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7. Studentski Kongres „Hrana-Ishrana-Zdravlje“ sa međunarodnim učešćem
7th Student Congress „Food-Nutrition-Health“ with international participation

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Jasmina Đeđibegović

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

KNJIGA SAŽETAKA

**7th Students Congress „Food-Nutrition-Health“
with international participation**

BOOK OF ABSTRACTS

Sarajevo, 2022

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Studentski kongres „HRANA-ISHRANA-ZDRAVLJE“, koji Univerzitet u Sarajevu organizuje se već sedmi put, jedinstveni je projekat ove vrste u regionu. Ono što ga čini posebnim jeste interdisciplinarni pristup temi od izuzetnog naučnog, ali i društvenog i životnog značaja. Naime, u samoj organizaciji kongresa učestvuju fakulteti grupacije medicinskih, prirodno-matematičkih i biotehničkih te humanističkih nauka Univerziteta u Sarajevu, dok prezentirane radove potpisuju studenti i njihovi mentori sa mnogih drugih fakulteta u zemlji i inostranstvu. S pravom možemo reći da je studentski kongres „HRANA-ISHRANA-ZDRAVLJE“ izrastao u regionalno prepoznatljiv naučni skup, na što smo izuzetno ponosni.

Za 7. Kongres „HRANA-ISHRANA-ZDRAVLJE“ Organizacioni odbor je odabrao 5 tematskih cjelina: 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. Na kongresu će biti predstavljen, 61 studentski rad, koji je prošao recenziju Naučnog odbora i čije sažetke donosimo u ovoj Knjizi sažetaka. Ocjena i naučna verifikacija iznijetih tvrdnji i rezultata je dalje prepuštena učesnicima Kongresa i široj naučnoj i stručnoj javnosti. Tekstovi rukopisa kratkih sadržaja nisu lektorisani.

Tradicionalno se u okviru kongresa održava i okrugli sto na kojem učešće uzimaju pozvani kompetentni stručnjaci i predstavnici nadležnih institucija, kao i ostali zainteresirani. Tema ovogodišnjeg okruglog stola je Zbrinjavanje animalnog otpada, što je jedno od gorućih i trenutno još uvijek neriješenih pitanja u oblasti proizvodnje hrane u BiH, ali i drugim susjednim zemljama.

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

Održavanje Kongresa bez pomoći sponzora bi bilo nemoguće pa im ovom prilikom izražavamo veliku zahvalnost.

Prof. dr Jasmina Đeđibegović, predsjednica Organizacionog odbora

FOREWORD

The student congress "FOOD-NUTRITION-HEALTH", organized by the University of Sarajevo for the seventh time, is a unique project of its kind in the region. What makes it unique is the interdisciplinary approach to a topic of exceptional scientific as well as social importance. Namely, the faculties of the medical sciences, natural and biotechnical sciences, and humanities groups of the University of Sarajevo participate in the organization of the congress. The authors of the presented works are students and their mentors from many other faculties in the country and abroad. We can rightly say that the student congress "FOOD-NUTRITION-HEALTH" has grown into a regionally recognized scientific congress, which we are extremely proud of.

For the 7th "FOOD-NUTRITION-HEALTH" Congress, the Organizing Committee has chosen 5 scientific sections: 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. At the congress, 61 student papers will be presented, which have passed the review of the Scientific Committee and whose abstracts are included in this Book of Abstracts. The assessment and scientific verification of the presented claims and results are further left to the participants of Congress and the wider scientific and professional public. Manuscript texts of short content are not proofread.

Traditionally, a round table is held as part of the congress, where invited competent experts and representatives of authorities and other interested parties participate. The topic of this year's round table is animal by-products disposal, which is one of the most pressing and currently still unresolved issues in the field of food production in Bosnia and Herzegovina, as well as in other neighboring countries.

On this occasion, we 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.

Holding the Congress without the help of sponsors would be impossible, so we express our great gratitude to them on this occasion.

Prof. dr Jasmina Đeđibegović, Chairwoman of the Organizing Committee

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Hemijski kontaminanti mleka i proizvoda od mleka

Radoslava SAVIĆ RADOVANOVIĆ

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

Sažetak

Mleko i proizvodi iz mleka, zauzimaju značajno mesto u ishrani ljudi. Pored sastojaka, koji se normalno nalaze u mleku mogu da sadrže u manjoj ili većoj količini druge supstance, koje se nazivaju kontaminanti. Hemijski kontaminanti predstavljaju hemijski rizik, koji može nastati tokom dobijanja, prerade i čuvanja mleka. To su materije koje se uobičajeno ne nalaze u mleku dobijenom "prirodnim procesom" (potpunom i neprekidnom mužom, ispravno držanih i pravilno hranjenih, zdravih muznih životinja). Neke od supstanci se teško razlikuju od prirodnih sastojaka mleka, a neke su potpuno nove u mleku. Aktivnost čoveka i emisija štetnih materija u životnu sredinu utiče na kvantitet zagađenja mleka. Hemijski kontaminanti štetno utiču na organizam muzne životinje i na zdravlje čoveka. Kontaminacija mleka najčešće je posledica namerne upotrebe hemijskih materija u lancu proizvodnje hrane, bilo zbog povećanja proizvodnje (hormoni) ili zaštite zdravlja životinja (antibiotici). Hemijski kontaminanti u organizam muznih životinja dospevaju putem hrane, vode i vazduha i u organizmu muzne životinja se metabolišu i deponuju u tkivima ili izlučuju ekskretima i mlekom. U zavisnosti od porekla i načina delovanja hemijski kontaminanti su, prema Aneksu I Direktive Saveta 96/23 / EC, razvrstani u dve grupe (A i B).

Grupa A- supstance koje imaju anaboličko dejstvo i druge nedozvoljene supstance:

Stilbeni, derivati stilbena, njihove soli i estri; antitireoidni agensi; steroidi (estradiol, progesteron, testosteron, trenbolon i dr.); laktoni rezorcilne kiseline, uključujući zeranol; β -agonisti (klenbuterol, salbutamol; ostala jedinjenja (nitrofurani, hloramfenikol).

Grupa B–veterinarski lekovi i kontaminanti životne sredine:

Antiimikrobne supstance (antibiotici, sulfonamidi i karbadoks); drugi veterinarski lekovi (antihelmintici, ekto- i endoparazitici; kokcidiostatici, uključujući nitromidazole; karbamati i piretroidi; sedativi (trankilajzeri, β -blokatori); nesteroidni anti-inflamatorni lekovi; druge farmakološki aktivne

supstance. Kontaminanti životne sredine su organohlorna jedinjenja uključujući i polihlorovane bifenile; organofosforna jedinjenja; toksični elementi (olovo, arsen, živa i kadmijum); mikotoksini, boje itd. Dodate materije (aditivi) su materije dodate u cilju falsifikovanja mleka). Sistemi kontrole kao što su menadžment kvaliteta i Hazard Analysis Critical Control Points (HACCP) imaju ulogu u prevenciji i kontroli hemijskih kontaminanata u mleku i proizvodima od mleka. U ovom preglednom radu će biti prikazani najznačajniji hemijski kontaminati mleka i proizvoda od mleka, kroz primere iz prakse biće ukazano na značajnu ulogu i multidisciplinarni pristup veterinarske, medicinske i farmaceutske struke za bezbednost hrane, što je imperativ svakog društva.

Ključne reči: *hemijski kontaminanti, mleko, proizvodi od mleka*

Plenary lecture

Chemical contaminants in milk and milk products

Radoslava SAVIĆ RADOVANOVIĆ

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

Summary

Milk and milk products take an important place in human diet. In addition to the components, which are normally found in milk, they may contain in smaller or larger quantities other substances, which are called contaminants. Chemical contaminants represent a chemical risk that can occur during the production, processing and storage of milk. They are substances that are not normally found in milk obtained by a "natural process" (complete and continuous milking of properly kept and fed, healthy dairy animals). Some of the substances are hardly distinguishable from the natural ingredients of milk, and some are completely new in milk. Human activity and the emission of harmful substances into the environment affect the quantity of milk pollution. Chemical contaminants cause a harmful effect on the organism of dairy animals and human health. Contamination of milk is most often a consequence of the intentional use of chemical substances in the food production chain, either due to increased production (hormones) or animal health protection (antibiotics). Chemical contaminants enter the organism of dairy animals through food, water and air, and in the organism of dairy animals they are metabolized and deposited in the tissues or excreted by excreta and milk. According to Annex I of Council Directive 96/23/EC, chemical contaminants are classified into two groups (A and B), depending on their origin and mode of action.

Group A - substances characterized by anabolic effect and other illegal substances:

Stilbenes, stilbene derivatives, their salts and esters; antithyroid agents; steroids (estradiol, progesterone, testosterone, trenbolone, etc.); resorcylic acid lactones, including zeranol; β -agonists (clenbuterol, salbutamol; other compounds (nitrofurans, chloramphenicol).

Group B – veterinary drugs and environmental contaminants:

Antimicrobial substances (antibiotics, sulfonamides and carbadox); other veterinary drugs (anthelmintics, ecto- and endoparasitics; coccidiostats, including nitromidazoles; carbamates and pyrethroids; sedatives (tranquilizers, β -blockers); non-steroidal anti-inflammatory drugs; other pharmacologically active substances. Environmental contaminants are organochlorine compounds including polychlorinated biphenyls; organophosphorus compounds; toxic elements (lead, arsenic, mercury and cadmium); mycotoxins, dyes, etc. Added substances (additives) are substances added for the purpose of milk adulteration). Control systems such as quality management and Hazard Analysis Critical Control Points (HACCP) play a role in the prevention and control of chemical contaminants in milk and milk products. In this review, the most important chemical contaminants of milk and milk products will be shown, through examples from practice, the important role and multidisciplinary approach of the veterinary, medical and pharmaceutical professions in food safety will be pointed out, which is an imperative of every society.

Keywords: *chemical contaminants, milk, milk products*

1. PRIMARNA PROIZVODNJA I PRERADA HRANE
PRIMARY PRODUCTION AND PROCESSING OF FOOD

Mogućnost primene etarskog ulja bergamota (*Citrus bergamia* Risso et Poiteau) za suzbijanje tri vrste skladišnih štetočina

Dragana BOŠKOVIĆ*¹, Dragana ŠUNJKA¹, Sanja LAZIĆ¹, Slavica VUKOVIĆ¹, Antonije ŽUNIC¹, Aleksandra ŠUŠNJAR¹

¹Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za fitomedicinu i zaštitu životne sredine

*Autor za korespondenciju: Dragana Bošković, dragana.boskovic@polj.edu.rs

Sažetak

Sa porastom broja stanovnika, javlja se i potreba za sve većom količinom hrane. Da bi se obezbedio kvalitet i kvantitet poljoprivrednih proizvoda, od izuzetnog je značaja obezbediti adekvatnu zaštitu u polju, ali i u skladištima. Jedan od najvećih izazova predstavljaju skladišne štetočine, koje uzrokuju velike gubitke i direktno utiču na dostupnost i kvalitet proizvoda. Zbog navedenog, upotreba sredstava za zaštitu bilja je opravdana i neophodna. Međutim, nekontrolisana i intenzivna primena pesticida, veoma često u dozama većim od propisanih, nosi određene rizike kao što su pojava ostataka pesticida u hrani i hrani za životinje u količini većoj od dozvoljene i akumulacija u životnoj sredini, što sve negativno utiče na zdravlje ljudi ili životinja. Iz ovih razloga, imperativ se stavlja na smanjenje upotrebe pesticida što čini jedan od temelja održive poljoprivrede. Stoga postoji opravdana potreba za bezbednim i ekološki prihvatljivim merama za zaštitu poljoprivrednih proizvoda, kako bi se upotreba pesticida svela na najmanju moguću meru, a sve u cilju dobijanja zdravstveno bezbednih proizvoda. Kao jedna od alternativa, jeste upotreba etarskih ulja u svrhu bioinsekticida. Bioinsekticide karakteriše brža razgradnja, kratka perzistenstnost, slabija mogućnost razvoja rezistentnosti, kao i odsustvo toksičnih supstanci u hrani, što im daje višestruku prednost u zaštiti poljoprivrednih proizvoda. Cilj ovoga rada je utvrđivanje repelentnog delovanje etarskog ulja bergamota (*Citrus bergamia*) na 3 vrste skladišnih štetočina, primenom Y-tube olfaktometra. Kao test organizmi korišćeni su *Ryzopertha dominica* (F.), *Oryzaephilus surinamensis* (L.) i *Sitophilus oryzae* (L.), najznačajnije skladišne štetočine. Ovim radom utvrđeno je da etarsko ulje bergamota ispoljava repelentno delovanje na ispitivane insekte.

Ključne riječi: *bioinsekticidi, skladišne štetočine, repelentno delovanje, bergamot*

1-O-1

The possibility of using bergamot essential oil (*Citrus bergamia* Risso et Poiteau) in control of three storage pests

Dragana BOŠKOVIĆ*¹, Dragana ŠUNJKA¹, Sanja LAZIĆ¹, Slavica VUKOVIĆ¹, Antonije ŽUNIĆ¹, Aleksandra ŠUŠNJAR¹

¹University of Novi Sad, Faculty of Agriculture, Novi Sad, Serbia

*Corresponding author: Dragana Bošković, dragana.boskovic@polj.edu.rs

Abstract

With the increasing population on Earth, there is a great need for a larger amount of food. In order to ensure the quality and quantity of agricultural products, it is crucial to ensure suitable protection and conservation of quality in the field, as well as in warehouses. One of the biggest challenges in warehouses are storage pests, which can lead to large loss because these pests affect the availability and quality of products. Considering the above mentioned, the use of plant protection products is justified and indispensable. However, the uncontrolled and more frequent use of pesticides, very often in doses higher than prescribed, carries certain risks such as a higher amount of pesticide residues in food and feed than permitted, the manifestation of a negative impact on human or animal health, and the occurrence of side effects on the environment. On that account, it is important to reduce the use of pesticides, which is one of the bases of sustainable agriculture. Therefore, there is a justified need for a safe and environmentally friendly way of protecting products, in order to obtain healthier products without pesticide residues. One of the alternatives is the use of essential oils for the purpose of bioinsecticides. Bioinsecticides are characterized by faster decomposition, short persistence, a lower possibility of developing resistance, as well as the absence of toxic substances in food, which gives them more advantages in the protection of agricultural products. The aim of this study is to determine the repellent effect of bergamot essential oil (*Citrus bergamia*) on 3 storage pests, using a Y-tube olfactometer, in two concentrations. As test organisms *Rhyzopertha dominica* (F.), *Oryzaephilus surinamensis* (L.) and *Sitophilus oryzae* (L.) were used. This paper reports that bergamot essential oil shows a repellent effect on the tested insects.

Keywords: *bioinsecticides, storage pests, repellent effect, bergamot*

Šta je zapravo problem GMO? Istina o genetskim modifikacijama i hrani

Benjamin CRLJENKOVIĆ

Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, BiH

Autor za korespondenciju: Benjamin Crljenković, crljenkovic.benjamin@gmail.com

Sažetak

Iako su genetske modifikacije široko prihvaćene u nekim industrijama, rasprave postaju neugodne kada je riječ o poljoprivredi i proizvodnji hrane. Zašto se ista tehnologija tretira različito u različitim sferama. Više ili manje svjesnim selekcijskim procesima, ljudi već milenijima genetski modificiraju biljke i životinje. Zbog toga se gotovo sve kulturne biljke i domaće životinje značajno razlikuju od svojih izvornih predaka. Šta je ustvari razlika genetski modificiranih organizama (GMO) u odnosu na selekciju? Dok proces selekcije zavisi od slučajnosti i selekcioneri se u izvjesnoj mjeri oslanjaju na sreću, genetski inženjering eliminira taj faktor. Savremena biotehnologija i genetski inženjering predstavljaju vrlo potentan alat, ali obavijeni su i raznim pitanjima. Kroz ovaj rad su predstavljene osnovne prednosti i nedostaci upotrebe GMO u poljoprivredi, najčešći razlozi njihove primjene, zatim, analizirana je opravdanost straha koji je primjetan u medijima i među potrošačima. Također su prikazani i primjeri upotrebe GMO tehnologija za prevazilaženje praktičnih problema u poljoprivrednoj proizvodnji, ali i predstavljeni neki potencijalni budući pravci razvoja ove tehnologije. Ipak, naglašeni su i učestali problemi koje je uzrokovala primjena iste. Literatura ukazuje na velike potencijale genetske tehnologije u različitim oblastima koji mogu značajno doprinijeti rješavanju aktuelnih socijalnih, ekonomskih i okolišnih problema. Kao i sa drugim relativno novim tehnologijama, potrebno je sagledati širu sliku, a sud donositi na osnovu informacija iz relevantnih izvora, bez nastojanja da se kompleksna etička i druga pitanja predstavljaju jednostavno, crnim ili bijelim.

Ključne riječi: *genetski modificirani organizmi, GMO, biotehnologija, zdravlje, okoliš*

1-O-2

**What exactly is the problem with GMOs?
The truth about genetic modification and food**

Benjamin CRLJENKOVIĆ

University of Sarajevo, Faculty of Agriculture and Food Sciences, B&H

Corresponding author: Benjamin Crljenković, crljenkovic.benjamin@gmail.com

Abstract

Although genetic modification is widely accepted in some industries, the debate becomes heated when it comes to agriculture and food production. Why is the same technology treated differently in different spheres. Through more or less conscious selection processes, humans have been genetically modifying plants and animals for millennia. Because of this, almost all cultivated plants and domestic animals differ significantly from their original ancestors. What is the difference between genetically modified organisms (GMO) and selection? While the selection process depends on chance and breeders rely to some extent on luck, genetic engineering eliminates that factor. Modern biotechnology and genetic engineering represent a very powerful tool, but they are also shrouded in various questions. Through this paper are presented the basic advantages and disadvantages of the use of GMOs in agriculture, the most common reasons for their application, and then analyzes the justification of the fear that is noticeable in the media and among consumers. Also, examples of the use of GMO technologies to overcome practical problems in agricultural production are presented, as well as some potential future directions for the development of this technology. However, some of the most frequent problems caused by its application were emphasized. The literature points to the great potential of genetic technology in various areas that can significantly contribute to solving current social, economic, and environmental problems. As with other relatively new technologies, it is necessary to look at the bigger picture, and make judgments based on information from relevant sources, without trying to present complex ethical and other issues simply, in black or white.

Keywords: genetically modified organisms, GMO, biotechnology, health, environment

Učestalost i uzroci klanja gravidnih goveda u Republici Hrvatskoj

Nikola ČUDINA

Veterinarski Fakultet, Sveučilište u Zagrebu, Hrvatska

Sažetak

Donedavno je smatrano kako je klanje gravidnih životinja sporadična pojava u klaoničkim objektima, prvenstveno zbog nedostatka stvarnih podataka i stručnog konsenzusa, no u posljednjih se nekoliko godina ova paradigma mijenja. Istraživanja u drugim zemljama koja su provedena utvrdila su kako je ova praksa proširena širom svijeta, stoga su ciljevi ovog rada bili utvrditi učestalost pojavnosti ove prakse u Republici Hrvatskoj, u kojoj fazi graviditeta do njih dolazi te razloge zašto se gravidne životinje upućuju na klanje. Istraživanje je provedeno u dva klaonička objekta u središnjoj Hrvatskoj u razdoblju od dva mjeseca putem terenskog upitnika koji su popunjavali doktori veterinarske medicine zaposlenici kontrolnih tijela tijekom redovitog ante i post mortem pregleda. Rezultati provedenog istraživanja na preko tisuću pregledanih goveda (n=1057) pokazuju kako se ova praksa provodi i u Hrvatskoj kako kod krava (1.9 %) tako i kod junica (4.95 %). Prosječni ukupno utvrđeni postotak od 3.6 % otkrivenih gravidnosti u ukupnom uzorku nešto je niži u usporedbi sa istraživanjima širom svijeta, no postotak goveda u drugom i trećem tromjesečju graviditeta je viši od procjena EFSA-e (junice 69 %, krave 55 %). Većina je goveda upućena u klaoničku obradu kroz redovito komercijalno klanje, a krave koje su poslone na klanje iz nužde poticale su iz područja nedavno opustošenih potresom. Navedeni rezultati otkrivenog visokog udjela kasnijih stadija gravidnosti kao i činjenica da su goveda poslana na klanje redovitim postupcima ukazuju na mogućnost postojanja propusta kod upućivanja životinja na klanje. Nadalje, rezultati upozoravaju na potrebu za dodatnom pažnjom pri zdravstvenoj procjeni životinja prije prijevoza kako bi se ova praksa smanjila na najmanju moguću mjeru.

Ključne riječi: *dobrobit, klaonička obrada, gravidnost, goveda*

1-O-3

The incidence and causes of the slaughter of pregnant cattle in the Republic of Croatia

Nikola ČUDINA

Faculty of Veterinary medicine, University of Zagreb, Croatia

Summary

Until recently, the slaughter of pregnant animals was considered a sporadic phenomenon in slaughterhouses, primarily due to the lack of real data and expert consensus, but this paradigm has changed in recent years. Studies in other countries have shown that this practice is widespread worldwide, so the objectives of this research were to determine: the incidence of this practice in the Republic of Croatia; at what stage of pregnancy they occur; and the reasons why pregnant animals are sent to abattoirs. The study was conducted in two slaughterhouses in central Croatia over a period of two months, through a field questionnaire filled out by veterinarians - employees of the control body - during regular ante and post mortem examinations. The results of the conducted research on over a thousand examined cattle ($n = 1057$) show that this practice is regularly carried out in Croatia in both cows (1.9%) and heifers (4.95%). The average total determined percentage of 3.6% of pregnancies detected in the total sample is slightly lower compared to surveys worldwide, but the percentage of cattle in the second and third trimesters of pregnancy is higher than those what EFSA estimates (heifers 69%, cows 55%). Most of the cattle were sent for slaughter processing through regular commercial slaughter, and cows sent for emergency slaughter came from areas recently devastated by the earthquake. The above results of the detected high proportion of later stages of pregnancy as well as the fact that cattle were sent for slaughter by regular procedures indicate the possibility of omissions in sending animals for slaughter. Furthermore, the results draw attention to the need for extra attention during the fit-for-transport assessment to minimize this practice.

Keywords: *welfare, slaughter processing, pregnancy, cattle*

Uticaj sanitacionih mjera na redukciju *Campylobacter* vrsta u proizvodnji brojlerskog pilećeg mesa

HRUSTEMOVIĆ Elma,^{1*} ČAKLOVICA Faruk,¹ ČAKLOVICA-KÜÇÜKKAYA İlvana,² KÜÇÜKKAYA Sertaç,² PAŠALIĆ Arzija³

¹Veterinarski fakultet, Univerzitet u Sarajevu, Sarajevo 71000, Bosna i Hercegovina

²Medicinski fakultet u Istanbulu, Univerzitet u Istanbulu, Istanbul 34093, Turska

³Fakultet zdravstvenih studija, Univerzitet u Sarajevu, Sarajevo 71000, Bosna i Hercegovina

* Autor za korespondenciju: Elma Hrustemović, elma_hrustemovic@hotmail.com

Sažetak

Campylobacter jejuni i *C. coli* su termofilne vrste roda *Campylobacter* koje koloniziraju crijeva brojlerskih pilića. Njihova prisutnost na koži trupova brojlera smanjuje sanitarni kvalitet pilećeg mesa i uzrokuje kampilobakteriozu kod potrošača koja se može manifestovati u akutnoj, septičkoj, subkliničkoj i hroničnoj formi. Najznačajnija je septička forma zato što može biti letalna. Cilj rada je da se pregledno ukaže na važnost primjene sanitacionih mjera u toku uzgoja, tokom klanja, primarne obrade i konfekcioniranja u svrhu proizvodnje mikrobiološki ispravnog mesa što doprinosi zaštiti zdravlja ljudi. Rezultati sugerišu da primjena sanitacionih mjera u uzgoju sprečava kolonizaciju crijeva pilića sa *C. jejuni* i *C. coli*, poboljšava crijevnu mikrobiotu i povećava prirast. Inficirana jata uslovljavaju veću kontaminiranost kože trupova u klaonicama, a izostanak higijenskih mjera tokom klanja, primarne obrade i konfekcioniranja dovodi do unakrsne kontaminacije trupova stim da najkritičniju fazu predstavlja evisceracija zbog mogućeg izljeva sadržaja iz želuca i crijeva. Primjena sanitacionih mjera i higijenskih načela u svim fazama proizvodnje pilećeg mesa je važan faktor u prevenciji ovih patogena i očuvanju zdravlja ljudi.

Ključne riječi: *Campylobacter spp.*, sanitacioni kvalitet pilećeg mesa, sigurnost hrane za ljude

The influence of sanitation measures on the reduction of *Campylobacter* species in the production of broiler chicken meat

HRUSTEMOVIĆ Elma,^{1*} ČAKLOVICA Faruk,¹ ČAKLOVICA-KÜÇÜKKAYA İlvana,² KÜÇÜKKAYA Sertaç,² PAŠALIĆ Arzija³

¹Faculty of Veterinary Medicine, University of Sarajevo, Sarajevo 71000, Bosnia and Herzegovina

² Istanbul Faculty of Medicine, Istanbul University, Istanbul 34093, Turkey

³Faculty of Health Studies, University of Sarajevo, Sarajevo 71000, Bosnia and Herzegovina

*Corresponding author: Elma Hrustemović, elma_hrustemovic@hotmail.com

Summary

Campylobacter jejuni and *C. coli* are thermophilic species of the *Campylobacter* genus that colonize the intestines of broiler chickens. Their presence on the skin of broiler carcasses reduces the sanitary quality of chicken meat and causes campylobacteriosis in consumers, which can manifest itself in acute, septic, subclinical and chronic forms. The most significant is the septic form because it can be lethal. The aim of the paper is to outline the importance of applying sanitary measures in breeding, slaughtering, primary processing, and packaging for the purpose of producing microbiologically correct meat, which contributes to the protection of human health. The results suggest that the application of sanitation measures in breeding prevents the colonization of the intestines of chickens with *C. jejuni* and *C. coli*, improves the intestinal microbiota and increases growth. Infected flocks lead to greater skin contamination of carcasses in slaughterhouses, and the absence of hygienic measures during slaughter, primary processing, and confectioning leads to cross-contamination of carcasses, with the most critical phase being evisceration due to the possible spillage of contents from the stomach and intestines. The application of sanitation measures and hygiene principles in all stages of chicken meat production is an important factor in the prevention of these pathogens and the preservation of human health.

Keywords: *Campylobacter* spp., sanitation quality of chicken meat, food safety for humans

Antibakterijski efekat origanovog ulja i njegove osnovne komponente karvakrola na izolate *Campylobacter jejuni* iz cekuma tovnih pilića

HRUSTEMOVIĆ Elma, ^{1*} ČAKLOVICA Faruk, ¹ DJEDJIBEGOVIĆ
Jasmina, ² ČAKLOVICA Kenan, ¹ ČLANJAK-KUDRA Enida ¹,
MURATOVIĆ Kenan³

¹Veterinarski fakultet, Univerzitet u Sarajevu, Sarajevo 71000, Bosna i Hercegovina

²Farmaceutski fakultet, Univerzitet u Sarajevu, Sarajevo 71000, Bosna i Hercegovina

³Federalno ministarstvo poljoprivrede, vodoprivrede i šumarstva, Ured za veterinarstvo,
Sarajevo 71 000, Bosna i Hercegovina

* Autor za korespondenciju: Elma Hrustemović, elma_hrustemovic@hotmail.com

Sažetak

Campylobacter jejuni je kolonizator crijeva životinja, ali najveće prevalencije zabilježene su u cekumu tovnih pilića. Greške u proizvodnji doprinose da prevalencije trupova tovnih pilića prelaze dozvoljene normative što povećava incidenciju obolijevanja potrošača od kampilobakterioze, bolesti prenosive hranom. Kako bi se spriječilo obolijevanje ljudi mnogi proizvođači posežu za profilaktičkom primjenom antibiotika kod tovnih pilića, ali takva praksa dovodi do antibiotske rezistencije. Cilj rada je da se pregledno ukaže na mogućnost upotrebe origanovog ulja kao alternative antibioticima u svrhu smanjenja kolonizacije cekuma sa *Campylobacter jejuni* kod tovnih pilića što će doprinijeti mikrobiološkoj ispravnosti pilećeg mesa, ali i smanjenju širenja antibiotske rezistencije. *In vitro* ispitivanja pokazuju antibakterijsku aktivnost origanovog ulja i njegove osnovne antibakterijske komponente karvakrola na izolate *Campylobacter jejuni* iz cekuma tovnih pilića, a *in vivo* ispitivanja duž cijelog perioda tova ukazuju na značajno smanjenje kolonizacije cekuma u prvim, ali ne i zadnjim danima tova, sugerišući važnost daljeg ispitivanja.

Ključne riječi: *antibakterijski efekat, origanovo ulje, Campylobacter jejuni, tovni pilići*

1-O-5

**Antibacterial effect of oregano oil and its main component carvacrol on
Campylobacter jejuni isolates from broiler caecum**

HRUSTEMOVIĆ Elma, ^{1*} ČAKLOVICA Faruk, ¹ DJEDJIBEGOVIĆ
Jasmina, ² ČAKLOVICA Kenan, ¹ ČLANJAK-KUDRA Enida ¹,
MURATOVIĆ Kenan³

¹Faculty of Veterinary Medicine, University of Sarajevo, Sarajevo 71000, Bosnia and Herzegovina

²Faculty of Pharmacy, University of Sarajevo, Sarajevo 71000, Bosnia and Herzegovina

³Ministry of Agriculture, Water Management and Forestry of the Federation of Bosnia and Herzegovina, Veterinary sector, Sarajevo 71 000, Bosnia and Hercegovina

*Corresponding author: Elma Hrustemović, elma_hrustemovic@hotmail.com

Summary

Campylobacter jejuni is a colonizer of the intestines of animals, but the highest prevalences were recorded in the cecum of broiler chickens. Production errors contribute to the prevalence of broiler carcasses exceeding permitted norms, which increases the incidence of consumer disease from campylobacteriosis, a foodborne disease. In order to prevent people from getting sick, many producers resort to the prophylactic use of antibiotics in broilers, but this practice leads to antibiotic resistance. The aim of the work is to outline the possibility of using oregano oil as an alternative to antibiotics in order to reduce the colonization of the cecum with *Campylobacter jejuni* in broiler chickens, which will contribute to the microbiological integrity of chicken meat, but also to reduce the spread of antibiotic resistance. *In vitro* tests show the antibacterial activity of oregano oil and its main antibacterial component carvacrol on *Campylobacter jejuni* isolates from the cecum of broiler chickens, and *in vivo* tests throughout the fattening period indicate a significant reduction in cecal colonization in the first, but not the last days of fattening, suggesting the importance of further tests.

Keywords: *antibacterial effect, oregano oil, Campylobacter jejuni, broilers*

Poljoprivredna politika u oblasti biljne proizvodnje na području općine Visoko

Elma PORČA

Univerzitet u Sarajevu-Poljoprivredno-prehrambeni fakultet

Sažetak

Poljoprivredni sektor predstavlja značajnu komponentu u ukupnoj privrednoj strukturi Bosne i Hercegovine, rangirajući se kao četvrta grana privrede. S obzirom na složenost političkog uređenja u Bosni i Hercegovini, poljoprivredna politika se vodi na više različitih nivoa. Na području općine Visoko, 39% poljoprivrednika se bavi isključivo biljnom proizvodnjom, a koji mogu aplicirati za ostvarivanje budžetske podrške sa svih nivoa. Posmatrajući stanje u općini Visoko, poljoprivredna politika doživljava promjene kroz uvođenje Programa poticaja za poljoprivrednu proizvodnju. Posmatrano sa aspekta broja registrovanih poljoprivrednih gazdinstava i obrta u općini Visoko, zabilježen je trend povećanja, uz prisustvo problema isparcelisanosti posjeda. Kategorišući budžetske podrške biljnoj proizvodnji na tri stuba, I stub- tržišne mjere i mjere direktne podrške proizvođačima, II stub- strukturalne mjere i mjere ruralnog razvoja, III stub- opće mjere koje se odnose na poljoprivredu izvršen je pregled navedenih mjera za period 2016-2020. godine. Kako bi se analizirala poljoprivredna politika i ocijenila njena efikasnost u općini Visoko, istraživanja su prije svega podrazumijevala proučavanje strateških dokumenata, razvojnih programa, pravilnika i programa za ostvarivanje podrške u poljoprivredi na različitim nivoima vlasti. Pomoć u analizi je ostvarena i kroz dodatne podatke zabilježene intervjuisanjem sa nadležnim općinskim službenicima Gradske uprave Visoko, unutar Službe za finansije, privredu, poslovne prostore i ekonomski razvoj i Odjela za poljoprivredu. Ukupna količina izdvojenih sredstava bilježi trend povećanja kroz analizirani period, sa posebnim porastom izdvojenih sredstava tokom pojave vanredne situacije uzrokovane pandemijom COVID-19. Na osnovu navedenog proizlaze i ciljevi rada: Utvrditi ukupnu budžetsku podršku biljnoj proizvodnji na području općine Visoko; Utvrditi strukturu mjera podrške biljnoj proizvodnji; Utvrditi koliko su zastupljene mjere efektivne, odnosno koliko su zastupljene mjere razvojnog karaktera.

Ključne riječi: poljoprivredna politika, budžetska podrška, mjere podrške poljoprivredi, ruralni razvoj, općina Visoko

1-O-6

Agricultural policy in the field of plant production in the area of the municipality of Visoko

Elma PORČA

University of Sarajevo-Faculty of Agriculture and food science

Summary

The agricultural sector represents a significant component in the overall economic structure of Bosnia and Herzegovina, ranking as the fourth branch of the economy. Given the complexity of the political system in Bosnia and Herzegovina, agricultural policy is conducted at several different levels. In the Visoko municipality, 39% of farmers are engaged exclusively in crop production, and those who can apply for budget support from all levels. Observing the situation in the municipality of Visoko, the agricultural policy is experiencing changes through the introduction of the Incentive Program for agricultural production. Observed from the aspect of the number of registered agricultural holdings and trades in the municipality of Visoko, an increasing trend was recorded, with the presence of the problem of property fragmentation. Categorizing budgetary support for plant production into three pillars, pillar I - market measures and measures of direct support to producers, pillar II - structural measures and rural development measures, pillar III - general measures related to agriculture their analysis was carried out for the period 2016- 2020. year. In order to analyze the agricultural policy and evaluate its effectiveness in the municipality of Visoko, the research primarily involved the study of strategic documents, development programs, regulations and programs for support in agriculture at different levels of government. Assistance in the analysis was achieved through additional data recorded by interviewing competent municipal officials of the Visoko City Administration, within the Department for Finances, Economy, Business Spaces and Economic Development and the Department of Agriculture. The total amount of allocated funds shows an increasing trend throughout the analyzed period, with a particular increase in allocated funds during the emergency situation caused by the COVID-19 pandemic. Based on the above, the objectives of the work are: to determine the total budget support for plant production in the area of the municipality of Visoko; to determine the structure of support measures for plant production; to determine whether the presented measures are effective and whether they are of a developmental nature.

Keywords: agricultural policy, budget support, agricultural support measures, rural development, municipality of Visoko

Poljoprivredna politika u oblasti animalne proizvodnje na području općine Visoko

Aida SELIMOVIĆ

Univerzitet u Sarajevu- Poljoprivredno-prehrambeni Fakultet

Sažetak

Ovim radom analizirana je poljoprivredna politika u oblasti animalne proizvodnje na području Općine Visoko u periodu od pet godina (2016-2020) te važnost poljoprivrede za ovu općinu. Poljoprivreda je godinama unazad jedna od najvažnijih privrednih grana kojom se bave stanovnici ovog područja. U Visokom postoji veliki potencijal za razvijanje poljoprivrede, a posebno animalne proizvodnje, što je rezultiralo povećanjem interesa, a time i rasta proizvodnje. Sa rastom proizvodnje, zabilježen je i rast podsticajnih mjera, kao i samih iznosa. Uzimajući u obzir važnost animalne proizvodnje u Općini Visoko kroz godine tradicije i iskustva u proizvodnji različitih proizvoda iz ovog dijela sektora u radu je analizirana poljoprivredna politika u oblasti animalne proizvodnje. Podrška poljoprivredi je razvrstana prema stubovima kao što je uobičajno kada je u pitanju ovaj sektor: I stub mjere direktne podrške proizvodnji, II stub mjere ruralnog razvoja i III stub mjere općih usluga. U Općini Visoko u oblasti animalne proizvodnje najzastupljenije su mjere I i III stuba, od čega se najveći dio sredstava isplaćuje za kravlje mlijeko.

Ključne riječi: *poljoprivredna politika, animalna proizvodnja, modeli podrške, grad Visoko, kanton, Federacija*

1-O-7

Agricultural policy in the field of animal production in the municipality of Visoko

Aida SELIMOVIĆ

University of Sarajevo-Faculty of Agriculture and food science

Summary

This work analyzed the agricultural policy in the field of animal production in the Visoko Municipality for a period of five years (2016-2020) and the importance of agriculture for this municipality. For years, agriculture has been one of the most important branches of the economy that the residents of this area are engaged in. In Visoko, there is great potential for the development of agriculture, especially animal production, which has resulted in an increase in interest, and thus in the growth of production. With the growth of production, there was also an increase in incentive measures, as well as the amounts themselves. Taking into account the importance of animal production in the Municipality of Visoko through years of tradition and experience in the production of various products from this part of the sector, the paper analyzes the agricultural policy in the area of animal production. Support to agriculture is classified according to pillars, as is usual when it comes to this sector: Pillar I of measures of direct support to production, Pillar II of measures of rural development and Pillar III of measures of general services. In the Municipality of Visoko, in the area of animal production, measures of the I and III pillars are the most represented, of which the largest part of funds is paid for cow's milk.

Keywords: agricultural policy, animal production, support models, city of Visoko, canton, Federation

Senzorni i nutritivni kvalitet vegeterijanskih burgera

Samra ŠEČIĆ, Adaleta ŠABIĆ

Univerzitet u Sarajevu-Poljoprivredno-prehrambeni fakultet

Sažetak

Briga za okoliš, ljudsko zdravlje i dobrobit životinja, te sve veći broj pristalica vegeterijanske i veganske ishrane jedan su od glavnih faktora koji su pokrenuli razvoj biljnih mesnih alternativa. Kada je u pitanju proizvodnja vegeterijanskih burgera i sličnih proizvoda nastoji se postići identična tekstura, okus, miris kao i nutritivni sastav sa mesnim proizvodima. Cilj ovog rada je bio proizvesti vegeterijanske burgere koji će teksturom, okusom i nutritivnim sastavom moći zamijeniti mesne brugere. U laboratorijskim uslovima proizvedeno je šest uzoraka vegeterijanskih burgera. Dva vegeterijanska burgera uzeta su sa tržišta i urađene su korekcije recepture, a preostala dva burgera uzeta su sa tržišta u originalnom obliku. Urađena je nutritivna analiza vegeterijanskih burgera koji su proizvedeni u laboratorijskim uslovima, a svi uzorci su senzorno ocjenjeni ocjenama od 1 - 5. Izračunata je srednja ocjena i koeficijent varijacije za svaki senzorni parametar te su rezultati predstavljeni grafički. Koeficijent varijacije je pokazao da postoje mala do umjerena variranja u ocjenama za sve senzorne parametre. Najveću ukupnu ocjenu i najveću srednju ocjenu prihvatljivosti u odnosu na mesni proizvod dobili su uzorak 9 - *HamBash* proizvođača Biona i uzorak 3 koji je proizveden u laboratorijskim uslovima od ekstrudiranog proteina graška. Najmanju ukupnu ocjenu dobili su uzorak 1 proizveden u laboratorijskim uslovima i uzorak 10 - soja burgeri sa sjemenkama proizvođača Biona. Za svaki od uzoraka proračunat je i nutri-score. Prema nutri - score proračunu nutritivno najprihvatljiviji uzorci su uzorak 7 i uzorak 8, a manje nutritivno prihvatljivi uzorak 4, uzorak 5 i uzorak 9.

Ključne riječi: vegeterijanski burgeri, biljne zamjene za meso, senzorni i nutritivni kvalitet

1-O-8

Sensory and nutritional quality of vegetarian burgers

Samra ŠEČIĆ, Adaleta ŠABIĆ

University of Sarajevo-Faculty of Agriculture and Food science

Summary

Concern for the environment, human health and animal welfare, and an increasing number of adherents of vegetarian and vegan diets are one of the main factors that have driven the development of plant-based meat alternatives. When it comes to the production of vegan burgers and similar products, we strive to achieve identical texture, taste, aroma and nutritional composition with meat products. The aim of this work was to produce vegetarian burgers that will be able to replace meat burgers with texture, taste and nutritional composition. Six samples of vegetarian burgers were produced in laboratory conditions. Two vegetarian burgers were taken from the market and recipes were corrected, and the remaining two burgers were taken from the market in their original form. Nutritional analysis of vegetarian burgers produced in laboratory conditions was performed, and all samples were sensory evaluated with grades from 1-5. The mean score and coefficient of variation for each sensory parameter were calculated and the results are presented graphically. The coefficient of variation showed that there are small to moderate variations in the scores for all sensory parameters. The highest overall score and the highest average acceptability rating in relation to the meat product were given to sample 9 - HamBash manufactured by Biona and sample 3 produced in laboratory conditions from extruded pea protein, and the lowest overall score was given to sample 1 produced in laboratory conditions and sample 10 - soy burgers with seeds manufactured by Biona. The nutri-score was recalculated for each of the samples. According to the nutri - score calculation, the most nutritionally acceptable samples are sample 7 and sample 8, and less nutritionally acceptable are samples 4, sample 5 and sample 9.

Keywords: vegetarian burgers, vegetable substitutes for meat, sensory and nutritional quality

Uticaj ekstrakta čuvarkušice (*Sempervivum tectorum L.*) na rast bakterija *Escherichia coli* i *Salmonella* spp.

Lamija GORO¹, Blažo LALEVIĆ², Saud HAMIDOVIĆ^{1*}

¹Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, Sarajevo, Bosna i Hercegovina;

²Univerzitet u Beogradu, Poljoprivredni fakultet, Beograd-Zemun, Srbija

*Autor za korespondenciju: Saud Hamidović, s.hamidovic@ppf.unsa.ba

Sažetak

Porast rezistencije prema antibioticima i nedostatak novih antimikrobnih sredstava su rezultirali razvojem novih efikasnih i pristupačnih metoda za spriječavanje mikrobnih infekcija, 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 ozbiljnom zdravstvenom zabrinutošću. Proizvodi prirodnog porijekla, koji imaju antimikrobno djelovanje, privlače komercijalnu pažnju, jer predstavljaju dobru alternativu sintetičkim proizvodima. Do sada je poznat veliki broj biljnih ekstrakata koji je pokazao dobre rezultate u suzbijanju rasta bakterija *Escherichia coli* i *Salmonella* spp. Cilj ovog rada bio je ispitivanje uticaja ekstrakta čuvarkušice (*Sempervivum tectorum L.*) na rast ovih bakterija. Ekstrakcija je izvršena iz svježih listova čuvarkušice (*Sempervivum tectorum L.*). 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 ekstraktom i postavljeni na hranljivu podlogu. Inkubacija je obavljena na temperaturi od 37°C u trajanju od 24h. U kontrolnoj varijanti, korištena je destilovana voda. Rezultati ukazuju na redukciju rasta ispitivanih bakterija nakon perioda inkubacije, što ukazuje na mogućnost primjene ekstrakta čuvarkušice u redukciji infekcije bakterijama *Escherichia coli* i *Salmonella* spp.

Ključne riječi: *ekstrakt čuvarkušice, test-difuzijska metoda, antimikrobna aktivnost*

1-P-1

The effects of Common Houseleek (*Sempervivum tectorum L.*) extract on the *Escherichia coli* and *Salmonella spp.* bacterial growth

Lamija GORO¹, Blažo LALEVIĆ², Saud HAMIDOVIĆ^{1*}

¹University of Sarajevo, Faculty of agriculture and food science, Sarajevo, Bosnia and Herzegovina

²University of Belgrade, Faculty of agriculture, Belgrade-Zemun, Serbia

*Corresponding author: Saud Hamidović, s.hamidovic@ppf.unsa.ba

Summary

The rise of antibiotic resistance and the lack of new antimicrobial agents have resulted in the development of new effective and affordable methods to prevent microbial infections, especially in developing countries, where 10% of deaths are related to infectious diseases. Occurrence of isolates of bacteria *Escherichia coli* and *Salmonella spp.* with a higher number of antibiotic-resistant phenotypes is considered a serious health concern. Products of natural origin, which have antimicrobial activity, are attracting commercial attention, as they represent a good alternative to synthetic products. Until now, a large number of plant extracts have shown good results in suppressing the growth of bacteria *Escherichia coli* and *Salmonella spp.* The aim of this work was to investigate the effect of the extract of common houseleek (*Sempervivum tectorum L.*) on the growth of these bacteria. The extraction was performed from fresh leaves of common houseleek (*Sempervivum tectorum L.*). Cultures of pure bacteria *Escherichia coli* and *Salmonella spp.* were planted on Mueller-Hinton medium. The growth test of these bacteria was followed by the test-diffusion method where filter paper discs with a diameter of 6 mm were impregnated with the extract and placed on a nutrient medium. Incubation was carried out at a temperature of 37°C in the time period of 24 hours. In the controlled variant, distilled water was used. The results indicate a reduction in the growth of the tested bacteria after the incubation period, which confirm the potential application of the extract of common houseleek in the reduction of *Escherichia coli* and *Salmonella spp.* bacterial infection.

Keywords: *Common houseleek extract, test-diffusion method, antimicrobial activity*

Antibakterijsko djelovanje ekstrakta rosopasa (*Chelidonium majus L.*) na rast bakterija *Escherichia coli* i *Salmonella* spp.

Verda ZAMETICA¹, Adel SALIHOVIĆ¹, SAUD HAMIDOVIĆ^{1*}

¹Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, Sarajevo, Bosna i Hercegovina

* Autor za korespondenciju: Saud Hamidović, s.hamidovic@ppf.unsa.ba

Sažetak

Prevenција kvarenja svježeg voća i povrća i drugih prehrambenih proizvoda najčešće se postiže primjenom hemijskih konzervanasa. Međutim, neki od njih imaju nepovoljno djelovanje na ljudsko zdravlje, ulaze u lanac ishrane, a i neki mikroorganizmi postaju otporni na korištenje hemikalija. Zbog ovih zabrinutosti, povećava se potreba za pronalaženjem novih, efikasnijih i bezbjednih alternativnih konzervanasa prirodnog porijekla. Imajući u vidu da su bakterije *Escherichia coli* i *Salmonella* spp. veoma zastupljene u infekcijama ljudi, mnoga istraživanja su usmjerena ka otkrivanju novih biljnih ekstrakata koji imaju potencijal u redukciji rasta ovih bakterija. Zbog toga je cilj ovog rada bio ispitivanje antimikrobnog dejstva ekstrakta rosopasa (*Chelidonium majus L.*) na rast bakterija *Escherichia coli* i *Salmonella* spp. Ekstrakcija je izvršena iz svježe stabljike rosopasa (*Chelidonium majus L.*). Antimikrobno djelovanje ovog ekstrakta određeno je test- difuzijskom metodom na podlozi Mueller–Hinton. Papirni diskovi prečnika 6 mm impregnirani su ekstraktom i postavljeni na hranljivu podlogu. Čistim kulturama ovih bakterija inokulisana je hranljiva podloga. Inkubacija je obavljena na temperaturi od 37°C u trajanju od 24 h. U kontrolnoj varijanti, korištena je destilovana voda. Rezultati ukazuju na redukciju rasta ispitivanih bakterija nakon perioda inkubacije. Ovi rezultati potvrđuju potencijalnu primjenu ekstrakta rosopasa za redukciju rasta bakterija *Escherichia coli* i *Salmonella* spp.

Ključne riječi: *ekstrakt rosopasa, test-difuzijska metoda i antimikrobna aktivnost*

1-P-2

Antibacterial effect of extract *Chelidonium majus* on the growth of bacteria *Escherichia coli* and *Salmonella* spp.

Verda ZAMETICA¹, Adel SALIHOVIĆ¹, Saud HAMIDOVIĆ^{1*}

¹ University in Sarajevo, Faculty of Agriculture and Food Sciences, Sarajevo, Bosnia and Herzegovina; verda.zametica@ppf.unsa.ba

¹ Corresponding author: Saud Hamidović, s.hamidovic@ppf.unsa.ba

Summary

Prevention of spoilage of fresh fruits and vegetables and other food products is most often achieved by using chemical preservatives. However, some preservatives have an adverse effect on human health, enter the food chain, and some microorganisms become resistant to the chemicals used. Due to these concerns, the need to find new, more effective and safe alternative preservatives of natural origin is increasing. Bearing in mind that the bacteria *Escherichia coli* and *Salmonella* spp. are highly prevalent in human infections, many researches are directed towards the discovery of new plant extracts that have the potential to reduce the growth of these bacteria. That is why the aim of this work was to investigate the antimicrobial effect of rosehip extract (*Chelidonium majus* L.) on the growth of bacteria *Escherichia coli* and *Salmonella* spp. The extraction was performed from a fresh stem of *Chelidonium majus* L.. The antimicrobial activity of this extract was determined by the test-diffusion method on the Mueller-Hinton medium. Paper discs with a diameter of 6 mm were impregnated with the extract and placed on a nutrient medium. The nutrient medium was inoculated with pure cultures of these bacteria. Incubation was carried out at a temperature of 37°C for 24 hours. In the control variant, distilled water was used. The results indicate a reduction in the growth of the tested bacteria after the incubation period. These results confirm the potential application of rosehip extract to reduce the growth of bacteria *Escherichia coli* and *Salmonella* spp.

Keywords: *Chelidonium majus* extract, test-diffusion method and antimicrobial activity

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

Histamin u ribi

Amra ALISPAHIĆ^{1*}, Kristina KNEŽEVIĆ,¹ Belma BAJREKTAREVIĆ¹

¹Veterinarski fakultet, Univerzitet u Sarajevu, Bosna i Hercegovina

*Autor za korespondenciju: Amra Alispahić, amra.alispahic@student.vfs.unsa.ba

Sažetak

Histamin je biogeni amin produciran u ribljem tkivu tokom dekarboksilacije slobodnog histidina od strane egzogene dekarboksilaze koju oslobađaju mikroorganizmi. Različiti rodovi Gram-pozitivnih i Gram-negativnih bakterija imaju sposobnost da produciraju histamin. Kako proces razgradnje ribe napreduje, povećava se i nivo histamina. Mikroorganizmi koji su prirodno prisutni na škrgama i u crijevima žive ribe počinju da rastu nakon smrti jer odbrambeni mehanizmi postaju neaktivni. Čak i ako se rast bakterija smanji tokom naknadnog hladnog skladištenja, zaostala aktivnost enzima se može nastaviti i, prema tome, nivo histamina se povećava. Trovanje histaminom je vrlo česta bolest koja se prenosi hranom koju karakteriziraju različiti simptomi koji su slični alergijskim reakcijama. Toksični efekti histamina su povezani sa njegovom fiziološkom funkcijom u tijelu. Dilatacija perifernih krvnih sudova dovodi do hipotenzije, crvenila, glavobolje, dok povećana propustljivost kapilara uzrokuje urtikariju, hemokoncentraciju i edem očnih kapaka; simptomi koji utiču na gastrointestinalni trakt nastaju zbog kontrakcija glatkih mišića što dovodi do grčeva u stomaku, dijareje, mučnine i povraćanja. Unos hrane koja sadrži male količine histamina ima mali učinak kod zdravih osoba, ali može dovesti do netolerancije na histamin kod osoba koje imaju oštećenu aktivnost diamin oksidaze (DAO). Preventivne strategije i procedure kontrole predstavljaju najefikasnije sredstvo i za potrošače i za ribnu industriju u kontroli povećanja nivoa histamina. Ovaj pregledni članak fokusira se na biološke i toksikološke karakteristike histamina, kao i na njegove konvencionalne i novije metode za detekciju histamina u ribi.

Ključne riječi: *biogeni amini, trovanje histaminom, riblji proizvodi, sigurnost hrane*

2-O-1

Histamine in fish

Amra ALISPAHIĆ,^{1*} Kristina KNEŽEVIĆ,¹ Belma BAJREKTAREVIĆ¹

¹Veterinary Faculty, University of Sarajevo, Bosnia and Herzegovina

*Corresponding author: Amra Alispahić, amra.alispahic@student.vfs.unsa.ba

Summary

Histamine is a biogenic amine produced in fish tissue through the decarboxylation of free histidine by exogenous decarboxylases released by microorganisms. Different genera of both Gram-positive and Gram-negative bacteria have the ability to produce histamine. Histamine level usually increases with the progress of fish decomposition. The microorganisms naturally present on the gills and in the gut of live fish start to grow after death because the defense mechanisms become inactive. Even if bacterial growth is reduced during the subsequent refrigeration, residual enzyme activity can continue and, therefore, histamine levels increase. Histamine poisoning is a very common food-borne disease characterized by a variety of symptoms similar to allergic reactions. The toxic effects of histamine are related to its normal physiological function in the body. The dilatation of the peripheral blood vessels results in hypotension, flushing, and headache, while the increased capillary permeability causes urticaria, hemoconcentration, and eyelids edema; the symptoms affecting the gastrointestinal system are due to the contraction of smooth muscles leading to abdominal cramps, diarrhea, nausea, and vomiting. The ingestion of food containing small amounts of histamine has little effect in healthy individuals, but it can result in histamine intolerance in persons characterized by impairment of diamine oxidase (DAO) activity. Preventive strategies and control procedures represent the most efficient tool for both consumers and the fish industry in control histamine levels increase. This review article focuses on biological and toxicological features of histamine, as well as its conventional and recent methods for the detection of histamine in fish.

Keywords: *biogenic amines, histamine food poisoning, fish products, food safety*

Koliko su sigurni kozmetički proizvodi?

Dalida ADILOVIĆ, Majda AVDIĆ, Aldina BAJIĆ*, Arnesa DŽANOVIĆ,
Šejla JUSUBAŠIĆ, Kanita KALJIĆ

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

*Autor za korespondenciju: Aldina Bajić, aldinabajic@ffsa.unsa.ba

Sažetak

Današnje tržište obiluje širokom ponudom komercijalnih kozmetičkih proizvoda. Postavlja se pitanje koliko je opasna kozmetika koju koristimo i jesu li svi kozmetički proizvodi sigurni? Kozmetički proizvodi su tvari ili smjese koje su namijenjene dodiru s vanjskim dijelovima ljudskog tijela (koža, kosa i vlasište, nokti, usnice i vanjski spolni organi) ili sa zubima i sluznicom usne šupljine isključivo u svrhu njihova čišćenja, parfimiranja, i/ili zaštite i održavanja u dobrom stanju, mijenjanja njihova izgleda i/ili korekcije tjelesnih mirisa. Sigurnost kozmetičkih proizvoda regulirana je jedinstvenim zakonodavstvom za cijelo područje Europske unije (EU), a riječ je o Uredbi br. 1223/2009/EZ o kozmetičkim proizvodima. Cilj ovog rada je da istraži sigurnost kozmetičkih proizvoda, koje sastojke trebamo izbjegavati pri odabiru kozmetičkih proizvoda, šta treba da sadrži deklaracija kozmetičkih proizvoda, te kako je pravilno tumačiti.

Ključne riječi: *kozmetički proizvodi, sigurnost, sastojci kozmetičkih proizvoda, deklaracija*

How much are safe cosmetic products?

Dalida ADILOVIĆ, Majda AVDIĆ, Aldina BAJIĆ*, Arnesa DŽANOVIĆ
Šejla JUSUBAŠIĆ, Kanita KALJIĆ

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

*Corresponding author: Aldina Bajić, aldinabajic@ffsa.unsa.ba

Summary

Today's market is full of a wide range of commercial cosmetic products. The question arises, how dangerous are the cosmetics we use and are all cosmetic products safe? Cosmetic products are substances or mixtures that are intended to come into contact with the external parts of the human body (skin, hair and scalp, nails, lips and external genitalia) or with the teeth and the mucous membrane of the oral cavity for the sole purpose of cleaning, perfuming, and/or protecting them and keeping them in good condition, changing their appearance and/or correcting body odors. The safety of cosmetic products is regulated by uniform legislation for the entire European Union (EU), namely Regulation no. 1223/2009/EC on cosmetic products. The aim of this work is to investigate the safety of cosmetic products, which ingredients we should avoid when choosing cosmetic products, what the declaration of cosmetic products should contain, and how to interpret it correctly.

Keywords: *cosmetic products, safety, ingredients of cosmetic products, declaration*

Praćenje i procjena kvaliteta vazduha u Kantonu Sarajevo u periodu 2021 godine

Merjem ADILOVIĆ¹, Emina BEČIĆ^{1*}, Lejla BEČIRAGIĆ¹, Nađa BIBEZIĆ¹, Hena BRKIĆ¹, Lamija BRKOVIĆ¹, Nedžla BUČO¹

¹Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: Emina Bečić, eminabecic@ffsa.unsa.ba

Sažetak

Zagađenje vazduha podrazumijeva prisustvo određenih materija, čestica i štetnih plinova u vazduhu koji mu nisu svojstveni po prirodi. Zagađenje zavisi od topografskih, demografskih i meteoroloških karakteristika, te stepena i vrste industrijalizacije u nekom području. Vazduh se smatra zagađenim ukoliko sadrži određene materije u koncentracijama koje izazivaju štetne posljedice kod živih organizama, prije svega kod čovjeka. Osnovne zagađujuće materije prisutne u vazduhu su: PM_{10} , $PM_{2.5}$, NO_2 , SO_2 , CO i O_3 . Glavni izvori zagađenja vazduha u Bosni i Hercegovini su: termoelektrane, željezare, prevozna sredstva, mala kućna ložišta i velika ložišta za centralno grijanje na ugalj i drva. U okviru ovog istraživanja praćena je kvaliteta vazduha u Kantonu Sarajevo (KS) u period od deset dana (od 17.12.2021. do 26.12.2021.). Podaci su prikupljeni sa stranice Federalnog hidrometeorološkog zavoda. Praćene su prosječne dnevne vrijednosti polutanata izražene u $\mu g/m^3$, a vrijednosti indeksa kvaliteta vazduha (AQI) su preračunate na osnovu vrijednosti $PM_{2.5}$ i PM_{10} , pomoću online dostupnog kalkulatora. U posmatranom desetodnevnom periodu u KS, vazduh je sve dane, izuzev zadnjeg, bio nezdrav za sve skupine stanovništva. Najbolja kvaliteta vazduha bila je na području starog dijela grada (mjerna stanica Vijećnica). Vrijednosti AQI u ovom području bile su u rasponu od 54 (umjeren) do 171 (nezdrav). Kvaliteta vazduha u području oko Ambasade Sjedinjenih Američkih Država i naselja Otoka bila je najlošija. Vrijednosti AQI u naselju Otoka bile su u rasponu od 74 (umjeren) do 191 (nezdrav), a u području oko Ambasade Sjedinjenih Američkih Država od 62 (umjeren) do 182 (nezdrav). Na dan 23.12.2021. kvaliteta vazduha u posmatranom razdoblju bila je najlošija, dok je na dan 26.12.2021. kvaliteta vazduha bila najbolja. Loša kvaliteta vazduha u KS je posljedica zagrijavanja kućanstava lošim energetima, čvrstim gorivima kao što je ugalj.

Ključne riječi: *zagađenje, Kanton Sarajevo, indeks kvaliteta vazduha*

2-O-3

Monitoring and assessment of air quality in Canton Sarajevo in the period of 2021

Merjem ADILOVIĆ¹, Emina BEČIĆ^{1*}, Lejla BEČIRAGIĆ¹, Nađa BIBEZIĆ¹, Hena BRKIĆ¹, Lamija BRKOVIĆ¹, Nedžla BUČO¹

¹University of Sarajevo, Faculty of Pharmacy, B&H

* Corresponding author: Emina Bečić, eminabecic@ffsa.unsa.ba

Summary

Air pollution implies the presence of certain substances, particles and harmful gases in the air that are not inherent to it by nature. Pollution depends on topographic, demographic and meteorological characteristics, as well as the degree and type of industrialization in an area. Air is considered polluted if it contains certain substances in concentrations that cause harmful consequences for living organisms, above all for humans. The basic pollutants present in the air are: PM_{10} , $PM_{2.5}$, NO_2 , CO and O_3 . The main sources of air pollution in Bosnia and Herzegovina are: thermal power plants, iron factories, means of transport, small home fireplaces and large fireplaces for central heating with coal and wood. As part of this research, the air quality in Canton Sarajevo (CS) was monitored for a period of ten days (from 12/17/2021 to 12/26/2021). The data were collected from the website of the Federal Hydrometeorological Institute. The average daily values of pollutants expressed in $\mu g/m^3$ were monitored, and the air quality index (AQI) values were recalculated based on the values of $PM_{2.5}$ and PM_{10} , using an online calculator. In the observed ten day period in the CS, the air was unhealthy for all population groups on all days, except for the last one. The best air quality was in the area of the old part of the city (measuring station Vijećnica). AQI values in this area ranged from 54 (moderate) to 171 (unhealthy). The air quality in the area around the Embassy of the United States of America and the settlement of Otoka was the worst. AQI values in the Otoka settlement ranged from 74 (moderate) to 191 (unhealthy), and in the area around the United States Embassy from 62 (moderate) to 182 (unhealthy). On 23.12.2021. air quality in the observed period was the worst, while on 26.12.2021 the air quality was the best. Bad air quality in CS is a consequence of heating households with harmful energy sources, more specifically solid fuels such as coal.

Keywords: *pollution, Canton Sarajevo, air quality index*

Mikroplastika u okolišu

Haris ČESIR^{1*}, Erna BAKIĆ¹, Ena OMEROVIĆ¹, Amra DEVEDŽIĆ¹,
Haris DELIBAŠIĆ¹, Almasa OSMANHODŽIĆ¹

¹Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za toksikologiju

*Autor za korespondenciju: Haris Česir, hariscesir@ffsa.unsa.ba

Sažetak

Mikroplastiku čine mali dijelovi plastičnog materijala, obično manji od 5 mm. Pojam mikroplastika generalno se odnosi na plastični otpad u toj veličini, koji nastaje iz većeg plastičnog otpada, a neadekvatnim odlaganjem dolazi u okoliš. Mikroplastika je ozbiljan onečišćivač koji, zbog svoje prisutnosti u okolišu i u čovjekom okruženju, izaziva veliku zabrinutost javnosti, ali i privlači pažnju naučnika u otkrivanju štetnih utjecaja na zdravlje i okoliš. Prisutna je u okeanima, na obalama, lahko putuje vjetrom, a najveći problem predstavlja morskim organizmima. Značajne količine mikroplastike nalaze se u vodenim vrstama koje su namijenjene za ljudsku prehranu čime mikroplastika putem prehrambenog lanca može završiti u ljudskom organizmu. Procjenjuje se da godišnje u svjetske okeane iscuri oko 1,3 miliona metričkih tona mikroplastike iz prašine guma, peleta, tekstila i proizvoda za ličnu njegu. Ukoliko se ništa ne promijeni, procjenjuje se da će onečišćenje okeana iz tih izvora mikroplastike povećati tri miliona metričkih tona godišnje do 2040. Odobrena je strategija za plastiku u skladu s kojom će plastična ambalaža na tržištu EU-e do 2030. biti prikladna za recikliranje, potrošnja plastike za jednokratnu upotrebu smanjit će se, a namjerna upotreba mikroplastike bit će ograničena. Glavni cilj našeg rada jeste da detaljnije istražimo značaj mikroplastike u okolišu, gdje se sve koristi, te način na koji dopijeva u okoliš i posljedično efekat na naš organizam. Također, u radu su navedena i rješenja kako smanjiti proizvodnju mikroplastike, te unos mikroplastike u organizam.

Ključne riječi: *mikroplastika, vode, onečišćenje, otpad*

2-O-4

Microplastics in the environment

Haris ČESIR^{1*}, Erna BAKIĆ¹, Ena OMEROVIĆ¹, Amra DEVDŽIĆ¹, Haris DELIBAŠIĆ¹, Almasa OSMANHODŽIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Toxicology

*Corresponding author: Haris Česir. hariscesir@ffsa.unsa.ba

Summary

Microplastics is made up of small parts of plastic material, usually not larger than 5mm. The term “microplastics” generally refers to plastic waste in that size, which is created from larger pieces of plastic waste, and enters the environment through inadequate disposal. Microplastic is a serious pollutant that, due to its presence in the environment and in the human environment, causes great public concern, but also attracts the attention of scientists in the detection of harmful effects on health and the environment. It can be present in the oceans, on the coasts, it travels easily with the wind, and it the largest problem for marine organisms. Significant amounts of microplastics are found in aquatic species that are intended for human consumption, which means that microplastics can end up in the human body through the food chain. It is estimated that around 1.3 million metric tons of microplastics from tire dust, pellets, textiles and personal care products leak into the world’s ocean annually. If nothing changes, it is estimated that ocean pollution from these sources of microplastics will increase by three million metric tons per year by 2040. A strategy for plastics has been approved, according to which plastic packaging on the EU market will be suitable for recycling by the year 2030, consumption of single-use plastics will decrease, and the intentional use of microplastics will be limited. The main goal of our paper is to investigate in more detail the significance of microplastics in the environment, where it is used, and the way in which it can get into the environment and how it affects our organism. Also, solutions to reduce the production of microplastics and the introduction of microplastics into the human body are listed in the paper.

Keywords: *microplastics, oceans, pollution, waste*

Koliko dobro poznajemo svoje kozmetičke proizvode?

Hanna HELAĆ,^{1*} Melika SPAHIĆ,¹ Iman MUHIĆ,¹ Amila OMEROVIĆ,¹
Amila REKANOVIĆ,¹ Salma SADIKOVIĆ,¹ Hana SKENDEROVIĆ¹

¹ Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: Hanna Helać, hannahelac@ffsa.unsa.ba

Sažetak

Uredba (EZ) br. 1223/2009 Evropskog parlamenta i Vijeća definiše kozmetički proizvod kao svaki pripravak koji je namijenjen za nanošenje po različitim dijelovima ljudskog tijela (koža, kosa, nokti, zubi, sluznica usne šupljine) pretežno zbog čišćenja, parfimiranja, zaštite i održavanja te korekcije tjelesnih mirisa. Primjena nekog kozmetičkog proizvoda treba biti svrsihodna, ne smije biti štetna po zdravlje ljudi i ne smije dovesti do neželjenih efekata. Da bi kozmetički proizvod bio siguran za primjenu, potrebno je voditi računa o njegovom roku trajanja, jer vremenom može doći do promjene organoleptičkih svojstava proizvoda što može dovesti do iritacije ili upalnih reakcija. Anketnim ispitivanjem o poznavanju kozmetičkih proizvoda i sigurnosti istih, kao i njihovim potrošačkim navikama nastojali smo ispitati stavove 202 studenta Farmaceutskog fakulteta Sarajevo. Većina (93%) su bile pripadnice ženskog spola. Anketiranje i interpretacija odgovora (najviše glasova po pitanju) je pokazala da: 41% čita deklaraciju na proizvodima, 56% se trudi pridržavati uputstava o korištenju proizvoda, 53% je bitna oznaka “nije testirano na životnjama” prilikom odabira proizvoda, 74% smatra da cijena nije mjera kvaliteta, 46% smatra da je proizvod s oznakom “preporučeno od strane stomatologa/dermatologa” bolji od onog bez te oznake. Ispitanici su se izjasnili kako najčešće kupuju u drogerijama (93%) i apotekama (50%). Neki od sastojaka kozmetičkih proizvoda kao što su parabeni su, neopravdano, okarakterisani kao iznimno štetni i većina ispitanika ih izbjegava, dok umjetne mirise i boje (ne)izbjegava podjednak broj ispitanika. Upotreba proizvoda deklariranih kao “prirodna kozmetika” je preferirana kod 56% ispitanika. Pravilna upotreba kozmetičkih proizvoda je važna jer 91% naših ispitanika kozmetiku koristi na dnevnoj bazi.

Ključne riječi: *kozmetički proizvod, sigurnost, deklaracija*

How well do we know our cosmetic products?

Hanna HELAĆ,^{1*} Melika SPAHIĆ,¹ Iman MUHIĆ,¹ Amila OMEROVIĆ,¹
Amila REKANOVIĆ,¹ Salma SADIKOVIĆ,¹ Hana SKENDEROVIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, BiH

*Corresponding author: Hanna Helac, hannahelac@ffsa.unsa.ba

Summary

Regulation (EC) No 1223/2009 of the European Parliament and of the Council defines a cosmetic product as any formulation intended for application to different parts of the human body (skin, hair, nails, teeth, mucous membrane of the oral cavity) mainly for cleaning, perfuming, protection, and maintenance and correction of body odors. The application of a cosmetic product should be purposeful, should not be harmful to people's health and not lead to unwanted effects. In order for the cosmetic product to be safe for use, it is necessary to regard its shelf life, because over time the organoleptic properties of the product can change, which can lead to irritation or inflammatory reactions. We conducted a survey on consumer knowledge of cosmetic products and their safety, as well as the consumer's buying behavior. By doing so, we tried to analyze the opinions of 202 students of the Faculty of Pharmacy in Sarajevo. The majority (93%) were female. The survey and interpretation of the answers (by most votes per question) showed that: 41% read the declaration on the products, 56% try to follow the instructions for using the product correctly, 53% consider the label "not tested on animals" important when choosing a product, 74% believe that price is not a measure of quality, 46% believe that a product with the label "recommended by a dentist/dermatologist" is better than one without that label. Respondents also declared that they most often shop in drugstores (93%) and pharmacies (50%). Some of the ingredients in cosmetic products, such as parabens, are unjustifiably characterized as extremely harmful and most respondents avoid them, while artificial fragrances and colors are (not) avoided by an equal number of respondents. The use of products labeled as "natural cosmetics" is preferred by 56% of respondents. Correct use of cosmetic products is important because 91% of our respondents use cosmetics on a daily basis.

Keywords: *cosmetic product, safety, declaration*

Šta trebamo znati o upotrebi sredstava za dezinfekciju na bazi hlora?

Riana JAHA*, Tea KOLAK, Merjam HADŽIFEJZOVIĆ, Amina SALIHOVIĆ, Elhana HADŽIABDIĆ, Emina HADŽIĆ, Selma HAJDARPAŠIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: Riana Jaha, rianajaha@ffsa.unsa.ba

Sažetak

Upotreba dezinficijensa za kućanstvo se drastično povećala početkom COVID-19 pandemije. Dezinficijensi su antimikrobni agensi koji se primjenjuju na neživim objektima radi uništavanja mikroorganizama koji žive na njima. Ova sredstva se razlikuju od drugih antimikrobnih agenasa kao što su antibiotici, koji uništavaju mikroorganizme u tijelu, i antiseptika, koji uništavaju mikroorganizme na živim tkivima. Cilj ovog rada je informisati javnost o sastavu dezinficijensa sa hlorom koji se koriste u kućanstvima, o sigurnom rukovanju, upotrebi kao i načinima intoksikacije. Dezinficijensi se razlikuju po hemijskom sastavu i načinu djelovanja, kao i koncentraciji aktivnih tvari. Neka aktivna tvar može biti pogodna za korištenje u kućanstvu, ali ne i za osobnu higijenu. Također, neka se sredstva mogu koristiti u blizini hrane, a druga ne. Hipohloriti, najšire korištena dezinfekcijska sredstva na bazi hlora se u prometu nalaze kao tekućine (npr. natrij hipohlorit) ili čvrste tvari (npr. kalcij hipohlorid), ali se najčešće koriste u formi vodenih rastvora. Natrij hipohlorit u koncentraciji koja se koristi u izbjeljivačima za domaćinstva može izazvati iritaciju oka, opekotine jednjaka i želuca. Dodatkom kiseline na proizvod koji sadrži hipohlorite dolazi do oslobađanja hlora. Osoba izložena hloru treba hitno potražiti medicinsku pomoć, ne treba izazivati povraćanje, osim ako to ne odredi medicinski stručnjak.

Ključne riječi: *dezinficijensi, hlor, mikroorganizmi, hipohloriti, trovanje*

2-O-6

What should we know about the use of chlorine-based disinfectants?

Riana JAHA*, Tea KOLAK, Merjam HADŽIFEJZOVIĆ, Amina SALIHOVIĆ, Elhana HADŽIABDIĆ, Emina HADŽIĆ, Selma HAJDARPAŠIĆ

University of Sarajevo, Faculty of Pharmacy, B&H

*Corresponding author: Riana Jaha, rianajaha@ffsa.unsa.ba

Summary

The use of household disinfectants increased drastically at the beginning of the COVID-19 pandemic. Disinfectants are antimicrobial substances used to eradicate bacteria present on inanimate items. They differ from other antimicrobial agents such as antibiotics, which destroy microorganisms in the body, and antiseptics, which destroy microorganisms on living tissues. The aim of this work is to inform the public about the composition of disinfectants with chlorine used in households, about safe handling, use, and ways of intoxication. Disinfectants differ in their chemical composition, mechanism of action, and amount of active substances. Some active substances may be suitable for household use, but not for personal hygiene. Also, some agents can be used near food and others cannot. Hypochlorites, the most widely used disinfectants based on chlorine, are sold as liquids (eg sodium hypochlorite) or solids (eg calcium hypochlorite), but are most often used as aqueous solutions. When used in the concentration found in household bleaches, sodium hypochlorite can irritate the eyes and burn the esophagus and stomach. By adding acid to a product containing hypochlorite, chlorine is released. A person exposed to chlorine should seek immediate medical attention, and shouldn't induce vomiting, unless directed by a medical professional.

Keywords: *disinfectants, chlorine, microorganisms, hypochlorites, poisoning*

Rizici povezani sa prisustvom rezidua lijekova u površinskim vodama

Faris BEGOVIĆ¹, Amila KEBO¹, Miralem KMETAŠ¹, Lucija MARIJANOVIĆ¹, Nejlja MELIĆ^{1*}, Lejla MEŠIĆ¹, Aida MUSTAFICA¹

¹Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za toksikologiju, BiH

*Autor za korespondenciju: Nejlja Melić, nejlamic@ffsa.unsa.ba

Sažetak

Lijekovi su namijenjeni za interakciju sa živim bićima i izazivaju farmakološki odgovor čak i pri niskim dozama. Dizajnirani su na način da budu stabilni kako bi dospjeli do ciljnih molekula gdje će ispoljiti svoje djelovanje. To znači da se sporo razgrađuju, te su stoga prepoznati kao onečišćenja koja izazivaju zabrinutost javnosti za okoliš i ljudsko zdravlje kada njihove rezidue dospiju u površinske vode. Zabrinjavajući je podatak da se samo oko 20% neiskorištenih lijekova pravilno odlaže povratkom farmaceutskim ustanovama. Cilj ovog rada je ukazati na rizike vezane za prisustvo rezidua lijekova u površinskim vodama na organizme ekosistema koji su direktno izloženi, potencijalne učinke na zdravlje opće populacije te dugoročne posljedice povezane sa antimikrobnom rezistencijom. Dokazano je da određeni lijekovi uzrokuju štetne učinke na ekosisteme, uključujući promjene u fiziologiji, ponašanju i reprodukciji. Najviše zabrinjava prisustvo antibiotika, hormona, analgetika i citostatika namijenjenih za humanu upotrebu; te prisustvo antibiotika i antihelminatika koji se koriste kao veterinarski lijekovi. Upotreba antibiotika je prekomjerna te je i njihova zastupljenost u okolišu velika, što rezultira razvojem multirezistentnih bakterija rizičnih za ljude i životinje. U ovom radu ćemo predstaviti i potencijalne mjere za smanjenje prisustva rezidua lijekova u površinskim vodama koje su već poduzete u nekim razvijenim zemljama.

Ključne riječi: *rezidue lijekova, vode, antibiotici, štetni učinci*

2-O-7

Risks associated with the presence of drug residues in surface waters

Faris BEGOVIĆ¹, Amila KEBO¹, Miralem KMETAŠ¹, Lucija MARIJANOVIĆ¹, Nejlja MELIĆ^{1*}, Lejla MEŠIĆ¹, Aida MUSTAFICA¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Toxicology, B&H

*Corresponding author: Nejlja Melić, nejlajmelic@ffsa.unsa.ba

Summary

Medicines are intended to interact with living systems and cause a pharmacological response even at low doses. They are designed to be stable in order to reach and interact with target molecules. This means that they degrade slowly, and are therefore recognized as environment pollutants of public concern when their residues reach surface waters. The fact that only about 20% of unused medicines are properly disposed of by returning to pharmaceutical institutions is concerning. The aim of this paper is to point out the risks related to the presence of drug residues in surface waters on organisms of ecosystems that are directly exposed, the potential effects on the health of the general population and the long-term consequences associated with antimicrobial resistance. Certain drugs have been shown to cause adverse effects on ecosystems, including changes in physiology, behavior and reproduction. Of greatest concern are: hormones, antibiotics, analgesics, antidepressants and anticancer pharmaceuticals used for human health; and antibiotics and antihelmintics used as veterinary pharmaceuticals. The use of antibiotics is excessive and their presence in the environment is high, which results in the development of multi-resistant bacteria that are dangerous for humans and animals. In this paper, we will also present potential measures to reduce the presence of drug residues in surface waters that have already been taken in some developed countries.

Keywords: *residues of medicines, surface water, antibiotics, adverse effects*

Prisustvo emergentnih polutana u vodi za piće i otpadnim vodama

Melina MUMINović^{1*}, Daira BEGIĆ¹, Ajka ČAMDŽIĆ¹, ASJA ČELEBIĆ¹, Avina CHEIKH DOMMAR¹, Azra DUGALIJA¹, Katarina MILOŠEVIĆ¹

¹Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za toksikologiju, BiH

*Autor za korespondenciju: Melina Muminović, melinamuminovic@ffsa.unsa.ba

Sažetak

Onečišćenje vode događa se svakodnevno prirodnim putem i ljudskim aktivnostima. Prema izvještajima SZO, oko 1,1 milijardi ljudi nema pristup zdravstveno ispravnoj vodi, a zbog onečišćene vode godišnje obolijeva oko 1,2 milijarde ljudi, od čega 15 miliona umire svake godine. Tehnološki razvoj, industrijska proizvodnja, poljoprivredne djelatnosti i ubrzana urbanizacija uništavaju izvore pitke vode i smanjuju količine prirodnih rezervi vode. Veliki problem predstavljaju emergentni polutanti (EMP), tj. industrijske hemikalije, zagađujuće materije koje se mogu detektovati u površinskim vodama velikih riječnih slivova, podzemnim vodama, jezerima i drugim vodnim tijelima. Osnovni način transporta i unosa u organizam čovjeka jeste konstantno prisustvo u površinskim vodama i prelazak u podzemne vode, čime se stvara mogućnost dospjevanja direktno u izvorišta pitke vode. EMP mogu biti farmaceutski proizvodi, proizvodi za ličnu higijenu, industrijske hemikalije, dezinfekciona sredstva, toksini algi te biocidi i njihovi metaboliti. Provedena istraživanja o onečišćenju vode često nisu provjerena i ne mogu pružiti pouzdane dokaze, što je opasno, jer samo dovoljna količina kvalitetnih podataka o razinama onečišćenja i srodnim bolestima može pomoći u određivanju prioriteta i standarda sigurnosti ovih tvari u pitkoj vodi. Povećava se potražnja za vodom, a povećava se i broj onečišćujućih tvari, zbog čega ljudi moraju imati dobru ekološku svijest, stalne preventivne mjere, strogu kontrolu pitke vode i vodovoda. Cilj ovog rada je objasniti važnost opskrbe zdravom vodom i da je to jedan od temeljnih uvjeta i načela društva, te jedna od osnovnih pretpostavki zdravog života. Bolesti uzrokovane ovim tvarima kroz vodu za piće obično se ne javljaju iznenada, već su češće povezane s hroničnim trovanjem, a posljedice će se osjetiti nakon dugotrajnog korištenja onečišćene vode.

Ključne riječi: *voda za piće, otpadne vode, emergentni polutanti, onečišćenje vode, hronično trovanje*

Presence of emerging pollutants in drinking water and wastewater

Melina MUMINOVIC^{1*}, Daira BEGIĆ¹, Ajka ČAMDŽIĆ¹, ASJA ČELEBIĆ¹, Avina CHEIKH DOMMAR¹, Azra DUGALIJA¹, Katarina MILOŠEVIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Toxicology, B&H

*Corresponding author: Melina Muminović, melinamuminovic@ffsa.unsa.ba

Summary

Water contamination is an everyday occurrence brought on by both natural and human factors. According to WHO data, around 1.1 billion people lack access to clean water, and due to contaminated water, approximately 1.2 billion people get sick every year, with 15 million of them dying. Water reserves in the natural world are being depleted as a result of rapid urbanization, industrial production, agricultural activity, and technological advancement. Emergent pollutants (EMP), or industrial chemicals, are contaminants that can be found in lakes, other bodies of water, subsurface waters, and surface waters of vast river basins. Constant presence in surface waters and transfer to subsurface waters are the primary modes of transport and introduction into the human body, which makes it possible to access drinking water sources directly. Pharmaceuticals, personal care products, industrial chemicals, disinfectants, algal toxins, biocides, and their metabolites are all examples of EMP. A sufficient amount of high-quality data on pollution levels and associated diseases is required to help determine priorities and safety standards for these substances in drinking water. Unfortunately, conducted research on water pollution is frequently unverified and unable to provide reliable evidence, which is dangerous. Due to rising pollution levels and rising water demand, people need to be more aware of their impact on the environment, take proactive steps constantly, and strictly regulate their access to clean drinking water and water supply. The aim of this work is to explain the importance of healthy water supply. It is one of the basic conditions and principles of society, and one of the basic assumptions of a healthy life. Diseases caused by these substances through drinking water usually do not appear suddenly, but are more often associated with chronic poisoning, and the consequences will be felt after long-term use of contaminated water.

Keywords: drinking water, wastewater, emerging pollutants, water pollution, chronic poisoning

Značaj monitoringa prisustva polutanata iz okoliša u majčinom mlijeku

Nejra PLJAKIĆ^{1*}, Amila HAJDAREVIĆ¹, Amina KAMENJAŠEVIĆ¹, Azra OSMANBEGOVIĆ¹, Katarina PAVLOVIĆ¹, Ajla SELIMOVIC¹, Farah TRAKO¹

¹Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za Toksikologiju, BiH

*Autor za korespondenciju: Nejra Pljakić, nejrapljakic@ffsa.unsa.ba

Sažetak

Majčino mlijeko je specifično potrebama ljudske vrste i osigurava djetetu neophodne hranjive tvari. Brojne su prednosti dojenja, kako za dijete, tako i za majku. Međutim, postoje određeni rizici koji se povezuju sa dojenjem, a među njima jeste upravo prisustvo polutanata iz okoliša kao stranih materija u majčinom mlijeku. Snažna ekspanzija industrijskih tehnologija, globalizacija i povećanje trgovine dovela je do povećanog kontakta ljudi s velikim brojem hemijskih spojeva. Najčešće to su endokrini disruptori (bisfenol A, insekticidi, ftalati itd.), dioksini, arsen, te mnoge druge supstance prisutne u zagađenom zraku. Obzirom da se tvari kojima je majka izložena mogu izlučivati i prenijeti novorođenčetu putem dojenja, majčino mlijeko može biti dobar pokazatelj zagađenosti okoliša. Svjetska zdravstvena organizacija je koristila majčino mlijeko za monitoring opterećenja ljudskog tijela hemijskim zagađivačima već nekoliko decenija. Brojne studije su pokazale da je majčino mlijeko kontaminirano štetnim hemikalijama iz okoliša. Nadležni organi bi trebali vršiti monitoring prisustva polutanata iz okoliša u majčinom mlijeku da bi se poduzele mjere za smanjenje eliminacije toksičnih materija u okoliš i smanjio njihov štetni utjecaj na zdravlje čovjeka. Ipak, osim u najekstremnijim slučajevima, majke se trebaju uvjeriti da majčino mlijeko jeste daleko najbolja hrana za novorođenčad, te da prednosti dojenja za bebe nadmašuju ove potencijalne zdravstvene rizike.

Ključne riječi: *majčino mlijeko, polutanti, monitoring, zagađen zrak, endokrini disruptori*

2-O-9

The importance of monitoring the presence of environmental pollutants in breast milk

Nejra PLJAKIĆ^{1*}, Amila HAJDAREVIĆ¹, Amina KAMENJAŠEVIĆ¹, Azra OSMANBEGOVIĆ¹, Katarina PAVLOVIĆ¹, Ajla SELIMOVIĆ¹, Farah TRAKO¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Toxicology, B&H

*Corresponding author: Nejra Pljakić, nejrapljakic@ffsa.unsa.ba

Summary

Breast milk is specific to the needs of the human species and provides the child with the necessary nutrients. There are numerous advantages of breastfeeding. However, there are certain risks associated with breastfeeding, such as the presence of environmental pollutants in breast milk. The strong expansion of industrial technologies, globalization and increased trade have led to increased human contact with many chemical compounds. Some of them are insecticides, phthalates, dioxins and arsenic. Considering that substances to which the mother is exposed can be transferred to the newborn through breastfeeding, breast milk can be a good indicator of environmental pollution. The WHO has used breast milk to monitor the human body's burden of chemical pollutants for several decades. Numerous studies have shown that breast milk is contaminated with harmful environmental chemicals. Competent authorities should monitor the presence of environmental pollutants in breast milk in order to take measures to reduce the elimination of toxic substances into the environment and reduce their harmful impact on human health. However, except in the most extreme cases, mothers should know that breast milk is by far the best food for infants, and that the benefits of breastfeeding for babies outweigh these potential health risks.

Keywords: breast milk, pollutants, monitoring, polluted air, endocrine disruptors

Mogući štetni aditivi iz plastike

Lana POPOVIĆ, Anela DACIĆ, Merjem PUSTAHIJA, Armin RADELJAŠ,
Aleksandra POROBIĆ

¹Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za Toksikologiju, BiH

*Autor za korespondenciju: Lana Popović, lana.popoviclanaa@gmail.com

Sažetak

Plastika, kao široko upotrebljivan materijal za izradu različitih predmeta, iako štetna, prije svega po okolinu s obzirom na vrijeme koje je neophodno da protekne da bi se ista eventualno razgradila, je svakako nužna u različitim granama industrije te stoga proizvođači plastičnih masa na sve načine pokušavaju da poboljšaju svojstva ovog materijala dodavanjem različitih aditiva. Takvi su retardanti plamena, hemijski aditivi koji mogu spriječiti nastanak plamena ili znatno usporiti njegovo širenje. Takođe, vrlo značajni su i aditivi koji imaju ulogu da ubrzaju biorazgradivost plastike, a da za vrijeme njene upotrebe ne štete ljudskom zdravlju. Aditivi poput azbesta su bili redovno upotrebljavani do prije dvadeset ili trideset godina, a da se pritom i tada znalo koliko su štetni po zdravlje te da je spomenuti azbest izrazito kancerogena supstanca. S druge strane, radi poboljšanja svojstava plastike poput njene čvrstoće, istoj se dodaje drveno brašno koje kao materijal prirodnog porijekla nema toksična svojstva, pa je samim tim sigurno po zdravlje ljudi, ali i okolinu. Rad se bavi problemom dodavanja aditiva u plastiku, pitanjem da li su oni zaista neophodni, kakve pogodnosti nude proizvođačima plastičnih materijala, te na koji način isti utiču na zdravlje ljudi.

Ključne riječi: *aditivi, plastika, retardanti plamena*

2-O-10

Possible harmful plastic additives

Lana POPOVIĆ, Anela DACIĆ, Merjem PUSTAHIJA, Armin RADELJAŠ,
Aleksandra POROBIĆ

¹University of Sarajevo, Faculty of Pharmacy, Department of Toxicology, BiH

*Corresponding author: Lana Popović, lana.popoviclanaa@gmail.com

Summary

Plastics, as widely used material for the preparation various objects, although harmful, primarily for the environment due the long time needed for its degradation, is necessary for the many industries, so manufacturers of plastics are trying in any way to upgrade its properties, by adding different additives. Mostly, flame retardants, chemical additives that can prevent combustion or can slow down spreading the flame. Also, very important are additives than can speed up the biodegradability of plastics, and that are not harmful for the consumers. Additives like asbestos, were regularly used until twenty of thirty years, even though its harmful potential on human health, like cancerogenic activity was already well known. On the other hand, to improve properties such as hardness, often wood flour is added, which is natural material safe for the human health and environment. This paper will discuss the problem of usage of additives in plastics, the necessity for their use, what are their advantages in manufacturing the plastics, and also about its impact on human health.

Keywords: *additives, plastics, flame retardants*

Najčešća trovanja u domaćinstvima – šta trebamo znati o mjerama prve pomoći?

Sabina BEHREM, Ajša KUDELIC, Amila KUKIĆ, Fatima MEHMEDOVIĆ, Berina SKORUPAN, Meša SMAJIĆ, Igor TOPIĆ

Univerzitet u Sarajevu-Farmaceutski fakultet, BiH

Sažetak

Prva pomoć predstavlja primjenu vještina i znanja kako bi se ukazala medicinska pomoć na mjestu gdje se zatekne bolesna ili ozlijeđena osoba. Njen zadatak je da se što ranije ukloni prijeteći uzrok smrti (spriječiti gušenje, zaustaviti krvarenje, omogućiti disanje ili oživjeti osobu u srčanom zastoju...), te spriječiti moguće komplikacije (zaustaviti razvoj infekcije i sl). Uzrok povreda i stanja koja zahtijevaju pružanje adekvatne prve pomoći često su različite svakodnevne supstance koje se mogu pronaći u prosječnom domaćinstvu, a iste su u upotrebi kao sredstva za čišćenje, kuhanje ili su u pitanju različiti lijekovi, najčešće OTC preparati (OTC – *over the counter* ili *iza pulta*, lijekovi koji se izdaju u bezreceptnom režimu). Upravo jednostavan pristup ovim hemikalijama, predstavlja opasnost od povećane mogućnosti trovanja, a posebno djece. Stoga je neophodno educirati šire stanovništvo o simptomima trovanja hemikalijama koje se često nalaze u domaćinstvima, kako pristupiti davanju prve pomoći ukoliko dođe do trovanja, ali i koje mjere poduzeti da se spriječe ovakva stanja. Cilj ovoga rada je omogućiti jednostavan pristup svim informacijama potrebnim za prepoznavanje trovanja, te uputa o načinu pružanja prve pomoći prilikom trovanja lijekovima koji se često nalaze u kućnim apotekama, poput sedativa i hipnotika, paracetamola i acetilsalicilne kiseline, kao i šta uraditi ukoliko dođe do trovanja nekim korozivnim sredstvom, koja u osnova sredstava za čišćenje. Pregledni rad daje i upute za prvu pomoć u slučaju trovanja ugljen monoksidom zbog brzog fatalnog djelovanja, te trovanja hranom.

Ključne riječi: *trovanja, prva pomoć, OTC lijekovi, ugljen monoksid, trovanja hranom*

2-O-11

The most common poisonings in households - what do we need to know about first aid measures?

Sabina BEHREM, Ajša KUDELIC, Amila KUKIĆ, Fatima MEHMEDOVIĆ, Berina SKORUPAN, Meša SMAJIĆ, Igor TOPIĆ

University of Sarajevo-Faculty of Pharmacy, BiH

Summary

First aid refers to skills and knowledge that are used in order to provide medical assistance at a place where a sick or injured person is found. Its task is to remove the threatening cause of death as soon as possible (prevent suffocation, stop bleeding, enable breathing or revive a person in cardiac arrest...), and prevent possible complications (stop the development of infection, etc.). The cause of injuries and conditions that require providing first aid are often various everyday substances that can be found in the average household, and the same are used as means for cleaning, cooking or different medicines, most often OTC drugs (OTC - over-the-counter medicines). Precisely the simple access to these chemicals represents the danger of increased possibility of poisoning, especially of children. Therefore, it is necessary to educate the wider population about the symptoms of chemical poisoning that are often found in households, how to provide first aid in case of poisoning, and what measures to take to prevent such situations. The purpose of this paper is to provide easy access to all the information needed to recognize poisoning, as well as instructions on how to provide first aid in case of poisoning with drugs that are often found in home pharmacies, such as sedatives and hypnotics, paracetamol and acetylsalicylic acid, as well as what to do if poisoning occurs with some corrosive agent, which is the basis of cleaning agents. The review paper also provides instructions for first aid in the case of carbon monoxide poisoning due to its rapid fatal effect, as well as food poisoning.

Keywords: *poisoning, first aid, OTC drugs, carbon monoxide, food poisoning*

Percepcija potrošača Kantona Sarajevo o sigurnosti hrane na tržištu

Ema VAJZOVIĆ,^{1*} Asja REDŽOVIĆ,¹ Erna ŠKRIJELJ,¹ Alma TULE,¹
Naida ZEJNELAGIĆ,¹ Selma ŽUNIĆ¹

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

*Autor za korespondenciju: Ema Vajzović, emavajzovic@ffsa.unsa.ba

Sažetak

Sigurnost hrane je uopćen pojam, a podrazumjeva mikrobiološku ili higijensku ispravnost/sigurnost i zdravstvenu sigurnost koja podrazumjeva da je hrana sigurna i po pitanju prisustva ostataka hemijskih supstanci te različitih kontaminata. Ovo istraživanje ima za cilj saznati kakva je percepcija potrošača KS o sigurnosti hrane na tržištu, povećati spoznaju o položaju potrošača na području KS kada je u pitanju zaštita potrošača, ukazati na važnost zaštite potrošača, unaprijediti i proširiti znanje o datoj temi, upoznati se sa pojmovima „sigurnost hrane“, „zaštita potrošača“, „percepcija potrošača o sigurnosti hrane“. Istraživanje u formi ankete sa pitanjima otvorenog i zatvorenog tipa provedeno je od 1.12.2021. do 13.12.2021., a uključivalo je 126 ispitanika sa područja Kantona Sarajevo. Rezultati provedenog istraživanja pokazali su da ispitanici često nisu upoznati ili su djelomično upoznati sa svojim pravima kao potrošača. Kako bi se to promijenilo potrebno je educirati potrošače o njihovim pravima (npr. putem letaka, TV i radio emisija, interneta). Ispitanici se ne osjećaju u potpunosti zaštićeno uz postojeće mjere zaštite potrošača, te smatraju da hrana na tržištu nije dovoljno sigurna za upotrebu. Razlog nepovjerenja potrošača su vjerovatno i situacije kao što su pronalazak „stranog tijela u hrani“, GM hrana na tržištu, ali i pristustvo određene doze nepovjerenja prema nadležnim organima zaduženim za ovu oblast ili nedovoljna informisanost o funkcionisanju organa zaduženih za sigurnost hrane na nivou države.

Ključne riječi: *sigurnost hrane, zaštita potrošača, GM proizvodi, Kanton Sarajevo*

2-O-12

Consumers perception of food safety in Canton Sarajevo

Ema VAJZOVIĆ,^{1*} Asja REDŽOVIĆ,¹ Erna ŠKRIJELJ,¹ Alma TULE,¹
Naida ZEJNELAGIĆ,¹ Selma ŽUNIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition,
B&H

*Corresponding author: Ema Vajzović, emavajzovic@ffsa.unsa.ba

Summary

Food safety is a general term, which includes microbiological or hygienic correctness/safety and health safety, which means that food is safe also in terms of the presence of chemical substance residues and contaminants. The aim of this research is to learn about the perception of consumers in Canton Sarajevo about food safety on the market, to increase knowledge about the position and attitudes of consumers in Canton Sarajevo when it comes to consumer protection, to point out the importance of consumer protection, to improve and expand knowledge on a given topic, to become familiar with the terms " food safety", "consumer protection", "consumer perception of food safety". Research in a form of questionnaire was conducted through the period of 01/12/2021 until 13/12/2021, and it included 126 respondents on the territory of Canton Sarajevo. Results of a research showed that the respondents are often not familiar or partially familiar with their rights as consumers. In order to change that, it is necessary to educate consumers about their rights (e. g. through leaflets, TV and radio shows, the Internet). Respondents do not feel fully protected by existing consumer protection measures, and believe that the food on the market is not safe enough for consumption. The main reason of consumers distrust could be situations of finding a "foreign body in food", GM food on the market, but also the presence of a certain amount of mistrust towards the competent authorities in charge of this area, or lack of information on the functioning of bodies responsible for food safety at the state level.

Keywords: food safety, consumer protection, GM products, Canton Sarajevo

Komparacija pojave gingivitisa kod mladih pušača cigareta i nargile i načina održavanja oralne higijene

Kanita ZAIMOVIĆ*, Amina SELIMOVIĆ, Indira MUJIĆ JAHIĆ, Mirjana GOJKOV VUKELIĆ, Sanja HADŽIĆ

Univerzitet u Sarajevu, Stomatološki fakultet sa klinikama, Katedra za oralnu medicinu i parodontologiju

*Autor za korespondenciju: Kanita Zaimović, e-mail: zaimovickanita @gmail.com

Sažetak

Svi organi podložni su djelovanju štetnih sastojaka duhanskog dima, pa tako i usna šupljina. Konzumiranje nargile, kao alterantive nikotinu, smatra se manje opasnim po zdravlje i danas je postalo popularno, naročito među mlađom populacijom. Cilj ovog rada bio je procijeniti stanje gingive kod mladih koji konzumiraju cigarete i nargilu u odnosu na način održavanja oralne higijene. Istraživanje je provedeno na 50 zdravih mladih odraslih ljudi koje su došli na redovan stomatološki pregled. Ispitanici su dobili obrazac za saglasnost za učešće u istraživanju. Nakon provedene anamneze o opštem zdravlju, navikama pušenja, konzumiranju nargile, oralnim higijenskim navikama, uradio se klinički pregled koji je obuhvatio pregled gingive, pri čemu su evidentirani parodontalni indeksi: indeks zubnih naslaga (PI), indeks gingive (GI) i indeks krvarenja papile (PBI). Svi dobiveni podaci bilježili su se u radni karton posebno osmišljen za ovo istraživanje. Rezultati pokazuju da od ukupno 48 pacijenta, njih 27 (56,2%) su bili pušači, a 15 (31,8%) ispitanika konzumiralo nargilu. Prosječna vrijednost PI kod svih ispitanika iznosila je $0,45 \pm 0,01$, GI; $0,96 \pm 0,02$, dok PBI; $0,65 \pm 0,02$. PI u skupini nepušača iznosio je $0,32-0,42 \pm 0,02$, i bio cio je značajno niži od vrijednosti PI skupine pušača cigareta $0,60 \pm 0,02$ ($p < 0,001$), kao i PI skupine pušača nargile, $0,51 \pm 0,03$ ($p < 0,001$). GI i PBI nisu se značajno razlikovali između ispitivanih grupa. Održavanje oralne higijene pokazalo se lošije kod pušača, nego kod nepušača, s tim da nema značajne razlike između pušača cigareta i nargile. GI i PBI kao pokazatelji upalnih promjena na gingivi nisu se statistički razlikovali između ispitivanih grupa.

Ključne riječi: *cigarete, nargila, oralna higijena, gingivitis*

2-O-13

Comparison of the gingivitis occurrence in young cigarette and hookah smokers and methods of maintaining oral hygiene

Kanita ZAIMOVIĆ*, Amina SELIMOVIĆ, Indira MUJIĆ JAHIĆ, Mirjana GOJKOV VUKELIĆ, Sanja HADŽIĆ

University in Sarajevo, Faculty of Dentistry with Clinics, Department of Oral Medicine and Periodontology

*Corresponding author: Kanita Zaimović, e-mail: zaimovickanita @gmail.com

Summary

All organs are susceptible to the harmful effects of tobacco smoke, and so is the oral cavity. Hookah consuming, as alternative to nicotine, is considered as less harmful for humans health and it's usage is widely spread, especially among the youngs. Aim of this work was to estimate the gingiva state of youngs who consume cigarettes and hookah with ways of maintaining oral hygiene. Research was conducted on 50 healthy young adults who came for a regular dental examination. Respondents filled the consent form for participation in research. After taking an anamnesis about general health, smoking habits, hookah consumption, oral hygiene habits, a clinical examination was performed which included the examination of gingiva by which the following parodontal indexes were recorded: dental plaque index (OI), gingival index (GI) and bleeding papilla (PBI). All gained data were recorded in the work card especially designed for this research. The results show that out of total of 48 patients, 27 of them (56.2%) were smokers, and 15 (31.8%) of the subjects consumed hookah. The average value of PI in all subjects was 0.45 ± 0.01 , GI; 0.96 ± 0.02 , while PBI; 0.65 ± 0.02 . The PI in the group of non-smokers was $0.32-0.42 \pm 0.02$, and was significantly lower than the PI of the cigarette smoker group 0.60 ± 0.02 ($p < 0.001$), as well as the PI of the hookah smoker group, 0.51 ± 0.03 ($p < 0.001$). GI and PBI were not significantly different between the studied groups. Maintaining oral hygiene was worse by smokers than by non-smokers, with no significant difference between cigarette and hookah smokers. GI and PBI as indicators of inflammatory changes on the gingiva were not statistically different between the studied groups.

Keywords: *cigarettes, hookah, oral hygiene, gingivitis*

Zbrinjavanje farmaceutskog otpada- Vodič za stanovništvo

Romana GALIN*¹, Elmedina AGANOVIĆ¹, Amela AVDIBEGOVIĆ¹,
Merima DURIC¹, Maja ĐUROVIĆ¹, Andrea GALIJAŠEVIĆ¹, Jasmina
GARIĆ¹

¹Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za toksikologiju, BiH

*Autor za korespondenciju: Romana Galin, romanagalina@ffsa.unsa.ba

Sažetak

Farmaceutski otpad odnosi se na sve farmaceutske proizvode, lijekove i hemikalije, uključujući i njihovu primarnu ambalažu, koji su postali neupotrebljivi jer im je istekao rok upotrebe, pripremljeni su pa neiskorišteni, ili je došlo do prolijevanja, rasipanja i slično. Loše upravljanje i nepravilno zbrinjavanje farmaceutskog otpada nosi visoki i dugoročni štetni rizik za zdravlje i okoliš. Prisustvo lijekova i farmakološki aktivnih supstanci u okolišu sve više postaje predmet javnog interesa jer predstavlja ne samo ekološku opasnost već i zdravstvenu opasnost za životinje, što ujedno daje indikaciju na mogući trend za dugoročne štetne zdravstvene posljedice na ljude. Današnja zakonska regulativa razvijenih zemalja vrlo detaljno regulira i prati odlaganje i zbrinjavanje farmaceutskog otpada, ali radi nedovoljne educiranosti stanovništva nije dovoljno implementirana niti se provodi u cijelosti. Farmaceutski otpad iz domaćinstava se treba odnijeti u apoteku kako bi se isti na pravilan način skladištio i uništio, te je stoga podizanje ekološke svijesti građana Bosne i Hercegovine i upoznavanje sa posljedicama koje može imati značajne negativne implikacije po okoliš, od velike važnosti.

Ključne riječi: *farmaceutski otpad, ekološka opasnost, štetne zdravstvene posljedice*

2-P-1

Disposal of pharmaceutical waste- Practical guide for citizens

Romana GALIN*¹, Elmedina AGANOVIĆ¹, Amela AVDIBEGOVIĆ¹,
Merima DURIC¹, Maja ĐUROVIĆ¹, Andrea GALIJAŠEVIĆ¹, Jasmina
GARIC¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Toxicology, BiH

*Corresponding author: Romana Galin, romanagalin@ffsa.unsa.ba

Summary

Pharmaceutical waste refers to all pharmaceutical products, medicines and chemicals, including their primary packaging, which have become unusable because their use-by date has expired, they have been prepared and then not used, or there has been a spill, waste, etc. Poor management and improper disposal of pharmaceutical waste carries a high and long-term harmful risk for health and the environment. The presence of drugs and pharmacologically active substances in the environment is increasingly becoming a subject of public interest because it represents not only an environmental hazard but also a health hazard for animals, which at the same time gives an indication of a possible trend for long-term adverse health consequences for humans. Today's legislation of developed countries regulates and monitors the disposal and disposal of pharmaceutical waste in great detail, but due to the insufficient education of the population, it is not sufficiently implemented nor is it implemented in its entirety. Pharmaceutical waste from households should be taken to the pharmacy in order to be properly stored and destroyed, and therefore raising the environmental awareness of the citizens of Bosnia and Herzegovina and familiarizing them with the consequences that can have more broader impact on environment is of great importance.

Keywords: pharmaceutical waste, environmental hazards, unwanted health consequences

PRAĆENJE PRISUSTVA TRIHALOMETANA U VODI ZA PIĆE

Naida ZEJNELAGIĆ,^{1*} Dženana REDŽOVIĆ,¹ Emina SARAJLIĆ,¹ Erna ŠKRIJELJ,¹ Alma TULE,¹ Ema VAJZOVIĆ,¹ Selma ŽUNIĆ¹

¹ Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: Naida Zejnelegić, naidazajnelegic@ffsa.unsa.ba

Sažetak

Voda je značajna za život svih živih bića jer bez nje tijelo ne bi moglo normalno funkcionisati. Pitka voda je voda visoke kvalitete koja se može koristiti za piće, pripremu hrane, te druge potrebe čovjeka. Takva voda u sebi nema mikroorganizme i sadrži nešto manje minerala. Pitka voda iz česme nije u potpunosti bez štetnih tvari, ali je prečišćena i hemijski tretirana kako ne bi imala veće količine štetnih tvari koje mogu negativno utjecati na zdravlje. Ovaj rad ima za cilj povećati spoznaju o trihalometanima, njihovim rizicima za zdravlje, kao i načinu zaštite od istih. Trihalometani su štetni spojevi koji nastaju reakcijom hlora i organskih tvari u zagađenoj, odnosno neprečišćenoj vodi. Najpoznatiji predstavnik trihalometana je hloroform, a ostali trihalometani su metihloroform, trihloretilen i tetrahloroetilen. Najviša dozvoljena koncentracija hloroforma u vodi za piće je 100µg/l. Trihalometani u vodi za piće ne izazivaju negativne učinke na zdravlje čovjeka ukoliko se unose u organizam povremeno i u vrlo malim količinama. Međutim, dugotrajna izloženost trihalometanima dovodi se u vezu sa pojavom raka i reproduktivnih smetnji, pa se trihalometani godinama klasificiraju kao potencijalno kancerogeni za ljude.

Ključne riječi: *trihalometani, hloroform, voda za piće*

2-P-2

Trihalomethanes in drinking water

Naida ZEJNELAGIĆ,^{1*} Dženana REDŽOVIĆ,¹ Emina SARAJLIĆ,¹ Erna ŠKRIJELJ,¹ Alma TULE,¹ Ema VAJZOVIĆ,¹ Selma ŽUNIĆ¹

¹ University of Sarajevo, Faculty of Pharmacy, BiH

*Corresponding author: Naida Zejnelagić, naidazejnelagic@ffsa.unsa.ba

Summary

Water is important for the life of all living beings because without it the body could not function normally. Drinkable water is high-quality water that can be used for drinking, food preparation, and other human needs. Such water does not contain microorganisms and contains slightly fewer minerals. Drinking water from the tap is not completely free of harmful substances, but it is purified and chemically treated so that it does not contain large amounts of harmful substances that can negatively affect health. This work aims to gain knowledge about trihalomethanes, their health risks, as well as the way to protect against them. Trihalomethanes are harmful compounds that are formed by the reaction of chlorine and organic substances in polluted or untreated water. The most famous representative of trihalomethanes is chloroform, and other trihalomethanes are methychloroform, trichloroethylene and tetrachloroethylene. The highest permitted concentration of chloroform in drinking water is 100µg/l. Trihalomethanes in drinking water do not cause negative effects on human health if they are taken into the body occasionally and in very small quantities. However, long-term exposure to trihalomethanes is linked to the occurrence of cancer and reproductive disorders, so trihalomethanes for years have been classified as potentially carcinogenic to humans.

Keywords: *trihalomethanes, chloroform, drinking water*

3. ISHRANA TOKOM ŽIVOTNOG CIKLUSA
NUTRITION THROUGH THE LIFECYCLE

Grejpfrut i lijekovi

Kenan ABDAGIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet

Sažetak

Grejpfrut je citrusno voće, čija konzumacija je pokazala blagotvorno djelovanje. Bogat je vitaminima A i C te manjom količinom minerala poput kalcija, fosfora i kalija. Ipak, "rajsko voće" kako ga nekada zovu, stupa u interakcije sa lijekovima. Grejpfrut sadrži hemikalije furanokumarine koji sprječavaju enzime da razgrađuju lijek u crijevima, zbog čega se učinak lijeka može udvostručiti, pa čak i utrostručiti, te tako naštetiti organizmu. Ključni enzim za nastanak interakcija između grejpfruta i pojedinih lijekova je citohrom P450 3A4 (CYP3A4). Navedeni enzim je važan u metaboliziranju velikog broja lijekova, a grejpfrut smanjuje njegovu aktivnost. Stoga, lijekovi koji predstavljaju supstrate za citrohrom P450 3A4, odnosno metaboliziraju se pomoću ovog enzima, kao što su: statini, pojedini antibiotici, lijekovi koji djeluju na centralni nervni sistem, imunosupresivi, lijekovi koji djeluju na urinarni trakt, srce i krvotok ili antitumorski lijekovi, stupaju u interakcije sa grejpfrutom, te je tu kombinaciju neophodno izbjegavati. Neki od neželjenih efekata zbog nastalih interakcija uključuju unutrašnja krvarenja, promjenu srčanog ritma, oštećenja bubrega i iznenadnu smrt. Stoga je cilj ovog rada ukazati na značaj grejpfruta u ishrani, ali i upozoriti na moguće interakcije sa lijekovima.

Ključne riječi: *grejpfrut, interakcije, lijekovi*

3-O-1

Grapefruit and drugs

Kenan ABDAGIĆ

University of Sarajevo, Faculty of Pharmacy

Summary

Grapefruit is a citrus fruit, the consumption of which has shown beneficial effects. It is rich in vitamins A and C and a small amount of minerals such as calcium, phosphorus and potassium. However, the "fruit of paradise" as it is sometimes called, interacts with drugs. Grapefruit contains furanocoumarin chemicals that prevent enzymes from breaking down the drug in the gut, which can double or even triple the drug's effect and harm the body. The key enzyme for interactions between grapefruit and certain drugs is cytochrome P450 3A4 (CYP3A4). This enzyme is important in metabolizing a large number of drugs, and grapefruit reduces its activity. Therefore, drugs that are substrates for cytochrome P450 3A4, i.e. are metabolized by this enzyme, like statins, certain antibiotics, drugs for the central nervous system, immunosuppressants, drugs for the urinary tract, drugs for the heart and blood flow or anticancer drugs, can interact with grapefruit, so that combination must be avoided. The unwanted consequences of these interactions include internal bleeding, changes in heart rhythm, kidney damage and sudden death. So the aim of this work is to emphasize the importance of grapefruit in the diet but also to warn about possible interactions with drugs.

Keywords: *grapefruit, interactions, drugs*

Školski obrok u srednjim školama KS – perspektiva učenika

Merjem ADILOVIĆ*, Elmedina AGANOVIĆ, Selma HAJDARPAŠIĆ, Ajša KUDELIĆ, Almasa OSMANHODŽIĆ, Amina SALIHOVIĆ

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

*Autor za korespondenciju: Merjem Adilović, merjemadilovic@ffsa.unsa.ba

Sažetak

Školski obrok nužan je za pravilan rast i razvoj djece i adolescenata. Neke države imaju određene standarde koje školski obroci moraju ispunjavati kako bi ispunile sve potrebe svojih učenika. Cilj istraživanja bio je utvrditi perspektivu učenika kada je u pitanju školski obrok u Kantonu Sarajevo. Ispitali smo da li postoji nezadovoljstvo, u kojem procentu je izraženo, koji su to osnovni uzroci nezadovoljstva učenika i šta oni smatraju da bi se moglo uraditi za unaprjeđenje njihovih školskih obroka kao i u kojem procentu su zastupljeni učenici koji imaju neki poseban režim ishrane i da li školski obrok ispunjava njihove potrebe. Istraživanje je sprovedeno na 95 učenika srednjih škola iz Kantona Sarajevo u decembru 2021. godine. Ispitano je 95 učenika, od toga 55 djevojčica, 38 dječaka, a 2 učenika se nisu htjela izjasniti o svome spolu. Zastupljeni su učenici od 14 do 19 godina. Metoda sprovođenja istraživanja bila je istraživanje putem anketiranja, a sama anketa je formirana u vidu elektronskog upitnika. Ispitanici su anketirani u jednoj vremenskoj tački. Vodilo se računa o tome da uzorak bude statistički reprezentativan. Učenici su generalno osviješteni po pitanju načina na koji bi trebao izgledati njihov školski obrok.

Ključne riječi: *školski obrok, ishrana*

3-O-2

School meals in secondary schools in Canton of Sarajevo – student’s perspective

Merjem ADILOVIĆ*, Elmedina AGANOVIĆ, Selma HAJDARPAŠIĆ, Ajša KUDELIĆ, Almasa OSMANHODŽIĆ, Amina SALIHOVIĆ

University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, B&H

*Corresponding author: Merjem Adilović, merjemadilovic@ffsa.unsa.ba

Summary

School meals are necessary for the proper growth and development of children and adolescents. Some countries have certain standards that school meals must meet in order to fulfill all the needs of their students. The research objective was to determine the perspective of students when it comes to school meals in Sarajevo Canton. We have researched if there is dissatisfaction, in what percentage is it expressed, what are the main causes of student dissatisfaction and what do they think could be done to improve their school meals and also, in what percentage are there students who have a special diet and whether the school meal fulfills their needs. The research was conducted on 95 high school students from Sarajevo Canton in December 2021. 95 students were examined, of which 55 were girls, 38 boys and 2 students did not want to declare their gender. Students from 14 to 19 years old were represented. The method of conducting the research was survey research, and survey itself was formed in the form of an electronic questionnaire. Respondents were surveyed at one point in time. Care was taken to make the sample statistically representative. Students are generally aware of what their school meal should look like.

Keywords: *school meal, diet*

Usporedba prehrabnenih navika studenata Sveučilišta u Mostaru

Ana BELJO^{1*}, Ana PLANINIĆ^{1,2}, Mia JURIŠIĆ³

¹Sveučilište u Mostaru, Fakultet zdravstvenih studija, Mostar, BiH

² Sveučilište u Mostaru, Agronomski i prehrabneno tehnološki fakultet, Mostar, BiH

³ Dom zdravlja Mostar

* Autor za korespondenciju: Ana Beljo, e-mail: anabeljo61@gmail.com

Sažetak

Pravilna i uravnotežena prehrana je vrlo važna za fizički i psihički razvoj mladih osoba, a posebno studenata koji su tijekom studiranja izloženi psihološkom naporu i stresu koji negativno utječe na psihu. U našem istraživanju je sudjelovalo 152 studenata Sveučilišta u Mostaru (SUM), od čega su najbrojniji bili studenti Fakulteta zdravstvenih studija. Cilj rada bio je istražiti svakodnevne prehrabnene navike i stavove studenata o prehrani te ih na kraju usporediti s preporučenim prehrabnenim smjernicama Hrvatskog zavoda za javno zdravstvo (HZJZ). Anonimna anketa je odrađena preko Google obrasca, a sastojala se od dva dijela. Prvi dio ankete su socio-demografski podaci ispitanika, dok su drugi dio pitanja o prehrabnenim navikama. Podaci su obrađeni pomoću kompjuterskog programa Microsoft Excel 2010 te su na kraju uspoređeni prema ustrojbenim jedinicama SUM-a. Rezultati prvenstveno pokazuju da studenti, njih 57 (52%), smatraju da je njihova prehrana nepravilna, dok 53 studenta (48%) ipak smatra da se pravilno hrane. Prema samopercepciji 78 studenata (72%) smatra da su odgovarajuće tjelesne težine, a 24 (22%) smatra da je pretilo. Ispitali smo i učestalosti alergija na namirnice te ukupno njih 10 (9%) pati od alergija, a među najčešće istaknutima mlijeko, gluten i jagode. Ispitali smo i učestalost tjelovježbe, koju svakodnevno obavlja samo dvoje (3%) studenata, četiri ili pet puta njih 16 (21%), dva ili tri puta tjedno njih 24 (31%), a jednom tjedno njih 34 (45%). Na pitanje o konzumiranju mesa u svakodnevnoj prehrani, 24 (22%) studenata je zaokružilo da ne konzumira meso na svakodnevnoj bazi dok preostalih 86 (78%) konzumira meso svakodnevno, a od namirnica najčešće izbjegavaju gluten i povrće. Čak 40 od 110 (36%) studenata ne prakticira doručkovati. Pri odabiru namirnica najveću pozornost studenti obraćaju na to da je namirnica ukusna te zatim da je namirnica zdrava i pristupačne cijene.

Ključne riječi: *prehrana, navike, smjernice, namirnice*

3-O-3

Assesment of nutritional habits of students at University of Mostar

Ana BELJO^{1*}, Ana PLANINIĆ^{1,2}, Mia JURISČIĆ³

¹University of Mostar, Faculty of Health Sciences, Mostar, BiH

² University of Mostar, Faculty of Agronomy and food technology, Mostar, BiH

³ Health center Mostar

*Corresponding author: Ana Beljo, e-mail: anabeljo61@gmail.com

Summary

Proper and balanced nutrition is very important for the physical and mental development of young people, especially students who are exposed to psychological strain and stress during their studies, which negatively affects the mental health. 152 students of the University of Mostar participated in our research, of which the most numerous were students of the Faculty of Health Studies. The aim of the work is to investigate the daily eating habits and attitudes of students about nutrition and finally compare them with the recommended guidelines of HZJZ. The anonymous survey was completed via a Google form, and consisted of two parts. The first part of the survey is the sociodemographic data of the respondents, while the second part is questions about eating habits. The data were processed using the Microsoft Excel 2010 program and finally compared according to the organizational units of SUM. The results primarily show that students, 57 of them (52%), think that their diet is irregular, while 53 students (48%) still think that they eat properly. According to self-perception, 78 students (72%) believe that they are of appropriate body weight, and 24 (22%) believe that they are obese. We also examined the frequency of food allergies and a total of 10 of them (9%) suffer from allergies, with milk, gluten and strawberries among the most prominent. We also examined the frequency of exercise, and only two (3%) students exercise daily, 16 (21%) four or five times, 24 (31%) two or three times a week, and 34 (45%) once a week. When asked about the consumption of meat in their daily diet, 24 (22%) students circled that they do not consume meat on a daily basis, while the remaining 86 (78%) consume meat every day, and most often avoid gluten and vegetables. As many as 40 out of 110 (36%) students do not eat breakfast. When hosting food, students pay the most attention to the fact that the food is tasty, and then that the food is healthy and affordable.

Keywords: *nutrition, habits, guidelines, food*

Školska prehrana u osnovnim školama u Kantonu Sarajevo

Nađa BIBEZIĆ*, Nedžla BUČO, Lamija BRKOVIĆ, Lejla BEČIRAGIĆ,
Hena BRKIĆ

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

*Autor za korespondenciju: Nađa Bibezić, nadjabibezic@ffsa.unsa.ba

Sažetak

Prehrana je oduvijek bila presudan čimbenik opstanka. Hrana označava sve što unosimo u organizam kako bismo nadoknadili potrošenu energiju i podstakli rast i razvoj organizma. Zdrava ili pravilna prehrana je ona prehrana koja tijelu osigurava optimalan unos kalorija, vitamina, minerala i tekućine, te optimalan odnos proteina, ugljikohidrata i masti, kako bi se osigurale potrebe organizma za gradivnim, energetske i zaštitnim supstancama. Današnji ubrzani način života, brza hrana, nedovoljno kretanje i sedentarni način života, potencijalni su faktori za razvoj mnogih bolesti (pr. gojaznost, hipertenzija, povećan rizik za kardiovaskularne bolesti, dijabetes tipa 2, pa čak i sterilnost). Kod školske djece i adolescenata nepravilna prehrana čest je uzrok pretilosti, obzirom da se prehrambene navike stečene u djetinjstvu nastavljaju i u odraslo doba. Cilj ovog rada jeste da se pruži uvid u realno stanje, koje se tiče prehrane djece, zbog čega smo proveli istraživanje u različitim osnovnim školama u Kantonu Sarajevo, gdje smo anketirali učenike i njihove roditelje, a rezultate smo uporedili sa zakonskim propisima, koji predlažu jelovnike, te način ishrane djece. Rezultati istraživanja su pokazali da se većina djece ne hrani pravilno, tj. Zdravo, a većina roditelja te djece ne zna šta njihovo dijete jede u toku boravka u školskim prostorijama. Važno je djeci pružiti kvalitetnu prehranu i omogućiti usvajanje pravilnih prehrambenih navika, koje preveniraju pojavu različitih bolesti.

Ključne riječi: *hrana, školska prehrana, jelovnik, zakonski propisi*

3-O-4

School meals in elementary schools in Canton Sarajevo

Nađa BIBEZIĆ*, Nedžla BUČO, Lamija BRKOVIĆ, Lejla BEČIRAGIĆ,
Hena BRKIĆ

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

*Corresponding author: Nađa Bibezić, nadjabibezic@ffsa.unsa.ba

Summary

Nutrition has always been a crucial factor for survival. Food is everything that we enter into our body in order to compensate for the energy we spend and stimulate growth and development of our body. A healthy or proper diet is a diet that provides the body with an optimal intake of calories, vitamins, minerals and fluids, as well as an optimal ratio of proteins, carbohydrates and fats, in order to ensure the body's needs for building, energy and protective substances. Today's fast-paced lifestyle, fast food, insufficient movement and sedentary lifestyle are all potential factors for development of many diseases (eg. obesity, hypertension, increased risk for cardiovascular diseases, type 2 diabetes and sterility). In school children and adolescents, improper nutrition is a common cause of childhood obesity, given that, eating habits acquired in childhood continue into adulthood. The aim of our research is to provide and insight into the realistic situation regarding the nutrition of children, which is why we did this research in different elementary schools in Canton Sarajevo, where we surveyed students and their parents, and compared the results with legal regulations, which propose menus and the way children are fed. The results of the research showed that most children do not eat properly, i.e. healthy, and most of the parents of these children do not know what their children eat during their school time. It is important to provide a high-quality nutrition to the children and enable proper eating habits, which prevent the occurrence of various diseases.

Keywords: food, school nutrition, menu, legal regulations

Uticaj prehrane na kvalitet sna

Amila HAJDAREVIĆ*, Farah TRAKO, Azra OSMANBEGOVIĆ, Nejra PLJAKIĆ, Katarina PAVLOVIĆ, Ajla SELIMOVIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, Bosna i Hercegovina

*Autor za korespondenciju: Amila Hajdarević, e-mail: amilahajdarevic @ffsa.unsa.ba

Sažetak

Deprivacija sna uzrokovana je stalnim nedostatkom sna ili smanjenom kvalitetom sna. To je česta pojava u društvu koja pogađa ljude svih dobnih skupina i može voditi do težih zdravstvenih posljedica. Brojni faktori mogu naštetiti kvaliteti sna, uključujući stres, anksioznost i korištenje elektroničnih uređaja prije spavanja. Međutim, znatan dio znanstvene literature daje prehrani jednako važnu ulogu. Istraživanja su pokazala da vrijeme, vrsta i količina unosa makronutrijenata doprinose očuvanju kvalitetnog sna. Ovaj rad raspravlja o učinku prehrane na varijable spavanja, naglašavajući važnost modifikacije prehrane kao personaliziranog pristupa poboljšanju kvalitete sna.

Ključne riječi: *deprivacija sna, kvalitet sna, prehrana, modifikacije prehrane*

3-O-5

The effect of diet on sleep quality

Amila HAJDAREVIĆ*, Farah TRAKO, Azra OSMANBEGOVIĆ, Nejra
PLJAKIĆ, Katarina PAVLOVIĆ, Ajla SELIMOVIĆ

University of Sarajevo, Faculty of Pharmacy, Bosnia and Herzegovina

*Corresponding author: Amila Hajdarević, e-mail: amilahajdarevic @ffsa.unsa.ba

Summary

Sleep deprivation is caused by a consistent lack of sleep or reduced quality of sleep. It is a common occurrence in society that affects people of all ages and can lead to more severe health consequences. Numerous factors can harm sleep quality, including stress, anxiety, and the use of electronic devices before sleep. However, a large body of scientific literature gives nutrition an equally important role. Studies have shown that time, type, and amount of macronutrient intake contribute to the preservation of quality sleep. This paper discusses the effect of diet on sleep variables pinpointing the importance of dietary modifications as a personalized approach to improving sleep quality.

Keywords: *sleep deprivation, sleep quality, diet, dietary modifications*

Uticaj ishrane na pravilan rast i razvoj orofacijalnog sistema

Lejla HROMALIĆ, Alisa TIRO

Univerzitet u Sarajevu Stomatološki fakultet sa klinikama

Sažetak

Najintenzivniji rast se dešava u prvoj godini života, a pravilna ishrana obezbjeđuje neophodne nutrijentne za rast cijelog organizma. Majčino mlijeko predstavlja idealnu hranu za dojenče sadržavajući neophodna cirkulirajuća antitijela i imunoglobuline koji doprinose normalnom napredovanju djeteta. Dojenje pozitivno utiče i na orofacijalni sistem uspostavljajući pravilan rast i razvoj kostiju lica i mišića. Cilj ovog rada bio je ispitati stavove i znanja roditelja/staratelja o uticaju ishrane na razvoj lica i vilica kod djece. 63 roditelja/staratelja ispunilo je upitnik koji sadrži 20 pitanja. Istraživanje je provedeno u dvije osnovne škole na području općine Sanski Most, a ciljana grupa obuhvatala je roditelje/staratelje djece prvog razreda. Najveći broj ispitanika, 95,24%, smatra da je dojenje najbolji vid ishrane za dijete. 63,49% roditelja navodi da je dijete, u prvim mjesecima života, hranilo isključivo dojenjem. Kao ishranu u prvim mjesecima 11,11% ispitanika je koristilo adaptirano mlijeko, a 25,40% je prakticalovalo dohranu. Niko od ispitanika nije koristio kravlje mlijeko. 23,81% roditelja je odgovorilo da dijete ima/imalo karijes zuba, kod 12,70% djece je urađena ekstrakcija zuba kao posljedica karijesa, 11,11% je imalo jaku bol zuba, a 9,52% djece upražnjava štetnu naviku sisanja prsta. Zadatak zdravstvenih radnika treba biti konstantna promocija dojenja. Ne smijemo zaboraviti informisati roditelje o pravilnoj higijeni usne duplje, kako bi se izbjegli nastanak ranog dječijeg karijesa i posljedice koje nosi na orofacijalni sistem ali i na sve ostale aspekte pravilnog psihičkog i fizičkog rasta i razvoja. Pravilan odabir hrane i njene konzistencije, raznovrsna ishrana bogata nutrijentima, ispravni stavovi i navike predstavljaju temelj zdrave populacije!

Ključne riječi: *dojenje, dojenčad, ishrana, rast i razvoj*

3-O-6

The influence of nutrition on the proper growth and development of the orofacial system

Lejla HROMALIĆ, Alisa TIRO

University of Sarajevo- Faculty of Dentistry with Clinics

Summary

The most intensive growth occurs in the first year of life, and proper nutrition provides the necessary nutrients for the growth of the whole organism. Breast milk is an ideal food for the infant. Breastfeeding also has a positive effect on the orofacial system by establishing proper growth and development of the bones of the face and muscles. The aim of the study is to examine the attitudes and knowledge of parents/guardians about the impact of nutrition on the development of faces and jaws in children. 63 parents/guardians completed a questionnaire containing 20 questions. The survey was conducted in two elementary schools in Sanski Most, and the target group included parents/guardians of first grade children. The largest number of subjects, 95.24%, considers breastfeeding to be the best dietary type for the child. 63.49% of parents report that the child, in the first months of life, was fed exclusively by breastfeeding. As a diet in the first months, 11.11% of subjects used adapted milk, and 25.40% practiced nutrition, that is, a combination of breastfeeding and adapted milk. None of the subjects used cow's milk. 23.81% of parents replied that the child had tooth decay, 12.70% of children had tooth extraction as a result of tooth decay, 11.11% had severe tooth pain, and 9.52% of children had a harmful finger-sucking habit. The task of healthcare professionals should be the constant promotion of breastfeeding. We must not forget to inform parents about the proper hygiene of the oral cavity, in order to avoid the formation of early childhood caries and the consequences it entails on the orofacial system, but also on all other aspects of proper mental and physical growth and development. Proper selection of food and its consistency, a varied diet rich in nutrients, correct attitudes and habits are the basis of a healthy population!

Keywords: *breastfeeding, infants, nutrition, growth and development*

Farmakoterapija gojaznosti – efikasnost i sigurnost

Almedina MUSLIM, Aida MUSTAFICA

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

Sažetak

Gojaznost je hronična, iscrpljujuća bolest sa razornim ukupnim zdravstvenim efektima i smatra se globalnim teretom, odnosno pandemijom. Zbog nakupljanja masnog tkiva, gojazne osobe imaju povećan rizik od razvoja mnogih oboljenja uključujući kardiovaskularne bolesti, dijabetes melitus tip 2 i slično. Gubitak tjelesne težine može poboljšati ove eventualne ishode. Gojaznost se može tretirati i farmakološki. Farmakoterapija za liječenje gojaznosti prvenstveno je usmjerena na gubitak težine, održavanje gubitka težine i smanjenje rizika od nastanka raznih oboljenja. Ovi lijekovi mijenjaju jedan od osnovnih procesa u ljudskom tijelu, regulaciju težine, mijenjajući ili apetit, ili apsorpciju kalorija. Ciljevi rada su da se objasni šta je to gojaznost, koji lijekovi se koriste u tretmanu gojaznosti, te kroz rezultate kliničkih studija objasniti djelovanje ovih lijekova kod gojaznih osoba sa komorbiditetima. Većina istraživanja na ovu temu je pokazala značajno veći gubitak težine kod pacijenata na aktivnom liječenju od onih koji su primali placebo. Studije su dokazale da pored gubitka težine, lijekovi za tretman gojaznosti pomažu u tretiranju prisutnih komorbiditeta. Zbog potencijalnih nuspojava koja se mogu javiti tokom tretiranja gojaznosti lijekovima, neophodno je da pacijent bude pod strogim nadzorom ljekara.

Ključne riječi: *gojaznost, farmakoterapija, tretman gojaznosti*

3-O-7

Pharmacotherapy for obesity – efficiency and safety

Almedina MUSLIM, Aida MUSTAFICA

University of Sarajevo, Faculty of Pharmacy, Bromatology and nutrition, BiH

Summary

Obesity is chronic, exhausting disease with devastating overall health, and it is considered a global burden, or better, a pandemic. Due to the accumulation of adipose tissue, obese individuals have an increased risk of developing many diseases including the most common ones, cardiovascular diseases and type I diabetes mellitus. Weight loss will improve these eventual outcomes. But, we can treat obesity pharmacologically. Pharmacotherapy for the treatment of obesity is primarily aimed at losing weight, maintaining weight loss, and reducing the risk of other illnesses. These drugs change one of the basic processes in the human body, regulating weight by changing appetite or calorie absorption. The main objectives of the research are to explain what obesity is, which drugs are used in the treatment of obesity, and through the results of clinical studies to explain the effects of these drugs in obese people with comorbidities. Most studies on this topic have shown significantly higher weight loss in a patient on active treatment than those receiving a placebo. Studies also showed that in addition to weight loss, obesity treatment drugs help treat comorbidities, too. Due to the potential side effects that may occur during the treatment of obesity with drugs, it is necessary for the patient to be under the supervision of a doctor.

Keywords: *obesity, pharmacotherapy, obesity treatment drugs*

Analiza nastavnih planova i programa i sadržaja vezanih za pravilnu ishranu i zdravlje

Aida DELIZAIMOVIĆ, Nejla NUKIĆ*, Irma ČEHIĆ, Sanela Merjem RUSTEMPAŠIĆ

Univerzitet u Sarajevu, Pedagoški fakultet Univerziteta u Sarajevu, Odsjek za razrednu nastavu

*Autor za korespondenciju: Nejla Nukić, e-mail: nukic.nejla1999@gmail.com

Sažetak

Ishrana je proces u kojem čovjek u organizam unosi hranu, a nastavak tog procesa se odvija u probavnom sistemu, te se ta hrana prerađuje u energiju. Pravilna ishrana je itekako važna za rast i razvoj djece, jer nepravilnosti u ishrani utiču na zdravlje u odrasloj dobi. U današnjem, brzom tempu života, često smo skloni nepravilnoj ishrani. To može predstavljati veliki problem za djecu. Djeca se ne bave dovoljno fizičkom aktivnošću, te imaju neredovne obroke i često konzumiraju nezdravu hranu (grickalice, gazirana pića i slatkiše). Takav način života i nepravilna ishrana dovode do pojave gojaznosti, dijabetesa, visokog pritiska, do povećanja masnoća u krvi, deformiteta kičme, anemije i drugih nepravilnosti u rastu i razvoju djece. Neophodno je stvoriti kod djece naviku o zdravoj ishrani, a tu naviku stvara porodica i škola. Učitelji moraju svojim primjerom, trudom i dosljednošću doprinijeti stvaranju te navike. Čuvanje zdravlja i svijest o tijelu je jedna od najbitnijih stavki NPP-a, jer je bitno razviti kod djece svijest o očuvanju svog tijela. Kada bi u NPP-u bilo više sadržaja o pravilnoj ishrani i zdravlju, učenici bi se češće susretali sa tim temama, te bi aktivnije primjenjivali principe pravilne ishrane u svom životu. Iz tog razloga izvršili smo analizu sadržaja vezanih za teme ishrane i zdravlja u aktuelnim nastavnim planovima i programima (NPP) od prvog do petog razreda. U NPP-u, nažalost nema dovoljno sadržaja o pravilnoj ishrani i zdravlju. Jedino u predmetima Moja okolina i Tjelesni i zdravstveni odgoj uči se o pravilnoj prehrani, obrocima, njihovoj raznolikosti, o osnovama namirnica, obliku, boji i veličini. Generalni zaključak je da NPP ne sadrži dovoljno sadržaja vezanih za pravilnu ishranu i zdravlje.

Ključne riječi: NPP, pravilna ishrana, zdravlje, učitelj, dijete

3-O-8

Analysis of Curriculum and content related to proper nutrition and health

Aida DELIZAIMOVIĆ, Nejla NUKIĆ*, Irma ČEHIĆ, Sanela Merjem RUSTEMPAŠIĆ

University of Sarajevo, Faculty of educational sciences, Field of class teaching

*Corresponding author: Nejla Nukić, e-mail: nukic.nejla1999@gmail.com

Summary

Nutrition is a process in which a person takes food into the body, and the continuation of that process takes place in the digestive system, after that food is processed into energy. Proper nutrition is very important for the growth and development of children because nutritional irregularities affect health in adulthood. We are often prone to unhealthy eating habits. This can be a big problem for children. Children do not engage in enough physical activity and often have irregular meals and consume unhealthy foods (snacks, carbonated drinks and sweets). This kind of lifestyle and irregular nutrition lead to the appearance of obesity, diabetes, high blood pressure, increased blood fat, spinal deformity, anemia and other irregularities in the growth and development of children. It is necessary to create a habit of healthy eating, and this habit is created by the family and the school. Teachers must contribute to the creation of that habit by their example, effort and consistency. Taking care of health and awareness of the body is one of the most important items of the Curriculum and Program because it is important to develop awareness among children about the preservation of their bodies. If the Curriculum had more content about proper nutrition and health, students would encounter these topics more often, and would work more actively on developing the active application of proper nutrition in their lives. For this reason, we analyzed the content related to the topics of nutrition and health in the current Curriculum from the first to the fifth grade. Unfortunately, there is not enough content on proper nutrition and health in the Curriculum. Only within the subjects Science and Physical and Health Education students learn about proper nutrition, meals, their variety, the basics of food, shape, color and size. The general conclusion is that Curriculum does not contain enough content related to proper nutrition and health.

Keywords: *curriculum, regular nutrition, health, teacher, child*

Prehrambene navike pacijenata tokom liječenja fiksnim ortodontskim aparatom

Abdurrahman NUHANović, Elma OPAČIN,
Ajla OSMANČEVIĆ, Lejla REDŽEPAGIĆ-VRAŽALICA

Univerzitet u Sarajevu, Stomatološki fakultet s klinikama, Bosna i Hercegovina

Sažetak

Domet ortodoncije kao stomatološke discipline proizilazi iz kompliciranih mehanizama koji dolaze do izražaja u funkciji orofacijalne regije. Često se susrećemo sa istraživanjima koja su vezana za fizički, psihički i psihosocijalni utjecaj na samog pacijenta, a vrlo rijetko na same prehrambene navike i način ishrane pacijenta u toku terapije fiksnim ortodontskim aparatom. Cilj istraživanja bio je ispitati u kojoj mjeri se mijenjaju prehrambene navike pacijenta tokom liječenja fiksnim ortodontskim aparatom u odnosu na period prije terapije. Ispitanici u ovom istraživanju bili su pacijenti svih dobnih skupina, oba spola, koji su u terapiji fiksnim ortodontskim aparatom. Ispitivanje se vršilo putem Google Forms ankete. Od ukupno upućenih 80 anketnih upitnika prikupljeno je njih 76 potpuno odgovorenih. Anketa se sastojala od deset pitanja koja su se odnosila na konkretne prehrambene namirnice i način njihovog unosa u organizam. Prema statističkim podacima ankete 67,5% ispitanika je potvrdilo prisustvo promjena u prehrambenim navikama u toku terapije. Velika većina izbjegava konzumiranje orašastih plodova, hrane ljepljive te tvrde konzistencije. 65,8% ispitanika je odgovorilo da izbjegava odgrizanje hrane, 57,9% ispitanika je potvrdilo da režu hranu na sitnije komade. Zaključak ovog istraživanja je da ortodontski pacijenti u velikoj mjeri trpe promjene u vlastitim prehrambenim navikama u toku ortodontskog tretmana u odnosu na period prije terapije.

Ključne riječi: ortodontska terapija fiksnim aparatom, prehrambene navike, oralna higijena

3-O-9

Eating habits of patients during treatment with a fixed orthodontic appliance

Abdurrahman NUHANOVIĆ, Elma OPAČIN,
Ajla OSMANČEVIĆ, Lejla REDŽEPAGIĆ-VRAŽALICA

University of Sarajevo, Faculty of Dentistry with clinics, Bosnia and Herzegovina

Summary

The range of orthodontics as a dental discipline comes from complicated mechanisms that are expressed in the function of the orofacial region. We often meet research topics that are related to the physical, psychological and psychosocial impact on the patient. Very rarely the eating habits and way of eating during therapy with a fixed orthodontic appliance are considered. The goal of this research was to examine how much the patients eating habits have been changed during treatment with a fixed orthodontic appliance compared to the period before therapy. Respondents in this research were patients of all age groups, both genders, who were treated with fixed orthodontic therapy. Examination was conducted using a google forms survey. From total of 80 survey questions, 76 fully answered questions were processed. The survey consists of ten questions that are related to specific food products and the way of consuming these products. According to the statistics of this survey 67,5% of respondents confirmed the changes in their eating habits during the therapy. The vast majority avoids consuming nuts, sticky food and food with harder consistency. 65,8% of respondents answered that they avoid biting off food. 57,9% respondents confirmed that they cut food into small pieces. Conclusion of this research is that orthodontic patients largely undergo changes in their own eating habits during orthodontic treatment comparing the period before therapy.

Keywords: *fixed orthodontic therapy, eating habits, oral hygiene*

Povezanost prehrambenih navika i unosa hrane kod odraslih sa pripremom hrane i kulinarskim vještinama

M. PEHLIVAN, N. DURAK

Istanbul Medipol univerzitet, Institut za zdravstvene studije

Sažetak

Cilj ove studije bio je da se procijene kulinarske vještine i utvrdi povezanost prehrambenih navika odraslih sa njihovim vještinama kuhanja i pripremanja hrane. U studiji je bilo uključeno 123 odraslih u rasponu godina od 18-65. Podaci su sakupljeni direktnim razgovorom sa ispitanicima pomoću upitnika koji je uključivao opisne informacije, prehrambene navike, skalu ocjenjivanja kulinarskih vještina i upitnik unosa hrane u proteklih 24 sata. Za statističku analizu podataka korišten je SPSS 28.0 statistički softver. Procjena prehrambenih navika ispitanika pokazala je da više od polovine (64,6%) ne konzumira redovno tri obroka, i da 37,3%, 46,3% i 13,0% često preskaču doručak, ručak i večeru, respektivno. Procenat onih koji sami pripremaju obroke je 52,0, i ovaj procenat je statistički značajno veći kod žena nego kod muškaraca (70.7% prema 14.6%). Uporedo sa ovim podacima, srednja FPCS vrijednost kod ženske populacije bila je 195.3 ± 31.8 , a za muške ispitanike 147.3 ± 44.1 , i veća je kod nezaposlenih ($p < 0.05$) i osoba sa nižim nivoom obrazovanja. Ispitanici su bili grupisani kao niski-srednji-visoki prema FPCS skoriranju i nije bilo statistički značajne razlike između grupa u odnosu na energetske unos ili konzumaciju ugljikohidrata (g/%), proteina (g/%), masti (g/%) i vlakana (g). Međutim, ispitanici u visokoj FCPS grupi imali su manji unos masti (g/%) i veći unos vlakana (g).

3-O-10

The relationship of food preparation and cooking skills with eating habits and food intake in adults

M. PEHLIVAN, N. DURAK

Istanbul Medipol University, Institute of Health Science

Summary

In this study, the aim was to determine food preparation and cooking skills, and eating habits, and to evaluate the relationship between food preparation and cooking skills and eating habits in people. This study was conducted with 123 adult aged 18-65 years. The researchers collected the study data using the face-to-face interview method through a questionnaire including the descriptive information form, eating habits, Food Preparation and Cooking Skills Scale, and 24-dietary recall. SPSS 28.0 statistical package program was used to analyze the data. When the nutritional habits of the participants were examined, it was found that more than half (64.6%) did not regularly consume 3 main meals and 37.3%, 46.3% and 13.0% of them usually skipped breakfast, lunch and dinner, respectively. The rate of those who prepare their own meals is 52.0%; this rate was found to be statistically significantly higher in women than in men (70.7% vs 14.6%). Parallel to this result, the mean FPCS score of female participants was 195.3 ± 31.8 , and male participants were 147.3 ± 44.1 , and it was found to be higher in unemployed people ($p < 0.05$) and people with low education level ($p > 0.05$). Participants were grouped as low-medium-high according to FPCS scoring and there was no statistically significant difference between groups in terms of energy, carbohydrate (g%), protein (g%), fat (g%) and fiber (g) consumption. However, participants in the high FPCS group had lower fat (g%) and higher fiber (g) intake.

Personalizirana prehrana – koncept i mogućnosti

Lana POPOVIĆ, Anela DACIĆ, Merjem PUSTAHIJA, Jasmina ĐEĐIBEGOVIĆ

Univerzitet u Sarajevu-Farmaceutski fakultet, Sarajevo, BiH

Sažetak

Rad se bavi pojmom personalizirane prehrane. Personalizirana prehrana individualizira prehranu za pojedinca na osnovu njegovih potreba, životnih navika, preferencija prema hrani, antropometrije itd. U modernije vrijeme sve više pažnje se poklanja genetici, odnosno povezanosti prehrane čovjeka i njegovih gena. Ovim se svakom pojedincu pruža ishrana koja je bazirana na njegovom genetskom sklopu. Za svrhe personalizacije prehrane danas se koriste genetski testovi koji pružaju informacije o tome koji vid prehrane je optimalan za pojedinca. No, rezultatima ovih testova ne treba slijepo vjerovati, jer je ljudski organizam izuzetno složen sistem i moguće je da dođe do pogrešnih interpretacija na nivou gena. Poznato je da se mnoge bolesti mogu javiti kao posljedica loše prehrane ili prehrane koja ne odgovara nekom pojedincu, među njima dijabetes, kardiovaskularne bolesti i karcinom, no svakako da je odnos između prehrane i hronične bolesti kompleksan, kao i identificiranje specifičnog prehrambenog uzroka. Personaliziranom prehranom je moguće tretirati neke bolesti ili stanja prilično uspješno, kao što su dijabetes, kardiovaskularne bolesti ili gojaznost, gdje promjenom prehrambenih navika i njihovim prilagođavanjem pojedincu se dolazi do značajno dobrih rezultata. Na taj način se uspješno eliminišu problemi sa zdravljem, a kosi se mogu javiti kao posljedica alergija na određenu vrstu hrane.

3-O-11

Personalized nutrition-concept and possibilities

Lana POPOVIĆ, Anela DACIĆ, Merjem PUSTARIJA, Jasmina
ĐEĐIBEGOVIĆ

University of Sarajevo-Faculty of Pharmacy, Sarajevo, BiH

Summary

This paper addresses more detailed the term ‘personalized nutrition’. Personalized nutrition individualizes nutrition for individual based on his needs, lifestyle habits, food preference, anthropometry, etc. In modern times, more and more attention is paid to genetics, that is the connection between human nutrition and his genes. With this each individual is provided with nutrition that is based on to his genetic makeup. Today, genetics are used to personalize nutrition tests that provide information about what type of diet is optimal for the individual. The results of these tests are not needed to believe blindly, because the human organism is extremely complex system and it is possible to lead to wrong interpretations at the gene level. It is known that many diseases can occur as a result of loss diet or diet that does not suit an individual, among them diabetes, cardiovascular diseases and cancer, no certainly that there is a relationship between diet and chronic disease complex, as well as the identification of a specific food product causes. It is also possible to treat some diseases with a personalized diet or conditions relatively successful, such as diabetes, cardiovascular disease or obesity, where the change dietary habits and their adaptation to the individual significantly good results are achieved. That way successfully eliminate health problems, which can be occur as a result of an allergy to a certain type of food.

Dijetarni unos vitamina A u populaciji studenata UNSA

Emina SARAJLIĆ,* Salma SADIKOVIĆ, Dženana ZAIMOVIĆ, Amila OMEROVIĆ, Amila REKANOVIĆ, Hana SKENDEROVIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: Emina SARAJLIĆ, e-mail: eminasarajlic@hotmail.com

Sažetak

Vitamin A je esencijalni nutrijent koji se ne sintetizira de novo u tijelu, nego se unosi ishranom ili suplementacijom. Ishranom se obezbjeđuje u dva oblika: pripremljeni vitamin A, koji se prirodno nalazi samo u životinjskim proizvodima; i karotenoidni prekursori vitamina A (provitamin A), koji se nalazi prvenstveno u hrani biljnog porijekla. Od izuzetne je važnosti za ljudsko tijelo, jer ima efekte na vid, pojačava otpornost na infekcije, integritet epitelnih ćelija, omogućava funkcionisanje koštanog sistema, fertilitet. Njegov nedostatak može izazvati niz problema povezanih sa očima i reproduktivnim sistemom. Cilj ovog rada bio je istražiti dijetarni unos vitamina A u populaciji studenata Univerziteta u Sarajevu, primarno Farmaceutskog fakulteta. U tu svrhu provedena je anketa, u kojoj je učestvovalo 144 ispitanika, od kojih je 115 (79,9 %) bilo ženskog spola, a 29 (20,1 %) muškog. Anketa se sastojala od nekoliko setova pitanja, između ostalog i ona koja su se odnosila na unos različitih grupa namirnica koje sadrže vitamin A (mliječni proizvodi, riba, lisnato, crveno i zeleno povrće te žuto povrće). Rezultati ankete pokazali su da većina studenata poznaje namirnice u kojima je prisutan vitamin A, kao i da većina ispitanika ima zadovoljavajući unos vitamina A hranom. Svega 6,3 % ispitanika koristi suplemente vitamina A, čime se zaključuje da suplementacija nije naročito zastupljena u ispitivanoj populaciji.

Ključne riječi: *vitamin A, nutrijent, studenti*

3-O-12

Dietary intake of vitamin A in the UNSA student population

Emina SARAJLIĆ,* Salma SADIKOVIĆ, Dženana ZAIMOVIĆ, Amila OMEROVIĆ, Amila REKANOVIĆ, Hana SKENDEROVIĆ

University of Sarajevo, Faculty of Pharmacy, BiH

*Corresponding author: Emina Sarajlić, e-mail: eminasarajlic@hotmail.com

Summary

Vitamin A is an essential nutrient that is not synthesized de novo in the body, but is obtained through diet or supplementation. It is provided by the diet in two forms: prepared vitamin A, which is naturally found only in animal products; and carotenoid precursors of vitamin A (provitamin A), which is found primarily in foods of plant origin. It is extremely important for the human body because it has effects on vision, resistance to infections, integrity of epithelial cells, functioning of the bone system, fertility. Its deficiency can cause a number of problems related to the eyes and the reproductive system. The aim of this study was to investigate the dietary intake of vitamin A in the population of students at the University of Sarajevo, primarily at the Faculty of Pharmacy. To fulfill the goal, the survey was conducted, and 144 respondents participated in it, of which 115 (79.9%) were female, and 29 (20.1%) were male. The survey included couple sets of questions, especially those related to the intake of the various group of foods that contain this vitamin (dairy products, fish, leafy, red, and green vegetables and yellow vegetables). The results showed that most students know the foods in which Vitamin A is present, and that respondents who participated have a satisfactory intake of vitamin A with food. Only 6.3% of respondents use vitamin A supplements, thus concluding that supplementation is not particularly prevalent in the target population.

Keywords: *vitamin A, nutrient, students*

Stavovi budućih edukatora o prehrambenim navikama učenika

Almina TALOVIĆ, Hana ŠURKOVIĆ*, Sanela Merjem RUSTEMPAŠIĆ,
Irma ČEHIĆ

Univerzitet u Sarajevu, Pedagoški fakultet Univerziteta u Sarajevu, Odsjek za razrednu nastavu

Autor za korespondenciju: Hana Šurković, e-mail: hanasurkovic24@gmail.com

Sažetak

Kvalitetna i zdrava ishrana ključna je za pravilan rast i razvoj djece, a učenicima razredne nastave neophodno je da imaju pravilno raspoređene obroke s obzirom na njihovu aktivnost i vrijeme koje provode tokom dana u školi u kojoj konzumiraju neke od obroka. Važnu ulogu u formiranju zdravih prehrambenih navika kod djece pored roditelja, imaju i učitelji s kojima djeca provode svakodnevno vrijeme. Učitelji svojim primjerom, stavom, znanjem i trudom mogu doprinijeti razvijanju zdravih prehrambenih navika kod učenika. U svrhu ovog rada provedeno je anketno istraživanje studentica i studenata sa svih pet studijskih godina na Pedagoškom fakultetu, na Odsjeku za razrednu nastavu, na Odsjeku za predškolski odgoj, Odsjeku za edukaciju i rehabilitaciju, te na Odsjeku za kulturu življenja i tehnički odgoj, u kojem su se istražili stavovi budućih edukatora o utjecaju i mogućnostima djelovanja edukatora na razvijanje prehrambenih navika učenika o prehrambenim navikama kod učenika. Studenti se tokom svog studija edukuju o važnosti zdrave prehrane u životu kao i o metodama i aktivnostima koje edukatori mogu primjenjivati u cilju razvijanja zdravih prehrambenih navika kod učenika. Zaključno, istraživanjem se utvrdilo da su budućí edukatori tog stava da mogu utjecati na prehrambene navike kod učenika i da je pravilna ishrana ključna za rast i razvoj djece mlađeg školskog uzrasta.

Ključne riječi: učitelj, učenici razredne nastave, zdrave prehrambene navike

3-O-13

Attitudes of future educators about students eating habits

Almina TALOVIĆ, Hana ŠURKOVIĆ*, Sanela Merjem RUSTEMPAŠIĆ,
Irma ČEHIĆ

University of Sarajevo, Faculty of Pedagogy, Department of Classroom Teaching

Corresponding author: Hana Šurković, e-mail: hanasurkovic24@gmail.com

Summary

Quality and healthy nutrition is essential for the proper growth and development of children, and it's necessary for students in class to have properly distributed meals, considering their activity and the time they spend during the day at school, where they consume some of the meals. In addition to parents, teachers with whom children spend their daily time play an important role in the formation of healthy eating habits in children. With their example, attitude, knowledge and effort, teachers can contribute to the development of healthy eating habits among students. For the purpose of this work, a survey was conducted of male and female students from all five study years at the Faculty of Pedagogy, at the Department of Class Teaching, at the Department of Preschool Education, Department of Education and Rehabilitation, and at the Culture of Living and Technical Education, in which the views of future educators on the influence and possibilities of educators actions on the development of students' eating habits were investigated. During their studies, students are educated about the importance of healthy eating in life, as well as methods and activities that educators can apply in order to develop healthy eating habits in students. In conclusion, the research determined that future educators are of the opinion that they can influence the eating habits of students and that proper nutrition is key to the growth and development of younger school-age children.

Keywords: *teacher, students in class, healthy eating habits*

Potrošnja i stavovi mladih o vinuNermin ZEKIĆ,^{1*} Jozo GRBAVAC^{1,2}¹Sveučilište u Mostaru, Fakultet zdravstvenih studija²Sveučilište u Mostaru, Agronomski i prehrambeno-tehnološki fakultet*Autor za korespondenciju: NerminZekić, e-mail: nerminzekic444@gmail.com**Sažetak**

Vino, je poljoprivredno-prehrambeni proizvod, dobiven potpunim ili djelomičnim alkoholnim vrenjem masulja ili mošta, od svježeg i, za preradbu u vino, pogodnoga grožđa (zdravo, zrelo, prezrelo, prosušeno ili prirodno smrznuto grožđe). Vina se u užem smislu razvrstavaju u mirna, pjenušava, biser i gazirana, a specijalna vina u desertna, aromatizirana i likerska. Broj kemijskih spojeva u vinu, kojega je sastav poznat, veći je od 600, a samo broj onih kemijskih spojeva što vinu daju aromu procijenjen je na više od 3000. Sastav vina kvantitativno varira neznatno, a kvalitativno znatno pod utjecajem prirodnih čimbenika (sorta, tlo, podneblje) i čovjeka (izbor uzgojnog oblika, obradba tla, te izbor postupka preradbe grožđa, doradbe i njege vina). Ciljevi ovog rada bili su utvrditi stupanj poznatosti vina autohtonih sorti, utvrditi stupanj isprobavanja i zadovoljstvo potrošača tim vinima. Istraživanje u ovom radu temeljilo se na anonimnoj anketi u kojoj je učestvovalo 103 osobe, a anketa je sadržavala 11 pitanja, koja su se odnosila na način potrošnje vina, nabave, važnost vanjskih i unutarnjih obilježja vina. Na pitanje o nabavci vina u kućanstvu 33% ih nabavlja vino iz supermarketa, 27,2% iz vinarije, 25,2% imaju vlastitu proizvodnju, te njih 14,6% nabavljaju u susjedstvu. Na pitanje u kojim prigodama se pije vino, većina ispitanika, njih 36,9% vino konzumiraju tokom svećanih događaja, 35% u društvu, a ostatak uz obrok ili neke druge prigode. U pogledu vrste vina, 47,6% ispitanika konzumira crno vino, 37,9% bijelo vino, dok 14,6% konzumira vino koje se ponudi. Što se tiče vanjskih obilježja vina najviše ispitanika (33%) izjasnilo se da je da im je važna cijena vina, za 29,1% bitno je ime vina ili samog proizvođača, dok za unutarnja obilježja vina 84,5% ispitanika smatra da je najbitniji okus vina. U pogledu preferencija različitih spolova, 56,3% ispitanika smatra da jednako vino konzumiraju i muškarci i žene.

3-O-14

Consumption and attitudes of young people about wine

Nermin ZEKIĆ,^{1*} Jozo GRBAVAC^{1,2}

¹University of Mostar, Faculty of Health Studies

² University of Mostar, Faculty of Agriculture and Food Technology

*Corresponding author: NerminZekić, e-mail: nerminzekic444@gmail.com

Summary

Wine, an agricultural-food product, obtained by complete or partial alcoholic fermentation of green beans or must, from fresh and, for processing into wine, suitable grapes (healthy, ripe, overripe, dried or naturally frozen grapes). In the narrower sense, wines are classified into still, sparkling, sparkling and carbonated, and special wines into dessert, flavored and liqueur wines. The number of chemical compounds in wine, the composition of which is known, is greater than 600, and the number of chemical compounds that give the wine its aroma is estimated at more than 3,000. The composition of wine varies slightly quantitatively, and qualitatively significantly under the influence of natural factors (variety, soil, climate) and man (choice of cultivation form, tillage of the soil, and choice of grape processing, finishing and care of wine). The goals of this work were to determine the degree of familiarity of wines of autochthonous varieties, to determine the number of people trying these wines and to determine consumer satisfaction with these wines. This study rely on an anonymous survey in which 103 people participated, and the survey contained 11 questions, related to the method of wine consumption, procurement, the importance of the external and internal characteristics of wine. When asked about purchasing wine in the household, 33% buy wine from a supermarket, 27.2% from a winery, 25.2% have their own production and 14.6% of them purchase from the neighborhood. Also on what occasions wine is drunk, most of them 36.9% consume wine during festive events, 35% in company, and the rest with a meal or some other occasion. 47.6% of respondents consume red wine, 37.9% white wine, while 14.6% consume wine that is offered. As for the external characteristics of the wine, most of them, i.e. 33% declared that the price of the wine is important to them, 29.1% the name of the wine or the producer itself is important, while the internal characteristics of the wine 84.5% of the respondents believe that the most important thing is the taste of the wine. According to preferences of different sexes, 56.3% of respondents believe that both men and women equally consume the wine.

Dijetarni unos polifenola u populaciji studenata Univerziteta u Sarajevu

Sukejna ŽIGA^{1*}, Adna KOKOT¹, Aiša KOVAČEVIĆ¹, Ajna KARALIĆ¹,
Nejra KEČO¹, Suada KRNJIĆ¹

¹ Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

* Autor za korespondenciju: Sukejna Žiga, e-mail: sukejnaziga@ffsa.unsa.ba

Sažetak

Polifenoli su sekundarni biljni metaboliti koji su prisutni u ljudskoj ishrani i naširoko se koriste u medicinske i kozmetičke svrhe. Posjeduju izuzetno korisne osobine kao što su antioksidativno, imunomodulatorno, antikancerogeno i antibakterijsko, a s obzirom na sve navedene benefite od velikog su značaja u posljednje vrijeme u prevenciji nekih hroničnih i degenerativnih oboljenja. S ciljem istraživanja koliko su studenti upoznati s pojmom polifenola i njihovim benefitima, te u kojoj mjeri su polifenoli prisutni u njihovoj prehrani, provedena je anketa među studentima Univerziteta u Sarajevu u decembru 2021. godine. U ovom istraživanju učestvovalo je 111 studenata dobi 18-26 godina, od čega su 93 ispitanika ženskog spola i 18 ispitanika su muškog spola. Fokus istraživanja je stavljen na učestalost konzumacije hrane i pića bogatih polifenolima, kao i učestalost i razlog korištenja suplemenata koji sadrže polifenole. Hranu sa visokim sadržajem polifenola konzumira 31 student svaki dan (27,9 %), a 51 nekoliko puta u sedmici (45,9 %), međutim samo njih 11 (10 %) poznaje benefite polifenola u ishrani. Dodatke prehrani s polifenolima koristi 10 studenata (9 %), većinom za poboljšanje sveukupnog zdravlja, a najčešće korišteni dodatak ishrani je ekstrakt ploda nara. Također, velika je zastupljenost konzumiranja napitaka bogatih polifenolima (kafa, crni i zeleni čaj, vino), čak 95 studenata (85,6 %). Na osnovu rezultata očigledno je prisutan manjak informisanosti studenata Univerziteta u Sarajevu o ulogama polifenola i njihovim zdravstvenim benefitima, iako su dio ishrane kod 95,5 % studenata.

Ključne riječi: *polifenoli, benefiti, ishrana, studenti*

3-O-15

Dietary intake of polyphenols in the population of students at the University of Sarajevo

Sukejna ŽIGA^{1*}, Adna KOKOT¹, Aiša KOVAČEVIĆ¹, Ajna KARALIĆ¹,
Nejra KEČO¹, Suada KRNJIĆ¹

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

* Corresponding author: Sukejna Žiga, e-mail: sukejnaziga@ffsa.unsa.ba

Summary

Polyphenols are secondary plant metabolites that are present in the human diet and are widely used for medical and cosmetic purposes. They have extremely useful properties such as antioxidant, immunomodulatory, anticancer and antibacterial, and considering all listed benefits, there has been a rising interest recently in the prevention of some chronic and degenerative diseases. The aim of research was on how familiar students are with the concept of polyphenols and their benefits, and how broadly polyphenols are present in their diet. For the purpose of research, a survey was conducted among students of the University of Sarajevo in December 2021. 111 students aged 18-26 participated in this research, of which 93 were female and 18 were male. The focus of the research is on the frequency of consumption of food and drinks rich in polyphenols, as well as the frequency and reason for using supplements containing polyphenols. Food with a high content of polyphenols is consumed by 31 students every day (27.9 %), and 51 several times a week (45.9 %), but only 11 of them (10 %) know the benefits of polyphenols in their diet. Dietary supplements with polyphenols are used by 10 students (9%), mostly to improve overall health, and the most commonly used dietary supplement is pomegranate fruit extract. Also, the consumption of beverages rich in polyphenols (coffee, black and green tea, wine) is high, as many as 95 students (85.6%). Based on the results, there is clearly a lack of knowledge about the roles of polyphenols and their health benefits among students at University of Sarajevo, even though 95,5 % of them have polyphenols present in their diet.

Keywords: *polyphenols, benefits, diet, students*

EPA i DHA suplementi - info letak za konzumente

Lejla BEČIRAGIĆ, Naila ABERHOUCHE

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

Sažetak

Dodaci prehrani danas se sve više koriste od strane zdravih pojedinaca u svrhu prevencije bolesti, ali i da se pospiješi funkcija pojedinih organskih sistema. Neki od suplemenata koji se često koriste su i omega-3-masne kiseline, uključujući eikozapanteansku kiselinu (EPA) i dokozaheksaensku kiselinu (DHA). Na tržištu uglavnom dolaze kao čvrsti ljekoviti oblici, odnosno kapsule, čije kvalitet može da varira kod različitih proizvođača. Do sada sprovedena istraživanja pokazala da su unosi ovih kiselina često niži od preporučenih dnevnih doza, pa se preporučuje suplementiranje. Izvor omega-3-masnih kiselina predstavljaju prije svega morski plodovi, orašasti plodovi, sjemenke i sl. Njihovo djelovanje je brojno, a neki od benefita su i to što su značajne za prevenciju malignih i KVS bolesti, a u novije vrijeme i mentalnih bolesti uključujući depresiju, demenciju, te poremećaj mentalne aktivnosti. Ono što je posebno bitno prilikom odabira ovakve vrste dodataka, jeste da potrošač treba obratiti pažnju na omjer i sadržaj upravo EPA i DHA u jednoj kapsuli.

Ključne riječi: *eikozapentaenska kiselina, dokozaheksaenska kiselina, omega-3-masne kiseline*

3-P-1

Supplements EPA and DHA – info leaflet for consumers

Lejla BEČIRAGIĆ, Naila ABERHOUCHE

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

Summary

Nutritional supplements are increasingly being used by different consumers, mostly healthy individuals to prevent illness, but also to improve the function of individual organ systems. Some of the supplements are omega-3 fatty acids, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). They come on the market in the form of solid pharmaceutical forms, e.g., capsules, but the quality can vary among the different manufacturers. Previously conducted research proves that intake of these acids is often lower than the recommended daily doses, so the supplementation is often recommended. The source of omega-3 fatty acids is primarily seafood, nuts, seeds etc. Their effects are numerous, and some of the benefits are that they are significant for the prevention of malignant and CVD diseases, and more recently also mental diseases, including depression, dementia, and mental activity disorder. What is particularly important when choosing this type of supplement is that the consumer should pay attention to the ratio and content of EPA and DHA in one capsule.

Keywords: *eicosapentaenoic acid, docosahexaenoic acid, omega-3 fatty acids*

Dijetarni unos vitamina D u populaciji studenata UNSA

Mirza GONILOVIĆ, Amra HADŽAGIĆ, Demir MEKUŠIĆ, Edin
SMAILBEGOVIĆ, Emin VELEDAR, Benjamin VELIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, Katedra za Bromatologiju i Nutriciju

*Autor za korespondenciju: Mirza Gonilović, email: mirzagonilovic@ffsa.unsa.ba

Sažetak

Vitamin D je liposulubilni vitamin koji se pored unosa hranom i suplementima može sintetizirati i u organizmu, tačnije u koži, nakon izlaganja suncu. Jedna minuta izlaganja suncu ekvivalentna je unosu 10 000 do 20 000 IU (internacionalnih jedinica) vitamina D. Preporučeni dnevni unos vitamina D za zdravu odraslu osobu je 600 IU, dok je gornji limit za unos istog 2 000 do 4 000 IU. Vitamin D ima brojne važne funkcije u organizmu kao što su crijevna apsorpcija kalcijuma i fosfora, inhibicija ćelijske proliferacije, indukcija terminalne diferencijacije, inhibicija angiogeneze te stimulacija proizvodnje inzulina. Nedostatak ovog vitamina dovodi do različitih poremećaja u organizmu te je sve veći globalni problem javnog zdravlja. Cilj ovog istraživanja bio je ustanoviti znanje studenata različitih fakulteta Univerziteta u Sarajevu o vitaminu D te procijeniti kakav je unos istog u ovoj populaciji. U svrhu postizanja cilja izvršeno je anketiranje navedene populacije. Anketom je ustanovljeno da ova populacija posjeduje neophodno osnovno znanje o važnosti vitamina D. Nadalje, istraživanje je pokazalo da je unos vitamina D među studentima UNSA zadovoljavajući. Iako su studenti fakulteta medicinske grupacije imali bolje teorijsko znanje od drugih grupacija, unos kod svih ispitivanih studenata bio je na podjednako zadovoljavajućem nivou.

Ključne riječi: *vitamin D, holekalciferol, dijetarni unos*

3-P-2

Dietary intake of vitamin D among the UNSA students

Mirza GONILOVIĆ, Amra HADŽAGIĆ, Demir MEKUŠIĆ, Edin
SMAILBEGOVIĆ, Emin VELEDAR, Benjamin VELIĆ

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

*Corresponding author: Mirza Gonilović, email: mirzagonilovic@ffsa.unsa.ba

Summary

Vitamin D is a fat-soluble vitamin that is not only absorbed from food and dietary supplements, but can also be synthesized by the body, more specifically by the skin after exposure to sunlight. One minute of exposure is equivalent to an intake of 10 000 to 20 000 IU (International Units) of vitamin D. The recommended daily dose of vitamin D for healthy adults is 600 IU, with an upper limit intake of 2 000 to 4 000 IU. It has many important functions in the body, including intestinal absorption, inhibition of cell proliferation, induction of terminal differentiation, inhibition of angiogenesis and stimulation of insulin production. Deficiency of this vitamin leads to various disorders in the body and is a global public health problem. The aim of this study was to examine the vitamin D knowledge of students from various faculties at the University of Sarajevo and to assess vitamin D intake in this population. To reach our goal, we conducted a survey among this population. Results indicated that this population group had the necessary basic knowledge about the importance of vitamin D. Additionally, the study showed that UNSA students were getting enough vitamin D. Students of the medical group faculties had higher theoretical knowledge than the other groups, but vitamin D intake was satisfactory for all students.

Keywords: *vitamin D, cholecalciferol, dietary intake*

4. DIJETOTERAPIJA
DIETOTHERAPY

Redukcija tjelesne mase iz perspektive pacijenta

Dalida ADILOVIĆ, Majda AVDIĆ, Aldina BAJIĆ*, Arnesa DŽANOVIĆ,
Šejla JUSUBAŠIĆ, Kanita KALJIĆ

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

*Autor za korespondenciju: Aldina Bajić, e-mail: aldinabajic@ffsa.unsa.ba

Sažetak

Veliki broj stanovnika u svijetu ima povišenu tjelesnu masu ili je gojazan. Vremenom, prevalenca gojaznosti se, nažalost, povećava. Gojaznost je čak i proglašena epidemijom. Povišena tjelesna težina ima brojne faktore rizika po ljudsko zdravlje. Dovodi do raznih oboljenja kao što su povišen krvni pritisak i dijabetes melitus tipa 2. Nažalost, nema studija koje se konkretno bave razlozima neuspjeha u redukciji tjelesne mase, iz perspektiva pacijenta. Većina studija je okrenuta istraživanju zašto je redukcija tjelesne mase onemogućena, iako pacijent radi sve u njegovoj moći da smanji tjelesnu masu. U ovom radu prikazani su rezultati ispitivanja, koje je obuhvatilo 71 ispitanika, a realizovano je u formi ankete sa pitanjima otvorenog i zatvorenog tipa. Većina ispitanika kao glavni razlog neuspjeha navodi nedostatak volje (motivacije), a zatim inzulinsku rezistenciju, stres ili sjedilački način života.

Ključne riječi: *gojaznost, ljudsko zdravlje, nedostatak volje, redukcija tjelesne mase*

4-O-1

Body mass reduction from the patient's perspective

Dalida ADILOVIĆ, Majda AVDIĆ, Aldina BAJIĆ*, Arnesa DŽANOVIĆ,
Šejla JUSUBAŠIĆ, Kanita KALJIĆ

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

*Corresponding author: Aldina Bajić, e-mail: aldinabajic@ffsa.unsa.ba

Summary

A large number of people in the world are overweight or obese. Over time, the prevalence of obesity is unfortunately increasing. Obesity has even been declared an epidemic. Being overweight has numerous risk factors for human health. It leads to various diseases such as high blood pressure and type 2 diabetes mellitus. Unfortunately, there are no studies specifically dealing with the reasons for failure in reducing body weight, from the patient's perspective. Most studies are focused on researching why weight reduction is impossible, even though the patient is doing everything in his power to reduce body weight. This paper presents the results of the survey, which included 71 respondents, and was conducted in the form of a survey with open and closed questions. The majority of respondents cited a lack of will (motivation) as the main reason for failure, followed by insulin resistance, stress or a sedentary lifestyle.

Keywords: *obesity, human health, lack of will, reduction of body mass*

Prehrana i psorijaza

Daira BEGIĆ^{1*}, Berina AJANOVIĆ¹, Faris BEGOVIĆ¹, Amila KEBO¹,
Miralem KMETAŠ¹, Nejla MELIĆ¹

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

*Autor za korespondenciju: Daira Begić, e-mail: daira.begic1@gmail.com

Sažetak

Psorijaza je imunološki posredovana, genetska bolest koja se manifestira kao izdignute svrbljive lezije na koži, upala zglobova ili oboje. To je hronična upalna bolest kože koju karakterizira ubrzana osa faktora nekroze tumora- α /interleukin-23/interleukin-17, hiperproliferacija i abnormalna diferencijacija epidermalnih keratinocita. Različiti genetski i okolišni čimbenici kao što su infekcije i stres, ali i prehrambene navike, uključeni su u patogenezu psorijaze i njezinih komorbiditeta. Pacijenti s psorijazom često su povezani s pretilošću, dijabetesom, dislipidemijom, kardiovaskularnim bolestima ili upalnim bolestima crijeva, te često pokazuju neuravnotežene prehrambene navike kao što je veći unos masti i manji unos ribe ili dijetalnih vlakana. Takve prehrambene navike mogu biti povezane s učestalošću i ozbiljnošću psorijaze. Zasićene masne kiseline (SFA), crveno meso, jednostavni šećeri ili alkohol pospješuju razvoj i napredak psorijaze i njezinih popratnih bolesti ubrzavajući os TNF- α /IL-23/IL-17, stvaranjem reaktivnih vrsta kisika (ROS), supresijom regulatornih T stanica (Tregs) i slično. Nasuprot tome, n-3 polinezasićene masne kiseline (PUFA), vitamin D, vitamin B12, dijetalna vlakna, kratkolančane masne kiseline (SCFA), genistein, selen ili probiotici ublažavaju psorijazu ili njezine komorbiditete putem supresije gore navedenih upalnih signalnih puteva ili indukcijom regulatornih T stanica. Također, neke studije su pokazale da razdoblja gladovanja, niskoenergetske dijeta i vegetarijanska prehrana poboljšavaju simptome psorijaze. U ovom radu su predstavljene ažurirane informacije o stimulativnom ili regulatornom djelovanju hranjivih tvari ili hrane na psorijazu i mogućem ublažavanju psorijaze prehrambenim strategijama.

Ključne riječi: *psorijaza, faktor nekroze tumora, neuravnotežena prehrana, dijeta, nutritijenti*

4-O-2

Psoriasis and nutrition

Daira BEGIĆ^{1*}, Berina AJANOVIĆ¹, Faris BEGOVIĆ¹, Amila KEBO¹,
Miralem KMETASŠ¹, Nejla MELIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and nutrition,
B&H

*Corresponding author: Daira Begić, e-mail: daira.begic1@gmail.com

Summary

Psoriasis is an immune-mediated genetic disease that can manifest as scaly, itchy skin lesions, joint inflammation, or both. It is a chronic inflammatory skin disease characterized by accelerated tumor necrosis factor- α /interleukin-23/interleukin-17 axis, hyperproliferation and abnormal differentiation of epidermal keratinocytes. The pathogenesis of psoriasis and its comorbidities is influenced by a combination of genetic and environmental factors, such as infections and stress, as well as dietary habits. People with psoriasis are often associated with obesity, diabetes, dyslipidemia, cardiovascular disease, or inflammatory bowel disease. They also often show unbalanced dietary habits, such as a higher fat intake and a lower intake of fish or dietary fiber. Such eating habits may be associated with the frequency and severity of psoriasis. Saturated fatty acids (SFA), red meat, simple sugars or alcohol promote the development and progression of psoriasis and its accompanying diseases by accelerating the TNF- α /IL-23/IL-17 axis, by creating reactive oxygen species, by suppressing regulatory T-cells (Tregs) and similar things. Instead, n-3 polyunsaturated fatty acids (PUFA), vitamin D, vitamin B12, dietary fiber, short-chain fatty acids (SCFA), genistein, selenium, or probiotics may alleviate psoriasis or its comorbidities through suppression of the above-mentioned inflammatory signaling pathways or induction of regulatory T cells. Furthermore, some studies have demonstrated that fasting periods, low-energy diets, and vegetarian diets can improve psoriasis symptoms. This paper presents new information on the stimulatory or regulatory effects of nutrients or food on psoriasis and the possible alleviation of psoriasis with dietary strategies.

Keywords: *psoriasis, tumor necrosis factor, unbalanced diet, diet, nutrients*

Efikasnost djelovanja kombinacije propolisa i lizozima

Haris DELIBAŠIĆ*, Haris ČESIR¹, Melisa BAŠIĆ¹, Amra DEVEDŽIĆ¹

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

*Autor za korespondenciju: Haris Delibašić, e-mail: harisdelibasic@ffsa.unsa.ba

Sažetak

Propolis i lizozim mogu se naći u vidu različitih preparata za oralnu primjenu, bilo da su to sprej, kapi ili tablete. Propolis je prirodni product pčela, koji ima do sada opisano oko 300 različitih komponenti. Postoje različite vrste propolisa s obzirom na porijeklo, ali zbog svoje raznolikosti teško je izvršiti standardizaciju propolisa kao lijeka. Do sada su opisani brojni biološki i farmakološki učinci propolisa; imunomodulacijski, protutumorski, protuupalni, antioksidativni, antimikrobni i antiparazitski učinci. Prepoznato je više od tri stotine različitih aktivnih spojeva u propolisu. Lizozim je supstanca prirodnog porijekla, proizvode ga neutrofili, bijela krvna zrnca, pa je poznat kao “antibiotik tijela”. On je protein, enzim koji u svom sastavu ima 129 različitih aminokiselina. Za razliku od propolisa za čije se djelovanje zna stotinama godina, antimikrobno dejstvo lizozima poznato je jedan kraći vremenski period i u zadnje vrijeme raste interes za njega. Glavno istraživačko pitanje postavljeno prilikom ovog rada jeste: da li propolis i lizozim imaju antimikrobna svojstva da bi se na tržištu mogli naći uz tu zdravstvenu tvrdnju?

Ključne riječi: *propolis, lizozim, antimikrobni učinak, mikroorganizmi*

4-O-3

Effectiveness of the combination of propolis and lysozyme

Haris DELIBAŠIĆ*, Haris ČESIR¹, Melisa BAŠIĆ¹, Amra DEVEDŽIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition

*Corresponding author: Haris Delibašić, e-mail: harisdelibasic@ffsa.unsa.ba

Summary

Propolis and lysozyme can be found in the form of various preparations for oral administration, whether they are sprays, drops or tablets. Propolis is a natural product of bees, which has about 300 different components described so far. There are different types of propolis with regard to origin, but due to its diversity, it is difficult to standardize propolis as a medicine. So far, numerous biological and pharmacological effects of propolis have been described: immunomodulating, antitumor, anti-inflammatory, antioxidant, antimicrobial and antiparasitic effects. More than three hundred different active compounds in propolis have been identified. Lysozyme is a substance of natural origin, it is produced by neutrophils, white blood cells, so it is known as the “antibiotic of the body”. It is a protein, and enzyme that has 129 different amino acids in its composition. Unlike propolis, whose action has been known for hundreds of years, the antimicrobial effect of lysozyme has been known for a shorter period of time, and interest in it has recently been growing. The main research question posed during this work is: do propolis and lysozyme have antimicrobial properties, so they could be found on the market as such?

Keywords: *propolis, lysozyme, antimicrobial effects, microorganisms*

Uloga zdravstvenih radnika u savjetovanju o pravilnoj prehrani u cilju prevencije kardiovaskularnih bolesti

Azra DUGALIJA^{1*}, Ajka ČAMDŽIĆ¹, Asja ČELEBIĆ¹, Avina CHEIKH DOMMAR¹, Mehmed MARIĆ¹, Melina MUMINOVIĆ¹

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

*Autor za korespondenciju: Azra Dugalija, e-mail: azradugalija@ffsa.unsa.ba

Sažetak

Morbiditet i mortalitet od kardiovaskularnih bolesti (KVB) se povećavaju, što predstavlja važan problem javnog zdravlja širom svijeta. U Bosni i Hercegovini morbiditet i mortalitet od KVB u stalnom je porastu. Za razvoj KVB značajan je utjecaj brojnih faktora rizika, među kojim se posebno ističe nepravilna ishrana. Promjenama životnog stila moglo bi se prevenirati čak 75% ukupnog kardiovaskularnog mortaliteta u svijetu. Cilj rada je prikazati ulogu i značaj zdravstvenih radnika u savjetovanju o pravilnoj prehrani u cilju prevencije kardiovaskularnih bolesti. U sklopu istraživanja, anketirali smo 384 ispitanika koji su studenti fakulteta zdravstvenih usmjerenja, putem Google ankete. 96,35% ispitanika smatra da bi kao budući zdravstveni radnici trebali biti zainteresovani za savjetovanje o pravilnoj prehrani u cilju prevencije bolesti. Svi ispitanici smatraju da je savjetovanje o pravilnoj prehrani u cilju prevencije KVB jako bitno. Broj ispitanika koji osjećaju odgovornost da informišu ljude u svojoj okolini o značaju hrane u prevenciji KVB je 91.15%, dok 7.55% ispitanika ne osjeća takvu vrstu odgovornosti. Na pitanje da li ispitanici smatraju da je savjetovanje o promjeni životnog stila bitno u prevenciji KVB, njih 98,69% je odgovorilo potvrdno, a 0.78% je odgovorilo negativno. 59.63% je upoznato sa određenim načinima prehrane u prevenciji KVB. Ispitanici koji su odgovorili potvrdno na prethodno pitanje smatraju da su najbolji načini prehrane u prevenciji KVB: mediteranska prehrana, hrana bogata antioksidansima, hrana sa niskim glikemijskim indeksom, DASH dijeta i hrana bez glutena. Uz pravilnu ishranu potrebna je i fizička aktivnost u skladu sa godinama, spolom i zdravstvenim stanjem osobe kao i smanjenje stresa.

Ključne riječi: *kardiovaskularna bolest, pravilna prehrana, zdravstveni radnik, prevencija*

4-O-4

The role of healthcare personnel in counseling on proper nutrition in order to prevent cardiovascular diseases

Azra DUGALIJA^{1*}, Ajka ČAMDŽIĆ¹, Asja ČELEBIĆ¹, Avina CHEIKH DOMMAR¹, Mehmed MARIĆ¹, Melina MUMINOVIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, Bosnia and Herzegovina

*Corresponding author: Azra Dugalija, e-mail: azradugalija@ffsa.unsa.ba

Summary

Cardiovascular disease (CVD) mortality and morbidity is increasing, representing an important public health problem worldwide. In Bosnia and Herzegovina morbidity and mortality from CVD is constantly increasing. The development of CVD is significantly influenced by numerous risk factors, among which improper nutrition stands out. As much as 75% of total cardiovascular mortality in the world could be prevented by lifestyle changes. The objective of this paper is to highlight the significance of counseling on proper nutrition in order to prevent cardiovascular diseases, provided by healthcare workers. The survey research was conducted among 384 respondents who were students of the Faculty of Health Sciences. 96.35% of the respondents believe that future healthcare workers should be interested in advising on proper nutrition in order to prevent disease. All respondents believe that counseling on proper nutrition in order to prevent CVD is very important. 91.15% of the respondents stated that they feel responsibility to provide information on importance of proper diet in preventing CVD to people in their surroundings, while 7.55% of respondents do not feel this type of responsibility. When asked whether respondents believe that counseling on lifestyle changes is essential in the prevention of CVD, 98.69% of them answered affirmatively, and 0.78% answered negatively. 59.63% of the respondents stated that they are familiar with certain diets implemented in order to prevent CVD, and they pointed out Mediterranean diet, food rich in antioxidants, food with a low glycemic index, DASH diet and gluten-free food. Apart from proper nutrition, other factors such as stress reduction and physical activity are of great importance for CVD prevention.

Keywords: cardiovascular disease, proper nutrition, healthcare workers, prevention

Efikasnost suplementacije vitaminima i mineralima u prevenciji i tretmanu COVID-19

Miralem KMETAS^{1*}, Edin SMAILBEGOVIĆ¹

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

*Autor za korespondenciju: Miralem Kmetaš, e-mail: miralemkmetas@ffsa.unsa.ba

Sažetak

Pandemija SARS-CoV-2 proglašena početkom 2020. godine je ostavila ogroman utjecaj na zdravlje oboljelih što je bio razlog ponovnog usmjerenja pozornosti opće populacije na mjere zaštite i jačanja imunološkog sistema. Smatra se da suplementacija, pored vakcina, koje predstavljaju glavno sredstvo u borbi protiv ove bolesti, također, jednim dijelom, može pomoći u prevenciji ovog oboljenja i razvoju teže kliničke slike kod pacijenata. Cilj ovog rada je istražiti povezanost suplementacije vitaminima i mineralima i njihove uloge u sprječavanju infekcije ili smanjenju progresije bolesti na osnovu literaturnih dokaza te pribaviti osnovne informacije o konzumiranju suplemenata među ispitivanom populacijom. Jednokratno, opazajno istraživanje je sprovedeno među studentima Farmaceutskog fakulteta Univerziteta u Sarajevu primjenom upitnika. Posebna pažnja upitnika je posvećena zdravstvenom stanju ispitanika, njihovim životnim navikama te suplementaciji. Od 144 ispitanika, 56,3% uzima dodatke prehrani u svrhu prevencije, dok 30,6% smatra da je suplementacija doprinijela prevenciji i lakšoj kliničkoj slici kod oboljelih. Korištenje vitamina i minerala kao dodataka prehrani je posebno važno kako za rizične skupine pacijenata i starije osobe, tako i za mlađu populaciju. U ovom radu fokus je bio na važnosti vitamina C, vitamina D, cinka i seleno kao mikronutrijenata koji su najviše primjenjivani među ispitanicima u sprovedenoj anketi. Obzirom da su određena istraživanja prijavila težu kliničku sliku kod COVID pozitivnih pacijenata kod kojih je ustanovljen deficit više od jednog mikronutrijenta, predložena je kombinirana primjena opisanih mikronutrijenata u svrhu jačanja imunološkog sistema te sprječavanju pogoršanja kliničke slike.

Ključne riječi: *Covid-19, SARS-CoV-2, suplementacija, nutraceutici*

4-O-5

Effectiveness of vitamin and mineral supplementation in the prevention and treatment of COVID-19

Miralem KMETAS^{1*}, Edin SMAILBEGOVIĆ¹

¹University of Sarajevo, Faculty of Pharmacy, Department of Bromatology and Nutrition, B&H

*Corresponding author: Miralem Kmetas, e-mail: miralemkmetas@ffsa.unsa.ba

Summary

The SARS-CoV-2 pandemic which was declared at the beginning of 2020, had a huge impact on the health of the patients, which was the reason for refocusing the attention of the general population on measures to protect and strengthen the immune system. It is believed that supplementation, in addition to vaccines, which are the main tool in the fight against this disease, can also, in part, help prevent this disease and the development of a more severe clinical picture in patients. This paper aims to investigate the connection between supplementation with vitamins and minerals and their role in preventing infection or reducing disease progression based on literature evidence, and to obtain basic information about the consumption of supplements among the studied population. A one-off, observational study was conducted among students of the Faculty of Pharmacy at the University of Sarajevo using a questionnaire. Special attention to the questionnaire is devoted to the state of health of the respondents, their lifestyle habits, and supplementation. Of the 144 respondents, 56.3% take nutritional supplements for prevention, while 30.6% believe that supplementation contributed to the prevention and a lighter clinical picture in patients. The use of vitamins and minerals as dietary supplements is particularly important for both at-risk groups of patients and the elderly, as well as for the younger population. In this paper, the focus was on the importance of vitamin C, vitamin D, zinc, and selenium as micronutrients that were most used among the respondents in the conducted survey. Given that certain studies have reported a more severe clinical picture in COVID-positive patients with a deficiency of more than one micronutrient, a combined application of the described micronutrients is suggested to strengthen the immune system and prevent worsening of the clinical picture.

Keywords: *Covid-19, SARS-CoV-2, supplementation, nutraceuticals*

CDED dijetoterapijski tretman Crohnove bolesti – komparacija s ekskluzivnom enteralnom prehranom

Katarina MILOŠEVIĆ^{1*}, Emina HADŽIĆ²

Univerzitet u Sarajevu, Farmaceutski fakultet

*Autor za korespondenciju: Katarina Milošević, e-mail: katarinamilosevic@ffsa.unsa.ba

Sažetak

Chronova bolest je nespecifično zapaljensko oboljenje digestivnog trakta. Može se ispoljiti u bilo kom životnom dobu, ali se najčešće javlja između 15. i 35. godine života. Pravilna prehrana uslov je normalnog funkcionisanja organizma, odnosno preduslov održanja svih energijskih i metaboličkih procesa. Loš status uhranjenosti negativno utječe na razvoj i rezultat bolesti, što dovodi do korištenja enteralne i parenteralne prehrane koji, uz normalnu peroralnu prehranu, čine dio nutritivne potpore bolesnika. Enteralnu prehranu definišemo kao metodu koja omogućuje unos nutritivno i farmakološki definiranih enteralnih pripravaka peroralnim putem ili primjenom tehnoloških pomagala (sonde i pumpe) u želudac ili tanko crijevo. Danas postoji inovativni prehrambeni pristup za osobe oboljele od Crohnove bolesti - Crohn's Disease Exclusion Diet (CDED) - koji podrazumijeva eliminacijski tip prehrane nadopunjen enteralnim pripravcima (PEN - engl. Partial Enteral Nutrition) čija je dokazana učinkovitost u liječenju Crohnove bolesti kod djece i odraslih gotovo jednaka učinku terapije ekskluzivne enteralne prehrane (EEN). Ideja CDED prehrane jest smanjiti unos zasićenih masnih kiselina, masnoća životinjskog porijekla, crvenog i procesiranog mesa, žitarica, glutena, prehrambenih aditiva (emulgatora, maltodekstrina, taurina, sulfita, umjetnih sladila i karagenana) i procesirane hrane na najmanju moguću mjeru. U ovaj vid prehrane pacijent se uvodi u dogovoru s doktorom koji ga liječi, a dobro je imati i podršku stručnjaka za kliničku prehranu i nutricionizam koji prati cijeli postupak provođenja dijete.

Ključne riječi: *Chronova bolest, CDED, EEN, prehrana*

4-O-6

CDED diet therapy treatment of Crohn's disease - comparison with exclusive enteral nutrition

Katarina MILOSEVIC^{1*} Emina HADŽIĆ²

¹University of Sarajevo, Faculty of Pharmacy

*Corresponding author: Katarina Milošević, e-mail: katarinamilosevic@ffsa.unsa.ba

Summary

Crohn's disease is a non-specific inflammatory disease of the digestive tract. It can appear at any age, but most often occurs between the ages of 15. and 35. Proper nutrition is a condition for the normal functioning of the body, that is, a prerequisite for the maintenance of all energy and metabolic processes. Poor nutritional status negatively affects the development and outcome of the disease, which leads to the use of enteral and parenteral nutrition, which, along with normal oral nutrition, is a part of the patient's nutritional support. We define enteral nutrition as a method that enables the introduction of nutritional and pharmacologically defined enteral preparations orally or by using technological aids (probes and pumps) into the stomach or small intestine. Today, there is an innovative dietary approach for people with Crohn's disease - Crohn's Disease Exclusion Diet (CDED) - which includes an elimination type of diet supplemented with enteral preparations (PEN - English Partial Enteral Nutrition), whose proven effectiveness in the treatment of Crohn's disease in children and adults is equal the effect of exclusive enteral nutrition (EEN) therapy. The idea of the CDED diet is to reduce the intake of saturated fatty acids, fats of animal origin, red and processed meat, grains, gluten, food additives (emulsifiers, maltodextrin, taurine, sulfites, artificial sweeteners and carrageenan) and processed foods to the lowest possible extent. In this type of diet, the patient is guided by agreement with the doctor who is treating him, and he also has the support of an expert in clinical nutrition and nutrition who monitors the entire process of implementing the diet.

Keywords: *Crohn's disease, CDED, EEN, nutrition*

Dijetoterapija poremećaja ishrane

Olga MLADENović*¹, Marija TRIŠOVIĆ²

¹Visoka sportska i zdravstvena škola Beograd

² Medigroup, Beograd, Srbija

*Autor za korespondenciju: Olga Mladenović, e-mail: olga.mladenovic.dr@gmail.com

Sažetak

Poremećaji ishrane označavaju nezdrave navike u hranjenju i/iliponašanju u ishrani i održanju telesne težine. Anorexia nervosa (AN) i bulimia nervosa (BN) su dva najpoznatija poremećaja ishrane. Američka psihijatrijska asocijacija (APA) preporučuje nutritivnu rehabilitaciju kao prvi korak u lečenju i AN i BN-e. U nutritivnoj rehabilitaciji ovih bolesnika insistira se na poštovanju: ritma obroka, porcije, prestanku povraćanja i uzimanju hrane u društvu. Cilj se vremenom menja od prvobitnog pristupa, ograničenog na grame i kalorije, do dobro balansiranoog nutritivnog programa. Specifična nutritivna rehabilitacija obuhvata opsežnu edukaciju pacijenta u vezi sa namirnicama i ishranom uopšte, uzimanju “zabranjene“ hrane, efektima gladovanja na organizam, ali i na pojavu bingova, zabludama o dijetama i održanju telesne težine uz pomoć kompenzatornih mehanizama. Cilj rada bio je da se utvrdi da li je dijetoterapija iz ugla obolelih korisna u lečenju obolelih od poremećaja ishrane. Praćeno je 35 devojaka obolelih od poremećaja ishrane, koje su se anonimno izjasnile koliki je bio uticaj dijetoterapije u njihovom lečenju. Većina njih tj. 68% ispitivanih devojaka se izjasnilo za veliku korist dijetoterapije, kao i željom da nastave s istom. Edukacija mladog stanovništva je neophodan korak ka usvajanju pravilnih navika u ishrani.

Ključne riječi: *poremećaji ishrane, dijetoterapija*

Diet therapy of eating disorders

Olga MLADENović*¹, Marija TRIŠOVIĆ²

¹College of Sports and Health, Belgrade

² Medigroup, Belgrade, Serbia

*Corresponding author: Olga Mladenović, e-mail: olga.mladenovic.dr@gmail.com

Sažetak

Eating disorders refer to unhealthy eating habits and/or eating behaviors and weight maintenance. Anorexia nervosa (AN) and bulimia nervosa (BN) are two of the most well-known eating disorders. The American Psychiatric Association (APA) recommends nutritional rehabilitation as the first step in the treatment of both AN and BN. In the nutritional rehabilitation of these patients, it is insisted on respecting: the rhythm of meals, portions, stopping vomiting and taking food in company. The goal changes over time from the original approach, limited to grams and calories, to a well-balanced nutritional program. Specific nutritional rehabilitation includes extensive education of the patient regarding food and nutrition in general, taking "forbidden" foods, the effects of starvation on the body, but also on the occurrence of binges, misconceptions about diets and maintaining body weight with the help of compensatory mechanisms. The aim of the work was to determine whether diet therapy is useful in the treatment of patients with eating disorders. 35 girls suffering from eating disorders were monitored, who anonymously stated how much the diet therapy had an impact in their treatment. Most of them ie. 68% of the surveyed girls declared that the diet therapy was very beneficial, as well as their desire to continue with it. The conclusion is that educating the young population is a necessary step towards adopting proper eating habits.

Keywords: *eating disorders, diet therapy*

Urolitini kao funkcionalne komponente

Sonja POLJČIĆ, Ajla REČICA, Jasmina ĐEĐIBEGOVIĆ

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

*Autor za korespondenciju: Sonja Poljčić, e-mail: sonjapoljic@ffsa.unsa.ba

Sažetak

Urolitini su sekundarni metaboliti nastali iz hrane bogate elaginskom kiselinom ili elagitaninom. Elaginska kiselina se u biljkama nalazi u formi glukozida, a hranu bogatu ovom kiselinom čine maline, nar, jagode, brusnice i orasi. Rezultati brojnih istraživanja koja su do sada provedena pokazala su da elaginska kiselina posjeduje antivirusno, antibakterijsko, antihipertenzivno, kao i antioksidativno djelovanje, pa prevenira razvoj ateroskleroze i drugih hroničnih bolesti koje nastaju kao posljedica oksidativnog stresa. Urolitini su u brojnim *in vivo* i *in vitro* studijama pokazali antitumorsko djelovanje, a neki od predloženih mehanizama djelovanja uključuju regulaciju ekspresije onkogeni, receptora faktora rasta ili tumor supresorskih gena. Upravo zbog ovog mogućeg pozitivnog djelovanja na zdravlje organizma sve više se konzumiraju dodaci prehrani koji sadrže urolitin A i urolitin B, kao i namirnice bogate elaginskom kiselinom. Cilj ovog rada je prikazati tipove urolitina od kojih su najznačajniji urolitin A i urolitin B, kao i njihove moguće efekte u organizmu. Takođe, prikazaće se i rezultati poređenja dijetetskih izvora i dodataka prehrani.

Ključne riječi: *urolitini, elaginska kiselina, antibakterijska, antitumorska svojstva*

4-O-8

Urolithins as functional components

Sonja POLJČIĆ, Ajla REČICA, Jasmina ĐEĐIBEGOVIĆ

University in Sarajevo, Pharmaceutical University, Department of Bromatology and nutrition, BiH

*Corresponding author: Sonja Poljčić, e-mail: sonjapoljic@ffsa.unsa.ba

Summary

Urolithins are secondary metabolites, created from food which contains a lot of ellagic acid or ellagitannin. Ellagic acid in plants exist in form of glucoside, and the food that have a lot of this components is: raspberries, strawberries, cranberries, nuts. According to results of the previously conducted research, it is believed that ellagic acid has antiviral, antibacterial, antihypertensive and antioxidant effects. Thus, this implies that ellagic acid can prevent the development of atherosclerosis and other chronic diseases that can occur as a result of oxidative stress. Urolithins have shown antitumor activity in numerous *in vivo* and *in vitro* studies, and some of the proposed mechanisms of action include regulation of the expression of oncogenes, growth factor receptors or tumor suppressor genes. Due to the possible positive effect on the health of the body, food supplements containing urolithin A and urolithin B, as well as foods rich in ellagic acid, are being consumed more and more. The aim of this work is to present different types of urolithins and most important are urolithin A and urolithin B, as well as their possible effects in the body. Also, the results of a comparison of dietary sources and food supplements will be presented.

Keywords: *urolithins, ellagic acid, antibacterial, antitumor characteristic*

Suplementi i hrana za posebne medicinske namjene za bubrežne bolesnike

Emina SARAJLIĆ,^{1*} Armin RADELJAŠ¹

Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju: Emina Sarajlić, e-mail: eminasarajlic@ffsa.unsa.ba

Sažetak

Bubrezi imaju funkciju regulatornog, ekskretornog i endokrinog organa. Stvaraju i izlučuju krajnje produkte metabolizma proteina, regulišu količinu vode i mineralnih tvari u tijelu, te održavaju normalan krvni pritisak. Osnovna funkcionalna jedinica je nefron, koji pri oštećenju bubrega propada i gubi svoju funkciju. Kod bolesnog bubrega, dolazi do oštećenja sve većeg broja nefrona a time i do nagomilavanja štetnih tvari koje se sve manje izlučuju iz organizma putem bubrega. Bolesti bubrega dovode i do drugih poremećaja poput oligurije (nesposobnost izlučivanja vode), pretjeranog gubitka soli što uzrokuje visoku koncentraciju kalijuma u organizmu, albuminurije, gubitka velike količine proteina mokraćom te pojave edema i visokog krvnog pritiska. Mnoge bubrežne bolesti nije moguće trajno izliječiti. Preporuke prehrane su individualne za svakog bolesnika, a razlikuju se i u istog bolesnika ovisno o fazi bubrežne bolesti. Kod novootkrivenih bolesnika neophodno je učiniti procjenu statusa uhranjenosti i energetske potrebe. Proteinsko energetska pothranjenost, gubitak mišićne mase i kaheksija snažni su prediktori mortaliteta u hroničnoj bubrežnoj bolesti. Usporedbom različitih prehranbenih pristupa u svakodnevnom životu oboljelog od bubrežnih bolesti najučinkovitijim se pokazao mediteranski način prehrane, koji ima važan preventivni uticaj na bubrežnu funkciju i smanjenje progresije same bolesti. Cilj ovog rada je da se podstakne stanovništvo na pravilnu i uravnoteženu prehranu koja je ključ dobrog zdravlja, a fokus je stavljen na osobe sa hroničnom bolešću bubrega. S namjerom da se izbjegne pogoršanje bubrežne bolesti i nastanak određenih komplikacija potrebna je hrana adekvatne kalorijske vrijednosti kako bi se zadovoljile dnevne energetske potrebe, uz adekvatan unos proteina i vitamina, a s druge strane potrebno je ograničiti unos soli, tečnosti i hrane bogate fosforom i kalijumom. Također, u radu su navedene i smjernice u prehrani za posebna medicinska stanja te ukoliko ih se pacijent redovno pridržava imat će brojne zdravstvene benefite, a i sam kvalitet života će biti na mnogo većem nivou.

Ključne riječi: *bubrezi, bolest, prehrana*

4-O-9

Supplements and food for special medical purposes for kidney patients

Emina SARAJLIĆ,^{1*} Armin RADELJAŠ¹

University of Sarajevo, Faculty of Pharmacy, B&H

*Corresponding author: Emina Sarajlić, e-mail: eminasarajlic@ffsa.unsa.ba

Summary

The kidneys have the function of a regulatory, excretory and endocrine organ. They create and excrete final products of proteins, regulate the amount of water and mineral substances in the body, and maintain normal blood pressure. The basic functional unit is the nephron, which loses its function when the kidney is damaged. With a diseased kidney, there is damage to an increasing number of nephrons and thus to the accumulation of harmful substances that are less and less excreted from the body through the kidneys. Kidney diseases also lead to other disorders such as oliguria (inability to excrete water), excessive loss of salt, which causes a high concentration of potassium in the body, albuminuria, loss of a large amount of protein in the urine, and the appearance of edema and high blood pressure. Many kidney diseases cannot be permanently cured. Nutrition recommendations are individual for each patient, and they differ even in the same patient depending on the stage of the kidney disease. In newly diagnosed patients, it is necessary to assess the nutritional status and energy needs. Protein-energy malnutrition, muscle wasting and cachexia are strong predictors of mortality in chronic kidney disease. By comparing different nutritional approaches in the daily life of a kidney disease sufferer, the most effective was the Mediterranean diet, which has an important preventive effect on kidney function and reducing the progression of the disease itself. The aim of this work is to encourage the population to have a proper and balanced diet, which is the key to good health, and the focus of this work is on people with chronic kidney disease. In order to avoid the worsening of kidney disease and the occurrence of certain complications, food with adequate caloric value is needed to meet daily energy needs, with an adequate intake of proteins and vitamins, and on the other hand, it is necessary to limit the intake of salt, liquids and food rich in phosphorus and potassium. In addition, this paper also lists dietary guidelines for special medical conditions, and if the patient regularly adheres to them, he will have numerous health benefits, and the quality of life itself will be at a much higher level.

Keywords: *kidneys, disease, diet*

Dijetoterapija - osnove lečenja migrene

Milana STOJANOVIĆ, Davor J. KORČOK

Farmaceutski fakultet Novi Sad

Adekvatan i pravilan način ishrane sa unosom odgovarajućih hranljivih materija ključ su zdravog života i pripremaju ljudski organizam za kasniji životni period, a dijetoterapija ima veliki značaj. Dijetoterapija se smatra jednom od najvažnijih nemedicinskih metoda kojom putem promena navika u ishrani utičemo na kontrolu i prevalencu bolesti. Neurodegenerativne bolesti kao neizlečive jedne su od najčešćih oboljenja koje ostavljaju posledice na funkcionisanje celog tela. U najčešća neurološka oboljenja spadaju: alchajmerova bolest, migrena, autizam, epilepsija i autoimuna oštećena nervnog sistema, a putem dijetoterapije obezbeđuje se odgovarajući unos vitamina i minerala sa jednim ciljem, a to je da se smanji upala i održi homeostaza nervnog funkcionisanja. Migrena je neurološki poremećaj kod kojeg dolazi do oslobodanja neurotransmitera i inflamatornih markera, vazodilatacije i aktivacije neurona. U zavisnosti da li je u pitanju umerena do teška migrena i simptomi se razlikuju od pulsirajućeg bola do osetljivosti na svetlost i zvuk, mučnine i povraćanja, a na sve to može uticati i fizička aktivnost koja može dovesti do pogoršanja migrene. Hrana se takođe može smatrati jednim od okidača, a pojedine namirnice mogu uticati na pojavu migrene. Različiti tipovi dijete se predlažu pacijentima koji pate od ovog neurološkog poremećaja, a na osnovu studija i kliničkih podataka sugerise se da ketodijeta može biti dobra profilaksa sa brzim početkom delovanja kod akutnih i hroničnih napada migrene. Rad je dizajniran sa ciljem da ukaže na efikasnost nemedicinskih preparata za terapiju i profilaksu migrene pretragom publikovanih naučnih radova. Rad je urađen pregledom i analizom relevantne literature naučnih radova i udžbenika. Od radova su korišćeni relevantni naučni podaci objavljeni u časopisima koji su dobijeni iz baze podataka PubMed, NCBI, MDPI. Dijetoterapija ima bitnu ulogu u prevenciji i lečenju mnogih bolesti, pristupačna je pacijentima i ne nosi rizik za pojavu teških neželjenih efekata. Kako bi se dijeta predložila kao opcija za prevenciju migrene neophodno je da se uradi još dosta studija putem kojih će se potvrditi njihova efikasnost, a dokle god nemamo jake dokaze fokus stavljamo na promenu načina ishrane, redovno vežbanje i smanjenje stresa.

Ključne reči: *dijetoterapija, migrena, dijeta*

4-O-10

Dietotherapy – basics of migraine treatment

Milana STOJANOVIĆ, Davor J. KORČOK

Faculty of Pharmacy, Novi Sad

Summary

An adequate and correct way of eating with the intake of appropriate nutrients is the key to a healthy life and prepares the human body for the later period of life, and dietotherapy is of great importance. Dietotherapy is considered one of the most valuable non-medical methods by which, through changes in eating habits, we influence the control and prevalence of diseases. Neurodegenerative diseases, as incurable, are one of the most common diseases that leave consequences on the functioning of the whole body. The most common neurological disorders include: Alzheimer's disease, migraine, autism, epilepsy and autoimmune damage to the nervous system, and through diet therapy, an adequate intake of vitamins and minerals is ensured with one goal, which is to reduce inflammation and maintain homeostasis of nerve functioning. Migraine is a neurological disorder in which there is release of neurotransmitters and inflammatory markers, vasodilation and neuron activation. Depending on whether it is a moderate to severe migraine, the symptoms vary from throbbing pain to sensitivity to light and sound, nausea and vomiting, all of which can be affected by physical activity that can lead to migraine flare-ups. Food can also be considered one of the triggers, and certain foods can affect the occurrence of migraines. Different types of diets are suggested for patients suffering from this neurological disorder, and based on studies and clinical data, it is suggested that the keto diet can be a good prophylaxis with early onset of action in acute and chronic migraine attacks. The work was designed with the aim of pointing out the effectiveness of non-medical preparations for therapy and migraine prophylactic by searching published scientific articles. The work was done by reviewing and analyzing the relevant literature of scientific articles and textbooks. From articles are used relevant scientific data published in journals obtained from the database PubMed, NCBL, MDPI. Dietotherapy has an important role in the prevention and treatment of many diseases, it is patient-friendly and does not carry the risk of severe adverse effects. In order to propose diet as an option for the prevention of migraines, it is necessary to do a lot of studies through which their effectiveness will be confirmed, and until we have strong evidence the focus is on changing nutrition, regular exercise and stress reduction.

Keywords: *dietotherapy, migraine, diet*

Značaj primjene vitamina D kod autoimunih oboljenja

Nidal ŠABIĆ^{1*}, Nina GRABOVAC²

¹Univerzitet u Sarajevu-Fakultet zdravstvenih studija, studijski program Sanitarно
Inžinjerstvo, BiH

*Autor za korespondenciju: Nidal Šabić, e-mail: nidal.sabic97@gmail.com

Sažetak

Vitamin D (kalciferol) pripada grupi u mastima topivih seko-sterola, prirodno prisutnih u nekoliko vrsta hrane, poput ulja jetre masnijih riba, gljiva, žumanca i jetre. Dvije fiziološki najznačajnije forme vitamina D su D2 (ergokalciferol) i D3 (holekalciferol). Obzirom na ekspresiju receptora za vitamin D na ćelijama imunog sistema (B ćelijama, T ćelijama i antigen prezentujućim ćelijama), vitamin D ima sposobnost modulacije urođenog i stečenog imunog odgovora. Iz ovoga slijedi da je deficit vitamina D povezan sa povećanom mogućnošću razvoja autoimunih oboljenja, ali i uobičajenih infekcija, sezonskih prehlada i slično. Cilj ovog rada je ukazati na važnost suplementacije vitaminom D kod autoimunih oboljenja, naročito multiple skleroze, dijabetes mellitusa tipa 1, inflamatornih bolesti crijeva i Hashimoto tireoiditisa. U ovom radu korišteni su dostupni naučni radovi objavljeni u relevantnim bazama podataka PubMed, Google Scholar, ScienceDirect upotrebnom ključnih riječi „Vitamin D“, „*autoimmune diseases*“, „*immune system*“. Dokazano je da nedovoljne količine vitamina D i nedovoljna izloženost sunčevom UV zračenju povećavaju rizik od nastanka multiple skleroze. Također, dokazano je da je stopa dijabetes mellitusa tipa 1 niža u sunčanijim oblastima. Status vitamina D je posmatran i kod osoba sa Kronovom bolesti i ulceroznim kolitisom, gdje je zaključeno da je nedostatak vitamina D povezan sa progresijom pomenutih oboljenja. Nedostatak vitamina D je čest kod Hashimoto tireoiditisa i dokazano je da suplementacija vitaminom D može usporiti razvoj hipotireoze i smanjiti kardiovaskularne rizike kod ovih pacijenata. Kao zaključak imamo brojne naučne dokaze koji potvrđuju da je vitamin D potentan imunomodulator, sa raznolikim efektima na naš imuni sistem. Deficit vitamina D je povezan sa pojavom više vrsta autoimunih oboljenja, na osnovu čega možemo da zaključimo da su optimalni nivoi vitamina D neophodni za normalnu funkciju imunog sistema i prevenciju autoimunih oboljenja u humanom organizmu.

Ključne riječi: *vitamin D, autoimuna oboljenja, imuni sistem*

4-O-11

Importance of using vitamin D in autoimmune disease therapy

Nidal ŠABIĆ^{1*}, Nina GRABOVAC²

¹Univerzitet in Sarajevo Fakultie of Health Studys; Department of Health and Ecology

*Corresponding author: Nidal Šabić, e-mail: nidal.sabic97@gmail.com

Summary

Vitamin D (kalciferol) belongs to a group of a fat soluble seko-sterols, naturally present in some foods like, liver oil, fatty fish, mushrooms, eggs, and liver. There are two forms of vitamin D which are of a physiological importance, D2 (ergocalciferol) i D3 (cholecalciferol). Because many cells, especially including immune cells had receptors for vitamin D those include B cells, T cells and Antigen presenting cells. Vitamin D can regulate in born and acquired immune response. This is leading us to the conclusions that vitamin D deficiency can lead to high possibility of developing some autoimmune disease, ordinary infections, and general chronic health problems. The purpose of this paper is to show the importance of vitamin D supplementations in the cases of autoimmune diseases, especially in Multiple sclerosis, diabetes type 1, inflammatory bowel disease, and Hashimoto tireoiditis. It has been proven that insufficient amount of vitamin D and insufficient exposure to UV radiation increases the risk of Multiple Sclerosis. Same thing had been proven in patient with diabetes type 1, the incidence of this disease is lowered in sunny areas where population has more exposure to the sun. Vitamin D status had been studied in patient with Chron's disease and Ulcerative colitis, where it had bean concluded that the vitamin D deficiency had bean linked with the progression of this disease. Deficiency of vitamin D is common in Hashimoto Thyroiditis, and it had been proven that supplements can drastically slow down the progression hypothyreose and reduced the cardiovascular risk in these patients. As a conclusion there are numerus scientific data showing that vitamin D is immonomodulating, with the range of effects on our immune system. Deficiency of vitamin D is attributive to a lot of autoimmune diseases. Therefore, we can conclude that the enough vitamin D is necessary for optimal and normal function of our immune system and prevention od autoimmune diseases in human body.

Keywords: *vitamin D, autoimmune diseases, immune system*

Prehrambene potrebe radnih i sportskih pasa u usporedbi s psima kućnim ljubimcima

Antonela ŠTIMAC*¹, Ivana VUKOVIĆ¹

¹Veterinarski fakultet Sveučilište u Zagrebu, Hrvatska

*Autor za korespondenciju: Antonela Štimac, email: astimac@vef.hr

Sažetak

Radni psi su neizostavni dio društva i imaju ključnu ulogu u mnogim situacijama kao što su prirodne nepogode. Pravilna prehrana jedna je od najvažnijih čimbenika koji utječu na njihove konačne rezultate, a zbog povećane tjelesne aktivnosti, količina kalorija u njihovoj prehrani veća je nego u odraslih pasa kućnih ljubimaca. Popularizacijom sporta kod pasa sve veći broj vlasnika odlučuje se aktivnosti kao što su agiliti ili flayball, stoga je neophodna edukacija o prehrambenim potrebama takvih pasa. Kod aktivnosti visokog intenziteta, koju za primjer imaju trkaći psi, prehrana bi se trebala sastojati od 50-60% lako probavljivih ugljikohidrata, dok postotak masti i bjelančevina trebao bi biti niži, dok bi kod pasa od kojih se očekuje dugotrajna aktivnost postotak ugljikohidrata trebao biti niži, a postotak masti i bjelančevina viši. S druge strane, prehrana odraslih pasa kućnih ljubimaca treba sadržavati najmanje 18% proteina i oko 30-60% ugljikohidrata. Za sportske/radne pse dodaci koji se najviše koriste su glukozamin, riblje ulje, antioksidansi i probiotici, dok kod odraslih pasa kućnih ljubimaca mnoge komercijalne hrane zadovoljavaju potrebe za vitaminima. Potrebno je prilagoditi energetske unos u skladiti s intenzitetom i trajanjem rada odnosno aktivnosti. Psi kućni ljubimci zahtijevaju manje potrebe za energijom u usporedbi s psima koji se koriste za rad ili sportske pse.

Ključne riječi: *pas, energetske potrebe, aktivnost*

4-O-12

Dietary requirements of working and sporting dogs compared to pet dogs

Antonela ŠTIMAC*¹, Ivana VUKOVIĆ¹

¹Faculty of Veterinary Medicine, University of Zagreb, Croatia

*Corresponding author: Antonela Štimac email: astimac@vef.hr

Summary

Working dogs are an indispensable part of society and play a key role in many situations such as natural disasters. Proper nutrition is one of the most important factors that affect their final results, and due to increased physical activity, the amount of calories in their diet is higher than in adult pet dogs. With the popularization of sports in dogs, an increasing number of owners decide on activities such as agility or flyball, therefore education about the nutritional needs of such dogs is necessary. In the case of high-intensity activity, such as that of racing dogs, the diet should consist of 50-60% easily digestible carbohydrates, while the percentage of fat and protein should be lower, while in dogs that are expected to do a long-term activity, the percentage of carbohydrates should be lower, and the percentage of fat and protein higher. On the other hand, the diet of adult pet dogs should contain at least 18% protein and about 30-60% carbohydrates. For sports/working dogs, the most commonly used supplements are glucosamine, fish oil, antioxidants and probiotics, while for adult pet dogs, many commercial foods meet vitamin needs. It is necessary to adjust energy intake to match the intensity and duration of work or activity. Pet dogs require less energy than working or sporting dogs.

Keywords: *dog, energy needs, activity*

Primjena dodataka prehrani kao potporna terapija kod pasa sa osteoartritisom

Ivana VUKOVIĆ*¹; Antonela ŠTIMAC¹; Anita KRALJEVIĆ¹

¹Veterinarski fakultet Sveučilišta u Zagrebu, Hrvatska

Sažetak

Osteoartritis (OA) je degenerativna bolest zglobova, uzrokovana degeneracijom zglobne hrskavice, hipertrofijom kosti, promjenama na sinovijalnoj membrani te praćena kroničnom boli, hromošću i ukočenošću zahvaćenih zglobova. Jedna je od najčešćih ortopedskih bolesti koja zahvaća čak 20% pasa starijih od godinu dana. Liječenje OA je dugotrajno i zahtjeva multimodalnu terapiju koja uključuje kontrolu tjelesne težine, fizikalnu terapiju, analgetsku terapiju te primjenu dodataka prehrani. Prehrana može biti jedan od bitnih čimbenika za prevenciju i liječenje OA te je iz tog razloga primjena dodataka u prehrani postala sve zastupljenija metoda u liječenju OA. Dodaci prehrani koji se najčešće primjenjuju su hondriotin sulfat, glukozamin, polinezasićene masne kiseline, nedenaturirani kolagen tipa II, nesaponificirana frakcija soje od avokada i kurkumin. Glukozamin i hondriotin sulfat imaju pozitivan učinak na sintezu matriksa hrskavice, kao i inhibicijski učinak na kataboličke enzime u zahvaćenim zglobovima. Istraživanja su pokazala kako primjena nedenaturiranog kolagena tip II poboljšava stabilizaciju i regeneraciju hrskavice, smanjuje bolnost, hromost i ukočenost zahvaćenih zglobova. Daleko najbolji rezultat u svim istraživanjima pokazuju polinezasićene masne kiseline, pogotovo omega 3 masne kiseline, koje su znatno poboljšale kliničku sliku pasa sa OA. Dobar utjecaj su imale na smanjenje stupnja hromosti i povećanja opsega kretanja zglobova kao i samog kretanja pacijenta te smanjenje ukočenosti i otečenosti zglobova. Obzirom na rezultate dosadašnjih istraživanja uključivanje dodataka prehrani kao potporne terapije kod pasa s OA može se smatrati neizostavnim dijelom u njegovoj terapiji.

4-O-13

Application of food supplements as support therapy in dogs with osteoarthritis

Ivana VUKOVIĆ¹, Antonela ŠTIMAC¹, Anita KRALJEVIĆ¹

¹Veterinary Faculty University of Zagreb, Croatia

Summary

Osteoarthritis (OA) is a degenerative disease of the joints, caused by the degeneration of joint cartilage, bone hypertrophy, changes in the synovial membrane and accompanied by chronic pain, lameness and stiffness of the affected joints. It is one of the most common orthopedic diseases that affects as many as 20% of dogs older than one year. Treatment of OA is long-term and requires multimodal therapy that includes weight control, physical therapy, analgesic therapy, and the use of nutritional supplements. Nutrition can be one of the important factors for the prevention and treatment of OA, and for this reason, the use of dietary supplements has become an increasingly common method in the treatment of OA. The most commonly used nutritional supplements are chondroitin sulfate, glucosamine, polyunsaturated fatty acids, undenatured collagen type II, unsaponified soy fraction from avocado and curcumin. Glucosamine and chondroitin sulfate have a positive effect on cartilage matrix synthesis, as well as an inhibitory effect on catabolic enzymes in the affected joints. Research has shown that the use of non-denatured type II collagen improves the stabilization and regeneration of cartilage, reduces pain, lameness and stiffness of the affected joints. Polyunsaturated fatty acids, especially omega 3 fatty acids, which significantly improved the clinical picture of dogs with OA, show by far the best results in all studies. They had a good effect on reducing the degree of lameness and increasing the range of motion of the joints as well as the patient's movement and reducing the stiffness and swelling of the joints. Considering the results of previous research, the inclusion of nutritional supplements as supportive therapy in dogs with OA can be considered an indispensable part of its therapy.

**Prednosti ishrane bogate orašastim plodovima u
prevenciji kardiovaskularnih bolesti, smanjenju rizika od smrtnosti,
metaboličkog sindroma i gojaznosti**

Adna ARNAOUT

Medicinski fakultet Univerziteta u Sarajevu

*Autor za korespondenciju: Adna Arnaout, e-mail: adna.arnaout119-2019@mf.unsa.ba

Sažetak

Iako nutritivno korisni s aspekta njihovog bogatstva vlaknima, proteinima, raznim vitaminima, mineralima, magnezijumom, gvožđem i antioksidansima, orašasti plodovi ipak posjeduju i 50-75 posto sadržaja masti, čime njihov nutritivni efekat postaje ambivalentan zbog mogućih implikacija vezanih za povećanje tjelesne težine kao posljedice njihovog unosa, kao i rizika od kardiovaskularnih oboljenja te pretilosti. Posljednjih decenija, međutim, istraživanja su pokazala da, uprkos visokom sadržaju masti, orašasti plodovi možda nisu povezani sa debljanjem, niti sa pretilošću, jer se njihov unos pokazuje uspješnim u smanjenju rizika od gojaznosti. Nadalje, studije su počele otkrivati i povezanost između konzumiranja orašastih plodova i kardiovaskularnog zdravlja, kao i smanjenog rizika od smrtnosti od drugih oboljenja. Ovaj kratki narativni pregled ima za cilj da predstavi neke od ovih zapanjujućih nalaza, s ciljem naglašavanja potencijalno korisnih smjernica za kliničare u Bosni i Hercegovini koji pacijentima sa rizikom od kardiovaskularnih oboljenja, pretilosti i metaboličkog sindroma pružaju savjetovanje o ishrani u svojoj svakodnevnoj praksi. Iako pregled nije sveobuhvatan, rezultati studija koje otkrivaju korisne efekte ishrane bogate orašastim plodovima, kao i moć poboljšanja zdravlja za koju se pokazalo da ova nutritivna hrana posjeduje, su brojni i vrijedni pažnje kako među kliničarima koji savjetuju pacijente s rizikom od kardiovaskularnih bolesti i gojaznosti, tako i među općom populacijom koja ima u interesu poboljšanje svojih prehrambenih navika.

Ključne riječi: orašasti plodovi, kardiovaskularno zdravlje, metabolički sindrom, gojaznost

4-P-1

Benefits of a diet rich in nuts in preventing cardiovascular disease as well as reducing risk of obesity and mortality

Adna ARNAOUT

University of Sarajevo, Faculty of Medicine

*Corresponding author: Adna Arnaout, e-mail: adna.arnaout119-2019@mf.unsa.ba

Summary

Although an overall nutritionally beneficial food, high in fiber, protein, and a variety of vitamins and minerals, magnesium, iron, and antioxidants, the 50-75 per cent fat content of nuts accounted for the ambiguity as to this foods' nutritive benefit in the past due to its potential to be a causal factor for obesity and cardiovascular illness. In the recent decade, though, research has shown that despite their high fat content, nuts may not be associated with weight gain, as their intake showed successful in reducing risk of obesity. Furthermore, studies have begun to reveal the valuable association between nut consumption and cardiovascular health, as well as a reduced risk of mortality. This brief narrative review aims to reveal some of these astounding findings, with the aim of shedding light on potentially beneficial guidelines for clinicians in Bosnia and Herzegovina providing nutrition counseling in their every-day practice. While the review is not conclusive and demands further elucidation as to the details including specificities regarding recommendations for nutrition consultations, the findings revealing beneficial effects of a diet rich in nuts are worthy of consideration among both clinicians advising patients at risk of cardiovascular illness and obesity, as well as among the general population in consideration of their personal dietary habits.

Keywords: nuts, cardiovascular health, metabolic syndrome, obesity

Efekti astaksantina na nervni sistem

Amina HRNČIĆ¹, Aleksandar GABONA², Aleksa ILINČIĆ³

¹Univerzitet u Sarajevu, Farmaceutski fakultet Sarajevo, BiH

²Univerzitet u Novom Sadu, Filozofski fakultet Novi Sad, Srbija

³Univerzitet u Novom Sadu, Medicinski fakultet Novi Sad, Srbija

*Autor za korespondenciju: Amina Hrnčić, e-mail: amina_hrnctic@hotmail.com

Sažetak

Astaksantin je karotenoid ksantofila prisutan u raznim mikroalgama i kvascima. Primarni izvor astaksantina za ljudsku ishranu dobiva se unosom morskih plodova ili ekstrahiranjem iz mikroalge *Haematococcus pluvialis* ili kvasca vrste *Phaffia*. On je i pigment koji se daje morskim životinjama, kakav je losos u uzgoju, da bi putem ishrane dobile svoju karakterističnu boju mesa. Astaksantin je snažan bioaktivni antioksidans i pokazao je djelotvornost na životinjskim ili ljudskim modelima makularne degeneracije, koja je uzrok sljepila. Poznato je da ima i antitumorsko dejstvo. U zadnje vrijeme je u fokusu istraživanje djelovanja astaksantina na nervni sistem. Ovaj rad daje pregled najnovijih studija koje se odnose na ovu temu. Utvrđeno je da astaksantin ima antidepresivna dejstva koja ostvaruje putem serotonergičkog sistema, a pored toga ima terapijsko protuupalno sredstvo za mnoge neurološke poremećaje, uključujući cerebralnu ishemiju, Parkinsonovu bolest, Alzajmerovu bolest, autizam i neuropatsku bol. Također, astaksantin je dokazano dobra metoda nutritivnog prekondicioniranja, kako bi se povećala otpornost, kada su u pitanju zatvorene povrede glave. Ovo znači da potencijalno astaksantin može povećati otpornost na ove povrede kod osjetljivih populacija kakve su sportisti i vojnici.

Ključne riječi: *astaksantin, nervni sistem, depresija, trauma, autizam*

4-P-2

The effects of astaxanthin on the nervous system

Amina HRNČIĆ¹, Aleksandar GABONA², Aleksa ILINČIĆ³

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

²University of Novi Sad, Faculty of Philosophy, Novi Sad, Serbia

³University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

*Corresponding author: Amina Hrnčić, e-mail: amina_hrnccic@hotmail.com

Summary

Astaxanthin is a xanthophyll carotenoid present in various microalgae and yeasts. The primary source of astaxanthin for human consumption is obtained by eating seafood or by extracting it from the microalgae *Haematococcus pluvialis* or the yeast *Phaffia* species. It is also a pigment that is given to marine animals, such as farmed salmon, to give them their characteristic flesh color through nutrition. Astaxanthin is a powerful bioactive antioxidant and has shown efficacy in animal and human models of macular degeneration, which causes blindness. It is known to have an antitumor effect. Recently, the effects of astaxanthin on the nervous system has been in focus of research. This paper provides an overview of the latest studies related to this topic. Astaxanthin has been found to have antidepressant effects mediated by the serotonergic system, in addition to being a therapeutic anti-inflammatory agent for many neurological disorders, including cerebral ischemia, Parkinson's disease, Alzheimer's disease, autism, and neuropathic pain. Also, astaxanthin is proven to be a good method of nutritional preconditioning, to increase resistance, when it comes to closed head injuries. This means that potentially astaxanthin can increase resistance to these injuries in susceptible populations such as athletes and soldiers.

Keywords: *astaxanthin, nervous system, depression, trauma, autism*

Antitumorsko djelovanje bromelaina, izolovanog iz ananasa (*Ananas cosmosus* (L) Merr.)

Amina HRNČIĆ¹, Aleksa ILINČIĆ²

¹Univerzitet u Sarajevu, Farmaceutski fakultet Sarajevo, BiH

²Univerzitet u Novom Sadu, Medicinski fakultet Novi Sad, Srbija

*Autor za korespondenciju: Amina Hrnčić, e-mail: amina_hrncic@hotmail.com

Sažetak

Ananas, (*Ananas comosus* (L) Merr.), višegodišnja je biljka iz porodice *Bromeliaceae*. Jestivi dio biljke je njegov plod. Porijeklom je iz tropske i subtropske Amerike, a prvi put je njegovo postojanje zabilježio Kristofor Kolumbo. Danas se koristi širom svijeta u ishrani i široko je distribuiran. U ovom radu fokus je na komponenti bromelain izolovanoj iz ananasa, a za koju se u zadnjih nekoliko godina vežu brojna istraživanja zbog njenog antitumorskog efekta. Tačnije, dat je pregled studija koje se odnose na antitumorsko djelovanje bromelaina. Bromelain, cisteinska proteaza ekstrahovana iz stabljike ananasa, ima visok afinitet vezivanja za transkripcione faktore p53 i β -katenin proteine koji su ključni u kontroli progresije hepatocelularnog karcinoma. Kad je u pitanju kolorektalni karcinom, u jednoj studiji bromelain je smanjio proliferaciju ćelija i podstakao apoptozu u Caco-2 ćelijama. In vivo, bromelain je smanjio razvoj aberantnih žarišta kripta i polipa kolorektalnog karcinoma. Pokazalo se da bromelain sprečava translokaciju nuklearnog faktora α B (NF- α B) zaustavljanjem G2/M i doprinosi ćelijskoj smrti u ćelijama humanog epidermoidnog karcinoma. Nadalje, bromelain usporava reakciju inhibicije rasta MCF-7 ćelija u ćelijama karcinoma dojke i stimuliše ciklus autofagije dok promovise monocitnu citotoksičnost kod žena sa karcinomom dojke kada se daje oralno. Bromelain je također pokazao in vivo antitumorsko djelovanje u ćelijskim linijama kao što su P-388 leukemija, sarkom (S-37), Ehrlih asketski tumor, Luisov karcinom pluća i adenokarcinom sisara ADC-755.

Ključne riječi: *ananas, bromelain, karcinom, kolorektalni karcinom, leukemija*

4-P-3

Antitumor activity of bromelain, isolated from pineapple (*Ananas cosmosus* (L) Merr.)

Amina HRNČIĆ¹, Aleksa ILINČIĆ²

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

²University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia

*Corresponding author: Amina Hrnčić, e-mail: amina_hrnčić@hotmail.com

Summary

Pineapple, (*Ananas comosus* (L) Merr.), is a perennial plant from the *Bromeliaceae* family. The edible part of the plant is its fruit. It originates from tropical and subtropical America, and its existence was first recorded by Christopher Columbus. Today it is used worldwide in food and is widely distributed. In this paper, the focus is on the bromelain, a component isolated from the pineapple, which has been the subject of numerous research studies in recent years due to its antitumor effect. More specifically, an overview of studies related to the antitumor activity of bromelain is given. Bromelain, a cysteine protease extracted from the stem of pineapple, has a high binding affinity to the transcription factors p53 and β -catenin proteins that are key players in controlling the progression of hepatocellular carcinoma. When it comes to colorectal cancer, in one study bromelain reduced cell proliferation and induced apoptosis in Caco-2 cells. In vivo, bromelain reduced the development of aberrant foci of colorectal cancer crypts and polyps. Bromelain has been shown to prevent nuclear factor α B (NF- α B) translocation through G2/M arrest and contribute to cell death in human epidermoid carcinoma cells. Furthermore, bromelain slows the growth inhibition response of MCF-7 cells in breast cancer cells and stimulates the autophagy cycle while promoting monocyte cytotoxicity in women with breast cancer when administered orally. Bromelain has also shown in vivo antitumor activity in cell lines such as P-388 leukemia, sarcoma (S-37), Ehrlich ascetic tumor, Lewis lung carcinoma, and mammary adenocarcinoma ADC-755.

Keywords: *pineapple, bromelain, cancer, colorectal cancer, leukemia*

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

IgG testovi intolerancije na hranu

Merima DURIĆ*, Amela AVDIBEGOVIĆ, Maja ĐUROVIĆ, Andrea GALIJAŠEVIĆ, Romana GALIN, Jasmina GARIĆ

Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju Merima Durić, e-mail: merimaduric@ffsa.unsa.ba

Sažetak

Intolerancija na neku hranu manifestuje se kao poteškoće s probavljanjem te hrane. Simptomi su najčešće nadutost, vjetrovi te bol u stomaku. Zadnjih desetak godina, sve više se govori o intolerancijama na hranu, primarno zahvaljujući dostupnosti raznih testova, čija se vjerodostojnost međutim dovodi u pitanje. Ciljevi samog rada jesu detaljno objasniti IgG testove intolerancije na hranu, postupak i varijabilnost, navesti najčešće razloge njihove upotrebe, te objasniti da li se baziraju na naučnoj osnovi. Kako bismo približi široj populaciji pojam intolerancija na hranu, izvršili smo anketno ispitivanje na osobama različitog uzrasta i primarno medicinskog obrazovanja. U radu će biti detaljno prikazani rezultati istraživanja, koji uključuju učestalost i razloge testiranja u ispitivanoj grupi. Publicirani naučni radovi ne pružaju dovoljno dokaza o potrebnoj pouzdanosti i praktičnoj primjenjivosti IgG testiranja intolerancije na hranu, a osnovni problem koji se navode su: prisustvo IgG antitijela ukazuje na izloženost i eventualnu toleranciju na hranu, a ne na intoleranciju; ne postoji standardizirana metodologija, a također nema ni dokaza o validaciji ovih testova. U konačnici testovi u nekim slučajevima mogu dovesti do nepotrebnih restrikcija u ishrani te time i do nezadovoljavanja potreba organizma za unošenjem određenih nutritiva. Zbog nedostatka dokaza koji podržavaju njihovu upotrebu, IgG testovi se ne preporučuju kao dijagnostički metod.

Ključne riječi: *intolerancija na hranu, IgG testovi intolerancije na hranu, anketno ispitivanje*

IgG food intolerance tests

Merima DURIĆ*, Amela AVDIBEGOVIĆ, Maja ĐUROVIĆ, Andrea GALIJAŠEVIĆ, Romana GALIĆ, Jasmina GARIC

Univerzitet u Sarajevu, Farmaceutski fakultet, BiH

*Autor za korespondenciju Merima Durić, e-mail: merimaduric@ffsa.unsa.ba

Summary

Intolerance to some food manifests itself as difficulties with digesting that food. The symptoms are most often flatulence, and stomach pain. In the last ten years, there has been more and more talk about food intolerances, primarily thanks to the availability of various tests, the reliability of which is however questioned. The goals of the paper itself are to explain in detail IgG food intolerance tests, the procedure and variability, to state the most common reasons for their use, and to explain whether they are based on a scientific basis. In order to bring the concept of food intolerance closer to the wider population, we conducted a survey on people of different ages and primary medical education. The paper will present the research results in detail, which include the frequency and reasons for testing in the examined group. Published scientific papers do not provide sufficient evidence of the required reliability and practical applicability of IgG food intolerance testing, and the main problems cited are: the presence of IgG antibodies indicates exposure and eventual tolerance to food, not intolerance; there is no standardized methodology, and there is also no evidence of validation of these tests. In the end, the tests in some cases can lead to unnecessary restrictions in the diet and thus to the satisfaction of the body's needs for the intake of certain nutrients. Due to the lack of evidence to support their use, IgG tests are not recommended as a diagnostic method.

Keywords: *food intolerance, IgG food intolerance tests, questionnaire survey*

Benefiti resveratrola i njegov sadržaj u grožđuAleksandra ŠUŠNJAR^{1*}, Dragana ŠUNJKA¹, Slavica VUKOVIĆ¹,Sanja LAZIĆ¹, Dragana BOŠKOVIĆ¹, Antonije ŽUNIĆ¹¹Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za fitomedicinu i zaštitu životne sredine, Srbija

*Autor za korespondenciju: Aleksandra Šušnjar, e-mail:

aleksandra.susnjar@polj.edu.rs**Sažetak**

Od svog zvaničnog otkrića 1939. godine, resveratrol (3,4',5-trihidroksistilben) (*trans* i *cis* oblik) se isticao kao veoma važno fenolno jedinjenje, posebno kada je reč o vinovoj lozi. Vremenom su ustanovljeni njegovi mnogobrojni pozitivni efekti po ljudsko zdravlje, poput antikancerogene, antiinflamatorne, imunomodulatorne, antioksidativne i kardiovaskularne zaštitne aktivnosti. Ovo jedinjenje prirodno je prisutno u vinovoj lozi i njegova koncentracija zavisi od sorte, genotipa, perioda zrenja i uslova sredine. Prisustvo resveratrola i njegova koncentracija razlikuju se u zavisnosti od dela čokota, pri čemu je u relativno većim količinama detektovan u semenkama i pokožici grožđa. Njegova sinteza intenzivira se u stresnim uslovima kao što su prisustvo infekcija izazvanih fitopatogenim organizmima, nepovoljni uslovi sredine, UV zračenje i sl. Infekcije najznačajnijim fitopatogenim gljivama vinove loze u najvećoj meri podstiču sintezu resveratrola. U tom slučaju ovo jedinjenje na patogene deluje poput hemijske barijere, time što sprečava dalje napredovanje infekcije, sve dok uslovi sredine ne postanu nepovoljni za dalji razvoj patogena. Mnoga istraživanja su pokazala da je resveratrol direktno uključen u otpornost vinove loze na neke od ekonomski najvažnijih patogena i da su crvene sorte, posebno autohtone, otpornije, jer inicijalno sadrže više resveratrola. Sadržaj resveratrola određen je u različitim sortama vinove loze, pri čemu je njegova koncentracija u svežim plodovima sorti Cabernet Sauvignon i Merlot iznosila 6,3 mg/l, odnosno 4,4 mg/l. Pinot noir i Malvasia sadržali su 2,5 i 0,296 mg/l ovog jedinjenja, dok je koncentracija resveratrola u Prokupcu varirala od 0,27-1,46 mg/l u zavisnosti od klona.

Ključne reči: *vinova loza, grožđe, resveratrol, benefiti*

Benefits of resveratrol and its content in grapes

Aleksandra ŠUŠNJAR^{1*}, Dragana ŠUNJKA¹, Slavica VUKOVIĆ¹,
Sanja LAZIĆ¹, Dragana BOŠKOVIĆ¹, Antonije ŽUNIĆ¹

¹The University of Novi Sad, Faculty of Agriculture, Department of Phytomedicine and Environmental protection, Serbia

*Corresponding author: Aleksandra Šušnjar, e-mail: aleksandra.susnjar@polj.edu.rs

Summary

Since its official discovery in 1939, resveratrol (3,4',5-trihydroxystilbene) (*trans* and *cis* form) has stood out as the most important phenolic compound, especially in grapevine. Over time, many healthful effects of resveratrol such as anti-cancer, anti-inflammatory, immunomodulatory, antioxidant, and cardiovascular protective activity have been established. It naturally occurs in the vine and its content depends on the grapevine variety, genotype, ripening period, and environmental conditions. Different amounts of resveratrol have been detected in different plant parts, but at a relatively higher amount in the grape seeds and skin. Its synthesis in plants is stimulated by stressful conditions such as infections caused by phytopathogens, environmental conditions, UV radiation, etc. The presence of infection greatly affects resveratrol synthesis. In that case, it acts on pathogens as a chemical barrier by preventing the further progress of the infection until the environmental conditions become unfavorable for the pathogen. Much research has shown that resveratrol is directly involved in the resistance of the grapevine to some of the most economically important pathogens and that the red varieties, especially autochthonous, were more resistant and abundant in resveratrol. The content of resveratrol was determined in different grape varieties, whereby its concentration in fresh fruits of Cabernet Sauvignon and Merlot was 6.3 mg/l and 4.4 mg/l, respectively. The Pinot noir and Malvasia contained 2.5 and 0.296 mg/l of this compound, while the concentration of resveratrol in Prokupac varied from 0.27-1.46 mg/l depending on its clone.

Keywords: *grapevine, grapes, resveratrol, benefits*

Procjena antioksidativnog profila osam odabranih varijeteta paradajza

Mirza VALJEVAC, Amina ŠERBO, Almira AVDIĆ

Poljoprivredno-prehrambeni fakultet, Univerzitet u Sarajevu

Sažetak

Paradajz (*Lycopersicon esculentum* Mill.) je jedna od najviše uzgajanih i najviše korištenih povrtnih kultura u svijetu. Paradajz je također izvrstan izvor prirodnih antioksidanasa među kojima se posebno izdvajaju fenolna i flavonoidna jedinjenja. Cilj ovog rada je bio ispitati razlike u antioksidativnoj aktivnosti i sadržaju ukupnih fenola i flavonoida između plodova osam različitih kultivara paradajza (Pink Gusto F1, Fantom F1, Pink Rock F1, Optima F1, 'Volovsko srce', Amati F1, Panekra F1 i Big Beef F1). Sadržaj ukupnih fenola u ekstraktima plodova paradajza određen je spektrofotometrijskom metodom upotrebom Folin-Ciocalteau reagensa, dok je sadržaj ukupnih flavonoida također određen spektrofotometrijski, ali uz korištenje aluminij hlorida kao reagensa. Za određivanje ukupne antioksidativne aktivnosti u plodovima paradajza korištena je FRAP metoda. Sadržaj ukupnih fenola u plodovima paradajza se kretao od 20.36 do 51.61 mg ukupnih fenola na 100 g⁻¹ svježe mase ploda, dok je sadržaj ukupnih flavonoida varirao od 2.88 do 4.91 mg ukupnih flavonoida na 100 g⁻¹ svježe mase ploda. Ukupna antioksidativna aktivnost u plodovima paradajza se kretala od 0.189 do 0.36 mmol Fe²⁺ na 100 g svježe mase ploda. Najviša antioksidativna aktivnost i sadržaj ukupnih fenola utvrđen je u plodovima paradajza kultivara Big Beef F1, Amati F1 i Panekra F1. Plodovi kultivara Volovsko srce su u sebi sadržavali najmanju količinu ukupnih fenola i flavonoida, a i ukupna antioksidativna aktivnost u njima je bila najmanja. U ovom istraživanju visok sadržaj fenola i flavonoida u plodovima paradajza je korespondirao s visokim vrijednostima antioksidativne aktivnosti, dok su plodovi s niskim sadržajem ukupnih fenola i flavonoida imali i niske vrijednosti ukupne antioksidativne aktivnosti. Ovi rezultati nedvojbeno potvrđuju hipotezu da fenolne komponente imaju važnu ulogu u antioksidativnoj aktivnosti plodova paradajza.

**The antioxidant profile evaluation of eight selected tomato varieties
paradajza**

Mirza VALJEVAC, Amina ŠERBO, Almira AVDIĆ

Faculty of Agriculture and Food Sciences University of Sarajevo

Summary

Tomato (*Lycopersicon esculentum* Mill.) is one of the most frequently cultivated and versatile vegetables in the world. It is also considered as an excellent source of natural antioxidants such as phenolics and flavonoids. The purpose of this study was investigating the variations in the antioxidant activity and contents of the main antioxidants (total phenolics and flavonoids) in fruits from eight selected tomato varieties namely Pink Gusto F1, Fantom F1, Pink Rock F1, Optima F1, 'Volovsko srce', Amati F1, Panekra F1 i Big Beef F1. Total phenolic content was estimated by the Folin-Ciocalteu method, total flavonoids by the Aluminium chloride colorimetric assay, and the total antioxidant activity was measured by ferric reducing antioxidant power (FRAP) assay. Total phenolic content of tomato fruits varied from 20.36 to 51.61 mg 100 g⁻¹ fresh mass, and total flavonoid content ranged from 2.88 to 4.91 mg 100 g⁻¹ fresh mass. Antioxidant activities of tomato fruits ranged from 0.189 to 0.36 mmol Fe²⁺ 100 g fresh mass. The results revealed major differences between tomato varieties in terms of estimated parameters. The highest total phenolic content and antioxidant activities were present in fruits of Big Beef F1, Amati F1 and Panekra F1 varieties. Tomato variety 'Volovsko srce' had the lowest total phenolic and flavonoid content as well as antioxidant activities. High antioxidant activities corresponded to high phenolic and flavonoid content, while tomato fruits with low antioxidant activity exhibited low total phenolic and flavonoid content. In general, the results of this study support the hypothesis that phenolic compounds are important sources of antioxidant activity in tomato fruits.

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