, PubMed, Medline) koji su pretraživani unosom ključnih riječi (*pravilna ishrana , zdravlje trudnice ,razvoj fetusa ,fizioterapeutske vježbe).* Većina istraživanja ukazuje na to da ishrana majke mora biti balansirana i bogata nutrijentima koji uključuju odgovarajuće količine proteina, ugljikohidrata i masnoća. Potreban je dovoljan unos vitamina, minerala, mikronutrijenata i oligoelemenata koji pozitivno djeluju na mentalni i fizički razvoj djeteta. Uticaj fizioterapijskih vježbi prema dosadašnjim istraživanjima odnosi se na održavanje kondicije, pripremu mišića koji će aktivno učestvovati tokom poroda. Osim toga vježbanjem u trudnoći postiže se pravilno držanje tijela, dolazi do poboljšavanja kardiovaskularne funkcije organizma, olakšava nadzor tjelesne težine, te se smanjuje rizik za nastanak hipertenzije, preeklamsije, edema, varikoziteta i prijevremenog poroda. Za zdravlje trudnice je od izuzetnog značaja pravovremena edukacija, balansirana ishrana i vježbe koje su prilagođene trudnoći što predstavlja temelj za prevenciju nastanka komplikacija.

Ključne riječi: *pravilna ishrana, zdravlje trudnice, razvoj fetusa, fizioterapeutske vježbe*

3-O-10

The influence of proper nutrition and physiotherapy exercises during pregnancy

Aida OMERAGIĆ[1], Šejla ŠILJEVIĆ[1], Samra SULJIĆ[1], Fahira IMAMOVIĆ[1], Adela EROVIĆ VRANEŠIĆ[1]

[1] Univerzitet u Sarajevu, Fakultet zdravstvenih studija, studijski program Babičarstvo/Primaljstvo, BiH

*Corresponding author: Aida OMERAGIĆ, e-mail:aida.omeragic@fzs.unsa.ba

Summary

A healthy diet is crucial during pregnancy to support the growth and development of the fetus. Adequate nutrient intake is particularly essential during the first trimester, as 90% of fetal growth occurs during this time. In addition to proper nutrition, physiotherapy exercises can also play a role in promoting maternal and fetal health during pregnancy. This review article examined studies from relevant databases, such as Google Scholar, PubMed, and Medline, using keywords such as proper nutrition, pregnant woman's health, fetal development, and physiotherapeutic exercises. The research indicates that a balanced and nutrient-rich diet that includes protein, carbohydrates, and healthy fats is crucial for maternal and fetal health. Adequate intake of vitamins, minerals, and micronutrients can positively impact the physical and mental development of the child. Physiotherapy exercises can also be beneficial during pregnancy. Studies suggest that such exercises can help maintain fitness, prepare muscles for labor and delivery, improve cardiovascular function, and aid in weight management. Additionally, physiotherapy may help reduce the risk of complications such as hypertension, preeclampsia, edema, varicose veins, and premature birth.Overall, education, a balanced diet, and adapted exercises are essential for maintaining maternal and fetal health during pregnancy, and may help prevent complications.

Keywords: *proper nutrition, health of pregnant women, fetal development, physiotherapeutic exercises*

3-O-11

Oralna higijena pacijenata u terapiji fiksnim ortodonstkim aparatom

Elma OPAČIN, Lejla REDŽEPAGIĆ-VRAŽALICA

Univerzitet u Sarajevu, Stomatološki fakultet sa stomatološkim kliničkim centrom, BiH

Sažetak

Terapija ortodontskim aparatom, posebno fiksnim, pogoduje nakupljanju hrane i naslaga na zubima te je održavanje oralne higijene otežano i zahtjevno. Pacijenti za vrijeme ortodontske terapije imaju značajno povećanje količine zubnog plaka kao posljedicu promjene prehrambenih navika i poteškoća u održavanju pravilne oralne higijene. Ovo istraživanje imalo je za cilj istaknuti važnost održavanja oralne higijene kod pacijenata u terapiji fiksnim ortodontskim aparatom kao i promjene koje se dešavaju u toku terapije. U svrhu ovog rada izvršeno je sistematsko pretraživanje literature u bazama podataka PubMed, ResearchGate i Google Scholar. Rezultati pokazuju da postava fiksnog ortodontskog aparata dovodi do promjena nivoa bakterija i promjene stanja gingive. Većina istraživanja na ovu temu pokazala je da mnogi pacijenti pokazuju svjesnost o oralnoj higijeni u toku tretmana, ali da je pravilno ne izvršavaju. Potreban je konstantni monitoring, reedukacija i remotivacija na kontrolnim pregledima za pravilno izvršavanje tehnike održavanja oralne higijene. Profesionalno uklanjanje mekih naslaga od strane terapeuta također vodi ka kontroli plaka i poboljšanju zdravlja gingive i zuba pacijenta.

Ključne riječi: *oralna higijena, fiksni ortodontski aparat*

3-O-11

Oral hygiene of patients in fixed orthodontic appliance therapy

Elma OPAČIN, Lejla REDŽEPAGIĆ-VRAŽALICA

University of Sarajevo, Faculty of Dentistry with Dental Clinical Center, Bosnia and Herzegovina

Summary

Therapy with an orthodontic appliance, especially a fixed one, favors the accumulation of food and deposits on the teeth, and maintenance of oral hygiene is difficult and demanding. During orthodontic therapy, patients have a significant increase in the amount of dental plaque as a result of changes in eating habits and difficulties in maintaining proper oral hygiene. The aim of this research was to highlight the importance of maintaining oral hygiene for patients undergoing fixed orthodontic appliance therapy, as well as the changes that occur during therapy. For the purpose of this work, a systematic literature search was performed in PubMed, Research Gate and Google Scholar databases. The results show that the placement of a fixed orthodontic appliance leads to changes in level of bacteria and changes in the condition of the gingiva. Most research on this topic has shown that many patients are aware of oral hygiene during treatment, but do not perform it properly. Constant monitoring, re-education and re-motivation at check-ups is required for the correct oral hygiene techniques. Professional soft plaque removal by a therapist also helps with plaque control and improved gingival and dental health of the patient.

Keywords: *oral hygiene, fixed orthodontic appliance*

3-O-12

Dijeta i oralno zdravlje

Ajla OSMANČEVIĆ, Indira MUJIĆ-JAHIĆ

Univerzitet u Sarajevu, Stomatološki fakultet sa stomatološkim kliničkim centrom, BiH

Sažetak

Za normalno funkcionisanje zdravog ljudskog organizma važna je prehrana bogata ugljikohidratima, proteinima i mineralima. Ishrana i oralno zdravlje su povezani na mnogo načina. Neadekvatna ishrana može uticati na oralno zdravlje uključujući karijes, parodontalne bolesti, bolesti oralne sluznice te zarazne bolesti, a ima značaj i u kraniofacijalnom razvoju. Ishrana utiče na zube tokom razvoja, a pothranjenost može pogoršati parodontalne i oralne zarazne bolesti. Međutim, najznačajniji učinak ishrane na zube je lokalno djelovanje ishrane u ustima na razvoj karijesa i erozije cakline. Neka istraživanja kažu da odrasli koji su na dijeti, vegeterijanci i vegani imaju povećan rizik od parodontalnih problema i karijesa, kao i dentalnih erozija. Cilj ovog rada jeste da se dovedu u vezu prehrana, oralno zdravlje i oralne bolesti te da se prezentuju prehrambene i dentalne navike koje će prevenirati negativne ishode. Rad je napisan pregledom i analizom relevantne literature naučnih radova. Korišteni su relevantni naučni podaci objavljeni u časopisima koji su preuzeti iz baze podataka PubMed, ResearchGate, Google Scholar i drugi. Dijetalni protokoli, ukoliko se ne sprovode na pravi način, mogu dovesti do poremećaja u ishrani (bulimija nervoza, anoreksija nervoza). Stoga, potrebno je na vrijeme uočiti simptome poremećaja u ishrani, uspostaviti brzu i agresivnu terapiju, prije nego se razviju ozbiljniji oblici poremećaja i ireverzibilna tjelesna oštećenja. Doktori dentalne medicine igraju važnu ulogu u ranom otkrivanju poremećaja ishrane, zato što se prvi simptomi najčešće pojavljuju oralno i ekstraoralno.

Ključne riječi: *dijeta, oralno zdravlje, ishrana, oralne bolesti*

3-O-12

Diet and oral health

Ajla OSMANČEVIĆ, Indira MUJIĆ-JAHIĆ

University of Sarajevo, Faculty of Dentistry with Dental Clinical Center, Bosnia and Herzegovina

Summary

A diet rich in carbohydrates, proteins and minerals is important for the normal functioning of a healthy human organism. Nutrition and oral health are connected in many ways. Inadequate nutrition can affect oral health, including caries, periodontal diseases, diseases of the oral mucosa and infectious diseases, and it is also important in craniofacial development. Diet affects teeth during development, and malnutrition can worsen periodontal and oral infectious diseases. However, the most significant effect of nutrition on teeth is the local effect of nutrition in the mouth on the development of caries and enamel erosion. Some research suggests that adults who are dieters, vegetarians, and vegans have an increased risk of periodontal problems and tooth decay, as well as dental erosion. The aim of this work is to link nutrition, oral health and oral diseases and to present dietary and dental habits that will prevent negative outcomes. The paper was written by reviewing and analyzing the relevant literature of scientific works. We used relevant scientific data published in journals that were downloaded from PubMed, ResearchGate, Google Scholar and other databases. Diet protocols, if not implemented in the right way, can lead to eating disorders (bulimia nervosa, anorexia nervosa). Therefore, it is necessary to notice the symptoms of eating disorders in time, to establish fast and aggressive therapy, before more serious forms of disorders and irreversible physical damage develop. Doctors of dental medicine play an important role in the early detection of eating disorders, because the first symptoms most often appear orally and extraorally.

Keywords: *diet, oral health, nutrition, oral diseases*

3-O-13

Procjena konzumacije kofeina među adolescentima u Kantonu Sarajevo

Ana PAUNIĆ*, Nejra ČENGIĆ, Seloa DERAKI, Gabrijela VULETA, Armina HASKOVIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za bromatologiju i nutriciju, BiH

*Autor za korespondenciju: Ana PAUNIĆ, anapaunic@ffsa.unsa.ba

Sažetak

Cilj ovog rada jeste upoznavanje sa pozitivnim i negativnim učincima kofeina na stanje i zdravlje adolescenata, te objasniti sprovedeno istraživanje na području Kantona Sarajevo koje daje uvid u učestalost konzumacije kofeina među adolescentima. Rezultati otkrivaju da čak 89,1% ispitanika konzumira pića koja sadrže kofein. Kada je u pitanju vrsta kofeinskog pića, većina ispitanika konzumira različite napitke na bazi kafe, a odmah na drugom mjestu su energetska pića, čajevi sa udjelom kofeina i Coca-cola. Unos kofeina povezan je s različitim zdravstvenim problemima kao što su akutna toksičnost, kardiovaskularne bolesti, loša prehrana, gustoća kostiju i nedostatak kalcija te razvojni i reproduktivni problemi. Prehrambene navike, uključujući unos kofeina, stiču se u djetinjstvu i obično se nastavljaju u odrasloj dobi. Osjetljivost na mnoge nezarazne bolesti usko je povezana s prehrambenim navikama. Međutim, adekvatno poznavanje i razumijevanje nutritivnog unosa i prehrambenih preporuka može pomoći adolescentima. Adolescenti u Kantonu Sarajevo skloni su učestaloj konzumaciji pića koja sadrže kofein, a gdje se ističu kafa i energetska pića. Kofein ima pozitivne učinke kao što su uticaj na stanje budnosti i bolja koncentracija, veća mišićna izdržljivost kao i povezanost konzumacije sa unutarnjom satisfakcijom prilikom konzumacije kofeinskih pića, ali prekomjerna konzumacija kofeina ima brojne štetne zdravstvene učinke kao što su nervoza, razdražljivost, mučnina, kardiovaskularni simptomi, poremećaj sna, osteoporoza i čir na želucu. Više od polovine ispitanika kofeinska pića konzumira umjereno, što uključuje 1-2 šalice kafe dnevno ili povremenu konzumaciju. Većina ispitanika svjesna je posljedica do kojih može dovesti prekomjerna konzumacija kofeina. Studije su dokazale da adolescenti koji imaju bolje prehrambrene navike i veću svijest o zdravlju, konzumiraju manje kofeina u odnosu na ostale vršnjake.

Ključne riječi: *kofein, adolescenti, Kanton Sarajevo*

3-O-13

Assessment of caffeine consumption among adolescents in Sarajevo Canton

Ana PAUNIĆ*, Nejra ČENGIĆ, Seloa DERAKI, Gabrijela VULETA, Armina HASKOVIĆ

University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, BiH

*Author for correspondence: Ana PAUNIĆ, anapaunic@ffsa.unsa.ba

Summary

The aim of this work is to get acquainted with the positive and negative effects of caffeine on the condition and health of adolescents and to explain the research conducted in the Sarajevo Canton, which provides insight into the frequency of caffeine consumption among adolescents. The results reveal that as many as 89.1% of respondents consume beverages containing caffeine. When it comes to the type of caffeinated drink, the majority of respondents consume various coffee-based beverages, followed immediately by energy drinks, caffeinated teas, and Coca-Cola. Adolescents in Sarajevo Canton are prone to frequent consumption of drinks containing caffeine, where coffee and energy drinks stand out. Caffeine has positive effects such as an effect on the state of alertness and better concentration, greater muscular endurance as well as the connection of consumption with internal satisfaction when consuming caffeinated beverages, but excessive caffeine consumption has numerous harmful health effects such as nervousness, irritability, nausea, sleep disorder, osteoporosis and stomach ulcer. More than half of the respondents consume caffeinated drinks in moderation. Studies have proven that adolescents who have better eating habits and a greater awareness of health consume less caffeine compared to other peers.

Key words: caffeine, adolescents, Sarajevo Canton

3-O-14

Poremećaji prehrane studenata Univerziteta u Sarajevu

Iman POJSKIĆ, Mia BUBENIK, Kemal DURIĆ, Kenan DURIĆ

Univerzitet u Sarajevu, Medicinski fakultet, Bosna i Hercegovina

Sažetak

Poremećaji prehrane su stanje praćeno narušavanjem prehrambenih obrazaca sa ozbiljnim posljedicama po zdravlje, a u konačnici i po život. Predstavljaju izazov za javno zdravlje, posebno u populaciji mladih, tako da je studentska populacija u fokusu ovog istraživanja. Akademski stres, varijabilni rasporedi obroka i socio-ekonomski pritisak doprinose promjenama prehrambenih navika i tako povećavaju rizik za razvoj poremećaja prehrane u studentskoj populaciji. Cilj ove deskriptivne studije je korelacija indeksa tjelesne mase (BMI) i prehrambenih navika studenata Univerziteta u Sarajevu (UNSA) sa četiri najčešća poremećaja ishrane: anoreksija i bulimija nervoza, prejedanje i selektivni poremećaj prehrane. Putem upitnika Google Forms ispitano je 211 studenata različitih fakulteta UNSA, starosti između 19 i 27 godina, oba spola. Upitnik je sadržavao 5 općih pitanja, zajedno sa 34 pitanja o prehrambenim navikama, formuliranim koristeći Likertovu skaliranu metodu i usaglašenih sa dijagnostičkim kriterijima za poremećaje ishrane definisanim u Diagnostic and Statistical Manual of Mental Disorders. Rezultati su statistički obrađeni i pokazali da u kategorizaciji BMI, prema smjernicama Svjetske zdravstvene organizacije, 155 ispitanika je imalo uredan nalaz, 12 je bilo u kategoriji pothranjenosti, dok 44 ima karakteristike pretilosti. Pitanja o prehrambenim navikama su organizirana u kategorije za svaki od poremećaja, a odgovori su numerički vrednovani kako bi se odredila procentualna učestalost prehrambenih navika povezanih sa svakim od četiri poremećaja ishrane kod svakog ispitanika. Prema tome, za anoreksiju nervozu i selektivni poremećaj prehrane procentualni raspon u kojem se nalazi najveći broj ispitanika iznosi 21%-40,99%, dok je to za bulimiju nervozu i poremećaj prejedanja raspon od 41%-60,99%. Zaključak ovog istraživanja ukazuje na to da studenti Univerziteta u Sarajevu u znatnoj meri pokazuju prehrambene obrasce koji se podudaraju s kriterijumima za poremećaje ishrane povezane sa četiri navedena oboljenja.

Ključne riječi: *poremećaji prehrane, anoreksija nervoza, bulimija nervoza, poremećaj prejedanja, selektivni poremećaj prehrane*

3-O-14

Eating disorders among students at the University of Sarajevo

Iman POJSKIĆ, Mia BUBENIK, Kemal DURIĆ, Kenan DURIĆ

University of Sarajevo, Faculty of Medicine, Bosnia and Herzegovina

Summary

Eating disorders are conditions characterized by disruptions in eating patterns with serious consequences for health and ultimately for life. They represent a challenge to public health, especially in the young population, so the student population is in the focus of this research. Academic stress, irregular meal schedules, and socioeconomic pressure contribute to changes in dietary habits and increase the risk of developing eating disorders in the student population. The aim of this descriptive study is to correlate the Body Mass Index (BMI) and dietary habits of students at the University of Sarajevo (UNSA) with four common eating disorders: anorexia nervosa, bulimia nervosa, binge eating, and selective eating disorder. A Google Forms questionnaire was used to survey 211 students from various faculties of UNSA, aged between 19 and 27, of both genders. The questionnaire comprised 5 general questions along with 34 questions about dietary habits, formulated using the Likert scaled method and in accordance with diagnostic criteria for eating disorders defined in the Diagnostic and Statistical Manual of Mental Disorders. The results were statistically analyzed and showed that, according to the World Health Organization guidelines for BMI categorization, 155 respondents had a normal BMI, 12 were underweight, and 44 exhibited characteristics of obesity. Dietary habit questions were categorized for each of the disorders, and responses were numerically evaluated to determine the percentage frequency of dietary habits associated with each of the four eating disorders in each participant. Therefore, for anorexia nervosa and selective eating disorder, the percentage range in which the majority of participants fell was 21%-40.99%, whereas for bulimia nervosa and binge-eating disorder, the range was 41%-60.99%. The conclusion of this study suggests that University of Sarajevo students exhibit dietary patterns significantly aligned with criteria for eating disorders associated with the four mentioned conditions.

Keywords: *eating disorders, anorexia nervosa, bulimia nervosa, binge eating, selective eating disorder*

3-O-15

Mleko drugih vrsta životinja u ishrani ljudi

Jovana RISTIĆ

Fakultet veterinarske medicine, Univerzitet u Beogradu, Bulevar oslobođenja 18, 11 000 Beograd, Srbija

Sažetak

Mleko zauzima značajno mesto u ishrani ljudi i kao sirovina se koristi za preradu u veliki broj različitih proizvoda od mleka. Postoji značajna razlika u hemijskom sastavu i osobinama mleka, što rezultira različitim pravcima korišćenja mleka drugih vrsta životinja u odnosu na kravlje mleko, koje čini više od 80% svetske proizvodnje mleka. S obzirom na visok sadržaj proteina i masti ovčije i bivolje mleko su veoma dobra sirovina za preradu, posebno za proizvodnju sira. Magareće i kobilje mleko spadaju u albuminska mleka i imaju najpribližniji sastav ženinom mleku (nizak sadržaj kazeina, nedostatak frakcije αs1-kazeina i β-laktoglobulina i visok sadržaj lizozima). Magareće mleko karakteriše profil masnih kiselina koji se razlikuje od mleka drugih životinjskih vrsta. Kamilje mleko ima dragocena nutritivna svojstva, jer sadrži antibakterijske materije i 30 puta veću koncentraciju vitamina C u poređenju sa kravljim mlekom. Sastav kozjeg mleka ga čini pogodnim za preradu da se koristi kao sirovina za preradu mleka. Analiza nutritivne vrednosti i tehnoloških osobina mleka izvršena je na osnovu dostupne literature. Ovom analizom obuhvaćene su različite životinjske vrsta koje se koriste za dobijanje mleka (goveda, koze, ovce, bivola, kamile, magarci i konji).

Ključne reči: *mleko, ishrana, ljudi*

3-O-15

The milk of other animal species in the human diet

Jovana RISTIC

Faculty of Veterinary Medicine, University of Belgrade, Bulevar oslobodjenja 18, 11 000 Belgrade, Serbia

Summary

Milk has a significant place in the human diet and is used as a raw material for processing into a wide variety of dairy products. There is a significant difference in chemical composition and characteristics of milk, resulting in different usage of milk from other animal species compared to cow's milk, which accounts for over 80% of global milk production. Due to their high protein content, including casein and fats, sheep and buffalo milk are excellent raw materials for processing, especially for cheese production. Donkey and mare milk belong to the category of albumin milk and have a composition closest to human milk (low casein content, lack of αs1-casein and β-lactoglobulin fractions, and a high lysozyme content). Donkey milk is characterized by its fatty acid profile, which differs from milk of other animal species. Camel milk has valuable nutritional properties as it contains antibacterial substances and has a 30 times higher C vitamin concentration compared to cow's milk. The composition of goat's milk allows it to be used as a raw material for processing and nutritional value analysis and technological characteristics of milk were conducted based on available literature. This analysis encompassed various animal species used for milk production, including (cattle, goats, sheep, buffalo, camels, donkeys, and horses).

Keywords: *milk, diet, human*

3-O-16

Ispitivanje navika ishrane studentske populacije

Naida SALKOVIĆ [1]*, Zarema OBRADOVIĆ [2]

[1]Univerzitet u Tuzli,Medicinski fakulteti, opšti studij medicine, BiH

[2]Univerzitet u Sarajevu, Fakultet zdravstvenih studija, BiH

*Autor za korespodenciju: Naida Salković, naidasalkovic@gmail.com

Sažetak

Ishrana predstavlja jedan od glavnih preduslova zdravlja. Zdrave prehrambene navike predstavljaju konzumiranje različitih namirnica kojim se obezbjeđuju gradivne, energetske i zaštitne materije kao što su voće, povrće, riba, te ograničen unos soli. Mnoga istraživanja ukazuju na značaj pravilnog unosa hrane u orgaizam, a posebno se ističe značaj doručka. Ishrana je različita u raznim periodima života, a period studiranja se često povezuje sa nezdravim prehrambenim navikama Cilj rada je istražiti prehrambene navike studenata Univerziteta u Tuzli. Istraživanje je provedeno online korištenjem standardizovanog upitika (Food Frequency Questionnair). U istraživanju su učestvovala 184 studenta, od kojih 54.5% studenata tokom studija živi s roditeljima. Rezultati istraživanja pokazuju da 54% ispitanika konzumira kafu jednom ili više puta dnevno, 43% studentana dodatno sole hranu bez prethodnog probanja, 70% ispitanika redovno doručkuje, biljno ulje pri kuhanju koristi 84.5%, 54% ispitanika povrće jedu nekoliko puta sedmično, a 32,1% jedu povrće jednom ili više puta dnevno. Voće nekoliko puta sedmično jede 54,5%, a 28,3% ispitanika voće jedu jednom ili više puta dnevno, dok se 59% njih izjasnilo da orašaste plodove jedu jednom sedmično ili manje od toga. U našem istraživanju 52% studenata se izjasnilo da slatko i kolače jedu jednom ili više puta dnevno. Zaključak ovog rada je da studenti Univerziteta u Tuzli samo dijelom poštuju smjernice kada je u pitanju zdrava i pravilna ishrana, te bi trebalo više poraditi na njihovoj edukaciji i stvaranju uslova za pravilnu ishranu.

Ključne riječi: *ishrana, studenti, navike, zdravlje*

3-O-16

Examining the eating habits of the student population

Naida SALKOVIĆ [1]*, Zarema OBRADOVIĆ [2]

[1] University of Tuzla, Faculty of Medicine, general study of medicine, Bosnia and Herzegovina

[2] University of Sarajevo, Faculty of Health Studies, Bosnia and Herzegovina

*Corresponding author: Naida Salković, naidasalkovic@gmail.com

Summary

Nutrition is one of the main prerequisites for health. Healthy eating habits include: consumption of various foods that provide building, energetic and protective substances such as fruits, vegetables, fish, and limited salt intake. Many studies point to the importance of proper food intake in the body, and the importance of breakfast is particularly emphasized. Nutrition is different in various periods of life, and the period of student life is often associated with unhealthy eating habits. The aim of the work is to investigate the eating habits of students at the University of Tuzla. The research was conducted online using a standardized questionnaire (Food Frequency Questionnaire). 184 students participated in the research, of which 54.5% of students live with their parents during their studies. The results of the research show that 54% of respondents consume coffee once or more a day, 43% of students additionally salt their food without first tasting it, 70% of respondents eat breakfast regularly, 84.5% use vegetable oil for cooking, 54% of respondents eat vegetables several times a week, and 32 ,1% eat vegetables once or more a day. 54.5% eat fruit several times a week, and 28.3% of respondents eat fruit once or more a day, while 59% of them declared that they eat nuts once a week or less. 52% of students declared that they eat sweets and cakes once a day or several times a day. Conclusion of this paper is that students of the University of Tuzla only partially respect the guidelines when it comes to healthy and proper nutrition, and more work should be done on their education and creating conditions for proper nutrition.

Keywords: *nutrition, students, habits, health*

3-O-17

Ispitivanje povezanosti emocionalne inteligencije i prehrambenih navika

Lejla MUSIĆ [1], Šejla SEJKANOVIĆ[1], Selma UZEIRBEGOVIĆ[1], Miralem MUSIĆ[2]*, Alisa TIRO[1]

[1]Univerzitet u Sarajevu, Stomatološki fakultet sa stomatološkim kliničkim centrom, BIH

[2]Univerzitet u Sarajevu Medicinski fakultet, BIH

*Autor za korespodenciju: Lejla Musić, lejla.music.lm71@gmail.com

Sažetak

Pravilna ishrana predstavlja ključni faktor u životu svakog pojedinca. Svijest o važnosti pravilne ishrane kao i briga za vlastito zdravlje mijenjaju se tokom razvojnih perioda života, a povezani su i sa psihološkim sazrijevanjem pojedinca. Zato je veoma važno da srednjoškolska i studentska populacija razvije dobre prehrambene i zdrave životne navike, jer je to period života u kojem mlade osobe preuzimaju punu odgovornost za vlastito zdravlje i budućnost. Početna hipoteza je da s obzirom na biološke razlike, postoji razlika i u emocionalnoj zrelosti između muškog i ženskog spola, to bi se moglo odraziti i na prehrambene i životne navike, kao i na brigu o vlastitom zdravlju. Cilj istraživanja je bio da se utvrde znanja i stavovi ispitanika (srednjoškolaca i studenata) o prehrambenim navikama, te odgovore dovesti u korelaciju sa emocionalnom zrelošću.. Materijali i metode: u istraživanju je sprovedeno online anketiranja srednjoškolske i studentske populacije u Sarajevu. Istraživanje je odobreno od strane Etičkog komiteta Stomatološkog fakulteta sa stomatološkim kliničkim centrom.

Ključne riječi: *emocionalna zrelost, prehrambene navike, hrana, psihički i fizički razvoj*

3-O-17

Investigating the correlation between emotional intelligence and eating habits

Lejla MUSIĆ [1], Šejla SEJKANOVIĆ[1], Selma UZEIRBEGOVIĆ[1], Miralem MUSIĆ[2], Alisa TIRO[1]

[1] University od Sarajevo School of Dental Medicine

[2] University of Sarajevo Faculty of Medicine

Summary

Proper nutrition is a key factor in the life of every individual. Awareness of the importance of proper nutrition as well as care for one's own health change during developmental periods of life, and are also related to the psychological maturation of the individual. That is why it is very important that the high school and student population develop good nutritional and healthy lifestyle habits, because this is the period of life in which young people take full responsibility for their own health and future. The initial hypothesis is that given the biological differences, there is also a difference in emotional maturity between the male and female sexes, which could be reflected in eating and living habits, as well as in taking care of one's own health. The goal of the research was to determine the knowledge and attitudes of the respondents (high school students and students) about eating habits, and to correlate the answers with emotional maturity. Materials and methods: the research conducted an online survey of the high school and student population in Sarajevo. The research was approved by the Ethics Committee of the Faculty of Dentistry with the Dental Clinical Center.

Keywords: *emotional intelligence, eating habits, psychological and physical development*

3-O-18

Značaj dojenja i majčinog mlijeka za rast i razvoj novorođenčeta

Samra SULJIĆ[1] , Šejla ŠILJEVIĆ[1], Aida OMERAGIĆ[1], Fahira IMAMOVIĆ[1], Adela EROVIĆ VRANEŠIĆ[1]

[1] Univerzitet u Sarajevu, Fakultet zdravstvenih studija, studijski program Babičarstvo/Primaljstvo , BiH

[*]Autor za korespodenciju: Samra Suljić, e-mail: samra.suljic@fzs.unsa.ba

Sažetak

Dojenje čini osnovni stub pravilne ishrane i prvo je na listi svih preporuka i smjernica o zdravoj ishrani. Dokazano je da djeca koja su hranjena majčinom mlijekom imaju jači imunološki sistem, da su zdravija od djece hranjene vještačkom hranom te pokazuju bolje rezultate na testovima inteligencije. Majčino mlijeko sadržava mnogo elemenata koje imaju važnu nutritivnu, razvojnu, imunološku i psihološku ulogu za dijete, Drugi naziv mu je i „bijelo zlato“, jer je visokokvalitetna i najjeftinija hrana za dijete. Dojenje ima udio u prevenciji nastanka infektivnih i neinfektivnih bolesti. Majčino mlijeko sadržava velike količine imunoglobulina IgA, IgG i IgM te ima značajnu prednost u odnosu na druge mliječne formule. Istraživanje ima za cilj definisati značaj dojenja i majčinog mlijeka u rastu i razvoju novorođenčeta te dvojaku korist kako za novorođenče tako i za majku. Rad je urađen kao pregledni članak, za čiju izradu su korišteni radovi iz relevantnih baza podataka (*Google Scholar, PubMed, Medline*) koji su pretraživani unosom ključnih riječi (majčino mlijeko, dojenje, novorođenče, dojenče, morbiditet, adaptirana prehrana). Majčino mlijeko idealna je prehrana za novorođenče i dojenče, što su potvrdila mnoga istraživanja i zdravstvene organizacije koje se bave očuvanjem i unapređenjem zdravlja djeteta od najranije dobi. Prirodna prehrana omogućava zaštitu cjelokupnog djetetovog organizma zbog niza elemenata koje su zaslužne za pravilan rast i razvoj djeteta, također i zaštitu njegove majke. Velika važnost pridaje se što dužem dojenju, po mogućnosti od jedne do dvije godine djetetova života. Posebna pozornost posvećuje se rizičnoj skupini novorođenčadi kojoj je potrebna prirodna i što duža prehrana majčinim mlijekom.

Ključne riječi: *majčino mlijeko, dojenje, novorođenče, adaptirana prehrana*

3-O-18

The importance of breastfeeding and mother's milk for the growth and development of the newborn

Samra SULJIĆ[1], Šejla ŠILJEVIĆ[1], Aida OMERAGIĆ[1], Fahira IMAMOVIĆ[1], Adela EROVIĆ VRANEŠIĆ[1]

[1] University of Sarajevo- Faculty of Health Sciences, BiH

[*]Corresponding author: Samra Suljić, e-mail: samra.suljic@fzs.unsa.ba

Summary

Breastfeeding forms the basic pillar of proper nutrition and is first on the list of all recommendations and guidelines on healthy nutrition. It has been proven that babies who received breast milk develop a stronger immune system, are healthier than children fed artificial food and show better results on intelligence tests. Breast milk contains many elements that have an important nutritional, developmental, immunological, and psychological role for the child. Another name for it is "white gold" because it is high-quality and the cheapest food for the child. Breastfeeding plays a role in the prevention of infectious and non-infectious diseases. Breast milk contains large amounts of IgA, IgG and IgM immunoglobulins and has a significant advantage over other milk formulas. The aim of the research is to define the significance of breastfeeding and mother's milk in the growth and development of the newborn and the dual benefits for both the newborn and the mother. For our review article, we conducted a thorough search using keywords like "breast milk," "breastfeeding," "newborn," "infant," "morbidity," and "adapted nutrition" in databases like Google Scholar, PubMed, and Medline. Mother's milk is the ideal nutrition for newborns and infants, as confirmed by many studies and health organizations that deal with preserving and improving the health of children from an early age. Natural nutrition enables the protection of the child's entire organism because of several elements that handle the proper growth and development of the child, as well as protecting its mother. It's highly emphasized to breastfeed for as long as possible, ideally from one to two years of the child's life. Newborns who require natural and prolonged nutrition with mother's milk are given special attention.

Keywords: *mother's milk, breastfeeding, newborn, adapted nutrition*

3-O-19

Percepcija značaja kontrole unosa soli u odraslih stanovnika Kantona Sarajevo

Ajla RIZVIĆ, Nermina ŠEČIĆ, Ajla ŠEHOVIĆ, Hena TAHMAZ, Lejda UZUNOVIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za bromatologiju i nutriciju, BiH

Sažetak

Kuhinjska so je namirnica prisutna u svakodnevnoj prehrani, doprinosi ukusu hrane, neophodna je za normalno funkcionisanje organizma i ima vrlo važnu ulogu u brojnim fiziološkim procesima. Prema preporuci Svjetske zdravstvene organizacije, unos kuhinjske soli ne bi trebao biti veći od 5g/dan, međutim, istraživanja pokazuju da je unos soli 2-3 puta veći od preporučenog. U Bosni i Hercegovini generalno, veliki broj stanovnika boluje od kardiovaskularnih oboljenja koja uzrokuju visoku stopu smrtnosti naročito kod pacijenta starije dobi uz pozitivnu porodičnu anamnezu oboljenja kardiovaskularnog sistema. U decembru 2022. godine, izvršeno je anketiranje 710 odraslih stanovnika Kantona Sarajevo u svrhu procjene njihovih pretpostavki i znanja o preporučenom unosu kuhinjske soli i mogućim posljedicama na kardiovaskularni sistem. Na osnovu sprovedenog istraživanja može se zaključiti da je prisutna opća neinformisanost stanovništva o preporučenom dnevnom unosu soli. Većina ispitanika nije upoznata sa rizicima prekomjernog unosa, kao i namirnicama koje u svom sastavu sadrže jako velike količine soli, a koje se svakodnevno u organizam nesvjesno unose.

Ključne riječi: kuhinjska so, prekomjerna konzumacija, zdravstvene posljedice

3-O-19

Perception of the importance of controlling salt intake in adults of Sarajevo Canton

Ajla RIZVIĆ Nermina ŠEČIĆ Ajla ŠEHOVIĆ Hena TAHMAZ Lejda UZUNOVIĆ

University of Sarajevo, Faculty of Pharmacy, Department of Pharmaceutical Analytics, BiH

Summary

Table salt is an ingredient used in everyday diet, it contributes to food taste and is necessary for the organism to function propperly and also plays a big role in many phisiological processes. According to The World Health Organisation, daily salt intake should not be greater than 5g/day, however, many researches show that people consume 2-3 times more table salt than recommended. In Bosnia and Herzegovina a lot of popoulation suffers from cardiovascular diseases, that are known to contribute to high mortality rate, especially noticable with elderly population with postive family history of cardiovascular dieseases. In december of 2022., a survey of 710 adult residents of the Sarajevo Canton was conducted, in order to estimate their assumptions and knowledge on the recommeded intake of table salt and possible consequences on the cardiovascular system. Based on the conducted survey, it is noticable that this population has very little knowledge on this topic and are not informed properly about the recommended daily table salt intake. Most od the participants were not aware of the risks of overconsumption of table salt, as well as the groceries that contain a lot of it, which contribute to unconscious ingestion of large quantities of salt.

Keywords: *table salt, excessive consumption, health risks*

3-O-20

Glikemijsko opterećenje u dnevnoj prehrani studenata Farmaceutskog fakulteta u Sarajevu

Edin ŠOLJANIN[1*], Ajten GRANIĆ[1], Arnela BIJELONJA[1],

Edina MRAČKIĆ[1], Maja BAREŠIĆ[1]

[1]Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za bromatologiju i nutriciju, BiH

*Autor za korespodenciju Edin ŠOLJANIN, e—mail: edinsoljanin@ffsa.unsa.ba

Sažetak

Ovaj rad istražuje glikemijsko opterećenje među studentima Farmaceutskog fakulteta u Sarajevu, fokusirajući se na unos ugljikohidrata u njihovoj ishrani. Uzorak od 108 studenata je anketiran putem FFQ formata s tolerancijom greške od 8.36%. Rezultati su pokazali da je 41.1% studenata imala visoko dnevno glikemijsko opterećenje, dok je 35.4% imalo srednje, a 23.5% nisko glikemojsko opterećenje. Bijeli hljeb, žitarice, mliječna čokolada i bombone bile su najčešće korištene namirnice sa visokim glikemijskim opterećenjem. Glikemijsko opterećenje je iznosilo 168.75 ± 14.1075. Iz ovoga je zaključeno da je prosječno glikemijsko opterećenje kod studentske populacije visoko.

Ključne riječi: *glikemijsko opterećenje, studenti, ugljikohidrati, ishrana, dijabetes*

3-O-20

Glycemic load in the daily diet of Pharmacy students at University of Sarajevo

Edin ŠOLJANIN[1*], Ajten GRANIĆ[1], Arnela BIJELONJA[1],
Edina MRAČKIĆ[1], Maja BAREŠIĆ[1]

[1]University in Sarajevo, Faculty of Pharmacy, Department of Bromatology and nutrition, BiH

*Corresponding author Edin ŠOLJANIN, e-mail: edinsoljanin@ffsa.unsa.ba

Summary

This study investigates the glycemic load among students of the Faculty of Pharmacy in Sarajevo, focusing on the intake of carbohydrates in their diet. A sample of 108 students was surveyed using the FFQ format with an error tolerannce of 8.36%. The result showed that 41.1% of students had a high daily glycemic load, while 35.4% had a medium and 23.5% a low glycemic load. White bread, cereals, milk chocolate and candies were the most commonly used foods with a high glycemic load. The glycemic load was 168.75 ± 14.1075. From these results, it was concluded that the average glycemic load in the student population is high.

Keywords: *glycemic load, students, carbohydrates, nutrition, diabetes*

3-O-21

Kvalitet prehrane adolescenata u Kantonu Sarajevo

Arijana TOTIĆ *, Lucija TVRTKOVIĆ, Hava MUJKIĆ, Sajra OMERAGIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: arijanatotic@ffsa.unsa.ba

Sažetak

Kvalitetna prehrana je jedan od ključnih faktora zdravog života, te je izrazito bitna u periodu adolescencije. Mladi organizam se brzo razvija, a optimalan unos vitamina, minerala, UH i proteina ne samo da utječe na njegov rast i razvoj, već poboljšava i funkcije pamćenja te razmišljanja koje su od izrazite važnosti (posebno u fazi školovanja). Nepravilna prehrana može dovesti do razvoja raznih bolesti i poremećaja, kao povećana tjelesna težina. Glavni cilj ovog istraživanja bio je utvrditi da li je prehrana adolescenata u Kantonu Sarajevo kvalitetna. Sukladno tome ostali ciljevi bili su utvrditi koliko su se prehrambene navike adolescenata promijenile polaskom u školu, njihovu sklonost brzoj prehrani i proizvodima iz pekare, te svijest o zdravoj prehrani i fizičkoj aktivnosti. Istraživanje je provedeno u decembru 2022. godine anonimnim online anketiranjem učenika na području Kantona Sarajevo, te je u njemu sudjelovalo 200 učesnika. Osnovni rezultati pokazuju da su ponašanja kao preskakanje doručka, brza prehrana i konzumacija proizvoda iz pekare trend među adolescentima. Udio adolescenata koji su izjavili da svakodnevno konzumiraju slatkiše i zaslađene i gazirane napitke nije zanemariv, vidimo da ih značajan broj ispitanika konzumira na sedmičnoj bazi, a ne tako mali broj čak i na dnevnoj. Rezultati pokazuju zdrave navike bavljenja sportom, no razočaravajuće je da se čak četvrtina ispitanika nikada ne bavi sportom, što je veoma nepoželjno za mlade osobe u razvoju.

Ključne riječi: *adolescenti, prehrana, zdrave životne navike*

3-O-21

Quality of diet among adolescents in Canton Sarajevo

Arijana TOTIĆ *, Lucija TVRTKOVIĆ, Hava MUJKIĆ, Sajra OMERAGIĆ

University of Sarajevo, Faculty of Pharmacy, BiH

*Corresponding author: arijanatotic@ffsa.unsa.ba

Summary

Quality nutrition is one of the key factors of a healthy life, and it is extremely important in the period of adolescence. A young organism develops rapidly, and an optimal intake of vitamins, minerals, UH and proteins not only affects its growth and development, but also improves the functions of memory and thinking, which are extremely important (especially during the schooling phase). Improper nutrition can lead to the development of various diseases and disorders, such as increased body weight. The main goal of this research was to determine whether the diet of adolescents in Canton Sarajevo is of good quality. Accordingly, the other goals were to determine how much the eating habits of adolescents changed after starting school, their preference for fast food and bakery products, and awareness of healthy eating and physical activity. The research was conducted in December 2022 through an anonymous online survey of students in the Sarajevo Canton, and 200 participants took part in it. Basic results show that behaviors such as skipping breakfast, fast food and consumption of bakery products are a trend among adolescents. The share of adolescents who stated that they consume sweets and sweetened and carbonated beverages on a daily basis is not negligible, we see that a significant number of respondents consume them on a weekly basis, and not so small amount even on a daily basis. The results show healthy sports habits, but it is disappointing that a quarter of respondents never do sports, which is very undesirable for young people in development.

Keywords: *adolescents, nutrition , healthy lifestyle*

3-P-1

Kvalitet prehrane starije dojenčadi u Kantonu Sarajevo

Džejna ĆULOV, Emina GANIJA, Alema HUSILOVIĆ, Sumeja HADŽALIĆ, Adna MULAIMOVIĆ, Arnela OBRALIJA

Univerzitet u Sarajevu, Farmaceutski fakultet Sarajevo, Katedra za bromatologiju i nutriciju, BiH

Autor za korespondenciju: Husilović Alema, a.husilovic@gmail.com

Sažetak

Ovaj naučni rad istražuje razvoj i primjenu indeksa kvaliteta prehrane za malu djecu, s fokusom na dojenčad u dobi od šest mjeseci do četiri godine. Cilj je procijeniti kvalitetu prehrane u ovoj dobnoj skupini i identificirati potencijalne obrasce prehrambenih navika koje je važno prepoznati i intervenirati u ranoj dobi. Autori koriste indeks koji se temelji na smjernicama prehrane, uzimajući u obzir različite grupe namirnica kao što su voće, povrće, mliječni proizvodi, proteini i slično. U svrhu analize i tumačenja prikupljenih podataka korišteni su dostupni i važeći zakonski akti i pravilnici na području Federacije Bosne i Hercegovine (FBiH), te naučni časopisi sa odobrenim smjernicama za prehranu dojenčadi. Rezultati pokazuju da postoje poboljšanja u kvaliteta prehrane za malu djecu, s posebnim naglaskom na promicanje konzumacije cjelovitih žitarica, voća i povrća. Također, primjećuju se razlike u prehrambenim navikama među različitim rasnim i etničkim skupinama, što ukazuje na važnost ciljanog pristupa prehrani ovisno o kulturnim običajima i preferencijama. Rad pruža važan uvid u kvalitetu prehrane kod male djece te ističe potrebu za ranom intervencijom kako bi se osigurala optimalna prehrana i potencijalno smanjili rizici od kasnijih zdravstvenih problema povezanih s prehranom.

Ključne riječi: *starija dojenčad, prehrambene navike, kvalitet prehrane, zdravstveni problemi, žitarice, mliječni prozvodi*

3-P-1

Quality of nutrition of older infants in Sarajevo Canton

Džejna ĆULOV, Emina GANIJA, Alema HUSILOVIĆ, Sumeja HADŽALIĆ, Adna MULAIMOVIĆ, Arnela OBRALIJA

Faculty of Pharmacy Sarajevo, University of Sarajevo, Department of Bromatology and Nutrition, BiH

Corresponding author: Husilović Alema, a.husilovic@gmail.com

Summary

This scientific article explores the development and application of a nutrition quality index for young children, with a focus on infants aged six months to four years. The goal is to assess the quality of nutrition in this age group and identify potential patterns of eating habits that are important to recognize and intervene at an early age. The authors use an index based on dietary guidelines, taking into account different groups of the diet such as fruits, vegetables, dairy products, proteins, and the like. For the purpose of analyzing and interpreting the collected data, available and valid legal acts and regulations in the territory of the Federation of Bosnia and Herzegovina (FBiH), as well as scientific journals with approved guidelines for infant nutrition, were used. The results show improvement in the quality of nutrition for young children, with a special emphasis on promoting the consumption of whole grains, fruits, and vegetables. Also, there are differences in eating habits among different racial and ethnic groups, which indicates the importance of a targeted approach to nutrition depending on cultural customs and preferences. The work provides important insight into the quality of nutrition in young children. It highlights the need for early intervention to ensure optimal nutrition and potentially reduce the risks of later health problems related to nutrition.

Keywords: *older infants, eating habits, diet quality, health problems, cereals, dairy products*

3-P-2

Uticaj alkalne ishrane na kvalitet života

Alem ZORNIĆ, Nejla VALJEVČIĆ, Emina KISELJAKOVIĆ

Univerzitet u Sarajevu-Medicinski fakultet

Autor za korespondenciju: Alem Zornić, alem.zornic@gmail.com

Sažetak

Raspoloženje, nivo energije, stepen tjelesne aktivnosti i količina sna su parametri koji su veoma bitni za život, a mogu se mijenjati u odnosu na konzumaciju namirnica čiji metabolizam mijenja pH u organizmu. Ovom studijom smo željeli dokazati povezanost unosa alkalnih i kiselih namirnica i kvalitete života. Cilj rad bio je ispitati povezanost između pH vrijednosti hrane i energičnosti čovjeka, kao i promjene raspoloženja, količine sna i nivoa tjelesne aktivnosti, te dokazati povezanost alkalne ishrane sa povećanjem energije i raspoloženjem, boljim spavanjem i većom tjelesnom aktivnosti. Projekat je uključio 14 ispitanika, u dobi od 21 do 31 godinu koji su dobrovoljno bili na sedmodnevnoj, pretežno alkalnoj ishrani (bez animalnih proteina, slatkiša, kafe i slatkih napitaka), za koju su se pripremili 3 dana (smanjili unos acidnih namirnica), a zatim na sedmodnevnoj pretežno acidnoj prehrani. Ispitanici su popunili upitnik koji se sastojao od tri domene. Prva domena sadržavala je pitanja o hranidbenim navikama. U drugu domenu su ispitanici u odgovarajućem režimu ishrane svakodnevno nakon buđenja bilježili parametre: raspoloženje, energičnost i količinu sna, a u treću domenu, na kraju dana, bilježili prethodnu fizičku aktivnost. Rezultati istraživanja pokazuju da kod ispitanika u periodu alkalne prehrane dolazi do porasta energije, raspoloženja, tjelesne aktivnosti i uravnotežen san. Sa druge strane kod ispitanika u periodu acidne prehrane dolazi do pada energije, raspoloženja, tjelesne aktivnosti i gubitak uravnoteženosti sna. Zaključak rada je da konzumiranje kisele hrane dovodi do nevoljkosti organizma i povećanog umora, dok prehrana alkalnom hranom dovodi do povećanja cjelokupne energije, raspoloženja, tjelesne aktivnosti i uravnoteženja sna.

Ključne riječi: *acidna ishrana, alkalna ishrana, tjelesna aktivnost, raspoloženje, energija, san*

3-P-2

The impact of alkaline nutrition on the quality of life

Alem ZORNIĆ, Nejla VALJEVČIĆ, Emina KISELJAKOVIĆ

University of Sarajevo - Faculty of Medicine

Corresponding author: Alem Zornić, alem.zornic@gmail.com

Summary

Mood, energy level, level of physical activity and amount of sleep are parameters that are very important for life, and they can change in relation to the consumption of foods whose metabolism changes the pH in the body. With this study, we wanted to prove the connection between the intake of alkaline and acidic foods and the quality of life. Objective of this work was to examine the connection between the pH value of food and human energy, as well as changes in mood, amount of sleep and level of physical activity, and also to prove the connection of alkaline nutrition with increased energy and mood, better sleep and greater physical activity. The project included 14 respondents, aged 21 to 31, who voluntarily followed a seven-day, predominantly alkaline diet (without animal proteins, sweets, coffee and sweet drinks), for which they prepared for 3 days (reduced the intake of acidic foods), and then on a seven-day predominantly acidic diet. Respondents filled out a questionnaire consisting of three domains. The first domain contained questions about eating habits. In the second domain, the respondents in the appropriate diet regime recorded the parameters: mood, energy and amount of sleep every day after waking up, and in the third domain, at the end of the day, they recorded the previous physical activity. The results of the research show that during the period of the alkaline diet, there is an increase in energy, mood, physical activity and balanced sleep. On the other hand, during the period of acid diet, there is a drop in energy, mood, physical activity and loss of balanced sleep. Conclusion of this work is that consumation of acidic food leads to the reluctance of the body and increased fatigue, while eating alkaline food leads to an increase in overall energy, mood, physical activity and balanced sleep.

Keywords: *acid diet, alkaline diet, physical activity, mood, energy, sleep*

4. DIJETOTERAPIJA
DIETOTHERAPY

4-O-1

Efekat dijetoterapije kod žena sa sideropeničnom anemijom

Edna BIHORAC[1]*, Ema ABASPAHIĆ[1], Martina ĐOTLO[1], Amir ČAUŠEVIĆ[1]

[1]Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Bosna i Hercegovina

Autor za korespodenciju: Edna Bihorac, e-mail adresa: edna.bihorac@fzs.unsa.ba

Sažetak

Anemija je globalni javnozdravstveni problem koji se najčešće javlja kod žena i djece, te predstavlja oblik hematološke bolesti koji se prezentira kao smanjena vrijednost hemoglobina ili broja eritrocita. Ovaj pregledni rad napisan je na osnovu dostupnih stručnih literatura, recenziranih randomiziranih meta-analiza, uključenih u bazu podataka PubMed, sa osnovnim ciljem podizanja svijesti ljudi o bitnosti dijetoterapije u preveniranju, ali i procesu liječenja sideropenične anemije. Prevencija i liječenje anemije uzrokovane deficitom željeza je posebno značajna u reproduktivnoj dobi žene. Sideropenična anemija predstavlja faktor rizika za smanjenje kvaliteta života i povećan mortalitet. Povezana je također sa nepovoljnim ishodima trudnoće i drugim problemima koji se javljaju kod djece čije su majke bile anemične trudnice. Razina željeza kod majke prije i tokom trudnoće značajno utječe na status zaliha željeza kod novorođenčeta. Prvih šest mjeseci života organizam se služi željezom koje potječe iz zaliha stečenih tokom intrauterinog života, do trenutka podvezivanja pupčane vrpce. Pored povećanog gubitka željeza menstrualnim krvarenjem, abnormalnog krvarenja iz meternice, gubitka željeza znojenjem, te povećane potrebe za željezom usljed intezivnije eritropoeze, jedan od glavnih uzroka razvoja anemije kod žena generativne dobi je loša ishrana. Nedostatak željeza je uobičajeni nutritivni nedostatak širom svijeta, međutim, razni drugi mikronutrijenti mogu nedostajati u neadekvatnoj i neuravnoteženoj ishrani i time utjecati na nastanak anemije. Deficiti mikronutrijenata sami ili u kombinaciji, manifestuju se kada se potrebe ne mogu zadovoljiti adekvatnim snadbjevanjem, unosom ili apsopcijom hranjivih materija. Da bi se suprostavili uporno visokoj prevalenciji anemije, postoji više strategija koje daju prioritet poboljšanju svakodnevne ishrane populacije.

Ključne riječi: *anemija, deficit željeza, sideropenična anemija, trudnoća i anemija*

4-O-1

Effect of dietotherapy in women with sideropenic anemia

Edna BIHORAC[1]*, Ema ABASPAHIĆ[1], Martina ĐOTLO[1], Amir ČAUŠEVIĆ[1]

[1]University of Sarajevo, Faculty of Health Studies, Bosnia and Herzegovina

*Correspoding author: Edna Bihorac, e-mail adresa: edna.bihorac@fzs.unsa.ba

Summary

Anemia is a global public health problem that most often occurs in women and children, and is a form of a hematological disease that presents as a reduced value of hemoglobin or the number of erythrocytes. This review paper was written on the basis of available professional literature, peer-reviewed randomized meta-analyses, included in the PubMed database, with the main goal of raising people's awareness of the importance of diet therapy in the prevention and treatment of sideropenic anemia. Prevention and treatment of anemia caused by iron deficiency is especially important in women of reproductive age. Sideropenic anemia is a risk factor for reduced quality of life and increased mortality. It is also associated with adverse pregnancy outcomes and other problems that occur in children whose mothers were anemic during pregnancy. The level of iron in the mother before and during pregnancy significantly affects the status of iron stores in the newborn. During the first six months of life, the body uses iron that originates from the reserves acquired during intrauterine life, until the moment of ligation of the umbilical cord. In addition to increased iron loss through menstrual bleeding, abnormal uterine bleeding, iron loss through sweating, and the increased need for iron due to more intense erythropoiesis, one of the main causes of anemia in women of reproductive age is poor nutrition. Iron deficiency is a common nutritional deficiency worldwide, however, various other micronutrients can be lacking in an inadequate and unbalanced diet and thus affect the development of anemia. Deficits of micronutrients, alone or in combination, are manifested when needs cannot be met by adequate supply, intake or absorption of nutrients. To counter the persistently high prevalence of anemia, there are several strategies that prioritize improving the daily nutrition of the population.

Keywords: *anemia, iron deficiency, iron deficiency anemia, pregnancy and anemia*

4-O-2

Uticaj kurkumina u ishrani na lipidni i antioksidativni status organizma

Lejla DRINČIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet

*Autor za korespodenciju: Lejla Drinčić, lejladrincic@ffsa.unsa.ba

Sažetak

Kardiovaskularna oboljenja su trenutno vodeći uzroci mortaliteta u svijetu. Najčešći faktori koji dovode do KV oboljenja jesu godine, spol, hipertenzija, hiperlipidemija, dijabetes, pretilost. Kurkuma (lat. *Curcuma longa*) je biljna vrsta iz čijeg se korijena dobija začin, žute boje, gorkasto-ljutkastog okusa – kurkumin. Kurkumin je prehrambeni aditiv deklarisan kao E100. Zbog percepcije da su prirodni proizvodi sigurniji za primjenu pacijenti ih preferiraju u odnosu na konvencionalne lijekove. Kurkumin može smanjiti nivo triglicerida, te u kombinaciji sa statinima (klasa lijekova za liječenje hiperholesterolemije i hiperlipidemije) na kraju dovodi do poboljšanja hiperlipidemije. Mehanizam samog djelovanja kurkumina veže se za mehanizam djelovanja statina. Pretpostavka je da djeluje na gotovo sve metaboličke puteve stvaranja i skladištenja lipida. Uticaj kurkumina počinje od gastro-intestinalnog trakta gdje smanjuje apsorpciju lipida iz hrane, u jetri smanjuje koncetraciju lipida u plazmi, posrednik je obrnutog transporta holesterola i utječe na uklanjanje holesterola iz perifernih tkiva. Kurkumin također djeluje na smanjenje peroksidacije lipida i tu se ogleda njegova antioksidativna uloga. Peroksidacija lipida finalno dovodi do upalnih reakcija koje dovode do oštećenja kardiovaskularnog sistema i ateroskleroze. Rezultati novijih istraživanja potvrđujuju da upotreba kurkume u kombinaciji sa statinima značajno smanjuje razine triglicerida i LDL-a ali tačan mehanizam nije u potpunosti razriješen. Ograničavajući faktor za upotrebu kurkumina je njegova slaba bioraspoloživost, te je potrebno pronaći adekvatnu formulaciju da bi se ona poboljšala. Meta-analize dosada provedenih studija, ukazuju na dobru podnošljivost doze od 800mg/dan, bez neželjenih efekata.

Ključne riječi: *kurkuma, kurkumin, hiperlipidemija, antioksidant*

4-O-2

The effect of curcumin in diet on the lipid and antioxidant status of the organism

Lejla DRINČIĆ

University of Sarajevo, Faculty of Pharmacy

*Corresponding author: Lejla Drinčić, lejladrincic@ffsa.unsa.ba

Summary

Cardiovascular diseases are currently the leading cause of mortality in the world. The most common factors that lead to CV diseases are age, gender, hypertension, hyperlipidemia, diabetes, and obesity. Curcuma lat. *Curcuma longa* is a plant species from the root of which is obtained a spice, yellow in color, with a bitter-spicy taste called curcumin. Curcumin is a food additive declared as E100. Because of the perception that natural products are safer to use, patients prefer them over conventional drugs. Curcumin can reduce the level of triglycerides, and in combination with statins (a class of drugs for the treatment of hypercholesterolemia and hyperlipidemia), it eventually leads to an improvement in hyperlipidemia. The mechanism of action of curcumin is related to the mechanism of action of statins. The assumption is that it acts on almost all metabolic pathways of lipid creation and storage. The influence of curcumin starts in the gastrointestinal tract, where it reduces the absorption of lipids from food; in the liver, it reduces the concentration of lipids in the plasma; it mediates the reverse transport of cholesterol; and it affects the removal of cholesterol from peripheral tissues. Curcumin also works to reduce lipid peroxidation, and this is where its antioxidant role is reflected. Lipid peroxidation finally leads to inflammatory reactions that lead to damage to the cardiovascular system and atherosclerosis. The results of recent research confirm that the use of turmeric in combination with statins significantly reduces the levels of triglycerides and LDL, but the exact mechanism has not been fully resolved. A limiting factor for the use of curcumin is its poor bioavailability, and it is necessary to find an adequate formulation to improve it. Meta-analyses of studies carried out so far indicate the good tolerability of a dose of 800 mg/day without unwanted effects.

Keywords: *turmeric, curcumin, hyperlipidemia, antioxidant*

4-O-3

Molekularni epitopi u terapiji alergija na hranu

Ema HADŽIĆ[1*], Selma NAKIĆ[1], Ajna Hujić[1]

[1]Univerzitet u Sarajevu, Farmaceutski fakultet, Sarajevo 71000, Bosna i Hercegovina

*Autor za korespodenciju: Ema Hadžić, emahadzic@ffsa.unsa.ba

Sažetak

Alergija na hranu predstavlja ozbiljan zdravstveni izazov na globalnom nivou, koji zahvata znatan broj pojedinaca. Ovaj rad tematizira ključnu ulogu molekularnih epitopa u kontekstu terapije alergena iz hrane. Molekularni epitopi su specifične regije prisutne na alergenima, koje su odgovorne za indukovanje alergijskih reakcija kod ljudi. Postupak mapiranja epitopa obuhvata nekoliko ključnih koraka, uključujući identifikaciju alergena, njihovu izolaciju i čišćenje, detaljnju karakterizaciju molekulske strukture, testiranje interakcija s imunoglobulinom E (IgE) antitijelima, te analizu ozbiljnosti alergijskih reakcija. Personalizirani pristup terapiji alergena, baziran na epitopima, omogućava precizniju dijagnozu i terapiju alergija na hranu. Identifikacija ključnih epitopa olakšava razvoj specifičnih imunoterapija koje su usmjerene na te epitope, te potiče stvaranje imunološke tolerancije prema alergenima. Ipak, postoje izazovi i ograničenja ovog pristupa, uključujući složenost epitopa, visoke troškove personalizacije terapije, kao i potrebu za temeljnom kliničkom validacijom.

Ključne riječi: *alergija na hranu, molekularni epitopi, personalizirana terapija*

4-O-3

Molecular Epitopes in the Treatment of Food Allergies

Ema HADŽIĆ[1*], Selma NAKIĆ[1], Ajna Hujić[1]

[1]University of Sarajevo, Faculty of Pharmacy, Sarajevo 71000, Bosnia and Herzegovina

*Corresponding author: Ema Hadzic, emahadzic@ffsa.unsa.ba

Summary

Food allergies represent a significant global health challenge affecting a substantial number of individuals. This paper addresses the pivotal role of molecular epitopes in the context of food allergen therapy. Molecular epitopes are specific regions present on allergens responsible for inducing allergic reactions in humans. The epitope mapping process encompasses several key steps, including allergen identification, isolation and purification, in-depth characterization of molecular structures, testing interactions with immunoglobulin E (IgE) antibodies, and analyzing the severity of allergic reactions. A personalized approach to allergen therapy based on epitopes enables more precise diagnosis and treatment of food allergies. Identifying key epitopes facilitates the development of specific immunotherapies targeted at these epitopes, prompting immune tolerance to allergens. However, challenges and limitations exist in this approach, such as epitope complexity, high cost of therapy personalization, and the need for thorough clinical validation.

Keywords: *food allergy, molecular epitopes, personalized therapy*

4-O-4

Klinička upotreba glutamina

Vildana HASANAGIĆ, Jasmina ĐEĐIBEGOVIĆ

Univerzitet u Sarajevu-Farmaceutski fakultet

*Autor za korespodenciju: Vildana Hasanagic, vildanahasanagic@ffsa.unsa.ba

Sažetak

Glutamin je aminokiselina koja igra ključnu ulogu u mnogim biološkim procesima u ljudskom tijelu. Osim što je osnovna komponenta proteina, glutamin ima značajnu ulogu u energetskom metabolizmu, funkciji imunološkog sistema i očuvanju integriteta crijevne sluznice. Zbog tih važnih funkcija, glutamin je privukao pažnju u medicini i istraživanjima. Ovaj rad ima za cilj pružiti sveobuhvatni pregled trenutnog stanja znanja o kliničkoj upotrebi glutamina u medicini i pomoći u donošenju informiranih odluka o njegovoj primjeni u praksi. Klinička upotreba glutamina je raznolika. Najčešća primjena je u tretmanu upalnih bolesti crijeva (IBD) i sindroma propusnog crijeva, gdje glutamin pomaže u obnovi oštećene sluznice crijeva i smanjenju upale. Također se primjenjuje kod pacijenata s opekotinama i traumatskim povredama kako bi se podržala brza regeneracija tkiva. Glutamin također ima ulogu i u podršci imunološkom sistemu, posebno u situacijama kada je imunološki sistem izložen stresu, kao što su razne vrste infekcija ili teške bolesti. Prisutna je upotreba suplemenata sa glutaminom i u raznim sportovima s ciljem poboljšanja izdržljivosti i smanjenja umora. Iako je unos suplemenata sa glutaminom siguran za većinu ljudi, treba ga koristiti pažljivo, posebno kod osoba sa određenim zdravstvenimproblemima. Mogući neželjeni efekti uključuju pojavu gastrointestinalnih smetnji i alergijskih reakcija. U zaključku, klinička upotreba glutamina ima značajan potencijal za poboljšanje zdravlja i liječenje različitih stanja. Međutim, uvijek je važno konsultirati se s kvalifikovanim zdravstvenim stručnjakom prije početka upotrebe glutamina, kako bi se osigurala sigurnost i efikasnost terapije.

Ključne riječi: *glutamin, Sindrom iritabilnog kolona, imuni sistem*

4-O-4

Clinical use of Glutamine

Vildana HASANAGIC , prof. dr. Jasmina ĐEĐIBEGOVIĆ

Farmaceutski fakultet Univerzitet u Sarajevu

*Autor za korespodenciju: Vildana Hasanagic, vildanahasanagic@ffsa.unsa.ba

Summary

Glutamine is an amino acid that plays a key role in many biological processes in the human body. In addition to being a fundamental component of proteins, glutamine has a significant role in energy metabolism, immune system function, and the preservation of intestinal mucosal integrity. Because of these important functions, glutamine has garnered attention in medicine and research. This paper aims to provide a comprehensive overview of the current state of knowledge regarding the clinical use of glutamine in medicine and assist in making informed decisions about its application in practice. The clinical use of glutamine is diverse. The most common application is in the treatment of inflammatory bowel diseases (IBD) and leaky gut syndrome, where glutamine aids in the restoration of damaged intestinal mucosa and reduction of inflammation. It is also used in patients with burns and traumatic injuries to support rapid tissue regeneration. Glutamine also plays a role in supporting the immune system, especially in situations where the immune system is exposed to stress, such as various infections or severe illnesses. Glutamine supplements are also used in various sports to enhance endurance and reduce fatigue. While the intake of glutamine supplements is generally safe for most individuals, it should be used cautiously, especially in people with certain health conditions. Possible side effects include gastrointestinal disturbances and allergic reactions. In conclusion, the clinical use of glutamine has significant potential for improving health and treating various conditions. However, it is always important to consult with a qualified healthcare professional before starting glutamine usage to ensure the safety and effectiveness of the therapy.

Keywords: *glutamine, Irritable Bowel Syndrome, immune system*

4-O-5

Dijetarni faktori značajni u prevenciji i/ili tretmanu karcinoma prostate

Elma HASKOVIĆ, Ejla HODŽIĆ, Elma KARADŽIĆ, Adisa MAHMUTOVIĆ, Azra MATORUGA, Jasmina ĐEĐIBEGOVIĆ

Farmaceutski fakultet Univerzitet u Sarajevu

*Autor za korespodenciju: Elma Hasković, elmahaskovic@ffsa.unsa.ba

Sažetak

Karcinom prostate zbog svoje učestalosti postaje sve značajniji javnozdravstveni problem širom svijeta, posebno u zapadnim zemljama. Dijetarni faktori su oni koji su direktno povezani sa prehrambenim navikama pojedinca i odnose se na vrstu, količinu i učestalost konzumiranja namirnica. Cilj rada je bio istražiti koji dijetarni faktori su značajni u prevenciji kao i tretmanu/liječenju karcinoma prostate, ali isto tako i skrenuti pozornost na namirnice koje bi trebalo izbjegavati tokom liječenja ili u prevenciji ove vrste karcinoma. Za izradu ovog rada korišteni su naučno-istraživački časopisi i radovi pronađeni putem internet pretraživača poput PubMed; National Library of Medicine; BioMedicine Central (BMC) Part of Springer Nature; ScienceDirect; UCSF Health (University of California San Francisco); stranicu AACR (American Association for Cancer Research). U radu su opisane određene vrste voća i povrća (nar, paradajz i proizvodi od paradajza, povrće iz porodice krstašica: kelj, kupus, brokule, karfiol), koji su od iznimnog značaja u prevenciji karcinoma prostate kao i spojevi koji imaju primarno antioksidativna djelovanja kao što su polifenoli i selen, te drugi vitaminski suplementi (vitamin A i D). Rezultati našeg istraživanja su pokazali da voće, povrće i polifenoli mogu biti značajni u prevenciji karcinoma prostate, ali su potrebne daljnje studije kako bi se razjasnila njihova uloga u tretmanu pacijenata s utvrđenom dijagnozom karcinoma prostate. Suplementi selena i vitamina ne mogu se zagovarati za prevenciju raka prostate i zaista veće doze mogu biti povezane s lošijom prognozom.

Ključne riječi: *karcinom prostate, dijetarni faktori, voće i povrće, polifenoli, vitaminski suplementi*

4-O-5

Dietary factors important in the prevention and/or treatment of prostate cancer

Elma HASKOVIĆ, Ejla HODŽIĆ, Elma KARADŽIĆ, Adisa MAHMUTOVIĆ, Azra MATORUGA, Jasmina ĐEĐIBEGOVIĆ

University of Sarajevo – Faculty of Pharmacy

Corresponding author: Elma Hasković, elmahaskovic@ffsa.unsa.ba

Summary

Due to its frequency, prostate carcinoma is becoming an increasingly significant public health problem worldwide, especially in Western countries. Dietary factors are those that are directly related to an individual's eating habits and refer to the type, quantity and frequency of food consumption. The aim of this paper was to investigate the significant dietary factors in the prevention as well as treatment of prostate carcinoma, while also drawning attention to the foods that should be avoided during the treatment or prevention of this type of cancer. For writing this paper, scientific research journals and paperworks found through internet search engines, such as PubMed; National Library of Medicine; BioMedicine Central (BMC) Part of Springer Nature; ScienceDirect; UCSF Health (University of California San Francisco); page from AACR (American Association for Cancer Research). The paper describes certain types of fruits and vegetables (pomegranates, tomatoes and tomato products, cruciferous vegetables: cale, cabbage, broccoli, cauliflower), which are extremely important in the prevention of prostate carcinoma, as well as compounds that have primarily antioxidant effects as which are polyphenols and selenium, and other vitamin supplements (vitamin A and D). The results of our research showed that fruits, vegetables and polyphenols can be important in the prevention of prostate cancer, but other further studies are needed to clarify their role in the treatment of patients with a confirmed diagnosis of prostate carcinoma. Selenium and vitamin supplements can not be advocated for the prevention of prostate cancer and indeed higher doses may be associated with a worse prognosis.

Keywords: *prostate carcinoma, dietary factors, fruits and vegetables, polyphenols, vitamin supplements*

4-O-6

Preventabilni faktori rizika za razvoj osteoporoze kod predmenopauzalnih žena u Bosni i Hercegovini

Amila KUKIĆ [1*]

[1] Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za bromatologiju i nutriciju, BiH

* Autor za korespodenciju: Amila Kukić, amilakukic@ffsa.unsa.ba

Sažetak

Osteoporoza je metabolička bolest koja se ubraja u 5 najčešćih hroničnih bolesti u svijetu. Ovu bolest karakterizira gubitak koštane mase, čime se povećava rizik od nastanka frakture kosti. Na nivou Federacije BiH registrovano je približno 4200 osoba sa osteoporozom godišnje. S obzirom na veliki broj oboljelih od osteoporoze širom svijeta ali i u našoj zemlji, fokus treba biti na svakodnevnim zdravim životnim navikama kako bi se smanjili faktori rizika te prevenirala bolest. Cilj ovog istraživanja bio je ispitati preventabilne faktore rizika za razvoj osteoporoze kod predmenopauzalnih žena. Anketni upitnik je uključivao 22 pitanja vezana za zdravstveno stanje i moguće faktore rizika, a isti je popunilo 200 ispitanica. Faktori rizika koji su se procjenjivali su: starost, spol, porodična anamneza, pušenje, konzumacija alkohola i anamneza lijekova. Rezultati ovog istraživanja su pokazali da je najzastupljeniji faktor rizika kod predmenopauzalnih ispitanica bilo konzumiranje kafe. Konzumiranje kafe 3-5 šolja dnevno i pušenje ciagreta duže od 5 godina utiče na povećanje rizika za nastanak preloma kostiju prilikom pada. Temelj zdravlja kostiju je održavanje tjelesne aktivnosti, uravnotežena i redovita prehrana te adekvatan unos kalcija i vitamina D. Dakle, pažnju treba sve više usmjeravati na edukaciju žena i promociju zdravog stila života gdje bi žene trebale biti svjesne navedenih rizika i što prije poduzeti mjere povećanja /očuvanja koštane gustoće i kvalitete kosti.

Ključne riječi: *osteoporoza, mineralna gustina kostiju, faktori rizika, tjelesna aktivnost*

4-O-6

Preventable risk factors for osteoporosis in premenopausal women in Bosnia and Herzegovina

Amila KUKIĆ [1*]

[1] University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, BiH

* Corresponding author: Amila Kukić, amilakukic@ffsa.unsa.ba

Summary

Osteoporosis is defined as metabolic disease that is the one of the five common chronic diseases in the world. This disease is characterized by loss of bone mass, which increases the risk of bone fracture. At the level of the Federation of Bosnia and Herzegovina, approximately 4,200 people with osteoporosis are registered annually. Considering the large number of osteoporosis sufferers around the world and in our country, the focus should be on daily healthy lifestyle habits in order to reduce risk factors and prevent the disease. The aim of this research was to examine preventive risk factors for the development of osteoporosis in premenopausal women. The survey questionnaire included 22 questions related to health status and possible co-founders, and it was filled out by 200 respondents. Risk factors that are evaluated are: age, sex, family history, smoking, alcohol consumption, and drug history. The results of this research showed that the most prevalent risk factor in premenopausal subjects was coffee consumption. Therefore, consuming 3-5 cups of coffee a day and smoking cigarettes for more than 5 years increases the risk of bone fractures during a fall. The basis of bone health is maintaining physical activity, a balanced and regular diet, and the proper of vitamin D and calcium intake. More attention needs to be paid on educating woman's education and the promotion on healthy lifestyle, where woman would be aware of all mentioned risks and they would be in a position to take measures on increasing bone density and quality of bones.

Keywords: *osteoporosis, bone mineral density, risk factors, physical activity*

4-O-7

Značaj prehrane u tretmanu akni

Nudžejma MUJDŽIĆ, Jasmina ĐEĐIBEGOVIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za bromatologiju i nutriciju, BiH

*Autor za korespodenciju: Nudžejma Mujdžić, nudzejmamujdzic@ffsa.unsa.ba

Sažetak

Acne vulgaris (AV) je hronična bolest koja pogađa veliki procenat populacije. Na razvoj akni utiču i vanjski i unutrašnji faktori. Akne na koži se mogu pojaviti u vidu papula, pustula, nodula, cista i neupalnih komedona. Pojava akni je najčešće povezana sa hiperpodukcijom sebuma, hiperkeratinizacijom folikula dlake, upalom i kolonizacijom bakterija *Cutibacterium acnes*, a mogu biti prisutni i nebakterijski uzroci nastanka akni. Svrha ovog rada je pokazati kakav je efekat unosa određene vrste hrane i dodataka prehrani na stanje akni, te kako određeni faktori u prehrani utiču na pojavu akni. Ti faktori su: mlijeko i mliječni proizvodi, čokolada, ugljikohidrati i glikemijski indeks, masne kiseline, antioksidansi, probiotici i prebiotici, vitamini A, D i E, cink i jod. Korištenjem odgovarajuće literature opisani su rezultati studija i sumirani su dokazi o uticaju pojedinačnog unosa nutrijenata na stanje akni kod pacijenata. Zahvaljujući rezultatima studija u ovom radu će biti prikazani i zaključci koji se odnose na prehranu u tretmanu akni. Hrana s visokim glikemijskim indeksom, mliječni proizvodi i čokolada mogu dovesti do pogoršanja stanja akni. Sa druge strane do poboljšanja stanja akni, gdje se smanjuje upala, dovodi upotreba omega-3 masnih kiselina, antioksidanasa, probiotika, prebiotika, vitamina A, D i E, cinka i joda.

Ključne riječi: *akne, prehrana, hrana*

4-O-7

The importance of nutrition in the treatment of acne

Nudžejma MUJDŽIĆ, Jasmina ĐEĐIBEGOVIĆ

University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, BiH

*Corresponding author: Nudžejma Mujdžić, nudzejmamujdzic@ffsa.unsa.ba

Summary

Acne vulgaris (AV) is a chronic disease that affects a large percentage of the population. Both external and internal factors affect the development of acne. Acne can appear on the skin in the form of papules, pustules, nodules, cysts and non-inflammatory comedones. The appearance of acne is most often associated with hyperproduction of sebum, hyperkeratinization of hair follicles, inflammation and colonization of bacteria *Cutibacterium acnes*, and non-bacterial causes of acne may also be present. The purpose of this paper is to show the effect of the intake of certain types of food and nutritional supplements on the condition of acne, and how certain factors in the diet affect the appearance of acne. These factors are: milk and milk products, chocolate, carbohydrates and glycemic index, omega 3 fatty acids, antioxidants, probiotics and prebiotics, vitamins A, D and E, zinc and iodine. Using the appropriate literature, the results of the studies were described and the evidence on the impact of individual nutrient intake on the condition of acne in patients was summarized. Thanks to the results of the study, this paper will also present conclusions related to nutrition in the treatment of acne. Foods with a high glycemic index, dairy products and chocolate can make acne worse. On the other hand, the use of fatty acids, antioxidants, probiotics, prebiotics, vitamins A, D and E, zinc and iodine leads to an improvement in the condition of acne, where inflammation is reduced.

Keywords: *acne, nutrition, food*

4-O-8

Procjena nutritivnog statusa i značaj nutritivne terapije kod pacijentica oboljelih od karcinoma cerviksa

Amina NUMANOVIĆ*, Dalila DUHOVIĆ, Sabina ŠEČIĆ

Univerzitet u Sarajevu - Fakultet zdravstvenih studija, Stjepana Tomića 1, Sarajevo

*Autor za korespondenciju: aminanumanovic17@gmail.com

Sažetak

Karcinom cerviksa predstavlja vodeći maligni tumor među oboljenjima reproduktivnog sistema kod žena širom svijeta. Prema podacima Svjetske zdravstvene organizacije, procjenjuje se da je do danas u svijetu oboljelo 570.700 žena, a 311.000 ih je umrlo zbog ove bolesti. Razvoj karcinoma cerviksa u korelaciji je sa nizom faktora, a jedan od najvažnijih je prehrana i njen uticaj na imunološki sistem i razvoj malnutricije. Cilj rada je pregledom literature prikazati važnost prehrane u regulaciji imunološkog sistema kod pacijentica sa karcinomom cerviksa, istovremeno naglašavajući nužnost korištenja alata za procjenu nutritivnog statusa. Korišteni su dostupni naučni radovi objavljeni u relevantnim bazama podataka kao što su ScienceDirect, PubMED upotrebom ključnih „nutrition“ , „cervical cancer“, „malnutrition“. Studije su pokazale da unos određenih hranjivih tvari može pomoći u smanjenju rizika od perzistentne infekcije humanim papiloma virusom (HPV). Namirnice bogate vitaminima A, C, E i D te folatom imaju potencijal inhibirati proliferaciju stanica, sprječavati oštećenje DNK i poboljšavati imunološke funkcije. Primjenom NRS 2002 alata za procjenu nutritivnog statusa utvrđeno je da je 27,27% od ukupno 47 pacijentica s karcinomom cerviksa bilo pod nutritivnim rizikom. Primjenom PG-SGA utvrđeno je da je 46,67% (n=77) pacijentica s karcinomom cerviksa imalo nutritivni rizik. U cilju smanjenja rizika od razvoja ovog malignog oboljenja, neophodno je promovisati zdrave životne stilove, usvojiti pravilne prehrambene navike i provesti vakcinaciju protiv HPV-a. Stoga je potrebno interdisciplinarno djelovanje zdravstvenih profesionalaca iz oblasti zdravstvene njege, dijetetičara i ljekara.

Ključne riječi: *prehrana, karcinom cerviksa, malnutricija*

4-O-8

Assessment of nutritional status and the importance of nutritional therapy in patients with cervical cancer

Amina NUMANOVIĆ*, Dalila DUHOVIĆ, Sabina ŠEČIĆ

University of Sarajevo - Faculty of Health Studies, Stjepana Tomića 1, Sarajevo

*Author for correspondence: aminanumanovic17@gmail.com

Summary

Cervical cancer is the leading malignant tumor among malignancies of the reproductive system in women worldwide. According to the World Health Organization, an estimated 570,700 women in the world have been diagnosed with it to date, and 311,000 of them have died from the disease. The development of cervical cancer is related to a number of factors, one of the most important of which is nutrition and its effects on the immune system and the development of malnutrition. The aim of this article is to review the literature to show the importance of nutrition in the regulation of the immune system in patients with cervical cancer and, at the same time, to emphasize the need to use tools to assess nutritional status. Available scientific papers published in relevant databases such as ScienceDirect, PubMED with the keywords "nutrition", "cervical cancer", "malnutrition" were used. Studies have shown that consumption of certain nutrients can help reduce the risk of persistent human papillomavirus (HPV) infection. Foods rich in vitamins A, C, E, and D, as well as folic acid, have the potential to inhibit cell proliferation, prevent DNA damage, and improve immune function. Using the NRS 2002 nutritional status assessment tool, it was found that 27.27% of a total of 47 patients with cervical cancer were at nutritional risk. Using PG-SGA, 46.67% (n=77) of cervical cancer patients were found to be at nutritional risk. In order to reduce the risk of developing this malignant disease, it is necessary to promote a healthy lifestyle, adopt proper dietary habits, and vaccinate against HPV. Therefore, an interdisciplinary approach and interaction between healthcare professionals, dieticians and physicians is required.

Keywords: *nutrition, cervical cancer, malnutrition*

4-O-9

Dijetoterapija kod osoba sa poremećajem autističnog spektra

Dženita PAŠALIĆ, Selma ABDUKIĆ, Šejla AVDUKIĆ, Ivona BAREŠIĆ, Ilda BUKVIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za Bromatologiju i nutriciju, BiH

Autor za korespondenciju: Dženita PAŠALIĆ, dzenita.pasalic99@gmail.com

Sažetak

Poremećaj autističnog spektra (akronim *ASD: Autism Spectrum Disorders*) je neurorazvojni poremećaj koji utiče na nekoliko sfera normalnog mentalnog razvoja u prvih nekoliko godina života, obično do treće godine života Djecu s ASD-om karakteriziraju deficiti u socijalnoj interakciji i komunikaciji, zajedno s prisutnošću ponavljajućih, ograničenih obrazaca ponašanja, interesa ili aktivnosti prisutnih tokom ranih perioda razvoja. Čest komorbiditet kod osoba sa ASD-om su poremećaji na nivou gastrointestinalnog trakta. ASD je složeno stanje, te je i liječenje istog kod djece i adolescenta vrlo složeno, a prema našim trenutnim saznanjima ne postoje lijekovi odobreni za liječenje ključnih simptoma ASD-a od strane relevantnih regulatornih agencija. Djeca s ovim poremećajem su uopšteno osjetljivija na nuspojave psihoaktivnih supstanci od njihovih vršnjaka koji nemaju ovaj poremećaj . Također kod istih, primjećeni su i nedostaci esencijalnih masnih kiselina u svakodnevnoj prehrani te su potrebne suportivne terapije, odnosno odgovarajuće dijetetske intervencije. Cilj rada jeste ukazati na značaj veće informiranosti zdravstvenih radnika o tretmanu djece i odraslih sa poremećajima autističnog spektra, načinu njihovog života. s posebnim naglaskom na prehranu i dodatke prehrani u svrhu poboljšanja kvaliteta života. Za izradu rada korišteni su naučnoistraživački i stručni članci dostupni na internetskim bazama podataka. Rezultati pretraživanja ovih izvora su pokazali da dijeta bez glutena i kazeina (GFCF), dijeta bez glutena (GFD) i ketogena dijeta (KD), dolaze u obzir kao suportivna terapija za osobe sa ASD.

Ključne riječi: *autizam, dijetoterapija, prehrambene smjernice*

4-O-9

Diet therapy for people with autism spectrum disorder

Dženita PAŠALIĆ, Selma ABDUKIĆ, Šejla AVDUKIĆ, Ivona BAREŠIĆ, Ilda BUKVIĆ

University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, BiH

Corresponding author: Dženita PAŠALIĆ, dzenita.pasalic99@gmail.com

Summary

Autism spectrum disorder (acronym ASD: Autism Spectrum Disorders) is a neurodevelopmental disorder that affects several spheres of normal mental development in the first few years of life, usually until the third year of life. Children with ASD are characterized by deficits in social interaction and communication, together with the presence of repetitive, limited patterns of behavior, interests or activities present during early periods of development. A common comorbidity in people with ASD are disorders at the level of the gastrointestinal tract. ASD is a complex condition, and its treatment in children and adolescents is very complex, and according to our current knowledge, there are no drugs approved for the treatment of key symptoms of ASD by the relevant regulatory agencies. Children with this disorder are generally more sensitive to the side effects of psychoactive substances than their peers who do not have this disorder. In the same case, deficiencies of essential fatty acids in the daily diet have been noticed, and supportive therapies, i.e. appropriate dietary interventions, are needed. The goal of the work is to point out the importance of better information for healthcare workers about the treatment of children and adults with autism spectrum disorders, their way of life with a special emphasis on nutrition and nutritional supplements for the purpose of improving the quality of life. Scientific research and professional articles available on internet databases were used for the preparation of the paper. The results of the search of these sources showed that gluten and casein-free diet (GFCF), gluten-free diet (GFD) and ketogenic diet (KD) are considered as supportive therapy for people with ASD.

Keywords: *autism, diet therapy, dietary guidelines*

4-O-10

Uloga vitamina D u preveniranju i liječenju osteoporoze

Anđela VIDOVIĆ[1], Sara VALJAN[1], Demir DŽAFEROVIĆ[1], Sabina ŠEČIĆ[1]

[1]Univerzitet u Sarajevu - Fakultet zdravstvenih studija, Sarajevo, BiH

Autor za korespodenciju: Anđela Vidović, andjela.vidovic@fzs.unsa.ba

Sažetak

Prema SZO osteoporoza je progresivna bolest koja mijenja mineralni sastav i čvrstoću kosti, povećavajući rizik od prijeloma. Zbog toga je potrebno unositi dovoljnu koncentraciju vitamina D koji pospješuje apsorpciju kalcija i fosfora i tako poboljšava mineralni sastav. Cilj rada je pregledom dostupne literature prikazati važnost vitamina D u liječenju i prevenciji osteoporoze. Istraživanje je sprovedeno na osnovu pregleda i analize naučnih radova koji su objavljeni u relevantnim bazama podataka (PubMED, ScienceDirect). U studijama koje su uključivale žene u postmenopauzi od 371, ukupno 51 % zahtijevalo je nadoknadu vitamina D, a 88 % žena je kroz 31 dan suplementacije vitaminom D normaliziralo koncentraciju vitamina D. Drugo istraživanje pokazalo je povezanost vitamina D i gustoće kostiju gdje je kod 44 % osoba s osteporozom bio prisutan nedostatak vitamina D, a najveća prevalenca navedenog je u dobnoj skupini 51-60 godina. Kod osoba s većim rizikom od prijeloma preporučuje se povišena razina vitamina D (30 ng/ml) kroz sunčevu svjetlost koja je glavni izvor, a konzumacijom masne ribe poput lososa, skuše i bakalara te nekih kruhova, sireva, jogurta također se može povećati njegova koncentracija, no uz navedenu ishranu potrebna je i dodatna suplementacija. U istraživanju koje uključuje zdravu populaciju dodatni vitamin D nije pokazao značajno poboljšanje mineralne gustoće kosti čime se dokazuje da je značajniji u liječenju nego u prevenciji osteoporoze. Rezultati pokazuju da vitamin D poboljšava koštanu gustoću osoba sa osteoporozom i tako smanjuje rizik za posljedicu koja može biti fatalna, a to je prijelom. Bolesnike s osteoporozom potrebno je poticati na promjenu načina života i prehrane kako bi se osigurao adekvatan unos vitamina D. Neophodno je sprovoditi javnozdravstvene akcije s ciljem poboljšanja statusa vitamina D i kod svih dobnih skupina.

Ključne riječi: *vitamin D, osteoporoza, ishrana*

4-O-10

The role of vitamin D in the prevention and treatment of osteoporosis

Anđela VIDOVIĆ[1], Sara VALJAN[1], Demir DŽAFEROVIĆ[1], Sabina ŠEČIĆ[1]

University of Sarajevo – Faculty of Health Studies, Sarajevo, BiH

Correesponding author: Anđela Vidović, andjela.vidovic@fzs.unsa.ba

Summary

According to the WHO, osteoporosis is a progressive disease that changes the mineral composition and strength of bones, increasing the risk of fractures. For this reason, it is necessary to consume a sufficient quantity of vitamin D, which enhances the absorption of calcium and phosphorus and thus improves the mineral composition. The aim of this work is to show the importance of vitamin D in the treatment and prevention of osteoporosis by reviewing the available literature. The research was conducted based on the review and analysis of scientific work published in the relevant databases (PubMED, ScienceDirect). During studies of women in postmenopausal period, 51 % of 371 participants required vitamin D supplementation and 88 % had normalized vitamin D levels within 31 days of vitamin D supplementation. Another study showed a connection between vitamin D and bone density, where 44 % of people with osteoporosis had a vitamin D deficiency. The highest prevalence of this was in the age group 51 – 60 years. For people with a higher risk of fractures, an increased level of vitamin D (30 ng/mL) is recommended through sunlight, which is the main source. Also a consumption of oily fish such as salmon, mackerel and cod, as well as some breads, cheeses, yogurt, can increas vitamin D concetration. In addition to the aforementioned nutrition, additional suplementation is required. In a study involving a healthy population, additional vitamin D did not show a significant improvement in bone mineral density. This proves that vitamin D is more important in the treatment than in the prevention of osteoporosis. The results show that vitamin D improves the bone density of people with osteoporosis and thus reduces the risk of a consequence such as fracture, that can be fatal. Patients with osteoporosis should be encouraged to modify their lifestyle and diet to ensure adequate vitamin D intake. It is necessary to implement public health measures to improve vitamin D status in all age groups.

Keywords: *vitamin D, osteoporosis, nutrition*

4-P-1

Uticaj ishrane mesnim proizvodima na hematološki profil i histološke karakteristike tankog crijeva adultnih stahora

Aida BEŠIĆ

Univerzitet u Sarajevu, Veterinarski fakultet, Katedra za kliničke nauke veterinarske medicine, BiH

E-mail: katicaaida1@gmail.com

Sažetak

Laboratorijski stahor je važan eksperimentalni model koji se koristi u istraživačke svrhe. Predstavlja animalni model od izbora za naše istraživanje jer je monogastrična životinja i omnivor. Cilj istraživanja je izvršiti procjenu uticaja mesnih proizvoda na hematološki profil stahora, kao i moguće patohistološke promjene na sluznici tankog crijeva (duodenuma i jejunuma). Upotrijebljeno je šesnaest (16) adultnih stahora, podijeljenih u dvije grupe po osam (8). Prva grupa je kontrolna, hranjena konvencionalnom hranom predviđenom za glodare. Druga grupa je eksperimetalna. Ista je konzumirala sedam (7) sedmica isključivo mesne proizvode, kombinovano svježe i termički obrađeno meso. Upotrijebljena je periferna krv za praćenje hematoloških i biohemijskih parametara. Također je izvršeno mikroskopiranje krvnih korpuskula periferne krvi u cilju kvantifikacije eventualno prisutnih poikilocitotičnih formi eritrocita. Patohistološka analiza je urađena prema standardnoj metodologiji, a fokus su bili dijelovi tankog crijeva, duodenum i jejunum. Dobiveni rezultati upućuju na pojavu anemije, utvrđene su snižene vrijednosti hemoglobina (HGB) – hipohromija. Neki biohemijski parametri periferne krvi su povišeni (urea, kreatinin), što upućuje na nepovoljan uticaj konzumiranja mesnih proizvoda kroz duži period na funkcionalno stanje bubrega. U prilog ovoj tvrdnji je pronalazak visokog procentualnog prisustva ehinocita (57,67%), što upućuje na neka oboljenja na nivou bubrega. U duodenumu eksperimentalne grupe je uočena nešto veća visina vilusa (602.83 μm) u odnosu na kontrolnu grupu (475.34 μm). Visina vilusa u jejunumu eksperimentalne grupe je pokazala značajno manju vrijednost (278.91 μm), u odnosu na kontrolnu grupu (314.10 μm).

Ključne riječi: *duodenum, hematologija, jejunum, mesna ishrana*

4-P-1

The influence of feeding meat products on the hematological profile and histological characteristics of the small intestine of adult rats

Aida BEŠIĆ

University of Sarajevo, Faculty of Veterinary Medicine, Department of Clinical Sciences of Veterinary Medicine, Bosnia and Herzegovina

E-mail: katicaaida1@gmail.com

Summary

The laboratory rat is an important experimental model used for research purposes. It represents the animal model of choice for our research because it is a monogastric animal and an omnivore. The goal of the research is to assess the impact of meat products on the hematological profile of rats, as well as possible pathohistological changes in the mucosa of the small intestine (duodenum and jejunum). Sixteen (16) adult rats were used, divided into two groups of eight (8). The first group is a control group, where rats were fed with conventional food intended for rodents. The second group is experimental , where it was consumed exclusively meat products, combined with fresh and thermally processed meat for seven (7) weeks. Peripheral blood was used to monitor hematological and biochemical parameters. Microscopy of the blood corpuscles of peripheral blood was also performed in order to quantify any poikilocytotic forms of erythrocytes present. Pathohistological analysis was performed according to standard methodology, and the focus was on parts of the small intestine, duodenum and jejunum. The obtained results indicate the occurrence of anemia, low hemoglobin (HGB) values were found - hypochromia. Some biochemical parameters of peripheral blood are elevated (urea, creatinine), which points to the unfavorable influence of consuming meat products over a long period on the functional state of the kidneys. In support of this claim is the finding of a high percentage of echinocytes (57.67%), which points to some diseases at the level of the kidneys. A slightly higher villus height (602.83 μm) was observed in the duodenum of the experimental group compared to the control group (475.34 μm). The height of the villus in the jejunum of the experimental group showed a significantly lower value (278.91 μm) compared to the control group (314.10 μm).

Keywords*: duodenum, hematology, jejunum, meat diet*

4-P-2

Anti-inflamatorna i protektivna uloga omega-3 polinezasićenih masnih kiselina

Amina BOLOBAN [1]*, Nataša BAJIĆ[1], Romana RADONJA[1], Ajna ŽUNIĆ[1], Emsel PAPIĆ[1], Sabina ŠEČIĆ[1]

[1]Univerzitet u Sarajevu, Fakultet zdravstvenih studija, Zdravstveni nutricionizam i dijetetika

*Autor za korespondenciju: Amina Boloban, amina.boloban@fzs.unsa.ba

Sažetak

Omega-3 polinezasićene masne kiseline (PUFA- *polyunsaturated fatty acids*) predstavljaju esencijalne nutrijente neophodne za normalno funkcionisanje organizma. Regulacijom antioksidativnih signalnih puteva i upalnih procesa, značajno doprinose smanjenju rizika od razvoja hroničnih nezaraznih oboljenja. Najznačajnije fiziološko djelovanje omega-3 PUFA imaju eikozapentaenska (EPA), dokozapentaenska (DPA), dokozaheksaenska kiselina (DHA), prisutne u ribljem ulju, te alfa-linolenska kiselina (ALA) prisutna u orašastom voću. Cilj rada je bio predstaviti uloge i benefite omega-3 PUFA na inflamatorne procese. Rad je urađen pregledom dostupne naučne literature objavljene u relevantnim bazama podataka upotrebom ključnih riječi "*omega 3 masne kiseline*", "*zdravlje*", "*koronarne bolesti*", "*upala*". Rezultati pretraživanja ovih izvora su pokazali da omega-3 PUFA imaju višestruke uloge i benefite. Anti-inflamatorna funkcija omega-3 PUFA se zasniva na moduliranju količine i vrsta proizvedenih eikozanoida, te djelovanju na unutarćelijske signalne puteve, aktivnost faktora transkripcije i ekspresiju gena. Pored ove uloge, omega-3 masne kiseline imaju i kardioprotektivno djelovanje, te također pokazuju vrlo efikasno dejstvo kod određenih autoimunih oboljenja. Osim toga, manjak DHA pridonosi razvoju neurodegenerativnih oboljenja. Užurban način života, izloženost svakodnevnom stresu, neadekvatna prehrana posljedično doprinosi većem unosu omega-6 masnih kiselina, što je posebno značajno u progresiji inflamatornih procesa. Učinkovite intervencije u svakodnevnoj prehrani, kao na primjer, pravilna integracija omega-3 masnih kiselina u ishranu, prema preporukama SZO, ključne su za zadovoljenje potreba svakog pojedinca, unapređenja zdravlja, te prevenciji bolesti, što rezultira smanjenjem opterećenosti sistema zdravstvene zaštite.

Ključne riječi: *omega-3 masne kiseline, zdravlje, koronarne bolesti, upala*

4-P-2

The anti-inflammatory and protective role of omega-3 polyunsaturated fatty acids

Amina BOLOBAN [1]*, Nataša BAJIĆ[1], Romana RADONJA[1], Ajna ŽUNIĆ[1], Emsel PAPIĆ[1], Sabina ŠEČIĆ[1]

[1]University of Sarajevo, Faculty of Health Studies, Health Nutrition and Dietetics
*Corresponding author: Amina Boloban, amina.boloban@fzs.unsa.ba

Summary

Omega-3 polyunsaturated fatty acids (PUFA) represent essential nutrients necessary for the normal functioning of the body. By regulating antioxidative signaling pathways and inflammatory processes, they significantly contribute to reducing the risk of developing chronic non-communicable diseases. The most significant physiological effects of omega-3 PUFAs are attributed to eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), docosahexaenoic acid (DHA), found in fish oil, and alpha-linolenic acid (ALA) present in nuts. The aim of this study was to present the roles and benefits of omega-3 PUFAs in inflammatory processes. The study was conducted by reviewing available scientific literature published in relevant databases using keywords such as "omega-3 fatty acids," "health," "coronary diseases," and "inflammation." The results of searching these sources have shown that omega-3 PUFAs have multiple roles and benefits. The anti-inflammatory function of omega-3 PUFAs is based on modulating the quantity and types of produced eicosanoids and their impact on intracellular signaling pathways, the activity of transcription factors, and gene expression. In addition to this role, omega-3 fatty acids also have a cardioprotective effect and demonstrate very effective actions in certain autoimmune diseases. Furthermore, a deficiency of DHA contributes to the development of neurodegenerative diseases. A fast-paced lifestyle, daily exposure to stress, and inadequate nutrition consequently lead to a higher intake of omega-6 fatty acids, which is particularly significant in the progression of inflammatory processes. Effective interventions in daily nutrition, such as the proper incorporation of omega-3 fatty acids into one's diet according to WHO recommendations, are essential for meeting the needs of individuals, improving health, and preventing diseases, resulting in a reduced burden on the healthcare system.

Keywords: *omega-3 fatty acids, health, cardiovascular disease, inflammation*

5. SAVREMENA DIJAGNOSTIKA I ANALITIKA HRANE
CURRENT TRENDS IN FOOD ANALYSIS

5-O-1

Ispitivanje stabilnosti dodataka prehrani s probioticima

Ajka ČAMDŽIĆ*[1], Jasmina ĐEĐIBEGOVIĆ[1], Davor J. KORČOK[2]

[1]Univerzitet u Sarajevu, Farmaceutski faklutet, Katedra za bromatologiju i nutriciju, BiH

[2]Farmaceutski fakultet Novi Sad

*Autor za korespondenciju: Ajka Čamdžić, ajkacamdzic@ffsa.unsa.ba

Sažetak

Probiotici su živi mikroorganizmi koji, kada se primjene u odgovarajućoj količini, domaćinu donose zdravstvenu korist. Da bi probiotici bili djelotvorni, moraju biti u stanju izdržati prolaz kroz gastrointestinalni trakt, kolonizirati se i razmnožavati u crijevima, stabilizirati ravnotežu crijevne flore, te biti sigurni i učinkoviti kod ljudi i ostati održivi tokom roka trajanja proizvoda. Ciljevi ovog rada bili su identificirati i prezentirati osnovne faktore stabilnosti dodataka prehrani sa probioticima, te eksperimentalno ispitati stabilnost odabranog soja probiotičkih bakterija nakon tri i šest mjeseci skladištenja u komori za stabilnost. Stabilnost je važan faktor koji direktno utiče na kvalitet, sigurnost i djelotvornost proizvoda, te se ispitivanje stabilnosti provodi u svim fazama razvoja farmaceutskog proizvoda, a omogućava razumijevanje uticaja spoljašnjih faktora na gotov proizvod. Faktori koji mogu uticati na održivost probiotika su: temperatura, sadržaj kiseonika, sadržaj vlage, aktivnost vode, tehnologija inkapsulacije, pH i uslovi obrade i skladištenja. U eksperimentalnom dijelu rada, bilo je potrebno zasijati agar ploče sa *Lactiplantibacillus plantarum 299v*, te pratiti rast kolonija nakon inkubacije na temperaturi od 37°C tri dana. Ukupan broj kolonija probiotskih bakterija sadržanih u sirovini/ili kapsulama određen je metodom decimalnih razblaženja, a rezultat od 36,9 i 31,95 x10^9 ćelija po kapsuli nakon tri i šest mjeseci, respektivno, ulazi u dati raspon sa zadržavanjem vijabilnosti od 66%. Rezultati određivanja integriteta blistera, sadržaja vlage, te aktivnosti vode, odgovarali su datim specifikacijama, što potvrđuje da pakovni materijal odgovara specifikacijama i osigurava stabilnost proizvoda.

Ključne riječi: *probiotici, Lactiplantibacillus plantarum 299v, stabilnost, integritet blistera, aktivnost vode*

5-O-1

Determination of stability of probiotic food supplements

Ajka ČAMDŽIĆ[1]*, Jasmina ĐEĐIBEGOVIĆ[1], Davor J. KORČOK[2]

[1]University of Sarajevo, Faculty of Pharmacy, Sarajevo, BiH

[2]Faculty of Pharmacy, Novi Sad

*Corresponding author: Ajka Čamdžić, ajkacamdzic@ffsa.unsa.ba

Summary

Probiotics are live microorganisms that, when administered in the appropriate amount, bring health benefits to the host. For the effectiveness of probiotics, they must be able to survive passage through the gastrointestinal tract, colonize and multiply in the gut, stabilize the balance of gut flora, and be safe and effective in humans while remaining viable throughout the product's shelf life. The goals of this work were to identify and present the basic stability factors of nutritional supplements with probiotics, and to experimentally examine the stability of a selected strain of probiotic bacteria after three and six months of storage in a stability chamber. Stability is an important factor that directly affects the quality, safety and effectiveness of a pharmaceutical product, therefore, stability testing is carried out in all phases of the development of a pharmaceutical product, and enables understanding of the influence of external factors on the final product. Factors that can affect the viability of probiotics are temperature, oxygen levels, moisture content, water activity, encapsulation technology, pH levels and processing and storage conditions. In the experimental part of the work, it was first necessary to inoculate agar plates with *Lactiplantibacillus plantarum 299v*, and monitor the growth of colonies after incubation at a temperature of 37°C for three days. The total number of colonies of probiotic bacteria contained in the raw material/or capsules was determined by the decimal dilution method, and the result of 36.9 and 31.95 x10^9 cells per capsule after three and six months, respectively, is within the given range with a viability retention of 66%. The results of determining the integrity of the blister, the moisture content and the water activity, corresponded to the given specifications, which confirms that the packaging material corresponds to the specifications and ensures the stability of the product.

Keywords: *probiotics, Lactiplantibacillus plantarum 299v, stability, blister integrity, water activity*

5-O-2

Određivanje koncentracije fenola, flavonoida i antioksidativne aktivnosti u različitim stadijima rasta brokule

Isidora ĐURIČIĆ, Lejla ČENGIĆ, Dženeta FAZLIĆ

Univerzitet u Sarajevu, Poljoprivredno – prehrambeni fakultet, Odsjek za prehrambene tehnologije, Smjer: Nutricionizam, Bosna i Hercegovina

Sažetak

Brokula (*Brassica oleracea* var. *italica*) je jednogodišnja kultura koja pripada porodici *Brassicaceae*. Brokula je bogata različitim nutrijentima i bioaktivnim spojevima poput fenola i flavonoida. Fenoli su prirodni spojevi prisutni u biljkama koji imaju snažan antioksidativni potencijal. Flavonoidi su podskupina fenola koja obuhvata raznoliku grupu jedinjenja, često povezanu sa raznim biološkim aktivnostima. Cilj ovog rada je odrediti sadržaj fenola, flavonoida i antioksidativnu aktivnost u različitim stadijima rasta brokule (klice, mikrobilje i glavica brokule). Uzorci su ekstrahirani sa 70% etanolom (60°C/30min) uz refluks. Određivanje ukupnih fenola temelji se na spektofotometrijskoj metodi, primjenom Folin - Cioalteau reagensa. Sadržaj flavonoida određen je istom metodom, korištenjem aluminij hlorida, dok je antioksidativni kapacitet određen pFRAP metodom. Kao standard za određivanje flavonoida korišten je katehin, dok je galna kiselina korištena za određivanje fenola i antioksidativne aktivnosti. Rezultati koncentracije fenola i antioksidativne aktivnosti izraženi su u mgGAE/100g uzorka (svježe mase), dok je koncentracija flavonoida izražena u mgCE/100g uzorka (svježe mase). Rezultati pokazuju najveći sadržaj fenola, sa koncentracijom 102,82 ± 3,79 mgGAE/100g ($p<0,05$); i flavonoida sa koncentracijom 10,72 ± 3,27 mgCE/100g ($p<0,05$) u klicama, dok mikrobilje ima najveću antioksidativnu aktivnost uz koncentraciju 0,35 ± 0,6 mgGAE/100g ($p<0,05$). Rezultati pokazuju značajno veći sadržaj fenola i flavonoida tokom faze klijanja, s tendencijom smanjenja tokom rasta vegetativnih organa. Potrebna su dodatna istraživanja kako bi se bolje razumjela kompleksnost utjecaja različitih faktora na produkciju bioaktivnih komponenti u različitim fazama rasta biljke.

Ključne riječi*: fenoli, flavonoidi, antioksidativna aktivnost, brokula*

5-O-2

Determination of the concentration of phenols, flavonoids and antioxidant activity at different stages of broccoli growth

Isidora ĐURIČIĆ, Lejla ČENGIĆ, Dženeta FAZLIĆ

University of Sarajevo, Faculty of Agriculture and Food Science, Department of Food technology, Major in Nutrition, Bosnia and Herzegovina

Summary

Broccoli (*Brassica oleracea var. italica*) is an annual crop belonging to the *Brassicaceae* family. Broccoli is rich in various nutrients and bioactive compounds such as phenols and flavonoids. Phenols are natural compounds present in plants that have strong antioxidant potential. Flavonoids are a subset of phenols encompassing a diverse group of compounds often associated with various biological activities. This study aims to determine the content of phenols, flavonoids, and antioxidant activity at different stages of broccoli growth (sprouts, microgreens, and broccoli heads). Samples were extracted with 70% ethanol (60°C/30min) using reflux. The determination of total phenols is based on a spectrophotometric method using the Folin-Ciocalteu reagent. The content of flavonoids was determined by the same method using aluminum chloride, while the antioxidant capacity was determined using the pFRAP method. Catechin was used as the standard for determining flavonoids, and gallic acid was used to determine phenols and antioxidant activity. The results of phenol concentration and antioxidant activity are expressed in mgGAE/100g of the sample (fresh weight), while the concentration of flavonoids is expressed in mgCE/100g of the sample (fresh weight). The results show the highest content of phenols, with a concentration of 102.82 ± 3.79 mgGAE/100g ($p<0.05$), and flavonoids with a concentration of 10.72 ± 3.27 mgCE/100g ($p<0.05$) in sprouts, while microgreens have the highest antioxidant activity with a concentration of 0.35 ± 0.6 mgGAE/100g ($p<0.05$). The results indicate significantly higher phenol and flavonoid content during the sprouting phase, with a tendency to decrease during the growth of vegetative organs. Further research is needed to better understand the complexity of the influence of various factors on the production of bioactive components at different stages of plant growth.

Keywords: *phenols, flavonoids, antioxidant activity, broccoli*

5-O-3

Uticaj procesiranja na sadržaj ukupnih fenola i antioksidativnu aktivnost u uzorku raštike (*Brassica oleracea* L. *var. acephala*)

Chiara MARINO*, Arnela ZULOVIĆ, Amna OMANOVIĆ, Elma ŠEMIĆ, Adna DŽAFERBEGOVIĆ, Amna BRKIĆ

Univerzitet "Džemal Bijedić" u Mostaru, Nastavnički fakultet, Odsjek hemija

*Autor za korespodenciju: Chiara Marino, chiaramarinoooo8@gmail.com

Sažetak

Raštika je autohtona hercegovačka povrtna kultura, veoma zastupljena u ishrani, nažalost malo istražena u svijetu. Ovo istraživanje ima za cilj ispitati sadržaj ukupnih fenola i antioksidativne aktivnosti u uzorku raštike, te ispitati uticaj procesiranja na sadržaj ovih supstanci. Istraživanje je provedeno korištenjem ultrazvučne ekstrakcije (UZV) i različitih otapala (voda i 70% etanol). Sadržaj ukupnih fenola određen je spektrofotometrijskom Folin-Ciolcalteu metodom, dok je antioksidativna aktivnost određena primjenom dvije različite metode, FRAP (*Ferric-reducing antioxidant power*) i ABTS (*2,2-azino-di-(3-ethylbenzthiazoline-sulfonic acid*). Dobiveni rezultati ukazuju na veći sadržaj ukupnih fenola u etanolnim ekstraktima, dok najveću antioksidativnu aktivnost i sadržaj ukupnih fenola je detektovan u svježem uzorku. FRAP metoda je pokazala veće vrijednosti antioksidativne aktivnosti u poređenju sa ABTS metodom. Zamrzavanje i kuhanje su doveli do smanjenja vrijednosti ukupnog sadržaja fenola, kao i antioksidativne aktivnosti. Svi ispitivani uzorci su pokazali dobru antioksidacijsku aktivnost i dobar udio ukupnih fenola.

Ključne riječi: *raštika, antioksidativna aktivnost, ukupni fenoli, ABTS, FRAP*

5-O-3

The impact of processing on total phenolic content and antioxidant activity in kale (*Brassica oleracea* L. *var. acephala*)

Chiara MARINO*, Arnela ZULOVIĆ, Amna OMANOVIĆ, Elma ŠEMIĆ, Adna DŽAFERBEGOVIĆ, Amna BRKIĆ

Dzemal Bijedic University of Mostar, Faculty of Education, Department for chemistry

*Corresponding author: Chiara Marino, chiaramarinoooo8@gmail.com

Summary

Kale is a native vegetable in Herzegovina, widely used in nutrition, unfortunately, with limited global research. This research aims to examine the content of total phenols and antioxidant activities in a kale samples and investigate the impact of processing on these substances. The study utilized ultrasonic extraction (UZV) with different solvents (water and 70% ethanol). Total phenol content was determined using the spectrophotometric Folin-Ciocalteu method, while antioxidant activity was determined using two different methods, FRAP (Ferric-reducing antioxidant power) and ABTS (2,2-azino-di-(3-ethylbenzthiazoline-sulfonic acid). The results indicated a higher total phenol content in ethanol extracts, while the highest antioxidant activity and total phenol content was detected in a fresh sample. The FRAP method showed higher values of antioxidant activity compared to the results obtained using ABTS method. Freezing and cooking resulted in a reduction in both the total phenol content and antioxidant activity. All tested samples showed good antioxidant activity and a significant content of total phenols.

Keywords: *kale, antioxidant activity, total phenols, ABTS, FRAP*

5-O-4

Matična mliječ – standard kvaliteta, aktivne komponente i biološke funkcije

Njegoš PARAŠ[1]*, Elma SUBAŠIĆ[1], Nikolina SKOKIĆ[1], Marija ŽABIĆ[1], Tanja VUKMANOVIĆ[1]

[1] Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespodenciju: Njegoš Paraš, njegosparas@ffsa.unsa.ba

Sažetak

U ovom radu je proučena matična mliječ, standard kvaliteta, aktivne komponente i biološke funkcije. Ciljevi su bili detaljno pregledati stručnu literaturu u cilju pronalaska informacija o sastavu, odnosno aktivnim komponentama matične mliječi, pronaći informacije o njenim biološkim funkcijama te steći znanje o kontroli kvaliteta matične mliječi. Matična mliječ je izvor hranjivih supstanci i bioaktivnih spojeva koji imaju značajnu ulogu u biološkoj aktivnosti i farmaceutskoj primjeni. Potvrđeno je da su proteini, peptidi, lipidi, fenoli i flavonoidi glavni bioaktivni spojevi odgovorni za različite farmakološke efekte matične mliječi. Proteini čine preko 50% suhe težine matične mliječi. Uočena su velika variranja u sadržaju manjih ugljikohidrata koji imaju ulogu u kontroli porijekla i autentičnosti proizvoda. Pored toga, u sastavu matične mliječi pronađeni su još i fenoli, voskovi, steroidi i fosfolipidi. Kao proizvod komercijalizovana je prvenstveno zbog dijetetske i kozmetičke aktivnosti. Matična mliječ pokazuje brojna značajna djelovanja kao što su antimikrobno, imunomodulatorno, antitumorsko, antiupalno, antioksidativno i druga djelovanja, no bez obzira na veliki broj bioaktivnih spojeva i njihovih mogućih djelovanja i dalje su potrebna dodatna istraživanja u ovom području. Postoje različiti faktori koji utiču na variranje koncentracije komponenti matične mliječi kao što su vrijeme žetve, geografsko područje, uslovi čuvanja. Potrebno je uložiti dodatne napore kako bi se donijele kvalitetne smjernice za ispitivanje kvaliteta i autentičnosti matične mliječi.

Ključne riječi*: matična mliječ, kvalitet, ugljikohidrati, djelovanje*

5-O-4

Royal jelly – quality standard, active components and biological functions

Njegoš PARAŠ[1*], Elma SUBAŠIĆ[1], Nikolina SKOKIĆ[1], Marija ŽABIĆ[1], Tanja VUKMANOVIĆ[1]

[1] University of Sarajevo, Faculty of Pharmacy, BiH

*Corresponding author: Njegoš Paraš, njegosparas@ffsa.unsa.ba

Summary

In this work, royal jelly, quality standard, active components and biological functions were studied. The goals were to review the professional literature in detail in order to find information about the composition, that is, the active components of royal jelly, to find information about its biological functions, and to gain knowledge about the quality control of royal jelly. Royal jelly is a source of nutrients and bioactive compounds that play a significant role in biological activity and pharmaceutical application. It has been confirmed that proteins, peptides, lipids, phenols and flavonoids are the main bioactive compounds responsible for the various pharmacological effects of royal jelly. Proteins make up over 50% of the dry weight of royal jelly. Large variations were observed in the content of minor carbohydrates, which play a role in controlling the origin and authenticity of the product. In addition, phenols, waxes, steroids and phospholipids were also found in the composition of royal jelly. As a product, it was commercialized primarily due to its dietary and cosmetic activity. Royal jelly shows numerous significant effects such as antimicrobial, immunomodulatory, antitumor, anti-inflammatory, antioxidant and other effects, regardless of the large number of bioactive compounds and their possible effects, additional research is still needed in this area. There are various factors that affect the variation in the concentration of royal jelly components such as harvest time, geographical area, storage conditions. Additional efforts are needed to provide quality guidelines for testing the quality and authenticity of royal jelly.

Keywords: *royal jelly, quality, carbohydrates, effect*

SPONZORI KONGRESA

BOSNALIJEK
Prvo zdravlje!

PRIJATELJI KONGRESA