

Naslov/Title:

4. Studentski Kongres „Hrana-Ishrana-Zdravlje“
4th Student Congress „Food-Nutrition-Health“

Glavni urednik/Editor in Chief

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Tehnički urednici/Technical Editors: Aleksandra Marjanović

Izdavač/Published by

Univerzitet u Sarajevu, Poljoprivredno-Prehrambeni Fakultet, Sarajevo, BiH
University of Sarajevo, Faculty of Agriculture and Food Sciences, Sarajevo, BiH

Za izdavača/For Publisher:

Muhamed Brka

Oblikovanje i prijelom/Design & DTP: Aleksandra Marjanović

Štampa/Printed by

Štamparija Fojnica d.d., Fojnica

Tiraž/Edition

200

4. Studentski Kongres „Hrana-Ishrana-Zdravlje“

KNJIGA SAŽETAKA

4th Students Congress „Food-Nutrition-Health“

BOOK OF ABSTRACTS

Sarajevo, 2019

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Univerzitet u Sarajevu, Poljoprivredno-prehrambeni fakultet, Sarajevo, BiH
Univerzitet u Sarajevu, Farmaceutski fakultet, Sarajevo, BiH
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20.-22. novembar 2019. godine, Sarajevo, Bosna i Hercegovina,

University of Sarajevo, Veterinary Faculty, Sarajevo, BiH
University of Sarajevo, Faculty of Agriculture and Food Sciences, Sarajevo, BiH
University of Sarajevo, Faculty of Pharmacy, Sarajevo, BiH
University of Sarajevo, Faculty of Educational Sciences, Sarajevo, BiH
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Organizovanjem Četvrtog studentskog kongresa „HRANA-ISHRANA-ZDRAVLJE“ sa međunarodnim učešćem, studenti i nastavnici fakulteta medicinske, biotehničke i humanističke grupacije, pokazuju svoju želju da održe kontinuitet ove multidisciplinarnе konferencije. Time je pokazana svijest naše akademske zajednice da nastavi da se bori sa najvećim izazovom 21. stoljeća, a to je rastuća nejednakost u pogledu ostvarivanja osnovnih ljudskih prava na adekvatnu prehranu i zdravlje. Multidisciplinarni karakter kongresa omogućava da se nađu adekvatni odgovori i rješenja na izazove u domenu hrane, ishrane i zdravlja.

Na 4. Kongres „HRANA-ISHRANA-ZDRAVLJE“ biće prezentirano 87 recenziranih radova u 5 tematskih cjelina: 1. Primarna proizvodnja i prerada hrane; 2.. Toksikologija i sigurnost hrane; 3. Ishrana tokom životnog ciklusa, 4. Dijetoterapija i 5. Savremena dijagnostika i analitika hrane. Ocjena i naučna verifikacija iznijetih tvrdnji i rezultata je prepuštena učesnicima Kongresa i široj naučnoj i stručnoj javnosti. Tekstovi rukopisa kratkih sadržaja nisu lektorisani.

U organizaciji i realizaciji 4. Kongresa uzeli su učešće studenti Poljoprivredno-prehrambenog, Farmaceutskog, Veterinarskog, Pedagoškog, Stomatološkog fakulteta sa klinikama, Fakulteta zdravstvenih studija i Medicinskog fakulteta Univerziteta u Sarajevu, čime su pokazali svoje opredjeljenje da usvajaju nova znanja i vještine i na najbolji način predstave svoje fakultete.

Ovom prilikom se zahvaljujemo i učesnicima svih odbora bez čijeg požrtvovanog rada ne bi bilo moguće realizovati ovaj sada već tradicionalni događaj. Ovaj studentski kongres postao je prepoznatljiv skup ne samo u našoj zemlji već i u regionu, tako da i ove godine aktivno učešće uzimaju profesori i studenti iz Slovenije, Hrvatske i Austrije.

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

Prof. dr Faruk Čaklović, predsjednik Koordinacionog odbora

FOREWORD

By organizing the fourth congress "FOOD-NUTRITION-HEALTH", with international participation, students and their teachers from faculties of medical, biotechnical and humanistic studies of the University of Sarajevo, show their willingness to maintain the continuity of this multidisciplinary conference.

This clearly shows the awareness and will of our academic community to keep on fighting with the greatest challenge of the 21st century, which is growing inequality in exercising fundamental human rights to have adequate nutrition and health.

The multidisciplinary character of the congress allows us to find proper answers and solutions to many issues in this field.

There will be 87 reviewed student works presented within five sections for the 4th Congress "FOOD-NUTRITION-HEALTH": 1. Primary production and processing of food; 2. Toxicology and food safety; 3. Nutrition through the life cycle, 4. Dietotherapy and 5. Modern food diagnostics and analysis. Evaluation and scientific verification of the statements and results are left to the participants of Congress and to a scientific and professional public. The English translations of the abstracts are not proofread.

Students of the Faculty of Agriculture and Food Sciences, Faculty of Pharmacy, Veterinary Faculty, Faculty of Educational Sciences, Faculty of Health Sciences, Faculty of Dentistry with Clinics and Faculty of Medicine from the University of Sarajevo took part in the organization and realization of the congress. This confirms the commitment of our students to acquire new knowledge and skills and also to represent their faculties in the best way. We take this opportunity to thank the Scientific, Organizing, Coordination and Technical Committee members for their hard work and efforts to organize this traditional event. The Congress has become widely recognized event not only in our county but also in the region. This year professors and students from Slovenia, Croatia and Austria will take part in this scientific event.

The realization of this Congress would not be possible without the help of the sponsors, to whom we are very grateful.

Prof. dr Faruk Čaklovića, Chairman of the Coordinating Committee

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Sudbina pesticida tokom procesa proizvodnje hrane

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Sažetak

Tokom zadnjeg stoljeća agrohemikalije su omogućile gotovo dvostruko uvećanje proizvodnje hrane, a trenutna potreba za povećanjem proizvodnje hrane kako bi se mogla obezbijediti dovoljna količina za rastuću populaciju ljudi, uslovljava intenzivnu upotrebu pesticida i fertilizatora. Sintetski pesticidi koriste se više od šest decenija i njihova upotreba je širom svijeta u stalnom porastu. U prošlosti, sintetisano je nekoliko različitih tipova pesticida koji su našli svoju primjenu, od organohlornih insekticida na početku do organofosfornih i danas rianodin pesticida. Iako su različite perzistentne organske hemiklajije zamijenjene više biorazgradivim spojevima, kontaminacija zaostalim ali i reziduama pesticida koji se danas koriste i dalje značajno utiče na kvalitet vode za piće, hrane i okoliš. Iz tog razloga budući izazovi u proizvodnji hrane odnose se na proizvodnju hrane boljeg kvaliteta, a sa manje toksičnih kontaminanata. Ovo podrazumijeva stalni razvoj naprednih praksi u cilju zaštite javnog zdravlja, pažljivu procjenu rizika i odobravanje za upotrebu, kao i educiranje poljoprivrednika u implementaciji dobrih praksi za održivi razvoj poljoprivrede, ribarstva i akvakulture. Fokus ove prezentacije će biti na UV stabilnost i (foto)degradaciju različitih pesticida (organofosfornih pesticida, kao i neonikotinoida i rianodin insekticida i njihovih metabolita) u različitim uzorcima hrane pod uticajem UV zračenja kao sredstva za konzervisanje hrane zajedno sa identifikacijom transformacionih ili degradacionih produkata i procjenom njihove toksičnosti.

Ključne riječi: *sudbina, pesticidi, proizvodnja hrane*

Plenary lecture

Fate of pesticides during the processes within the food-production chain

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Summary

Agrochemicals have enabled to more than duplicate food production during the last century, and the current need to increase food production to feed a rapid growing human population maintains pressure on the intensive use of pesticides and fertilizers. Synthetic pesticides have been used for more than six decades and their consumption increases constantly worldwide. In the past, several different types of pesticides were synthesised and put into application; from organochlorine insecticides at the beginning, to organophosphorus type and lately to ryanodine type of pesticides. Although various persistent organic chemicals have been replaced by more biodegradable chemicals, contamination by legacy residues and recent residues still impacts on the quality of human food, water, and environment. From that reason future challenges in food production have to go along with production of food with better quality and with less toxic contaminants. That means further development of advanced practices to protect public health, careful risk assessment and licensing, as well as education of farmers and users in implementation of good practices for sustainable development of agriculture, fisheries, and aquaculture. In this presentation the focus will be on UV stability and (photo)degradation of various pesticides (organophosphorus insecticides as well as neonicotinoid and ryanodine insecticides and their metabolites) in different food matrices under ultraviolet irradiation as a food preservation tool together with identification of transformation or degradation products and toxicity assessment.

Keywords: *fate, pesticides, food-production chain*

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

Eksperimentalna proizvodnja funkcionalnog soka od tikve i jabuke

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Sažetak

Posljednjih godina je u svijetu, pa i na bosanskohercegovačkom tržištu prisutan trend potražnje za funkcionalnom hranom, a tikva i jabuka s obzirom na bogatsvo nutritivnih i nenutritivnih komponenti koje sadrže mogu se svrstati u kategoriju istih. Stoga je cilj ovog rada bio analizirati senzorna svojstva proizvedenih sokova od tikve i jabuke radi kreiranja funkcionalnog pića. Sokovi su proizvedeni od tri vrste tikve hokkaido (*Cucurbitamaxima*), šećerka (*Cucurbita moschate*) i obična tikva (*Cucurbita pepo*) i jabuke sorte Idared različitim kupažama (40:60, 50:50, 60:40, 80:20) tikva-jabuka. Analiziranisu senzorni atributi proizvedenih kašastih sokova i to: boja, miris, okus i homogenost od strane 11 ocjenjivača. Utvrđen je uticaj vrste tikve i kupaže na boju, miris i homogenost, dok na senzornu ocjenu okusanije utvrđen uticaj istih. Najvećom prosječnom ocjenom za sve analizirane attribute ocijenjeni su sokovi proizvedeni od tikve šećerke. Imajući u vidu senzorne karakteristike te visoku koncentraciju dijetetskih vlakana, karotenoida i fenolnih komponenti sok proizveden od tikve šećerke u kupaži 40:60 šećerka- jabuka predlaže se kao funkcionalna hrana.

Ključne riječi: *funkcionalni sokovi, Cucurbita maxima, Cucurbita moschate, Cucurbita pepo*

1-O-1

Experimental production of functional squash and apple juice

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Abstract

In recent years, there has been a trend of demand for functional foods in the world, including in the BiH market; pumpkins and apples, given their rich nutritional and non-nutritive components, can be categorized as such. Therefore, the aim of this paper was to analyze the sensory properties of pumpkin and apple juices to create a functional drink. The juices are made from three types of pumpkin: hokkaido (*Cucurbita maxima*), crookneck (*Curcubita moschata*), and the common pumpkin (*Cucurbita pepo*), along with idared apples in different combinations (40:60, 50:50, 60:40, 80:20) of pumpkin-apple. The sensory attributes of the mushy juices produced were analyzed: color, odor, taste and homogeneity by 11 evaluators. The effect of the type of pumpkin and the blend on color, odor, and homogeneity was determined, while the sensory evaluation of the taste did not determine the effect of the pumpkin and blend. The highest average grade for all the attributes analyzed were juices made from the crookneck pumpkin. Considering the sensory characteristics and the high concentration of dietary fiber, carotenoids and phenolic components, the juice produced from the crookneck pumpkin in a 40:60 blend of crookneck-apple is suggested to be a functional food.

Keywords: *functional juice, Cucurbita maxima, Curcubita moschata, Cucurbita pepo*

Procjena ukupne proizvodnje ovčijeg mesa u Bosni i Hercegovini

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Sažetak

Uzimajući u obzir raspoloživost prirodnih resursa i broj poljoprivrednih proizvođača koji se bave stočarstvom, ova proizvodnja ima veliki značaj za poljoprivredu u BiH, a posebno u Federaciji BiH. Iako je 1996. godine uslijedilo oživljavanje ovčarstva u Federaciji BiH, obim ove proizvodnje još uvijek ne zadovoljava domaće potrebe, pa je i dalje značajan uvoz žive jagnjadi za klanje. Analiza sektora poljoprivrede podrazumijeva sagledavanje ukupne proizvodnje svih poljoprivrednih proizvoda. Kada je u pitanju animalna proizvodnja nailazi se na problem, jer se vodi evidencija o brojnom stanju stoke po kategorijama, broj, neto i bruto masi zaklane stoke u klaonicama, kao i randmanu, ali ne i o domaćoj proizvodnji mesa. Za bilo kakvu dalju analizu poljoprivredne proizvodnje potrebno je raspolagati ovim informacijama kako bi se mogla izračunati ukupna vrijednost proizvodnje sektora. Cilj rada je ukazati na problem nedostatka podataka bosanskohercegovačke statistike i ponuditi alternativu - prijedlog metode izračuna ukupne proizvodnje mesa u BiH. Predstavljena je kalkulacija proizvodnje ovčijeg mesa za period od 2010. do 2017. godine prema uputstvima EUROSTAT-a. Istraživanje je pokazalo da postoji značajna razlika između obima stvarne proizvodnje ovčijeg mesa i podataka o proizvodnji ovčijeg mesa kojima raspolažu institucije BiH.

Ključne riječi: *ovčije meso, domaća proizvodnja, statistika, kalkulacije*

1-O-2

Assessment of total mutton production in Bosnia and Herzegovina

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Abstract

Given the availability of natural resources and the number of livestock farmers, livestock production is of great importance for the agricultural sector in Bosnia and Herzegovina, and especially in the Federation of Bosnia and Herzegovina. Although the revival of sheep farming in the Federation of Bosnia and Herzegovina in 1996 followed, the volume of this production still does not meet domestic needs, so imports of live lambs for slaughter is still significant. The analysis of the agricultural sector implies an overview of the total production of all agricultural products. When it comes to animal production, there is a problem because records are kept on the number of livestock by category, the number, net and gross weight of slaughtered livestock in slaughterhouses, as well on the yield, but not on domestic meat production. Any further analysis of agricultural production requires the availability of this information in order to calculate the total value of the sector's production. This paper aims to point out the gaps in the statistics and offer an alternative - a proposal for a method of calculating total meat production in Bosnia and Herzegovina. The calculation of mutton production for the period from 2010 to 2017 is presented according to EUROSTAT guidelines. The study showed that there is a significant difference between the volume of actual mutton production and the data on mutton production available to BiH institutions.

Keywords: *mutton, domestic production, statistics, calculations*

Sterilizacija hrane zračenjem: prednosti i nedostaci

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Sažetak

Bolesti prenosive hranom u 21. stoljeću predstavljaju sve veći problem javnog zdravlja. One godišnje uzrokuju na hiljade smrtnih slučajeva, te milione slučajeva oboljenjapraćenih dijarejom i brojnim komplikacijama. Isto tako, ekonomski gubici koji nastaju kvarenjem i truljenjem hrane uslijed dejstva mikroorganizama su ogromni. Da bi se ovakva stanja prevenirala, može se upotrijebiti jonizirajuće zračenje u određenoj dozi, određenom vremenskom periodu te na određenim vrstama namirnica. Cilj ovog rada jeste da objektivno prikaže prednosti i nedostatke ovakve tehnologije proizvodnje hrane. Iako upotreba zračenja nije popularna, ono se zaista koristi u zemljama širom svijeta, a brojna istraživanja koja traju već četiri stoljeća ukazuju na njenu mikrobiološku, toksikološku te nutritivnu sigurnost. Razlog ograničene upotrebe ove tehnologije jeste nedovoljna edukacija stanovništva te skepticizam prema novim tehnologijama. Bitno je naglasiti da upotreba samo zračenja u procesu proizvodnje hrane neće riješiti sve probleme, ali bi njeno upotreba u kombinaciji s drugim metodama sanitacije u velikoj mjeri mogla doprinijeti poboljšanju sigurnosti hrane, smanjenju ekonomskih gubitaka te produženju roka trajanja namirnica. Nužno je poznavati cjelokupnu tehnologiju, te efekte koje radijacija ima na žive organizme, kako bi se ono iskoristilo na adekvatan i prihvatljiv način, bez posljedica koje bi se ispoljile na hranii ljudima koji rade u takvim postrojenjima, te bez posljedica na okoliš. Da bi se proširila upotreba zračenja u sterilizaciji hrane, neophodno je edukovati stanovništvo, dokazati sigurnost i pokazati sve prednosti, ali i ograničenja koje ono ima. Upravo to i jeste svrha ovog rada.

Ključne riječi: sterilizacijahrane, radijacija, javno zdravlje

1-O-3

Food irradiation: benefits and concerns

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Abstract

Food-borne diseases are becoming an emerging public health problem in the 21st century. They claim thousands of lives annually and cause millions of cases of diarrheal disease and complications. Also, economic losses caused by rotting and food spoilage due to microorganism actions, are enormous. In order to prevent this, we can use ionizing radiation at the exact dose, specific period and on certain types of foods. Aim of this paper is to objectively show benefits and concerns of this type of food technology. Although usage of irradiation is not very popular, it is still in use worldwide, and numerous studies that have been ongoing for four centuries have shown that irradiated food is microbiologically, toxicologically and nutritionally safe. Insufficient education of the population and their skepticism about new technologies is the main reason for limited usage of food irradiation. It is important to emphasize that using only irradiation will not solve all the problems, but if it is combined with other sanitation methods, we will be able to contribute to improvement of food safety, reduce economic losses and extend shelf-life of food. It is necessary to be familiar with the whole process and side effects that radiation has on living organisms so it can be used in an adequate and acceptable manner, with no consequences on the food, on people working in such facilities and no environmental repercussion. In order to expand usage of food irradiation, it is important to educate the population, to prove food safety and (to) show all the advantages and the limitations it has. That is exactly the purpose of this paper.

Keywords: food sterilization, radiation, public health

Uticaj prerade na sadržaj fenolnih spojeva u sokovima i nektarima od jabuke

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Sažetak

Postoji veliki broj sorti jabuka, od kojih je svaka selekcionira za određeni vid upotrebe ili prerade. Voćni sokovi i njima srodni proizvodi poput nektara predstavljaju neke od najznačajnijih prerađevina od jabuke kako na domaćem tako i na inostranom tržištu. Međutim, zbog samog načina proizvodnje fizičko-hemijske karakteristike nektara od jabuke se značajno razlikuju od soka. Zbog toga je vrlo važno ispitati sadržaj pojedinih komponenti poput fenola koji imaju veliki značaj u formiranju pojedinih senzornih atributa poput okusa, arome i boje. Stalno praćenje kvaliteta sirovine, proizvodnog procesa i gotovog proizvoda od presudnog su značaja kako bi se dobio proizvod ujednačenog hemijskog sastava i senzornih svojstava te siguran za potrošača. Stoga je cilj ovog rada utvrditi sadržaj ukupnih fenolnih komponenti u proizvedenom mutnom i bistrom soku, te nektarima od jabuke kako bi se utvrdilo variranje sadržanja fenola u zavisnosti od vrste bezalkoholnih pića, kao i utvrditi uticaj vrste bezalkoholnog pića na analizirane senzorne atribute. Utvrđeno je da postoje značajne razlike u sadržaju fenolnih komponenti između proizvedenih bezalkoholnih pića, dok pri ocjeni senzornih atributa razlike nisu bile statistički značajne.

Ključne riječi: *jabuka, sokovi, nektari, fenoli, senzorni atributi*

1-O-4

The effect of processing the content of phenolic compounds in juices and nectars made of apple

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Abstract

There are many sorts of apples and each of them is selected for certain use or processing. Fruit juices and similar products like nectars are one of the most important apple products in our and foreign markets. However, physico-chemical characteristics of apple nectars are significantly different than juices, because of the way of producing. It is really important to examine the content of some components like phenol, which is the big significance while forming some of sensory attributes like taste, aroma and color. The constant monitorings of quality of raw material, of process of production and of finished products are crucial to get the product that has uniform chemical composition and sensory properties and also to get a product that is safe for a consumer. The aim of this work is to determine the content of total phenolic components in produced clear and turbid juice and also in apple nectars to determine the total variation in phenol content, depending on non-alcoholic kind of drink on analysed sensory attributes. It is determined that there are significant differences in the content of phenolic components between produced non-alcoholic drinks, but while evaluating sensory attributes, differences aren't statistically significant.

Keywords: *apple, juices, nectar, phenols, sensors attributes*

Utjecaj boje ambalaže na odluku pri izboru u kupovini voćnih sokova

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Sažetak

Boja nastaje kao rezultat interpretacije moždanih vibracija koje se odvijaju oko nas. U marketingu ostvaruje prvu neverbalnu komunikaciju sa kupcima koji zbog brojnosti informacija koje mozak prima mali dio pamte na svjesnoj razini. Ostatak apsorbiranih informacija koje mogu nastati i efektom boje, mozak prima, procesira i skladišti na podsvjesnoj razini. Zahvaljujući tom potencijalu koji posjeduje čovjek, marketing stručnjaci boju koriste kao snažan alat za postizanje različitih ciljeva i ostvarenje superiornijih pozicija. Cilj rada je istražiti da li boja ambalaže utiče i kakav efekat ima pri donošenju odluke u kupovini voćnih sokova na području Bosne i Hercegovine. Dosadašnji broj istraživanja ovakvog tipa i na ovom području je prilično malen i nedovoljno istražen. Metodom anketiranja ispitano je 274 osobe različite starosne dobi i statusa. Rezultati pokazuju da većina ispitanika važnost boje kao faktora pri kupovini ocjenjuje sa brojem tri (neodlučan/na sam). Prema dobivenim rezultatima, utvrđeno je da odabir i preferencija boje ovisi o vrsti proizvoda koji se prodaje. Kada su u pitanju voćni sokovi i srodni proizvodi, zelena se pokazala najpogodnijom bojom za privlačenje pažnje kupca.

Ključne riječi: *boja ambalaže, marketing, voćni sok*

1-O-5

The influence of packaging color on the decision to make when purchasing fruit juices

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Abstract

Color is formed as a result of brain vibrations around us. The first non-verbal communication with customers is made in marketing. Customers' brain can consciously acquire only part of information because of abundance of information in general. The rest of information can be absorbed by the effect of color which brain accepts, processes and stores subconsciously. Thanks to this potential of a human being, marketing experts use color as a strong tool for achievement of various goals and superior positions. The aim of this project is to examine whether color of packaging and in what way it effects on customers while buying fruit juices in Bosnia and Herzegovina. Present number of researches of this type is quite small and poorly explored. 274 persons of different ages and statuses have been questioned by the survey method. Results show that most of the subjects rate the importance of color as a factor while buying a product with number 3 (indecisive). According to the results of the survey, it has been established that selection and preference of color depends on the product. When it comes to fruit juices and similar products, according to the results, green color is the best to attract attention of customers.

Key words: *color of packaging, marketing, fruit juice*

Utjecaj mesne industrije na globalno zagrijavanje

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Sažetak

Jedan od najvećih problema današnjice je globalno zagrijavanje, što je u prvom redu posljedica povećane emisije stakleničkih gasova. Sagorijevanje fosilnih goriva, efekt staklenika, pretjerano krčenje šuma, a također i mesna industrija predstavljaju faktore koji doprinose povećanju globalnog zagrijavanja. Sa rastom ljudske populacije rastu i potrebe za većom količinom hrane pa se u posljednjih sto godina stočni fond značajno povećao sa posljedičnim negativnim utjecajem na klimu, biodiverzitet i ekosistem. Životinje koje se uzgajaju radi mesa, naročito preživari, proizvode velike količine metana koji se emituje u atmosferu i sa svojim produktima sagorijevanja potpomaže degradaciji ozonskog omotača. Pored emisije metana i ostali faktori koji su usko vezani za mesnu industriju kao što su trošenje izvora hrane i vode za životinje, sječa šuma zbog stvaranja prostora za izgradnju farmi, te transport stoke i mesa dodatno pogoršavaju situaciju. Da bi se ovaj problem minimizirao potrebno je podizati svijest pojedinaca da je povećanje globalnog zagrijavanja multifaktorijalne prirode, te da se odgovarajućim načinom ishrane može značajno doprinijeti postizanju navedenog cilja.

Ključne riječi: globalno zagrijavanje, mesna industrija, metan, ugljen dioksid

1-O-6

Impact of Meat Production on Global Warming

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Abstract

One of the biggest problems today is global warming, which is primarily the result of increased greenhouse gas emissions. Fossil fuel combustion, the greenhouse effect, excessive deforestation and the meat industry are factors contributing to the increase in global warming. As human population grows, so does the need for more food, and over the last hundred years, the amount of livestock has increased significantly with the consequent negative impact on climate, biodiversity and the ecosystem itself. Animals raised for meat, especially ruminants, produce large amounts of methane, which is emitted into the atmosphere and therefore aids the degradation of the ozone. In addition to methane emissions, other factors that are closely related to the meat industry such as the consumption of food and water supplies for animal feed, logging for the creation of farms, and the transport of livestock and meat further aggravate the situation. In order to minimize this problem, it is necessary to raise the awareness of individuals that the increase in global warming is multifactorial in nature and that a proper diet can make a significant contribution to achieving the goal of slowing this process down.

Keywords: *global warming, meat industry, methane, carbon dioxide*

Učestalost fascioleze i dikrocelioze kod zaklanih ovaca

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Sažetak

Fascioleza i dikrocelioza su veoma često prisutna parazitska oboljenja kako širom svijeta, tako i u Bosni i Hercegovini. Obzirom da ova oboljenja ne ugrožavaju uvijek zdravlje ljudi na direktan način, pridaje im se vrlo malo pažnje, a količina podataka o utjecaju fascioleze i dikrocelioze u javnom zdravstvu je oskudna. Stoga, cilj ovog rada je ukazati na sve veću učestalost ovog problema u animalnoj proizvodnji kako bi se na osnovu toga poboljšala higijenska ispravnost hrane, a ekonomski gubici sveli na minimum. Procjenjuje se da su godišnji ekonomski gubici u svijetu, uzrokovani prisustvom ovih oboljenja, oko 3,2 milijarde američkih dolara. Najveći postotak infestacije ovim parazitima vezan je za ovce, sa najčešćim nalazom na jetri i plućima, a sporadično na srcu, slezeni i bubrezima. U Evropi je zabilježeno 11 slučajeva velikih infestacija ovim parazitima. Kada govorimo o Bosni i Hercegovini istraživanja provedena na području Sarajeva i Travnika daju nam pouzdane podatke o učestalosti ovih oboljenja. Na području sarajevskih klaonica infestacija *Fasciolom hepaticom* bila je 54,2%, a sa *Dicrocoelium dendriticum* ukupno 74,1%. Infestacija *Fasciolom hepaticom* travničke regije iznosila je 16,3%, a sa *Dicrocoelium dendriticum* 49,29%. Obzirom na veliki procenat učešća navedenih parazita, potrebno je što više raditi na prevenciji nastanka oboljenja kako bi se animalni produkti mogli iskoristiti na najbolji način.

Ključne riječi: *fascioleza, dikrocelioza, ovce, učestalost*

1-O-7

Consistency of fasciolosis and dicrocoeliosis inslaughtered sheeps

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Abstract

Fasciolosis and dicrocoeliosis are very common parasitic diseases that can be found around the world, including Bosnia and Herzegovina. Considering that these diseases do not often endanger human lives not much attention is given to them, in that manner causing the amount of data gathered on fasciolosis and dicrocoeliosis to be in short supply. Therefore, the purpose of this text is to point out the consistent rise of these diseases in animal based products with the final goal to improve food hygiene and to reduce economical losses. It has been estimated that 3,2 billion dollars are lost on a yearly basis around the world because of these diseases. Percentage wise, the parasitic infestations strike sheeps the most, usually found in their lungs or liver, but occasionally we can find the disease in their heart, spleen or kidneys. In Europe there was eleven big outbreaks of these diseases. Within Bosnia and Herzegovina research has been conducted in the areas of Sarajevo and Travnik and gave us valuable information on the diseases. The infection rate in Sarajevo slaughterhouses was measured at 54,4% for fasciolosis and 74,1% for dicrocoeliosis. On the other hand, the region of Travnik was measured with 16,3% for fasciolosis and 49,29% for dicrocoeliosis. Considering the high occurrence number of the named parasites, it is crucial to work on prevention in order to have the ability to use animal products in the safest and most productive way possible.

Key words: *fasciolosis, dicrocoeliosis, sheeps, consistency*

Proizvodnja funkcionalnih kolača u laboratorijskim uslovima

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Sažetak

Usljed povećanja broja oboljelih od kancerogenih i kardiovaskularnih oboljenja kao i oboljelih od dijabetesa, javlja se potreba za mijenjanjem prehrambenih navika te uvođenjem funkcionalne hrane kako na svjetsko tako i na bosanskohercegovačko tržište. Veliki broj oboljelih od dijabetesa jesu upravo djeca za koje je nezamislivo provesti dan bez slatkiša. Stoga je i cilj ovog rada bio proizvesti kolače od zobnih pahuljica sa različitim vrstama suhog voća (šljiva, kruška, smokva, grožđe, marelica, hurma i brusnica) koji bi bili supstituenti konvencionalnim proizvodima, proizvedenim uz dodatak konzumnog šećera, a koji se ne preporučuju oboljelima od dijabetesa. Eksperimentalni dio rada podjeljen je u četiri faze: proizvodnja funkcionalnih kolača, senzorna ocjena, statistička obrada podataka, te preporuka i prijedlog deklarisanja odabranih uzoraka. Napravljeno je pet uzoraka kolača sa različitim vrstama i udjelima suhog voća (50% šljive i 50% kruške, 50% smokve i 50% grožđa i tri uzorka sa 100% -nim udjelima marelice, hurme i brusnice), a zobne pahuljice, cimet i banana bili su konstantni sastojci. Uzorci su senzorno ocjenjeni (boja, izgled, miris, okus, aroma, konzistencija i ukupna prihvatljivost) ocjenama od 1-9 od strane priučeniha ocjenjivača. Na osnovu dobivenih rezultata utvrđeno je da ne postoji statistički značajna razlika u senzornim ocjenama kolača, ali je uzorak sa suhim brusnicama dobio najvišu ukupnu senzornu ocjenu te se zbog nutritivnih i nenutritivnih komponenti koje brusnica sadrži isti preporučuje kao funkcionalna hrana.

Ključne riječi: *funkcionalni kolači, zobne pahuljice, suho voće, senzorna analiza*

1-O-8

Production of functional cookies under laboratory conditions

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Summary

Due to the increase of patients suffering from cancer and cardiovascular diseases as well as those suffering from diabetes, there is a need to change their eating habits and introduce functional foods to the world as well as to the BiH market. A large number of diabetics are children for whom it is unthinkable to spend a day without sweets. Therefore, the aim of this work was to produce oatmeal cookies with different types of dried fruits (plums, pears, figs, grapes, apricots, dates and cranberries) which would be substituents for conventional products who are made with the consumable sugar and which are not recommended for diabetics. The experimental part of the work is divided into four stages: production of functional cakes, sensory evaluation, statistical data processing and recommendation and proposal of declaring selected samples. Five cake samples were made with different types and proportions of dried fruits (50% plum and 50% pear, 50% fig and 50% grapes and three samples with 100% apricot, hurma and cranberry), and oatmeal, cinnamon and bananas were a constant ingredient. Samples were sensorily evaluated (color, appearance, odor, taste, aroma, consistency, and overall acceptability) by 1-9 by trained evaluators. Based on the obtained results, it was determined that there was no statistically significant difference in sensory ratings of cakes, but the sample with dried cranberries received the highest total sensory grade and is therefore recommended as functional food due to the nutritional and non-nutritional components contained in cranberries.

Key words: *functional cookies, oat flakes, dried fruits, sensory analysis*

Najčešće patoanatomske promjene na organima i trupovima zaklanih životinja

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Sažetak

Klanje životinja u svrhu proizvodnje mesa regulisano je u svim zemljama propisima. U Bosni i Hercegovini je na snazi „Odluka o načinu obavljanja veterinarsko-zdravstvenog pregleda i kontrole životinja prije klanja i proizvoda životinjskog porijekla, (Službeni glasnik BiH, 82/06). Veterinarsko-zdravstveni nadzor u proizvodnji i prometu mesa, mesnih prerađevina i drugih namirnica animalnog porijekla ima višestruku svrhu: zaštitu zdravlja ljudi, sprečavanje širenja zaraznih i parazitarne bolesti životinja, zaštitu materijalnih dobara društva i zaštitu ekonomskih interesa potrošača. Za klanje životinje vrši se prijava uz odgovarajuću dokumentaciju o životinji. Pregledom se mora utvrditi:

- a) je li životinja obolila ili sumnjiva na zaraznu bolest koja se prenosi na ljude i životinje;
- b) ispoljava li životinja druge simptome bolesti ili poremećaj općeg stanja koji može meso učiniti higijenski neispravnim za javnu potrošnju;
- c) je li životinja primala tvari sa farmakološkim djelovanjem ili neke druge tvari koje mogu meso učiniti higijenski neispravnim za javnu potrošnju;
- d) je li životinja umorna, uznemirena ili ozlijeđena;
- e) kopitari se moraju ispitati na sakagiju metodom oftalmomaleinizacije, osim u slučaju prisilnog klanja. Način vršenja veterinarskog post-mortem pregleda trupova i organa zaklanih životinja kao i krvi propisan je u čl. 30 prethodno spomenute odluke. Izvođenje pregleda se vrši vizuelno (aspekcijski), pipanjem (palpacijom), zasijecanjem mesa, organa i limfnih čvorova (incizijom), a prema potrebi mikrobiološkim i drugim laboratorijskim pretragama. U toku pregleda mesa mogu se uočiti patoanatomske promjene na organima kao posljedica parazitarne invazije, upalni procesi na organima i mišićnom tkivu različite etiologije, razne tumorozne promjene i dr.

Ključne riječi: *inspekcijski pregled, patoanatomske promjene organa*

1-0-9

The most common pathoanatomical changes on the organs and carcasses of slaughtered animals

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Summary

The slaughter of animals for meat production is regulated in all countries. In Bosnia and Herzegovina, the following applies "Decision on the Method of Performing Veterinary Health Inspection and Control of Animals Before Slaughtering and Products of Animal Origin" (Official Gazette of BiH, 82/06). Veterinary and health control in the production and marketing of meat products and other foodstuffs of animal origin has a multiple purposes, protection of human health, preventing the spread of infectious and parasitic diseases of animals, material goods of society and economic interests of consumers. The slaughter of the animal is subject to the appropriate documentation on the animal. The review must establish:

- a) whether the animal is diseased of being a contagious disease transmitted to humans and animals;
- b) whether the animal exhibits other symptoms of the disease or a disorder of any general condition that may make the meat hygienically defective for public consumption;
- c) whether the animal received a pharmacologically active substance or other substance that may render the meat hygienically ineligible for public consumption;
- d) whether the animal is tired, disturbed or injured;
- e) equidae must be tested for saccagia by the ophthalmoleinisation method, except in the case of forced slaughter. The manner of performing veterinary post-mortem inspection of carcasses and organs of slaughtered animals as well as blood is prescribed in Art. 30 of the previously mentioned decision. The examination is performed visually (aspectually), by palpation, by the cutting of meat, organs and lymph nodes (incision), and if necessary by microbiological and other laboratory tests. During meat examination, pathoanatomical changes on organs can be observed as a result of parasitic invasions, inflammatory processes on organs and muscle tissue of different etiology, various tumor changes, etc.

Keywords: *inspection, pathoanatomical changes of organs*

Uticaj biostimulatora na kvalitet grožđa sorte *Muskat hamburg*

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Sažetak

Biostimulatori predstavljaju spojeve, čija je uloga stimulacija određenih fizioloških procesa u biljci čime se podiže nivo otpornosti na stres povećavajući prinos i kvalitet te bi se trebali smatrati neophodnima u biljnoj proizvodnji. Istraživanje je provedeno 2018. godine na sorti grožđa *Muskat hamburg*, a korišteni su biostimulatori Green code, Red block, First sun i Alikakoji predstavljaju tečne ekstrakte algi obogaćene dodatnim materijama koje proširuju spektar njihovog dejstva. Čokoti u ispitivanju su podijeljeni u varijante A, B i C u zavisnosti od kombinacije primjenjenih biostimulatora sa zaštitnim sredstvima u pojedinim fazama razvoja vinove loze, dok je varijanta K predstavljala kontrolu (samo zaštita bez stimulatora). Grožđe za analizu ubrano je u vrijeme tehnološke zrelosti, a ispitivani su: šećer, dužina i širina bobice, masa grozda te ukupni prinos. Rezultati mjerenja pokazali su da se najveći sadržaj šećera nalazio u varijanti C (23%), a najmanji u varijanti B (19,5%). Najveća prosječna masa bobica bila je u varijanti C (6,41 g), a najmanje u varijanti K (4,53 g). Najveća vrijednost visine i širine bobica bila je u varijanti A ($\uparrow 2,1$ cm, $\leftrightarrow 2,4$ cm), a najmanja u varijanti kontrola ($\uparrow 1,4$ cm, $\leftrightarrow 1,9$ cm). Najveća prosječna masa grozda ostvarena je u varijanti A (410 g), a najmanja u varijanti K (290 g), dok je najveći prinos bio u varijanti B (18,60 kg), a najmanji u K (14,80 kg/10 m²). Primjena biostimulatora u ovom istraživanju pokazala se opravdanom u svim ispitivanim parametrima što ukazuje da njihova upotreba može pozitivno utjecati na kvalitet grožđa.

Ključne riječi: biostimulatori, grožđe, kvalitet

1-P-1

**Influence of biostimulators on grape quality of the variety
*Muskathamburg***

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Abstract

A plant biostimulators represent compounds, whose role is to stimulate certain physiological processes in the plant through the increase of the level of stress resistance by influencing larger yield of higher quality and it should be considered as the necessity in plant production. The study was conducted in 2018, on the *Muskathamburg* grape variety, using biostimulators Green code, Red block, First sun, liquid algae extracts enriched with added substances which extend the spectrum of their action.

The test grafts were divided into variants A, B and C, depending on the combination of applied biostimulators with the plant protection agents at certain stages of the wine development. The variant K represented the control (protection without biostimulators applied). The grapes for analysis were harvested at the time of technological ripening and the following parameters were examined: sugar, berry length and width, mass of grapes and total yield. Measurement results showed that the highest sugar content was in variant C (23%), and the lowest in variant B (19.5%). The highest average weight of berries was in variant C (6.41 g), and the lowest in variant K (4.53 g). The highest values of the height and width of the berry were found in variant A (↑2.1 cm, ↔ 2.4 cm), and the smallest in the control variant (↓1.4 cm, ↔ 1.9 cm). The highest average mass of grapes was achieved in variant A (410 g), and the lowest in variant K (290 g), while the highest yield was in variant B (18, 60 kg), and lowest in K (14.80 kg/10 m²). The use of biostimulators in this study proved to be justified in the all tested parameters, indicating that their use can have a positive effect on the quality of the grapes.

Keywords: biostimulators, grapes, quality

Utjecaj temperature na kiselost mliječnih proizvoda

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Sažetak

Mlijeko i mliječni proizvodi pokrivaju širok spektar sirovina i proizvoda. Glavna svrha ispitivanja kiselosti mlijeka i mliječnih proizvoda je dokazivanje ispravnosti njihove kakvoće. Praćenjem kiselosti u toku čuvanja mliječnih proizvoda, utvrđeno je da je temperatura skladištenja vrlo važna. Čuvanje mliječnih proizvoda na višim temperaturama negativno utiče na kvalitet proizvoda, u smislu povećanja kiselosti. Ispitivanja provedena u ovom radu imala su za cilj procjenu utjeaja različitih temperatura držanja na kiselost mliječnih proizvoda. Ispitivanja su obavljena u laboratoriji Sarajevske mljekare "Milkos" d.d. Uzorci jogurta, pavlake, sira uzeti su u originalnim jedinicama za pakovanje, odmah nakon proizvodnje i pohranjeni na definisane temperature (5°C, 15°C i 23°C), a ispitivanja su vršena 3 puta u toku roka trajanja u zavisnosti od vrste proizvoda. Rezultati ispitivanja kiselosti pokazali su rast titracione kiselosti i pad pH vrijednosti na višim temperaturama držanja, kod svih ispitivanih proizvoda.

Ključne riječi: *kiselost, mliječni proizvodi, utjecaj temperature*

1-P-2

Effect of temperature on acidity of dairy products

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Summary

Milk and milk products cover a very wide range of raw materials and manufactured products. The main purpose of testing the acidity of milk and dairy products is to test their quality. It was determined that the storage temperature is very important factor in storage of dairy products. Keeping dairy products at higher temperatures has a negative effect on product quality, in terms of increasing acidity. The examinations carried out in this paper aimed to assess the effect of different temperatures on the acidity of dairy products. The tests were carried out in the laboratory of Sarajevo dairy "Milkos" d.d. Samples of yoghurt, sour cream and cheese were taken in the original packaging units immediately after production and stored at the defined temperatures (5°C, 15°C and 23°C), the tests were performed 3 times during the shelf life in dependence on the type of the product. The results showed an increase in titration acidity and a pH decrease at higher storage temperatures in all tested products.

Key words: *acidity, dairy products, effect of temperature*

2. TOKSIKOLOGIJA I SIGURNOST HRANE
FOOD SAFETY AND TOXICOLOGY

Efekat mikrovalova na vijabilnost *Salmonella enterica*Selma BEHMEN,^{1*} Belma RAŠČIĆ,¹ Anesa JERKOVIĆ – MUJKIĆ¹¹Univerzitet u Sarajevu, Prirodno – matematički fakultet, Odsjek za biologiju, BiH

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Sažetak

Mikrovalna pećnica je postala često korišten uređaj u modernoj svakodnevnicu. Mikrovalovi spadaju u nejonizirajuće zračenje koje zagrijava hranu koristeći princip dielektričnog grijanja. U usporedbi s običnom pećnicom, zagrijavanje hrane u mikrovalnoj pećnici zahtijeva mnogo manje vremena te stoga troši mnogo manje električne energije. Ona se koristi za razne vrste obrade hrane kao što je grijanje, kuhanje i odmrzavanje. Dodatno, mikrovalno zračenje se koristi za očuvanje hrane, jer uništavanje mikroorganizama mikrovalovima ima veliki potencijal u pasterizaciji hrane. Mikrovalovi stvaraju velike pore u bakterijskoj membrani, što bakterijskoj ćeliji uzrokuje gubitak vitalnih unutarćelijskih molekula sa mogućim letalnim ishodom. U ovom istraživanju kao testni organizam je korištena *Salmonella enterica*, i to njena dva serovara Enteritidis i Typhimurium koji se prenose sa životinja na ljude u većini dijelova svijeta, uključujući Europsku uniju. Ova bakterija je jedna od najčešćih patogena koji se prenosi neadekvatno obrađenom hranom, a glavni vektori transmisije su purani, pilići, svinje i krave. Cilj ove studije bio je utvrditi utjecaj mikrovalnog zračenja na preživljavanje ova dva klinički važna serovara *S. enterica*. Korištenjem Pearsonovog testa korelacije utvrđeno je da je broj vijabilnih kolonija opadao kako se povećavalo vrijeme tretiranja uzoraka mikrovalovima povećavalo. Primjenom parnog t-testa utvrđeno je signifikantno smanjenje broja vijabilnih bakterija u svim uzorcima tretiranim mikrovalovima u odnosu na kontrolu. Stoga, mikrovalna pećnica, ako se koristi prema preporuci proizvođača, može služiti kao efikasno sredstvo za redukciju broja ili eliminaciju bakterijskih patogena u hrani.

Ključne riječi: mikrovalna pećnica, mikrovalovi, Salmonella enterica, očuvanje hrane

2-O-1

The effect of microwaves on *Salmonella enterica* viability

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Abstract

Microwave oven has become a common device in modern kitchen. Microwaves are non ionizing radiation that heat food using the principle of dielectric heating. Compared to the ordinary oven, heating food in microwave requires much less time and therefore consumes much less electricity. Microwave oven is used for various kinds of food processing, e.g. heating, cooking and defrosting. Additionally, microwave radiation is used for food preservation since destruction of microorganisms with microwaves has a great potential in the pasteurization of foods. Microwaves create large pores in the bacterial membrane that cause leakage of vital intracellular molecules from the bacterial cells which may lead to their death. In this study the test organisms were *Salmonella enterica* serovars, *S. enterica* subsp. Enterica Enteritidis and Typhimurium respectively. These are the two most important serotypes of *S. enterica* transmitted from animals to humans in most parts of the world, including the European Union. Being able to survive in meats and animal products that are not thoroughly cooked, they are the primary vehicle of Salmonella transmission. The aim of this study was to determine the effect of microwave radiation on the viability of these two clinically important *S. enterica* serovars. Using the Pearson correlation test a dose-dependent decrease in the number of viable colonies has been observed. Paired t-test revealed significant reduction in the number of viable bacteria in all samples against the control. Therefore, the microwave oven, if used according to manufacturer's recommendation, can serve as an effective means of reducing the number or eliminating bacterial pathogens in food.

Keywords: *microwave oven, microwaves, Salmonella enterica, preservation of foods*

Određivanje prisustva amigdalina u odabranim uzorcima voćnih sokova

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Sažetak

Cijanogeni glikozidi su toksične supstance, koje se prirodno nalaze u biljkama. Hidrolizom ovih spojeva, spontano tokom prerade ili djelovanjem enzima glukozidaze prilikom konzumacije oslobađa se hidrogen cijanid, koji ima toksično djelovanje na ljude i životinje. Amigdalin je cijanogeni glikozid prisutan u različitim vrstama porodice *Rosaceae* i to najčešće roda *Prunus*, ali i drugih porodica: *Fabaceae*, *Leguminosae*, *Linaceae* i *Compositae*. U jestivim dijelovima biljaka iz ovih porodica mogu biti prisutne znatne količine amigdalina, te one mogu predstavljati potencijalne izvore cijanida za osobe koje ih konzumiraju. Zbog nedovoljnog broja kvantitativnih toksikoloških ili epidemioloških podataka teško je uspostaviti sigurne nivoe unosa za cijanogene glikozide putem hrane. Cilj ovog eksperimentalog rada bio je da se odredi sadržaj amigdalina u uzorcima voćnih sokova (sok od breskve i jabuke, dva multivitaminska soka sa deklariranim sadržajem breskve i kajsije i sok od jabuke) sa bh. tržišta. Sadržaj amigdalina u uzorcima je određen modifikovanom spektrofotometrijskom metodom, originalno namijenjenoj određivanju cijanida. Za kvantificiranje sadržaja amigdalina u ispitivanim uzorcima konstruisana je kalibraciona kriva ($R^2=0,973$) u rasponu 0,01-0,06 mg/l. Određeni su i limit detekcije (LoD) i limit kvantifikacije (LoQ) metode i iznosili su 0,011 mg/l i 0,035 mg/l, respektivno. Amigdalin je pronađen samo u uzorku broj 4 (voćni sok od jabuke) i to u koncentraciji od 0,006 mg/l, što je bilo ispod određenog limita detekcije metode. Dobiveni rezultati su donekle očekivani obzirom na ispitivane uzorke, a nađeni sadržaj je bio daleko ispod prosječnog sadržaja u sličnim uzorcima koji su prijavljeni u literaturi (0,001-0,007 mg/ml). Prosječni sadržaj amigdalina koji se unese konzumacijom jedne čaše ispitivanog pozitivnog uzorka (sok od jabuke) daleko je ispod privremenog maksimalnog tolerantnog dnevnog unosa za cijanogene heterozide (PMTDI=20 $\mu\text{g}/\text{kg}$ t.t./dnevno), pa se može zaključiti da nema mogućeg zdravstvenog rizika po konzumente.

Ključne riječi: *cijanogeni heterozidi, amigdalin, voćni sokovi*

2-O-2

Determination of amygdalin content in selected fruit juice samples

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Abstract

Cyanogenic glycosides are toxic substances that are naturally found in plants. Hydrogen cyanide which can cause toxic effects to humans and animals, is formed following the hydrolysis of these compounds, either spontaneously during processing or in the presence of enzyme glucosidase during the consumption. Amygdalin is a cyanogenic glycoside that can be found in different plants from the certain families, such as *Rosaceae*, especially genus *Prunus*, but also in *Fabaceae*, *Leguminosae*, *Linaceae* and *Compositae*. In edible parts of these plants great amount of amygdalin can be found, so they represent potential sources of cyanides for the consumers. Lack of quantitative toxicological and epidemiological data makes it difficult to establish safe levels of cyanogenic glycosides intake from food. The aim of this experimental work was to determine amygdalin content in fruit juice samples (peach and apple juice, two fruit multivitamin juices with declared peach and apricot content and apple fruit juice) from the B&H market. Four samples were analyzed: fruit The content of amygdalin in the samples was determined by a modified spectrophotometric method originally intended for the determination of cyanide. For the quantification of content of amygdalin in samples, calibration curve was prepared ($R^2=0,973$) by diluting standard solution of amygdalin, in the range 0,01-0,06 mg/l. The limit of detection (LoD) and limit of quantification (LoQ) were 0,011 mg/l and 0,035 mg/l, respectively. Amygdalin was detected only in the sample 4 (apple juice) in a concentration of 0.006 mg/L, and was below the limit of detection for method used. The results obtained are somewhat expected bearing in mind analyzed samples, and the content of amygdalin was lower than the content found in same samples previously reported in literature (0,001-0,007 mg/mL). The average content of amygdalin present in one glass of apple juice (sample 4) is far below provisional maximum tolerable daily intake for cyanogenic glycosides (PMTDI=20 μ g/kg b.w./d), so it can be concluded that it would be unlikely to pose health problems to consumers.

Keywords: *cyanogenic glycosides, amygdalin, fruit juices*

Mikrobiološka ispravnost „Bosanskog sudžuka” proizvedenog na zanatski i industrijski način

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Sažetak

Tradicionalni suhomesnati i kobasičarski proizvodi zauzimaju značajno mjesto u ishrani građana Bosne i Hercegovine. „Bosanski sudžuk” u tom smislu veoma je reprezentativan gastronomski specijalitet, koji je više stoljeća prepoznatljiv na našim trpezama. Zato se ovom proizvodu poklanja posebna pažnja na mikrobiološku ispravnost i kvalitet. Mikrobiološku ispravnost „Bosanskog sudžuka” pratili smo u uzorcima kobasica proizvedenim na industrijski i zanatski način u periodu 2017. i 2018. godine. Ispitivanja smo obavili u Zavodu za higijenski nadzor namirnica i zaštitu životne sredine na Veterinarskom fakultetu Univerziteta u Sarajevu. Uzorci „Bosanskog sudžuka” proizvedeni na zanatski i industrijskim način su uzimani u proizvodnim pogonima i dostavljani na mikrobiološku analizu u rashladnim uređajima. Mikrobiološka ispitivanja kao nezaobilazna analitička aktivnost su normativno regulisana i koja u analitičkom postupku obuhvataju slijedeće vrste i skupine mikroorganizama: Salmonela vrste, Sulfit reducirajuće klostridije, Enterobakterije, Koagolaza pozitivne stafilokoke i *L.monocytogenes* (Pravilnik o mikrobiološkim kriterijima za hranu, Sl. glasnik BiH br 11/13 i 79/16 i 64/18). Metode mikrobiološke pretrage uzoraka rađene su prema zahtjevima standarda BAS EN ISO/IEC 17025:2006. U grupi uzoraka „Bosanskog sudžuka” proizvedenih na zanatski način broj neispravnih se kretao od 3 (5,45%) u 2018., do 4 (6,66 %) u 2017. godini, ukupno 7 neispravnih uzoraka (6,08%), a u uzorcima proizvedenim na industrijski način, neispravni uzorci su utvrđeni samo u 1 slučaju (1%) u 2017. godini, ukupno neispravnih uzoraka 1 (0,52%). U neispravnim uzorcima utvrđene su Enterobakterije, a u jednom slučaju i *L.monocytogenes*.

Ključne riječi: „Bosanski sudžuk”, mikrobiološka ispravnost, sigurnost konzumenata

2-O-3

Microbiological quality of „Bosanski sudžuk” produced in traditional and industrial manner

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Abstract

Traditional sausages and smoked meat products play a significant role in the nutrition of citizens of Bosnia and Herzegovina. In that sense, “Bosanski sudžuk” is a very representative gastronomic specialty and has been a recognizable part of our cuisine for many centuries. Because of that, this product needs special attention when it comes to microbiological status and quality. Microbiological quality of “Bosanski sudžuk” was monitored in samples of sausages produced in industrial and traditional manner between 2017 and 2018. The analysis were conducted in Institute for Food Hygiene and Environmental Protection at Veterinary faculty of University of Sarajevo. Samples of “Bosanski sudžuk” manufactured in a traditional or industrial manner were taken from production facilities and delivered to the laboratories in refrigerators. Microbiological analysis, as an unavoidable analytical activity are normatively regulated. Analytical procedure include the following species and groups of microorganisms: species *Salmonella*, Sulfite reducing *Clostridia*, *Enterobacteriaceae*, Coagulase-positive Staphylococci and *L. monocytogenes* (Rulebook on microbiological criteria for food, “Sl. glasnik BiH br. 11/13 and 79/16 and 64/18” Microbiological examination of samples were conducted according to the requirements of the BAS EN ISO/IEC 17025:2016 standard. In the group of “Bosanski sudžuk” samples produced in the traditional manner, the number of defective samples ranged from 3 (5,45%) in 2018 to 4 (6,66%) in 2017. with a total of 7 defective samples. In samples manufactured in an industrial manner in 2017, only one sample (1%) was defective. In total 0,52% of industrially made samples were defective. In the defective samples, most commonly detected bacteria were from the *Enterobacteriaceae* species, and in one case *L. monocytogenes* was detected.

Keywords: “Bosanski sudžuk”, microbiological correctness, consumer safety

Evaluacija citogenotoksičnog potencijala tri različita parabena—značaj i efekti na ishranu i zdravlje

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Sažetak

Povećavanje raznolikosti prehrambenih proizvoda, želja za konzumiranjem sezonske hrane u svako godišnje doba, te povećanje kvalitete i roka trajanja prehrambenih proizvoda doveli su do obavezne upotrebe aditiva u hrani. Parabeni (PB), jedna od skupina aditiva u hrani, su alkilni esteri p-hidroksibenzojeve kiseline. Cilj ove studije bio je procijeniti citogenotoksične učinke tri različita parabena, metilparaben, etilparaben i butilparaben u kulturi humanih limfocita i biljnih ćelija (*Allium cepa*). Rezultati su pokazali da se mitotički indeks u *Allium* testu i humanim limfocitima smanjivao s povećanjem koncentracije (100 µg/ml, 250 µg/ml i 500 µg/ml). Nijedan od testiranih PBa nije pokazao inducirajuće djelovanje na rast korijena, naprotiv, postojala je stagnacija rasta pri većoj koncentraciji. Sve tri testirane koncentracije butilparabena pokazale su neznatno smanjenje dužine korijena. U *Allium* testu uočena je povećana učestalost hromosomskih aberacija (CA) u poređenju s kontrolama. Etilparaben povećava učestalost apoptoze (500 µg/ml), dok metilparaben povećava učestalost nekroze (100; 500 µg/ml). U ljudskim limfocitima razlike između PBa i kontrole primjećene su za acentrični fragment (250 µg/ml metilparaben), hromatidni prekid (100 µg/ml etilparaben), aneuploidiju (100 µg/ml etilparabena) i poliploidiju (100 µg/ml metilparaben i 250 µg/ml butilparaben). Pojačana učestalost apoptoze izazvana je metil- i etilparabenom (250; 500 µg/ml za oba PB-a). Naši rezultati pokazali su da PBi imaju citogenotoksični potencijal u oba modela i da dugotrajna i intenzivna upotreba ispitivane supstance može predstavljati rizik za ljude.

Ključne riječi: *aditivi u hrani, parabeni, citogenotoksični potencijal, Allium test, kultura humanih limfocita*

Evaluation of cytogenotoxic potential of three different parabens - importance and effect on nutrition and health

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Summary

The increase in the variety of food products, the desire to consume seasonal foods in every season, and the increasing of quality and the shelf life of food products have made it obligatory to use food additives. Parabens (PBs), one of the food additives group, are alkyl esters of p-hydroxybenzoic acid. The objective of this study was to evaluate cytogenotoxic effects of the three different parabens, methylparaben, ethylparaben and butylparaben in human lymphocyte culture and plant cells (*Allium cepa*). Results showed that mitotic index in *Allium* test and human lymphocytes decreased with increasing concentration (100 µg/ml, 250 µg/ml and 500 µg/ml). None of the tested PBs showed inducing effect on root growth, on the contrary, there was stagnation in growth at higher concentration. All three tested concentration of buthylparaben showed slight decrease in length of the root. Increased frequency of chromosome aberrations (CA) in comparison with controls was observed in *Allium* test. Ethylparaben increased frequency of apoptosis (500 µg/ml), while methylparaben increased frequency of necrosis (100; 500 µg/ml). In human lymphocytes differences between PBs and control was observed for accentric fragment (250 µg/ml methylparaben), chromatid break (100 µg/ml ethylparaben), aneuploidy (100 µg/ml ethylparaben) and polyploidy (100 µg/ml methylparaben, and 250 µg/ml butylparaben). Increased frequency of apoptosis was induced by methyl- and ethylparaben (250; 500 µg/ml for both PBs). Our results demonstrated that PBs have cytogenotoxic potential in both model and that the long-term and intensive use of the tested substance may pose a risk to humans.

Keywords: *Food additives, parabens, cytogenotoxic potencial, Allium cepa assay, human lymphocyte culture*

Efekti hronične upotrebe energetske pića na zdravlje

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Sažetak

Konsumacija energetske pića može predstavljati ozbiljan rizik po zdravlje ljudi, a naročito na zdravlje mladih ljudi koji po istraživanjima najviše i konzumiraju iste. S obzirom da energetska pića sadrže u velikim koncentracijama kofein, cilj ovoga rada je prvenstveno ispitati i prikazati na osnovu pregleda relevantne literature koji su to najčešći neželjeni efekti na zdravlje povezani sa konzumacijom visokih koncentracija kofeina.

Pregledom relevantne literature na internetu može se uočiti da prilikom konzumacije energetske pića dolazi do ubrzanja srčanog ritma i porasta krvnog pritiska odnosno da su najčešći neželjeni efekti povezani s učincima na kardiovaskularni sistem. Kod osoba koje hronično konzumiraju energetska pića primjećena su stanja koja su karakterisana: endotelnom disfunkcijom, stimulacijom trombocita, te pojavom infarkta miokarda kod adolescenata. Pored djelovanja na kardiovaskularni sistem uočeni su neželjeni efekti koji se odnose na funkciju bubrega pri čemu može doći do njihovog oštećenja, te su primjećene posljedice na nervni sistem koje se ogledaju kroz uticaj na procese učenja i stvaranje dugog pamćenja.

Na osnovu prethodno nevedenog može se zaključiti da energetska pića predstavljaju potencijalni rizik po zdravlje mladih ljudi. Edukacijom roditelja može se utjecati na to se smanji stopa konzumacije energetske pića kod adolescenata, te da se kroz istraživanja uočavaju prijedlozi da se prodaja energetske pića zabrani osobama mlađim od 16. godina.

Ključne riječi: kofein, kardiovaskularni sistem, energetska pića

2-O-5

Chronic consumption of energy drinks and its effects on health

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Abstract

Consumption of energy drinks may represent a serious health risk, which is highest in adolescents because they are main consumers of energy drinks. Considering that energy drinks contain high amounts of caffeine, the goal of this paper is to review relevant literature and to present potentially harmful effects of high caffeine intake.

Reviewing relevant literature on internet reveals that consumption of energy drinks leads to increased heart rate and increased blood pressure. Negative effects of energy drinks are mostly tied to cardiovascular system. Chronic consumption of energy drinks leads to: endothelial dysfunction, platelet stimulation and myocardial infarction especially in adolescents. Besides negative effects on cardiovascular system, there is also proof of kidney dysfunction and nervous system dysfunction like decreased cognition and impairment of long-term memory.

By reviewing literature, we can conclude that energy drinks pose a potential health risk especially for younger people. Consumption rate can be lowered by educating parents and implementing the under-16 ban.

Keywords: *caffeine, cardiovascular system, energy drinks*

Pregled sastava i učestalosti upotrebe dijetetskih suplemenata u sportu na tržištu u Sarajevu

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Sažetak

Upotreba dijetetskih suplemenata prisutna je u mnogim sportovima, kako među vrhunskim sportistima tako i među rekreativcima, ali u današnje vrijeme i kao zamjena pojedinih obroka, naročito među mladim ljudima. Povećana potrošnja dijetetskih suplemenata proizilazi iz vjerovanja da suplementi mogu unaprijediti sportske sposobnosti. U EU, za samo nekoliko aktivnih sastojaka dijetetskih suplemenata za sportiste, kao što su proteini, kreatin, vitamini i minerali postoje odobrene zdravstvene tvrdnje evaluirane od strane EFSA (European Food Safety Authority). Osnovni cilj rada je da se kvantitativno i kvalitativno analizira upotreba dijetetskih suplemenata među rekreativnim sportistima u našem okruženju. Pregledom suplemenata dostupnih na tržištu u Sarajevu, nisu pronađeni nikakvi zabranjeni sastojci. U radu se detaljnije analizirane karakteristike čestih sastojaka u ovim proizvodima (umjetnih zaslađivača – sukraloze i aspartama, te kreatina), kao i na njihova neželjena dejstva i efekat na zdravlje, ali i na sve popularniji ekstrakt biljke *Tribulus terrestris*. Sprovedbom i evaluacijom ankete, koju su ispunile 72 osobe (36 muškaraca i 36 žena), dobi od 18 do 26 godina, zaključeno je da je upotreba suplemenata u sportu opće prisutna, te da osobe koje ih upotrebljavaju najčešće to rade samoinicijativno i bez ljekarskog nadzora jer smatraju da će na taj način lakše postići željene rezultate.

Ključne riječi: *dijetetski suplementi, sukraloza, aspartam, kreatin, Tribulus terrestris*

2-O-6

An overview of the composition and frequency of use of dietary supplements in sports found in the Sarajevo market

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Abstract

The use of dietary supplements is present in many sports, both in professional athletes and in recreational athletes, but nowadays it is also a substitute for certain meals, especially among young people. Increased consumption of dietary supplements stems from the belief that supplements can enhance the athletic ability. In the EU, only a few active ingredients of dietary supplements for athletes, such as proteins, creatine, vitamins and minerals, have been approved by EFSA (European Food Safety Authority). The main goal of the paper is to quantitatively and qualitatively analyze the use of dietary supplements among recreational athletes in our environment. The examined supplements available on the Sarajevo market did not contain any prohibited ingredients. The paper deals with the characteristics of common ingredients in these products (artificial sweeteners - sucralose, aspartame and creatine), as well as their side effects and health effects, as well as the increasingly popular extract of *Tribulusterrestris*. The characteristics of common ingredients in these products (artificial sweeteners - sucralose, aspartame and creatine), as well as their side effects and effects on health, as well as the popular extract of *Tribulusterrestris*, are discussed in this paper. By implementing and evaluating a survey completed by 72 people (36 men and 36 women) it has been concluded that supplements are widely used in sports, and that people who use them are most likely to do it on their own initiative and without medical supervision, as they believe that this will make it easier achieve the desired results.

Keywords: *dietary supplements, sucralose, aspartame, creatine, Tribulusterrestris*

Fish-borne“ parazitske zoonoze – rizik za javno zdravstvoAmina JAŽIĆ^{1*}¹Univerzitet u Sarajevu, Veterinarski fakultet

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Sažetak

Riba kao namirnica je izvor esencijalnih amino i masnih kiselina. Zbog male energetske vrijednosti pripada dijetalnim namirnicama, te kao takva ima posebno mjesto u ishrani ljudi. Meso ribe sa svim svojim kvalitetima potencijalno nosi i veliki rizik, a to su „fish-borne“ bolesti, odnosno parazitske zoonotične bolesti koje se prenose konzumacijom sirovog i nedovoljno termički obrađenog mesa ribe. Najčešća oboljenja ljudi koja su izazvana parazitima su anizakijaza, opistorhijaza, difilobotrioza i gnatostomijaza. Navedena oboljenja mogu izazvati blage i umjerene simptome kod ljudi, ali i smrtni ishod. Iako je najbolja mjera prevencije ovih bolesti nekonzumiranje jela od sirove ribe, FDA je izdala smjernice za termičku obradu mesa ribe koja će se koristiti za pripremanje takvih jela. Obzirom na sve veći trend konzumacije mesa sirove ribe i sve veći broj restorana u našoj državi koji na meniju imaju jela od sirove ribe, cilj ovog rada je ukazati na važnost educiranja i upozorovanja konzumenata i subjekata u poslovanju sa hranom o svim potencijalnim rizicima za zdravlje ljudi koje ovako pripremljena hrana posjeduje.

Ključne riječi: *paraziti, ribe, zoonoza*

2-O-7

„Fish-borne“ parasite zoonosis – risk for public health

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Abstract

Fish as food is a source of essential amino and fatty acids. Due to its low energy value, it belongs to diet foods and as such has a special place in human nutrition. Fish meat despite all its qualities carry potential risks to human health, those are “fish-borne“ diseases or parasitic zoonotic diseases which are transmitted by the consumption of raw and undercooked fish meat. The most common diseases of humans which are parasite caused are anisakiasis, opistorchiasis, diphyllbothriasis and gnathostomiasis. These diseases can cause mild and moderate symptoms in humans as well as death. Although the best preventive measures are to not consume raw fish meat, the FDA has announced guidelines for treatment of fish meat that will be used to prepare raw-fish meals. Because of the increasing trend of raw meat consumption and the increasing number of restaurants in our country that have raw fish meals on the menu, the main aim of this paper is to emphasize importance of education of consumers as well as food business operators about all potential risks to human health that food prepared this way carries.

Keywords: *parasites, fish, zoonosis*

Salmonella u pilećem mesu, problem javnog zdravstva

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Sažetak

Trovanja salmonelama su i danas veoma česta, uprkos značajnim tehnološkim i higijenskim ostvarenjima u primarnoj proizvodnji, preradi i prometu mesa i drugih namirnica. Upravo iz tih razloga neophodno je istrajavati na primjeni odgovarajućih sistema kontrole među kojima HACCP ima poseban značaj. Salmonеле mogu dospjeti u meso intravitam, ako je zbog slabljenja općeg zdravstvenog stanja peradi u tovu (akutni upalni procesi crijeva, drugih organa i sistema, stresa i dr) došlo do njihovog ubrzanog razmnožavanja u crijevima i prodora u limfu i krv. Pileće meso može biti kontaminirano u samoj klaonici prilikom klanja, šurenja i primarne obrade, u toku prerade, pakovanja i transporta. Učestalost pojave salmonela u pilećem mesu srazmjerno je velika, i pojava ovog patogena u mesu nije vezana za nizak životni standard, nego naprotiv za visok i za masovno razvijenu industrijsku proizvodnju hrane. S toga ovaj rad ima za cilj analizu pojave salmoneloze kako u svijetu tako i u regionu, te predstavljanje načina na kojima se zasniva borba protiv ove bolesti. Rezultati analiza pokazuju da je najveći broj pozitivnih uzoraka na salmonelu utvrđen u mljevenom pilećem mesu, batcima i pilećim mješavinama za supu. Trovanja ljudi nastaju prilikom konzumacije zaraženog pilećeg mesa. Centar za kontrolu i prevenciju bolesti (CDC) procjenjuje da salmonela uzrokuje oko 1,2 miliona bolesti, 23.000 hospitalizacija i 450 smrtnih slučajeva svake godine u SAD-u. Prema podacima Hrvatskog zavoda za javno zdravstvo (HZJZ), u Republici Hrvatskoj svake godine oboli 2000-4000 osoba, sporadično ili u epidemijском obliku. Zavod za javno zdravstvo Federacije BiH (ZZJZFBiH) navodi da je u 2018. godini bilo registrovano 179 slučajeva salmoneloze sa morbiditetom 8,23/100,000. Povećanje mjera kontrole u primarnoj proizvodnji i preradi pilećeg mesa, doprinosi smanjenju trovanja salmonelom, i rješavanju ključnih problema u javnom zdravstvu.

Ključne riječi: *Salmonella*, pileće meso, javno zdravstvo

Salmonella in chicken meat, an issue of public health

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Abstract

Salmonella poisoning is the most frequent alimentary intoxication. The most common source of a salmonella infection comes from poultry. Contamination can occur in many different ways, and that is the reason why it's necessary to increase the biosecurity measures when controlling this disease. Poultry can be contaminated within the butchery, during the slaughter, or during transport. Processing the meat, and packaging the finished products may also be a potential source of contamination. The frequency of salmonella in poultry is proportionally large, and the occurrence of these bacteria in meat isn't connected to a low standard of living, but to a higher one, even for the massively developed food production industry. Therefore, the aim of this paper is to analyze the occurrence of salmonellosis in the world as well as in the region, and to present the ways in which the fight against this disease is based. Results of analysis showed that, regarding the type of poultry, the most positive samples of salmonella come from milled chicken meat. Salmonella is often isolated from poultry drumsticks and chicken soup mixture. Human poisoning occurs by consumption of infected poultry. The Center for Disease Control and Prevention (CDC) estimates that salmonella causes around 1.2 million diseases, 23.000 hospitalizations, and 450 deaths every year in the USA. According to the data from the Croatian Institute for Public Health (HZJZ), in the Republic of Croatia 2000-4000 people get sick every year, either sporadically or in epidemic form. The Institute for Public Health of the Federation of Bosnia and Herzegovina (ZZJZFBiH) states that there were 179 cases of salmonellosis registered in 2018 with a morbidity rate of 8,23/100,000. Increasing control measures in the primary production and processing of chicken meat contributes to the reduction of Salmonella poisoning, and to the resolution of key issues in public health.

Keywords: Salmonella, poultry, public health

Mikrobiološka ispravnost dimljenog sira u tipu „Zarica“

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Sažetak

Proizvodnja sira je složen i dugotrajan proces sastavljen od niza postupaka s ciljem dobijanja finalnog proizvoda specifičnih organoleptičkih, fizikalno-hemijskih i mikrobioloških svojstava. U toku proizvodnje sir može biti kontaminiran hemijskim i mikrobiološkim kontaminantima. Mikrobiološka ispravnost sira predstavlja značajan javno-zdravstveni interes, te su kriteriji mikrobiološke ispravnosti mlijeka kao sirovine veoma visoki (Uredba Komisije (EZ) br. 2073/2005 o mikrobiološkim kriterijima za hranu). Ispunjavanje ovih mikrobioloških kriterija zavisi od više faktora: sirovine koja se koristi u proizvodnji sira, dakle o mlijeku i načinima dobivanja i manipulaciji s mlijekom, provođenju dobre higijenske prakse, tehnološkom procesu proizvodnje (proizvodnom pogonu), o uslovima čuvanja finalnih proizvoda na mjestu proizvodnje, ali i domaćinstvu potrošača. Mikrobiološka ispitivanja dimljenog sira u tipu „Zarica“, proizvedenog u domaćim kapacitetima Bosne i Hercegovine obavili smo u periodu 2018. godine na Zavodu za higijenski nadzor namirnica i zaštitu životne sredine Veterinarskog fakulteta Univerziteta u Sarajevu. Mikrobiološkim ispitivanjima obuhvatili smo sve relevantne mikroorganizme koje propisuje Pravilnik o mikrobiološkim kriterijima za hranu (Sl.glasnik BiH br 11/13, 79/16 i 64/18), a metode mikrobiološke pretrage rađene su prema zahtjevima standarda BAS EN ISO/IEC 17025:2006. U toku 2018. godine ukupno je ispitano na mikrobiološku ispravnost 125 uzoraka dimljenog sira „Zarica“. Na tržište su bili plasirani u vakuum PVC ambalazi i u klasičnom PVC pakovanju. Broj neispravnih uzoraka kretao se od 1,1% (vakuum pakovanje) do 1,9% (klasična pakovanja u PVC ambalazi). U pozitivnim uzorcima utvrđeno je prisustvo *E.coli* i kvasaca u većem broju od dozvoljenog.

Ključne riječi: *dimljeni sir „Zarica“, mikrobiološka ispravnost, sigurnost konzumenata*

2-O-9

Microbiological safety of the "Zarica" typesmoked cheese

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Abstract

Cheese production is a complex and time-consuming process consisting of a series of processes aimed at obtaining the final product of specific organoleptic, physicochemical and microbiological properties. During production, cheese can be contaminated with chemical and microbial contaminants. The microbiological safety of cheese is a significant public health concern and therefore the criteria for microbiological safety of milk as a raw material are very high (Commission Regulation (EC) No 2073/2005 on microbiological criteria for food). The fulfillment of these microbiological criteria depends on several factors: the raw material used in cheese production, i.e. on milk and methods of milk production and handling, good hygiene practice, technological production process (production facility), on the conditions of storage of final products at the place of production, but also to the household of consumers. Microbiological testing of smoked cheese in the "Zarica" type, inspected in the domestic capacities of Bosnia and Herzegovina, was carried out in 2018 at the Institute for Food Hygiene and Environmental Protection at the Veterinary Faculty, University of Sarajevo. Microbiological testing included all relevant microorganisms prescribed by the Rulebook on Microbiological Criteria for Food (Official Gazette of BiH No. 11/13 and 79/16 I 64/18), and methods of microbiological testing were performed according to the requirements of BAS EN ISO / IEC 17025: 2006. During 2018, a total of 125 samples of "Zarica" smoked cheese were tested for microbiological accuracy. They were marketed in vacuum PVC packaging and in classic PVC packaging. The number of defective samples ranged from 1.1 %(vacuum packaging) to 1.9% (classic PVC packaging). The positive (defective) samples showed the presence of E. coli and yeast in quantity exceeding allowed.

Keywords: smoked "Zarica" cheese, microbiological safety, consumer safety

Analiza citotoksičnosti biljnih ekstrakata – značaj primjene u oblasti sigurnosti hrane

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Sažetak

Rasprostranjenost konzumiranja ljekovitog bilja datira još od vremena drevnih civilizacija, no i u današnjici se vrlo malo zna o aktivnim spojevima i toksičnim tvarima biljaka. Često je potrebno procijeniti sigurnost tradicionalno korištenog ljekovitog bilja u *in vitro* studijama citotoksičnosti kako bi se predvidjela moguća toksična djelovanja na ljude. Analiza opravdanosti korištenja i endemskih biljaka u tradicionalnoj medicini moguća je primjenom testova citotoksičnosti, a u cilju racionalizacije i smanjenja prekomjerne eksploatacije. U tu svrhu testirani su efekti ekstrakata endemskih vrsta *Thymus bracteosus* Vis ex Bentham i *Acinos orontius* (K. Maly) Šilić primjenom MTT testa. Evaluacija citotoksičnih učinaka različitih koncentracija vodenih i DMSO ekstrakata vršena je procjenom vijabilnosti mononuklearnih ćelija periferne krvi nakon 48-satnog tretmana. Statističkom analizom rezultata utvrđeno je značajno povećanje ćelijske vijabilnosti u odnosu na kontrolu ($p < 0.001$). Naime, inhibitorni učinak nije uočen pri primjenjenim koncentracijama (0.01-0.2 mg/ml), već doza-ovisno povećanje vijabilnosti. Komparativnom analizom ustanovljeno je da ekstrakti *T. bracteosus* imaju znatno veće povećavanje vijabilnosti ćelija nego ekstrakti *A. orontius*, dok se pokazalo da je voda bolji i pouzdaniji rastvarač za obje biljne vrste. Buduće studije bi svakako trebale istražiti djelovanja ispitivanih ekstrakata na ćelijski ciklus normalnih, ali i kanceroznih ćelija. Obzirom na endemičnost ovih vrsta potrebno je poduzeti mjere edukacije korisnika prirodnih preparata u smislu da izbjegavaju neosnovano branje i upotrebu endemskih vrsta naspram onih široko dostupnih sa istim ili sličnim efektima.

Ključne riječi: *biljni ekstrakti, Thymus bracteosus, Acinos orontius, citotoksičnosti, MTT test*

2-O-10

Cytotoxicity analysis of plant extracts - importance of application in the field of food safety

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Abstract

The prevalence of consuming medicinal herbs dates back to the time of ancient civilizations, but even today very little is known about active compounds and toxic substances in plants. It is often necessary to assess the safety of traditionally used herbs with *in vitro* cytotoxicity studies to predict possible toxic effects on humans. Justification analysis for usage of endemic plants in traditional medicine is possible through application of cytotoxicity tests, with the aim of rationalizing and reducing their over-exploitation. Therefore, the extracts effects of the endemic species *Thymus bracteosus* Vis ex Bentham and *Acinos oronitus* (K. Maly) Šilić were tested using the MTT assay. The cytotoxic effects of aqueous and DMSO extracts within different concentrations were evaluated by assessment of peripheral blood mononuclear cells viability after 48 hours treatment. Statistical analysis of results revealed a significant increase in cell viability compared to control ($p < 0.001$). Moreover, the inhibitory effect was not observed at applied concentrations (0.01-0.2 mg/ml), but rather a dose-dependent increase in viability. Comparative analysis showed that *T. bracteosus* extracts had a significantly higher increase in cell viability than *A. orontius* extracts, whereas water was shown to be better and more reliable solvent for both plant species. Future studies should certainly investigate the effects of tested extracts on cell cycle of normal as well as cancerous cells. Given the endemism of these species, it is necessary to take measures for educating users of herbal preparations in the sense to avoid unreasonable picking and usage of endemic species against those widely available with the same or similar effects.

Key words: *plant extracts, Thymus bracteosus, Acinos orontius, cytotoxicity, MTT assay*

Značaj edukacije zaposlenika u implementaciji HACCP sistema

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Sažetak

Za uspostavljanje funkcionalnog sistema sigurnosti hrane (HACCP) pored materijalnih resursa, važna je praktična osposobljenost i motivisanosti kako upravljačkih struktura, tako i zaposlenika koji manipulišu hranom. Loša radna praksa zaposlenika, te odstupanje od uputstava za rad povećavaju mogućnost kontaminacije hrane. Pregledom dostupne naučne literature prikazati značaj edukacije zaposlenika na svim nivoima složenosti rada u cilju uspješne implementacije i održavanja HACCP sistema. Istraživanje je sprovedeno pregledom naučnih članaka objavljenim u relevantnim bazama podataka (Google Scholar, PubMed) i on-line časopisima u periodu 2005-2018. godine, upotrebom ključnih riječi: „HACCP“, „zaposlenici“, „edukacija“. Studije su pokazale da je edukacija kompleksan proces uzimajući u obzir različite profile kao i nivo formalnog obrazovanja zaposlenika. Metode obuke i načini edukacije iz oblasti sigurnosti hrane moraju biti prilagođene svakom pojedincu. Jasna vizija i prepoznavanje benefita implementacije HACCP sistema od strane rukovodstva predstavlja inicijalni korak koji služi kao primjer ostalim zaposlenicima za sigurno poslovanje s hranom. Funkcionalnost HACCP sistema leži u praktičnoj osposobljenosti HACCP tima, kao i ostalih zaposlenika. Analizirana istraživanja pokazuju da je kod subjekta u poslovanju s hranom sanitarno-higijenski status značajno bolji nakon implementacije HACCP sistema, pozivajući se na kontinuiranu izobrazbu u oblasti dobre higijenske prakse. Kreiranje odgovornog tima zaposlenika i uspješnost implementacije funkcionalnog HACCP sistema rezultat je planiranog, temeljitog, dokumentovanog i kontinuiranog programa edukacije iz oblasti sigurnosti hrane.

Ključne riječi: *HACCP, edukacija, zaposlenici*

2-O-11

Importance of employee education in implementation of the HACCP system

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Abstract

In order to establish a functional food safety system (HACCP) in addition to material resources, the practical competence and motivation of both management structures and employees manipulating food is important. Bad employee work practices and deviations from work instructions increase the possibility of food contamination. Reviewing the available scientific literature from relevant databases to show importance of employees education at all levels of complexity of work with a aim of successful implementation and maintenance of the HACCP system. Research was conducted by reviewing scientific articles published in relevant databases (Google Scholar, PubMed) and online journals from 2005 to 2018, using the keywords: "HACCP," "employees", "education". Studies have shown that education is a complex process due to the different profiles and levels of formal education of employees. Training and education methods in the field of food safety must be tailored to each individual. A clear vision and recognition of HACCP benefits by management is an initial step as well as an example to other employees for safe food business activities. The functionality of the HACCP system lies in the practical competence of the HACCP team, as well as other employees. Analyzed studies show that sanitary and hygienic status in different food bussines operators is significantly better after the implementation of HACCP system referring to continuing education in the field of good hygiene practices. Creating a responsible team of employees and the success of the HACCP system implementation is the result of a planned, extensive, documented and continuous educational programs in the field of food safety.

Keywords: *HACCP, education, employees*

Postupci sanitacije kao preduslov za sigurnost hrane

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Sažetak

Postupci sanitacije podrazumjevaju načine i korake u procesu održavanja higijene obzirom na mogućnost direktne kontaminacije proizvoda tokom proizvodnje. Navedeni postupci predstavljaju opšte aktivnosti koje utiču na zdravstvenu ispravnost hrane prilikom prijema, obrade, pripreme, proizvodnje, skladištenja i distribucije hrane. Pregledom dostupne naučne literature iz relevantnih baza podataka prikazati značaj primjene sanitarnih postupaka kao preduslova za sigurnost hrane. Istraživanje je sprovedeno pregledom naučnih članaka publiciranih u relevantnim bazama podataka (KOPERNIO, PUBMED) upotrebom ključnih riječi „sanitacija“, „sigurnost hrane“. Masovna pojava neadekvatnog izbora sredstava za sanitaciju i njeno nepravilno izvođenje, te nepoštivanje postojećih propisa ima za posljedicu bakterijsku rezistenciju, nepovoljan uticaj na sigurnost hrane, te direktan uticaj na ljudsko zdravlje. Istraživanja su pokazala da se temeljitim čišćenjem i pranjem uklanja najveći dio mikroorganizama s ruku, pribora i radne površine, te spriječava širenje mikroorganizama na proizvode. Na osnovu rezultata pretraživanja dostupne naučne literature dokazano je da postupci sanitacije smanjuju osnovne potencijalne rizike proizvodnje i osiguravaju zdravstvenu ispravnost proizvoda. Sprovođenjem mjera mehaničkog čišćenja i dezinfekcije po procedurama sa tačno određenim kritičnim kontrolnim tačkama procesa smanjuje se ili potpuno isključuje narušavanje sigurnosti hrane.

Ključne riječi: *sanitacija, sigurnost hrane*

Sanitation procedures as a prerequisite for food safety

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Abstract

The Sanitation procedures involve ways and steps in process of maintaining hygiene considering the possibility of direct contamination of products during the manufacture process. The procedures outlined present general activities which affect food safety during the reception, treatment, preparation production, storage and distribution of food. The aim of this study was to indicate the importance of applying sanitation as a prerequisite for food safety by reviewing the available scientific literature from relevant databases. Research was conducted by reviewing scientific articles published in relevant databases (KOPERNIO, PUBMED), using the keywords: “sanitation”, “food safety”. The massive occurrence of inadequate choice of sanitizers and its improper application, as well as non-compliance with regulations leads to bacterial resistance, adversely affecting food safety with direct impact on human health. Researches has shown that proper cleaning and disinfection remove most of microorganisms from hands, equipment and surfaces and prevent their spreading. Based on the results of the available scientific literature, it has been proven that sanitation practices reduce the basic potential risks of production and provided food safety. The implementation of mechanical cleaning and disinfection measures according to procedures with specific determination of critical control points reduces or completely eliminates the impairment of food safety.

Key words: sanitation, food safety.

Mikrobiološki kontaminanti u vodi za piće i njihov uticaj na zdravlje ljudi

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Sažetak

Voda predstavlja pogodan medij za razvoj i prenošenje mikroorganizama. Zdravstveno ispravna voda je voda koja ne sadrži agense mikrobiološkog porijekla koji mogu nepovoljno uticati na zdravlje ljudi. Prenos zaraznih oboljenja vodom zapiće kontaminiranom mikrobiološkim uzročnicima zauzima posebno mjesto zbog masovne upotrebe vode kao i količine koja se unosi u organizam. Prikazati najznačajnije mikrobiološke kontaminante u vodi za piće i njihov uticaj na zdravlje ljudi. Istraživanje je sprovedeno pregledom dostupne naučne i stručne literature dostupne online u relevantnim bazama podataka upotrebom ključnih riječi „water“, „contamination“, „microorganisms“. Najznačajnija mikrobiološka kontaminacija vode za piće patogenim mikroorganizmima potiče od humanih i animalnih izvora onečišćenja. Mikroorganizmi iz ovih izvora su najčešće uzročnici crijevnih zaraznih oboljenja kao što su gastroenteritisi, zarazna žutica, bacilarna dizenterija, kolera, trbušni tifus, paratifus, dječja paraliza i dr. Oboljenja povezana s vodom kontaminiranom mikrobiološkim uzročnicima imaju značajan efekat na zdravlje koji rezultira bolovima u želucu, povraćanjem, proljevom, glavoboljom, zatajenjem bubrega ili smrtnim slučajevima. Najvećem zdravstvenom riziku prilikom konzumacije onečišćene vode izložene su vulnerabilne skupine stanovništva. Dijareja uzrokovana konzumacijom kontaminirane vode za piće uzrokuju 2 miliona smrtnih slučajeva svake godine, od čega je najveća stopa mortaliteta zabilježena kod djece mlađe od 5 godina. Osiguranje dostatnih količina zdravstveno ispravne vode za piće najznačajnija je preventivna mjera u smanjenju oboljenja i smrtnih slučajeva povezanih s konzumacijom vode kontaminirane uzročnicima mikrobiološkog porijekla.

Ključne riječi: voda, kontaminacija, mikroorganizmi

2-O-13

Microbiological contaminants in drinking water and their impact on human health

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Summary

Water is a suitable environment for the development and transmission of microorganisms. Wholesome water is water that does not contain agents of microbial origin that can adversely affect human health. Transmission of infectious diseases caused by drinking water that is contaminated with microbiological agents is widely important due to the frequency of water consumption. The aim of this research was to indicate the most important microbiological contaminants in drinking water and their impact on human health. Research was conducted by a review of available scientific and professional literature available online in relevant databases using the keywords „water“, "contamination“, „microorganisms“. The most important contamination of drinking water by pathogenic microorganisms originates from human and animal sources of contamination. Microorganisms from these sources are the most common causes of intestinal infectious diseases such as gastroenteritis, infectious jaundice, bacillary dysentery, cholera, typhoid fever, polio, etc. Diseases associated with drinking water contaminated with microbial agents have a significant effect on human health resulting in stomach pain, vomiting, diarrhoea, headache, kidney failure or death. Vulnerable populations are exposed to the greatest health risk when consuming contaminated water. Diarrhoea caused by the consumption of contaminated drinking water causes 2 million deaths each year, with the highest mortality rate recorded in children under 5 years of age. Ensuring adequate supply of wholesome water is the most important preventative measure in reducing the disease and deaths associated with the consumption of water contaminated with pathogenic microorganisms.

Keywords: *water, contamination, microorganisms*

Sigurnost umjetnih sladila

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Sažetak

Umjetna sladila spadaju u grupu umjetnih aditiva. Prema definiciji WHO (World Health Organisation) aditivi su tvari poznate hemijske strukture koji se uobičajeno ne konzumiraju niti su tipičan sastojak hrane. Umjetni aditivi, a samim tim i većina umjetnih sladila se sintetiziraju različitim hemijskim postupcima, te ih možemo podijeliti na hranjiva i nehranjiva umjetna sladila. U cilju smanjenja kalorijskog unosa šećera u hrani i pićima zamjenjujemo ih umjetnim sladilima koja služe kao vrlo dobra nisko kalorijska zamjena. Budući da se umjetna sladila koriste u prehrani neophodno je istražiti sigurnost njihove primjene i prihvatljivi dnevni unos (ADI) koji je postavila FDA za svako umjetno sladilo, a koji ustvari predstavlja maksimalni iznos prehranbenog aditiva koji se može sigurno konzumirati na dnevnoj bazi tokom života neke osobe bez ikakvih štetnih učinaka, a uključuje i sigurnosni faktor do 100 puta. Cilj ovog rada je da se pokaže da li su umjetna sladila sigurna u prehrani i u kojim količinama, te da se istraže postojeće zakonske regulative u Bosni i Hercegovini, Evropskoj Uniji i Sjedinjenim Američkim Državama. Neka od umjetnih sladila koja su u upotrebi i koja će biti obrađena u ovom radu jesu acesulfam, aspartam, ciklamat, ksilitol, Neotame, saharin, stevia i sukraloza. Umjetni zaslađivači su dosta popularni i kod osoba koje pokušavaju smanjiti tjelesnu težinu, međutim njihov efekat na apetit i kilažu variraju u znanstvenim studijama. Ono što je sigurno jeste da zamjenom šećera umjetnim sladilima u preporučenim količinama ćemo smanjiti kalorijski unos, a znanstvene studije su pokazale i to da pridržavanje preporučenim količinama umjetnih sladila neće biti štetno po zdravlje.

Ključne riječi: *aditivi, zamjena, umjetna sladila, dnevni unos, sigurnost*

Safety of artificial sweeteners

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Abstract

Artificial sweeteners belong to the group of artificial additives. According to the WHO (World Health Organization) definition, additives are substances of known chemical structure that are not commonly consumed or a typical food ingredient. Artificial additives, and therefore most artificial sweeteners, are synthesized by various chemical processes and we can divide them into nutritious and non-nutritious artificial sweeteners. To reduce the caloric intake of sugars in foods and beverages, we replace them with artificial sweeteners that serve as a very good low-calorie substitute. Because artificial sweeteners are used in the diet, it is necessary to research the safety of their use and the acceptable daily intake (ADI) set by the FDA for each artificial sweetener, which actually represents the maximum amount of dietary additive that can be safely consumed on a daily basis over a person's life without any adverse effects and includes a safety factor up to 100 times. The aim of this paper is to show whether artificial sweeteners are safe in nutrition and in what quantities, and to investigate the existing legislation in Bosnia and Herzegovina, the European Union and the United States of America. Some of the artificial sweeteners which are in use and will be elaborated in this paper are acesulfam-k, aspartame, cyclamate, xylitol, Neotame, saccharin, stevia and sucralose. Artificial sweeteners are quite popular with people trying to lose weight, however, their effect on appetite and weight gain varies in scientific studies. What is surely is that replacing sugars with artificial sweeteners in the recommended amounts will reduce caloric uptake, and scientific studies have shown that adherence to the recommended amounts of artificial sweeteners will not be detrimental to health.

Keywords: *additives, substitution, artificial sweeteners, daily uptake, safety*

Barijere pri implementaciji i održavanju HACCP sistema u ugostiteljskim objektima

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Sažetak

Ugostiteljska djelatnost specifična je u pogledu uspostavljanja HACCP sistema zbog velikog broja i učestalosti rizika koji mogu ugroziti zdravstvenu ispravnost hrane koja se nudi krajnjem potrošaču. Pregledom dostupne naučne literature iz relevantnih baza podataka prikazati ključne barijere prilikom implementacije i održavanja sistema sigurnosti hrane-HACCP u ugostiteljskim objektima. Istraživanje je sprovedeno pregledom naučnih članaka publiciranim u relevantnim bazama podataka (Google Scholar, PubMed, Medline) i on-line časopisima u periodu 2009.-2019., upotrebom ključnih riječi: „HACCP“, „implementation“, „restaurants“, „barriers“. Pregled literature iz oblasti sigurnosti hrane pokazuje da implementacija i održavanje HACCP sistema u ugostiteljskim objektima ovisi o složenom spoju menadžerskih, organizacionih i tehničkih prepreka. Neadekvatni sanitarno-higijenski i tehnički uslovi u objektima otežavajuća su okolnost pri uspostavi principa dobre higijenske i dobre proizvođačke prakse kao temelja za propisno uvođenje HACCP sistema. Dinamika, složenost poslovanja, fluktuacija radne snage, vođenje dokumentacije i zapisa, kao i nivo obrazovanja, te motivisanost menadžerskih struktura i zaposlenika koji manipulišu hranom ključne su barijere koje su direktno povezane s kvalitetom implementacije, održavanja i razvoja HACCP sistema u sektoru ugostiteljstva. Uspješna uspostava i održavanje HACCP sistema u ugostiteljstvu zahtijeva posvećenost i rad svih karika u lancu hrane. Jasna vizija rukovodstvenih struktura, shvatanje značaja adekvatne implementacije HACCP sistema, kao motivisanost ostalih zaposlenika ključni su elementi za uspostavljanje funkcionalnog sistema bezbjednosti hrane HACCP.

Ključne riječi: *HACCP, ugostiteljstvo, barijere*

2-O-15

Barriers in implementation and maintenance of HACCP system in catering facilities

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Abstract

Implementation of HACCP system in catering facilities is specific due to the high number and frequency of risks that may endanger the safety of food that is offered to the final consumer. Reviewing the available scientific literature from relevant databases to identify key barriers to the implementation and maintenance of food safety systems-HACCP in catering facilities. Research was conducted by reviewing scientific articles published in relevant databases (Google Scholar, PubMed, Medline) and online journals from 2009 to 2019, using the keywords: "HACCP," "implementation," "restaurants," "barriers". A review of the literature in the field of food safety has indicated that the implementation and maintenance of HACCP systems in catering facilities depends on a complex interrelation of managerial, organizational and technical barriers. Inadequate sanitary-hygienic and technical conditions in the facilities are an aggravating circumstance in establishing the principles of good hygiene and good manufacturing practice as a basis for the proper implementation of the HACCP system. The dynamics, complexity of the business, fluctuation of the workforce, records and documents keeping, as well as the level of education, and the motivation of the management structures and employees who manipulate with food are the key barriers that are directly related to the quality of implementation, maintenance and development of the HACCP system in the catering sector. Successful implementation and maintenance of HACCP system in catering facilities require dedication and work of all participants in the food chain. Clear vision of the management structures, understanding the importance of adequate implementation of HACCP system, as well as motivation of other employees are the key elements for adequate implementation of food safety system - HACCP.

Key words: *HACCP, catering facilities, barriers*

Mikroplastika u prehrambenom lancu

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Sažetak

Pristup dovoljnim količinama zdravstveno bezbjedne hrane ključan je faktor za održavanje života i dobrog zdravlja kod ljudi. Hrana koja sadrži štetne supstance izaziva više od 200 bolesti. Mikroplastični zagađivači zbog svoje veličine nesmetano prolaze kroz sisteme filtracije vode čime uzrokuju ozbiljne probleme vezane za okoliš i sigurnost hrane. Cilj ovog rada je utvrditi prisustvo mikroplastike u prehrambenom lancu, tenjen potencijalni rizik i posljedice na ljudsko zdravlje. Provedena je retrospektivna studija. Naučnim pregledom literature u bazama ScienceDirect, PubMed, Medline i Google Scholar analizirani su naučni radovi objavljeni u periodu od 01.01.2014. do 15.10.2019. godine koristeći ključne riječi: “microplastics”, “microplastic pollution”, “food”, “food chain”, “drinking water”. Mikro i nanoplastika se kreću u morskom ekosistemu preko različitih trofičkih nivoa unutar lanca ishrane. Godišnje između četiri i 12 miliona tona plastike odlazi u mora i okeane, a glavnim izvorima smatraju se mikroplastika u kozmetici i plastika za jednokratnu upotrebu. Gutanje vode zagađene mikroplastikom, primjećeno u ribama, školjkama i rakovima, glavni je put izloženosti. Od 25 vrsta ribe komercijalnog značaja, njih 11 sadrže mikroplastiku. Voda za piće sadrži od 10^{-3} do 1000 čestica mikroplastike/L. Mikroplastika je izolovana i u ljudskom fecesu. Za procjenu opsega mikroplastike u prehrambenom lancu potrebna su dodatna istraživanja koja bi definisala vrstu, veličinu i komponente mikroplastike u prehrambenom lancu. Trenutno dostupne informacije o potencijalnim štetnim uticajima mikroplastike na zdravlje ljudi su oskudne i sporadične. Potencijalno nakupljanje mikroplastike u prehrambenom lancu moglo bi imati štetne učinke na zdravlje ljudi.

Ključne riječi: *mikroplastika, mikroplastično zagađenje, voda za piće, hrana, prehrambeni lanac*

Microplastics in the food chain

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Abstract

Access to sufficient amounts of safe and nutritious food is key to sustaining life and promoting good health. Unsafe food containing harmful substances causes more than 200 diseases. Because of their tiny size, these pollutants escape water filtration systems and cause serious environmental and food safety concerns. Aim of this paper was to determine the presence of microplastics in the food chain and potential risks and consequences for human health. A retrospective study was conducted. We performed a search of ScienceDirect, PubMed, Medline i Google Scholar databases for articles published from 1st Januar 2014 to 15th October 2019. by using key words: “microplastics”, “microplastic pollution”, “food”, “food chain”, “drinking water”. Microplastics and nanoplastics are transferring in the marine ecosystem across different trophic levels inside the food web. Annually between 4 and 12 million tonnes of plastic go into the seas and oceans. Microplastics from cosmetics and disposable plastics are considered to be the main pollutants. Ingestion of water contaminated with microplastics, observed in fishes, bivalves and crustaceans is the main exposure route. Of the 25 fish species of commercial importance, 11 contain microplastics. Drinking water contains from 10⁻³ to 1000 microplastics particles/L. Microplastics are also isolated in human faeces. Additional research is needed to evaluate the extent of microplastics in the food chain which will include the type, size, and components of microplastics in the food chain. The information available currently on the potential adverse effects of microplastics on human health is scanty and sporadic. Potential accumulation of microplastics in the food chain could have adverse effects on human health.

Key words: *microplastics, microplastic pollution, drinking water, food, food chain*

Akumulacija teških metala u slatkovodnim ribama

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Sažetak

Prisutnost teških metala u ribama izvan graničnih vrijednosti propisanih zakonskom legislativom predstavlja veliki problem po zdravlje ljudi kao zadnjim učesnicima u lancu ishrane. Budući da je Bosna i Hercegovina jako bogata rijekama i jezerima koja obiluju ribom, od izuzetne je važnosti vršiti monitoring teških metala u istim. Cilj ovog istraživanja je utvrditi sadržaj teških metala u ribama koje obitavaju u jezeru 'Brana' smještenom u blizini rudnika mangana u općini Bužim. Kao predmet istraživanja odabrane su dvije vrste riba: *Squalius cephalus* (klen) i *Carassius gibelio* (babuška) iz razloga što je njihova prisutnost u ispitivanom jezeru i najizraženija. Ispitan je sadržaj sljedećih teških metala u tkivu ribe: kadmija (*Cd*), olova (*Pb*), cinka (*Zn*), hroma (*Cr*), nikla (*Ni*), mangana (*Mn*) i bakra (*Cu*). Sadržaj teških metala je utvrđen korištenjem atomske apsorpcione spektrometrije. Rezultati istraživanja su pokazali da je sadržaj svih ispitivanih teških metala u uzorcima ribljeg tkiva u objema ispitivanim vrstama bio znatno niži u odnosu na maksimalne granične vrijednosti koje su propisane zakonskim legislativama u Bosni i Hercegovini, iz čega proizlazi da je ispitivana riba sa aspekta sadržaja teških metala pogodna za ljudsku ishranu.

Ključne riječi: *teški metali, riba, rudnik, zdravlje*

2-O-17

Accumulation of heavy metals in freshwater fish

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Summary

The presence of heavy metals in fish beyond the value limits prescribed by law is a major problem for human health as the last link in the food chain. Since Bosnia and Herzegovina is very rich in fish-populated rivers and lakes, it is of utmost importance to monitor heavy metal levels therein. The aim of this study is to determine the content of heavy metals in fish inhabiting Lake 'Branja' which is located near the manganese mine in Buzim municipality. Two fish species were selected as the subject of study; *Squaliuscephalus* (European chub) and *Carassiusgibelio* (Prussian carp) since their presence in the examined lake is most evident. The content of the following heavy metals in fish tissue was examined: cadmium (*Cd*), lead (*Pb*), zinc (*Zn*), chromium (*Cr*), nickel (*Ni*), manganese (*Mn*) and copper (*Cu*). The content of heavy metals was determined using Atomic Absorption Spectrometry.

The study results demonstrated that the content of all tested heavy metals in fish tissue samples in both sample species was significantly lower than the maximum value limits prescribed by relevant legislation in Bosnia and Herzegovina, which implies that the tested fish in terms of heavy metals content is suitable for human consumption.

Keywords: *heavy metals, fish, mine, health*

Cisticerkoza kao javno zdravstveni problem

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Sažetak

Cisticerkoza je glavni javni zdravstveni problem u nekoliko područja u svijetu s procijenjenom prevalencijom većom od 50 miliona zaraženih osoba. Infekcija s larvenim cistama predstavlja cisticerkozu. Vrste trakavica koje uzrokuju oboljenja kod ljudi su goveđa trakavica (*Taenia saginata*) i svinjska trakavica (*Taenia solium*). Međutim, najučestaliju od navedenih trakavica, a koja uzrokuje cisticerkozu ljudi, predstavlja larveni stadiji *T. solium*, odnosno svinjske trakavice. Cisticerkoza ljudi nastaje unoseći jaja *T. solium* koja se nalaze u fecesu ljudi inficiranih ovom trakavicom. Jaja trakavice se unose hranom, vodom ili preko fecesom kontaminiranih površina. Ljudi ne oboljevaju jedući nedovoljno kuhano svinjsko meso. Ishrana sa nedovoljno kuhanim svinjskim mesom dovodi do razvoja interstinalnih trakavica, ukoliko je prethodno svinjsko meso sadržavalo larvene ciste. Klinički simptomi variraju ovisno o lokalizaciji larve, broju larvi i reakcije domaćina. Ti simptomi uključuju iznenadne napade, glavobolju, žarišne neurološke simptome, poremećaje vida, lokalizirane čvoriće skeletnih mišića i bol. Cisticerkozu treba razmotriti kod svakog pacijenta iz endemskog područja u kojima su zapaženi ovi simptomi. Liječenje inficiranih ljudi se razlikuje ovisno o kliničkoj slici. Iako je poznata etiologija bolesti, njegova definitivna histološka dijagnoza nije moguća u većini slučajeva, jer je predilekciono mjesto u moždanim tkivima gdje rutinska biopsija nije izvodiva. Stoga bi se dijagnoza cisticerkoze (i neurocisticerkoze) trebala zasnivati na pravilnom tumačenju simptoma bolesnika zajedno s podacima dobivenim radiološkim ispitivanjima i imunološkim testovima za otkrivanje anticisticerkusnih antitijela. Nažalost, pleomorfizam ove parazitske bolesti stvara konfuziju kada se za dijagnostiku neuroloških manifestacija koriste samo nespecifični klinički radiološki ili imunološki kriteriji. Najbitnija je prevencija ove zoonoze. Veterinarske i humane zdravstvene institucije trebale bi zajedničkim snagama doprinijeti tome da se broj zaraženih životinja i broj oboljelih ljudi svede na minimum.

Ključne riječi: *Cisticerkoza*, *Taenia saginata*, *Taenia solium*, *neurocisticerkoza*, javno zdravstveni problem

Cysticercosis as public health problem

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Abstract

Cysticercosis is a major public health problem in several areas of the world with an estimated prevalence greater than 50 million persons infected. The infection with the cysts is called cysticercosis. Types of tapeworms that cause disease in humans are beef tapeworm (*Taenia saginata*) and pig tapeworm (*Taenia solium*). The most important of these tapeworm infections is cysticercosis, caused by the larval stage of *T. solium*, the pork tapeworm. People get cysticercosis when they swallow *T. solium* eggs that are passed in the feces of a human with a tapeworm. Tapeworm eggs are spread through food, water, or surfaces contaminated with feces. People do not get cysticercosis by eating undercooked pork. Eating undercooked pork can result in intestinal tapeworm if the pork contains larval cysts. Its clinical symptoms vary depending on site of larval lodging, larval burden, and host reaction. These symptoms include seizures, headaches, focal neurologic symptoms, visual disturbances, and localized skeletal muscle nodules and pain. Cysticercosis should be considered in any patient from an endemic area presenting with these symptoms. Treatment varies with the clinical presentation. While the disease has a recognized etiologic agent, its definitive histological diagnosis is not possible in most cases because this parasite tends to lodge in cerebral tissues where routine biopsy is not feasible. Therefore, the diagnosis of human cysticercosis (and neurocysticercosis) should rest on the proper interpretation of the patients' symptoms together with data provided by radiological studies and immunologic tests for the detection of anticysticercal antibodies. Unfortunately, the pleomorphism of this parasitic disease creates confusion when non-specific clinical, radiological or immunologic criteria alone are used to diagnose hospitalized patients with neurological manifestations. The most important thing is prevention of this zoonosis. Veterinary and human health institutions, should combine their resources to put number of infested animals and sick people on minimum.

Keywords: cysticercosis, Taenia saginata, Taenia solium, neurocysticercosis, public-health problems

Onečišćenje hrane aflatoksinima i metode redukcije

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Sažetak

Obezbjedenje velike količine hrane koja će zadovoljiti kriterijume za visokim nutritivnim kvalitetom i težnja ka proizvodnji zdravstveno sigurne hrane bez bioloških, fizičkih i hemijskih kontaminanata cilj je savremene masovne proizvodnje hrane. Na polju, ali i tijekom skladištenja, može doći do onečišćenja žitarica plijesnima koje proizvode toksične hemijske spojeve-mikotoksine. Mikotoksini su sekundarni metaboliti plijesni koji induciraju akutne i hronične toksične učinke kod ljudi i životinja. Među najznačajnijim mikotoksinima, kojima se u posljednje tri decenije posvećuje velika pažnja su aflatoksini. Poznato je da aflatoksine proizvode vrste iz roda *Aspergillus-Aspergillus flavus* i *Aspergillus parasiticus*. Glavni cilj ovog preglednog rada je izdvojiti proizvode biljnog i animalnog porijekla koji su najviše podložni onečišćenju aflatoksinima, kao i to kojim metodama možemo reducirati sadržaj istih kako ne bi ugrozili zdravlje čovjeka. Onečišćenje aflatoksinima kod proizvoda biljnog porijekla je najčešće kod kikirikija, riže, grožđa, kukuruza i stočne hrane, a kod proizvoda animalnog porijekla kao najčešći kontaminanti pojavljuju se kod mlijeka i sira. Zbog činjenice da prisutnost aflatoksina u hrani može biti opasna po ljudsko zdravlje i predstavljati problem velikih razmjera sve je veći naglasak na razvoj metoda redukcije aflatoksina, kao što su: metode sprječavanja onečišćenja plijesnima i rasta plijesni i metode detoksikacije onečišćenih proizvoda. Detoksikacija se može postići gama zračenjem, toplinskom inaktivacijom, fizičkim odjeljivanjem, razgradnjom mikrobne flore te različitim hemijskim postupcima. U cilju proizvodnje zdravstveno ispravne hrane potreban je kontinuirani razvoj i primjena savremenih metoda u detekciji i redukciji onečišćenja aflatoksinima, kao i sistema provedbe državnih monitoringa na reprezentativnom broju uzoraka hrane i hrane za životinje.

Ključne riječi: *hrana, aflatoksini, onečišćenje, metode redukcije, zdravlje*

2-P-1

Pollution of food with aflatoxins and methods of reduction

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Summary

Securing large amounts of food which will satisfy the criteria for high nutritional quality and striving for the production of health-safe food without biological, physical and chemical contaminants is the aim of modern mass production of food. In the field, but also during storage, can occur contamination of the cereals with mold who produce toxic chemical compounds. Mycotoxins are secondary metabolites of mold which induce acute and chronic toxic effects in humans and animals. In the last three decades, much attention has been dedicated to aflatoxins. Aflatoxins are produced by species of the genus *Aspergillus*- *Aspergillus flavus* and *Aspergillus parasiticus*. The main aim of this review paper is to identify the plant and animal products which are most submissive to aflatoxin contamination, as well as, by which methods we can reduce their content so as not to threaten human health. Aflatoxin contamination in products of plant origin is most commonly found in peanuts, rice, grapes, corn and animal feed, and in animal products, aflatoxins are found in milk and cheese. Due to the fact that the presence of aflatoxins in food can be hazardous for human health and present a large scale problem, there is increasing emphasis on the development of aflatoxin reduction methods, such as: methods for preventing mold contamination and mold growth, and methods for detoxifying contaminated products. Detoxification can be achieved by gamma radiation, thermal inactivation, physical separation, degradation of microbial flora and various chemical processes. In order to produce healthy food, it is required to continuous development and application of modern methods in the detection and reduction of aflatoxin contamination, as well as a system of state monitoring on a representative number of food and feed samples.

Keywords: *food, aflatoxins, pollution, methods of reduction, health*

Razumijevanje deklaracija na prehrambenim proizvodima i stav o bacanju hrane

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Sažetak

Slobodan protok sigurne i kvalitetne hrane ključni je aspekt unutrašnjeg tržišta i znatno doprinosi zdravlju i dobrobiti građana te njihovim socijalnim i privrednim interesima.

Kako bi se postigao visok stepen zaštite potrošača i osiguralo njihovo pravo na informacije, potrebno je osigurati primjereno informisanje potrošača u vezi s hranom koju konzumiraju. Na izbor potrošača utječu, između ostalog, zdravstvene, privredne, okolišne, socijalne i etičke okolnosti.

U Bosni i Hercegovini na snazi je Pravilnik o pružanju informacija potrošačima o hrani koji je u skladu sa Uredbom (EU) 1169/2011 o informisanju potrošača o hrani.

U Bosni i Hercegovini je provedeno je anketno istraživanje s ciljem razumijevanja deklaracija na prehrambenim proizvodima i stava o bacanju hrane. Anketa je provedena u toku 2018. godine na području Stoca, Nevesinja, Konjica, Jablanice i Mostara na uzorku od 200 ispitanika starosne dobi od 18 do 60+ godina.

Iz rezultata ankete može se zaključiti da veći broj ispitanika redovno čita informacije navedene na deklaraciji, ali također i to da veliki broj njih i ne razumije iste informacije. Najviše se obraća pažnja na rok trajanja bilo kog proizvoda.

Ključne riječi: hrana, zdravstvena ispravnost, deklaracije, prehrambeni proizvodi

Knowledge food product declarations and attitude about food waste

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Abstract

The free flow of safe and quality food is a key aspect of the internal market and contributes significantly to the health and well-being of citizens and their social and economic interests. In order to achieve a high level of consumer protection and to ensure their right to information, it is necessary to ensure that consumers are adequately informed about the food they consume. Consumer choice is influenced by health, economic, environmental, social and ethical circumstances. In Bosnia and Herzegovina, there is a Regulations on the provision of food information to consumers in accordance with Regulation (EU) 1169/2011 on consumer information on food. In Bosnia and Herzegovina, a survey conducted to understand food product declarations and food disposal attitudes. The survey conducted during 2018 in the area of Stolac, Nevesinje, Konjic, Jablanica and Mostar on a sample of 200 respondents aged 18-60. It can be concluded from the results of the survey that many respondents regularly read the information stated on the declaration, but also that a many of them do not even understand the same information. Most attention is paid to the shelf life of any food product.

Keywords: *food, health, declarations, food products*

Uticaj pakovanja na zdravstvenu sigurnost kobasica

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Sažetak

Osnovni cilj ovog rada je bio da se odredi uticaj vrste pakovanja na zdravstvenu sigurnost kobasica, a samim tim mikrobiološka usklađenost sa zahtjevima Pravilnika o mikrobiološkim kriterijima za hranu. Ispitivanje je uključilo određivanje prisutnosti bakterija roda: *Salmonella*, *E.coli*, Enterobakterije, *Campylobacter*, *Listeria monocytogenes*, te Sulfitredukujuće Clostridie kao i ukupan broj bakterija unutar svakog pojedinačnog proizvoda. U skladu s ciljem ispitivanja uticaja vrste pakovanja (vakuum, MAP i rinfuza) na bezbjednost kobasica izvršeno je prikupljanje uzoraka kobasica pakovanih u vakuum pakovanje, modifikovanu atmosferu i rinfuznom pakovanju od različitih proizvođača za svaku vrstu pakovanja. Kao rezultat istraživanja utvrđeno je da su od 10 analiziranih uzoraka u svim uzorcima kobasica izolacijom na selektivnim podlogama, dokazane bakterije iz familija Enterobacteriaceae u rasponu vrijednosti od 1,8 do 2,55 CFU/ml., *E. Coli* u rasponu vrijednosti od 0,51-1,23 CFU/ml., ukupnih bakterija se kretala od 2,6-4,02 CFU/ml., kvasaca i plijesni u ispitivanim uzorcima je bio između 2,22 – 3,84 CFU/ml. Mikrobiološkim ispitivanjima nisu pronađene bakterije iz grupa: *Salmonela spp.*, *Listeria* i Sulfitredukujuće klostridije. Utvrđeno je da svi uzorci odgovaraju Pravilniku o mikrobiološkoj ispravnosti.

Ključne riječi: pakovanje, kobasice, sigurnost, mikrobiologija, bakterije

2-P-3

Effect of packaging on health safety of sausage

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Abstract

The main goal of this study was to determine the impact of the type of packaging to health safety sausage, and therefore the microbiological compliance with the requirements of the Regulation on microbiological criteria for foodstuffs. The study included the determination of the presence of bacteria of the genus: Salmonella, E.coli, Enterobacteria, Campylobacter, Listeria monocytogenes, and Sulfitereducing Clostridie as well as the total number of bacteria within each individual product. According to estimate the effect of the type of packaging (vacuum, MAP and bulk) to the safety of sausages was performed collecting samples of sausages packed in a vacuum packaging, modified atmosphere packaging of bulk and different manufacturers for each type of packaging.

As a result of the study, out of 10 analyzed samples, bacteria from the Enterobacteriaceae family in the range of values from 1.8 to 2.55 CFU / ml., E. Coli, in the range of 0, were found by isolation on selective media. 51-1.23 CFU / ml., Total bacteria ranged from 2.6-4.02 CFU / ml., Yeasts and molds in the samples tested were between 2.22 - 3.84 CFU / ml. Microbiological tests did not reveal any bacteria from the following groups: Salmonella spp., Listeria and Sulphite-reducing clostridia. It was found that all samples correspond to the Regulation on microbiological safety.

Keywords: *packaging, sausages, safety, microbiology, bacteria*

Negativni uticaj mikroplastike na ribu i morske plodove kao aktuelna problematika za sigurnost hrane i zdravlje čovjeka

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Sažetak

Danas se smatra da je plastika jedan od najzastupljenijih i najupotreblijivijih materijala na svijetu zbog čega je i globalano prisutna u svim ekosistemima, obuhvatajući i akvatične ekosisteme. Plastika sadržava različite tipove polimera, kao što su polipropilen (PP), polietilen (PE), polistiren (PS), polivin hlorid (PVC), polietilen tereftalat (PET), kao i mnoge druge štetne supstanice koje su najčešće napravljene od fosilnog goriva. Bez obzira na široku zastupljenost plastike, mikroplastika (dimenzije manje od 5 mm) se smatra najopasnijim tipom plastike za akvatične vrste čiji se efekat odražava na čovjeka kroz lanac ishrane. Kada mikroplastika jednom dospije u marinske i slatkovodne ekosisteme, ona može da se disperguje u različite nivoe obuhvatajući površinu vode, pelagijal i bentos te utiče na akvatičnu biotu koja obitava na različitim staništima i trofičkim nivoima. Spoznaja onegativnom efektu mikroplastike na zdravstveni status čovjeka kroz konzumaciju riba i morskih plodova je još uvijek novo istraživano područje i zahtjeva dalja istraživanja. Zbog navedenog, ovaj rad će dati pregled potencijalnih rizika od prisustva mikroplastike po sigurnost konzumnih vrsta u akvatičnim ekosistemima i posljedičnu povezanost sa štetnim efektima na zdravlje čovjeka. Još uvijek nema dovoljno dokaza o negativnom uticaju mikroplastike na zdravlje ljudi, zbog čega su neophodna dodatna istraživanja bazirana na novim tehnologijama i metodama kvantifikacije njenog prisustva u vodenim ekosistemima.

Ključne riječi: *mikroplastika, riba, morski plodovi, zagađenost*

2-P-4

**Negative impact of microplastic on fish and seafood as an emerging issue
for food security and human health**

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Summary

Nowadays, plastics seems to be one of the most widely used material in the world which the worldwide pollution is available in different ecosystems, including the aquatic environment. Plastics consist of a large variety of polymer types, including polypropylene (PP), polyethylene (PE), polystyrene (PS), polyvinyl chloride (PVC), polyethylene terephthalate (PET) and many other harmful substance which are mainly made from fossil fuels. No matter to the fact of worldwide expand plastics, the microplastics (small pieces of plastic less than five millimeters) has been considered as most dangerous type for aquatic species which has correlated effects on human health through the food chain. Once entering into the marine and freshwater ecosystems, microplastics can widely disperse in different environmental compartments such as surface water, water column and benthic affecting aquatic biota of different trophic levels or habitats. Knowledge about the negative effects of microplastics on the human health through the consumption of fish and seafood is still in its infancy and require further investigation. This paper will provide and overview of the evidence and potential risk with the presence of microplastics in the aquatic environment integrated on their negative impact on consumed species and their relation and implication for human food security and health. This topic of the negative impact of micoplastics is still under investigation and not well explored which need urgently research to collect scientific data through properly technology and methodology of microplastic quantification.

Key words: *microplastics, fish, seafood, pollution*

Citogenetčki efekt kantarionovog ulja (*Hypericum perforatum* L.)

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Sažetak

Kantarion, botanički poznat kao *Hypericum perforatum* L., je biljka koja je rasprostranjena u većini umjerenih regija. Upotreba ove vrste kao biljnog lijeka za liječenje raznih unutarnjih i vanjskih tegoba potječe još iz vremena starih Grka. Od tada postaje popularno liječenje anksioznosti, depresije, posjekotina i opekotina. Nedavna istraživanja sugeriraju učinkovitost ove biljke u liječenju drugih bolesti, uključujući rak, poremećaje povezane s upalom, bakterijskim i virusnim bolestima, kao antioksidans i neuroprotektivno sredstvo. Cilj ovog rada bio je utvrditi citogenotoksične efekte na meristemske ćelije korijena luka koristeći protokol citogenotoksikološkog testa *Allium cepa* L., mjerenja dužine korijenaka prije i poslije tretmana, izračinavanje mitotičkog indeksa, posmatranje hromosomskih aberacija, te apoptoza i nekroza. Korištene su koncentracije 100%, 75%, 50% i 25% kantarionovog ulja te kontrolne skupine voda i DMSO. Analizom dužine korjenčića luka (*Allium cepa* L.), tretiranih različitim koncentracijama kantarionovog ulja, uočeno je da ispitivano ulje ne djeluje inhibitorno na rast korjenčića. Analiza učestalosti hromosomskih aberacija u meristemskim ćelijama luka (*Allium cepa* L.), pokazala je da je kantarionovo ulje uzrokovalo statistički značajno smanjenu frekvenciju mikronukleusa pri koncentracijama 50%, 75% i 100%, zatim signifikantno reduciranu frekvenciju hromosomskih mostova pri koncentraciji 75%, te povećanu frekvenciju missegregacije hromosoma pri koncentraciji 25%. Analiza citotoksičnih efekata kantarionovog ulja u meristemskim ćelijama luka, pokazala je značajno smanjenje frekvencije apoptičnih ćelija pri koncentraciji 100%, te smanjenje frekvencije nekrotičnih ćelija pri koncentracijama 25% i 100%.

Ključne riječi: *Hypericum perforatum* L., kantarionovo ulje, mitotički index, citogenotoksikološki efekti, *Allium test*

2-P-5

Cytogenetic effect of Cantarion oil (*Hypericum perforatum* L.)

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Summary

St. John's wort, botanically known as *Hypericum perforatum* L., is a plant that is widespread in most temperate regions. The use of this species as a herbal remedy for the treatment of various internal and external ailments dates back to the time of the ancient Greeks. Since then, treatment for anxiety, depression, cuts and burns has become popular. Recent research suggests that the efficacy of this herb in the treatment of other diseases, including cancer, disorders associated with inflammation, bacterial and viral diseases act as an antioxidant and a neuroprotective agent. The aim of this study was to determine the cytogenotoxic effects on meristem cells of onion root using the protocol of cytogenotoxic test *Allium cepa* L., measurements of root length before and after treatment, calculation of mitotic index, observation of chromosomal aberrations, and apoptosis and necrosis. Concentrations of 100%, 75%, 50% and 25% of cantarion oil, as well as water and DMSO controls were used. Analyzing the length of the onion root (*Allium cepa* L.) treated with different concentrations of cantarion oil, it was found that the test oil had no effect on the root growth. An analysis of the frequency of chromosomal aberrations in meristem cells of onions (*Allium cepa* L.) showed that cantarion oil caused a statistically significant decrease in the frequency of micronuclei at concentrations of 50%, 75% and 100%, then a significantly reduced frequency of chromosomal bridges at a concentration of 75%, and increased frequency of chromosome missegregation at a concentration of 25%. Analysis of the cytotoxic effects of cantarion oil in onion meristem cells showed a significant decrease in the frequency of apoptotic cells at a concentration of 100%, and a decrease in the frequency of necrotic cells at concentrations of 25% and 100%.

Keywords: *Hypericum perforatum* L., Cantarion oil, mitotic index, cytogenotoxic effects, *Allium test*

Tanini u čaju: prikrivena opasnost?

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Sažetak

Tanini pripadaju velikoj grupi spojeva, polifenola, a mogu se naći u različitim dijelovima jestivih i nejestivih biljaka kao što je kora stabla, listovi, začini, orašasti plodovi i sl. Jedan od najbogatijih izvora tanina jeste čaj (*Camellia sinensis* L.), te opori okus nekih tipova čaja upravo je porijeklom od prisutnih tanina. Četiri tipa čaja se posebno ističu kao odličan izvor tanina: bijeli, crni, zeleni i oolong čaj. Sva četiri tipa čaja prave se od listova biljke *Camellia sinensis* a koncentracija tanina u datom čaju zavisi od načina obrade pri proizvodnji, te vremenu potapanja pri pripremi. Taninima se pripisuju slična antioksidativna svojstva kao i drugim polifenolima, ponajviše zbog epigalokatehin galata i elagitanina. Međutim tanini mogu da izazovu i određene nus pojave. Jedna od najvećih nus pojava jeste smanjena apsorpcija željeza, jer se tanini vežu za željezo u digestivnom traktu i onemogućavaju njegovo usvajanje. Upravo radi potencijalnih nus pojava usljed prevelike konzumacije čajeva bogatih taninima, u ovom istraživanju analizirali smo sadržaj tanina u komercijalno dostupnim čajevima biljke *Camellia sinensis* u odnosu na tip čaja (crni, bijeli, zeleni) te dužinu trajanja potapanja čaja u vodu prilikom pripreme.

Ključne riječi: *antioksidanti, Camellia sinensis, tanini, željezo*

2-P-6

Tannins in tea: lurking danger?

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Abstract

Tannins, polyphenolic compounds, can be found in different edible and inedible plants, such as bark, leaves, spices, nuts etc. One of the richest sources of tannins is tea, and its bitter flavor are characteristic of present tannins. Four tea types are main source of tannins: white, black, green and oolong tea. All four are made from leaves of plant *Camellia sinensis*, and tannin concentration is affected by the way of production and how long it's steeped when prepared. Tannins, just like other polyphenols, are considered as good antioxidants mainly due to the presence of epigallocatechin gallate and ellagitannin but tannins can be responsible for some side effects as well. One of the main downsides of high tannin consumption is reduced iron absorption due to binding of tannins with iron in the digestive tract making the iron unavailable for absorption. For this reason, we analyzed tannin content in commercially available teas prepared from *Camellia sinensis* in relation to production process (white, black, green) and length of steepening during preparation.

Key words: *antioxidants, Camellia sinensis, tannins, iron*

Unos nitrata putem vode za piće i procjena rizika po zdravlje

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Sažetak

Zdravstveno sigurna voda za piće predstavlja osnovu zdravog življenja i jedan je od prioriteta u primarnoj zdravstvenoj zaštiti. Sigurnost podrazumijeva mikrobiološki i fizičko-hemijski ispravnu vodu. Posljednjih godina dolazi do ubrzanog zagađivanja podzemnih voda materijama koje sadrže azot. Toksikološka istraživanja su pokazala da se 5-10 % ukupno konzumiranih nitrata djelovanjem bakterija u probavnom traktu redukuje u nitrite. Usljed prevelikog unosa nitrata u organizmu može doći do razvoja methemoglobinemije. S ciljem praćenja koncentracije nitrata u toku 2019. godine izvršen je monitoring vode za piće na izvorištu Studenac u Gradu Mostaru, te je urađena i procjena rizika po zdravlje odraslih i djece proračunom Hazard Quotient Indeks (*HQI*). Utvrđeno je da su uzorci u skladu sa Pravilnikom o zdravstvenoj ispravnosti vode za piće (Službeni glasnik BiH, broj 40/10), te da ne premašuju MDK vrijednosti za nitrate. Proračunom Hazard Quotient Indeks (*HQI*) na bazi dnevnog unosa utvrđeno je da nema rizika po zdravlje odraslih i djece unosom nitrata iz vode za piće sa ovog izvorišta.

Ključne riječi: *voda, zdravstvena ispravnost, nitrati, rizik po zdravlje, Hazard Quotient Indeks*

2-P-7

Health risk assessment by nitrate intake from drinking water

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Summary

Safe drinking water is the basis of healthy living and is one of the priorities in primary health care. Safety involves microbiologically and physically and chemically correct water. In recent years, there has been an emerged pollution of groundwater by substances containing nitrogen. Toxicological studies shown that 5-10% of the total consumed nitrate in the digestive tract is reduce to nitrite by gut bacteria. Excessive nitrate intake can bring out to the development of methemoglobinemia. In order to monitor nitrate concentration during 2019, drinking water at the Studenac wellspring in the City of Mostar was monitored, and an assessment of the health risks for adults and children was calculated using the *Hazard Quotient Index* (HQI).The analyzed samples were in accordance with the Drinking Water Health Regulations (Official Gazette of BiH, No. 40/10) and did not exceed the MDC values for nitrates. The *Hazard Quotient Index* (HQI), based on daily intake, showed that there is no risk to the health of adults and children by ingesting nitrate from drinking water from this wellspring.

Keywords: *water, health, nitrates, health risk, Hazard Quotient Index*

3. ISHRANA TOKOM ŽIVOTNOG CIKLUSA
LIFECYCLE NUTRITION

Procjena energetske i nutritivne vrijednosti obroka jelovnika za djecu do tri godine

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Sažetak

Pravilna prehrana u ranom djetinjstvu je neophodna za djetetov normalan rast, ali i kongnitivan i emocionalan razvoj. Smatra se da upravo prekomjeren unos rafinirane hrane i hrane sa visokim udjelom zasićenih masti i jednostavnih šećera tokom djetinjstva povećava rizik od nastanka niza hroničnih bolesti kao što su kardiovaskularne bolesti, hipertenzija, gojaznost, dijabetes i osteoporoza. Prema preporukama Svjetske zdravstvene organizacije, da bi se osigurala odgovarajuća ishrana neophodna za rast i razvoj djeteta potrebno je da bude zasnovana na skladnom odnosu izbora i količine hrane sa jedne strane te uzrasta, pola, energetske i nutritivne potreba sa druge strane. S obzirom na činjenicu da je ishrana djece jedan od značajnih javno-zdravstvenih problema, kako u svijetu tako i kod nas, cilj rada je bio procijeniti energetske i nutritivne vrijednosti obroka jelovnika djece do tri godine upoređujući ih sa važećim standardima i normativima. Za procjenu energetske i nutritivne vrijednosti obroka jelovnika korišten je program *Nutrisurvey* sa inkorporiranim tablicama prosječnog sastava više hiljada namirnica. Procjenom energetske i nutritivne vrijednosti obroka jelovnika djece do tri godine dobijeni rezultati ukazuju na prekomjeren energetske unos u odnosu na važeće preporuke i smjernice. Također, unos svih makronutrijenata i nekih mikronutrijenata kao što je vitamin A, B₂, B₆, vitamin C, magnezijum, cink i željezo su iznad preporučenih dnevnih potreba za djecu do tri godine. Rezultati analiziranog jelovnika djece do tri godine ukazuju da su za povećani energetske unos odgovorni u najvećem procentu jednostavni šećeri i zasićene masti, te je manjim modifikacijama jelovnika moguće smanjiti unos istih.

Ključne riječi: *nutritivna vrijednost, Nutrisurvey, ishrana djece*

3-O-1

Estimation of energy and nutritional value of meals for children up to three years of age

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Summary

Proper nutrition in early childhood is important for child's normal growth, as well as cognitive and emotional development. Excessive intake of refined foods and foods high in saturated fats and simple sugars during childhood are thought to increase the risk of various chronic conditions such as cardiovascular disease, hypertension, obesity, diabetes and osteoporosis. According to World Health Organisation recommendations, to ensure adequate nutrition needed for child's normal growth and development, it must be based on a harmonious relationship between the choice and quantity of food on the one hand, and age, gender, energy and nutritional needs on the other. Considering the fact that child nutrition is one of the major public health problems, both in the world and in our country, the aim of the study was to evaluate the energy and nutritional values of meals for children up to three years of age, comparing them to current standards and norms. To evaluate energy and nutritional values of meals for children up to three years of age we used Nutrisurvey software which contains an extensive collection of food databases from all over the world. After estimation of energy and nutritional values of meals for children up to three years of age, the results indicate an excessive energy intake relative to the current recommendations and guidelines. Also, the intake of all macronutrients and some micronutrients such as vitamin A, B₂, B₆, vitamin C, magnesium, zinc and iron are above the recommended daily requirements for children up to three years of age. The results of the analysed menu indicate that, in the highest percentage, simple sugars and saturated fats are responsible for the increased energy intake and it is possible to reduce their intake with smaller modification of the menu.

Keywords: *nutritional value, Nutrisurvey, child nutrition*

Dijabetes kod djece – izazovi za učenike i učitelje

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Sažetak

Dijabetes je bolest za koju stručnjaci kažu da je „bolest savremenog doba“. Godine 2012. dijagnostikovano je kod 600 djece uzrasta do 18 godina iz Federaciji Bosne i Hercegovine, a danas taj broj prelazi 850 oboljelih, što ukazuje da je broj oboljele djece u naglom porastu. Cilj ovog rada je predstaviti neke izazove i poteškoće s kojima se djeca oboljele od inzulinozavisnog dijabetesa tipa 1 svakodnevno susreću, način njihove prehrane, te kako to utječe na redovne školske obaveze. Također, pri radu sa djecom koja boluju od dijabetesa, učitelji/ce trebaju znati kako njihovo tijelo funkcionira, kako se ponašati i reagovati u situacijama kao što su hipo ili hiperglikemija. Moraju biti svjesni svoje uloge, biti podrška djeci i kontinuirano ih poticati na pridržavanje svih pravila nužnih da bi se dijabetes održao pod kontrolom, što podrazumijeva pravilnu ishranu te bavljenje sportskim aktivnostima. Istraživanje o izazovima i poteškoćama sa kojima se susreću djeca sa dijabetesom sprovele smo na ciljanom uzorku- djeci koja treniraju u MNK Dia BiH i boluju od dijabetesa. Rezultati istraživanja prikazani su kvantitativno i kvalitativno i ukazuju na utjecaj glikemijskih promjena u krvi na koncentraciju i spremnost na učenje, posebne zahtjeve unutar nastave, kao i inkluzivan odnos učitelja prema njihovim potrebama. Ovim istraživanjem potvrđen je značaj i utjecaj pravilne i pravovremene prehrane i aktivnog ili rekreativnog bavljenja sportom djece sa dijabetesom u realizaciji školskih obaveza ali i ishoda učenja.

Ključne riječi: *dijabetes, djeca s dijabetesom, djeca, pravilna ishrana, sportske aktivnosti*

3-O-2

Diabetes in children—challenges students and teachers face with

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Summary

Diabetes is a disease that experts refer to as “the disease of modern times”. In 2012, there were 600 cases of diabetes among children under the age of 18 in the Federation of BiH, while today, this number exceeds 850 minors, which means that diabetes in children is on the rise. The aim of this paper is to present some of the challenges and difficulties that children with type 1 insulin-dependent diabetes face on a daily basis, their diet, and how this affects their regular schoolwork. Also, when working with children with diabetes, teachers need to know how their body functions, how to behave and respond in situations such as hypo or hyperglycemia. They need to be aware of their role, be supportive of the children and constantly encourage them to adhere to all the rules necessary to keep diabetes under control, which includes proper nutrition and engaging in sports activities. We conducted a study on a targeted sample - children who train at MNK Dia BiH and suffer from diabetes. The results of the research are presented quantitatively and qualitatively and indicate the influence of glycemic changes in blood on concentration and readiness for learning, special requirements within teaching, as well as the inclusive attitude of teachers towards their needs. This research confirmed the importance and impact of proper and timely nutrition and active or recreational sports of children with diabetes in the realization of school responsibilities, and learning outcomes.

Keywords: *diabetes, children with diabetes, children, proper nutrition, sporting activities*

Nutritivni profil namirnica obogaćenih omega – 3 masnim kiselinama sa prehranbenim i zdravstvenim tvrdnjama na sarajevskom tržištu

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Sažetak

Omega -3 masne kiseline spadaju u esencijalne nutrijente. Iako neophodne za ljudsko zdravlje, ne sintetiziraju se u organizmu, već se moraju unositi hranom. Od velikog značaja je obratiti pažnju na izvor masnih kiselina koje se unose u organizam i na njihov kvalitet. Najbolji izvor omega-3 masnih kiselina su riba i morski plodovi.

U ovom radu istražili smo namirnice obogaćene omega-3 masnim kiselinama sa prehranbenim i zdravstvenim tvrdnjama prisutne na policama jednog od bosanskohercegovačkih prodajnih lanaca i uporedili nutritivni profil sa sličnim namirnicama bez istaknute tvrdnje. Osvrnuli smo se na opštu legislativu i uredbe koje reguliraju pravila o označavanju, prezentaciji i reklamiranju prehranbenih proizvoda. Označavanje može podrazumijevati različite oblike kao što su riječi i piktogrami, koji se odnose na proizvod.

Svaki od proizvoda sadrži omega-3 masne kiseline kao što je istaknuto na prehranbenim tvrdnjama, međutim sadrži i omega-6 masne kiseline kao i druge štetne masne kiseline o čemu nema pomena na deklaraciji. Kao zdravstvena tvrdnja uzima se i logo u obliku srca koji sugeriše na pozitivne efekte na kardiovaskularni sistem. U radu smo analizirali da li je upotreba ovih proizvoda opravdana navedenim tvrdnjama, te da li konzumenti imaju stvarnu zdravstvenu korist primjenom istih u pojedinačnim porcijama bez unošenja i većih količina nepotrebnih masti ili ulja, kako bi postigli preporučeni dnevni unos omega -3 masnih kiselina.

Ključne riječi: *masne kiseline, esencijalni nutrijenti, omega – 3 masne kiseline, prehranbene i zdravstvene tvrdnje*

3-O-3

Nutritive profiles of the food products high in omega - 3 acids with nutritious and healthy labels of Sarajevo market

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Abstract

Omega - 3 fatty acids are known as essential nutrients. Even though they're necessary for human health, they are not synthesized in human bodies, but rather taken in by alimentation. The source and quality of fatty acids in human diet is of great importance. The best natural source of omega - 3 fatty acids are fish and sea food. This research was conducted in Sarajevo in one of the shopping center chains to establish nutritive profiles of the food products that have been enriched with omega - 3 fatty acids with nutritious and healthy labels. The nutritive facts of the chosen food products were compared to nutritive profiles of the similar products without labels. Through this paper, we have referred to the general legislation and regulations governing the rules on the labeling, presentation and advertising of food products. Labeling can take different forms, such as words and pictorials that refer to a product. Each product contains omega-3 fatty acids as highlighted on the nutrition claims, but it also contains omega-6 fatty acids as well as other harmful fatty acids, which is not mentioned on the label. A heart - shaped logo on these products is also considered a health claim, because it suggests positive effects on the cardiovascular system. In the paper we analyzed whether the use of these products is justified by the stated claims and whether the consumers have a real health benefit by taking them in individual portions, without consuming large quantities of unnecessary fats or oils to achieve the recommended daily intake of omega -3 fatty acids.

Keywords: fatty acids, essential nutrients, omega – 3 fatty acids, nutritious and healthy labels

Kvinoja: Nutritivna vrijednost i potencijalni zdravstveni benefiti

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Sažetak

Chenopodium quinoa Willd (kvinoja) pripada porodici *Chenopodiaceae*. Stoljećima je kultivirana na području Perua i Bolivije, a u današnje vrijeme je kultivacija proširena na nekoliko zemalja, kao što su Australija, Kanada, Kina i Velika Britanija. Kvinoja je izrazito otporna na abiotički stres, budući da ovu biljku odlikuje velika genetska varijabilnost koja omogućava prilagodbu i rast u najnepovoljnijim uvjetima okoliša. Kvinoja ima karakteristike žitarica, ali ne pripada porodici *Gramineae*. Ubraja se u pseudožitarice i ima posebne botaničke karakteristike. Obiluje visokimnivoima masnih kiselina, proteina, vitamina, minerala, dijetalnih vlakana, bioaktivnih komponenata, antioksidanasa, itd. Posebna odlika kvinoje je izuzetna nutritivna ravnoteža proteina i lipida. Dodatno, kvinoja ne sadrži gluten, što je čini pogodnom za ishranu osoba s celijakijom ili alergijom na pšenicu. Kvinoja se može konzumirati na više načina. Sjemenke se mogu fermentirati s ciljem pravljenja piva, prokljivale sadnice (kvinoja klice) mogu biti sastojci salata, samljevene sjemenke se mogu koristiti za pravljenje peciva i pekarskih proizvoda, itd. U odnosu na pšenicu ili raž, kvinoja je znatno manje rasprostranjena, no interes za njenom potrošnjom kontinuirano raste, prvenstveno zbog visoke nutritivne vrijednosti. Uprkos velikog nutritivnog potencijala i genetske raznolikosti, kvinoja još uvijek nije značajno zastupljena u prehrani, prvenstveno zbog visoke cijene i nedovoljne informisanosti konzumenata o potencijalnim zdravstvenim benefitima povezanim s konzumacijom kvinoje. Stoga je cilj rada bio pregled nutritivnog sastava kvinoje s osvrtom na potencijalne zdravstvene benefite koji proizilaze iz konzumacije ove namirnice. Istraživanje je podrazumijevalo pretragu relevantnih baza podataka.

Ključne riječi: *Chenopodium quinoa* Willd, nutritivna vrijednost kvinoje, benefiti kvinoje, celijakija

3-O-4

Quinoa: Nutritional value and potential health benefits

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Abstract

Chenopodium quinoa Willd (quinoa) belongs to the family *Chenopodiaceae*. It has been cultivated in Peru and Bolivia for centuries, and today cultivation has been expanded to several countries, such as Australia, Canada, China and the United Kingdom. Quinoa is highly resistant to abiotic stress, as this plant is characterized by great genetic variability that allows adaptation and growth in the most adverse environmental conditions. Quinoa has grain characteristics but does not belong to the *Gramineae* family. It is a pseudo-cereal and has special botanical characteristics. It is rich in high levels of fatty acids, proteins, vitamins, minerals, dietary fiber, bioactive components, antioxidants, etc. A special characteristic of quinoa is the exceptional nutritional balance of proteins and lipids. In addition, quinoa does not contain gluten, which makes it suitable for individuals with celiac disease or wheat allergy. Quinoa can be consumed in several forms. The seeds can be fermented for the purpose of making beer, the germinated seedlings (quinoa sprouts) can be salad ingredients, ground seeds can be used to make pastry and bakery products, etc. In comparison to wheat and rye, quinoa is less widespread, but interest in its consumption is growing steadily, primarily due to its high nutritional value. Despite its high nutritive potential and genetic diversity, quinoa is still not significantly represented in the diet, primarily due to the high cost and consumer's lack of information regarding potential health benefits associated with quinoa consumption. Therefore, the aim of the study was to review the nutritional composition of quinoa with reference to the potential health benefits arising from the consumption of this food. Efforts have been made to review the relevant databases.

Key words: *Chenopodium quinoa* Willd, nutritional value of quinoa, benefits of quinoa, celiac disease

Povezanost životnih navika djece od 12 do 15 godina sa nastankom Diabetes mellitusa

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Sažetak

Zdrave životne navike i pravilna prehrana imaju ključnu ulogu u očuvanju cjelokupnog psihofizičkog zdravlja. Edukacija i savjetovanje o važnosti zdravog stila života i pravilne prehrane, predstavlja poseban zadatak zdravstvenih radnika, a posebno onih koji se u svome poslu redovno susreću sa mlađim pacijentima. Vjerovatnoća za nastanak dijabetesa se povećava do 50% kod gojaznih pojedinaca. U strategijama namijenjenim za smanjenje rizika od razvoja oboljenja, od kojih većina značajno narušava kvalitet života, promovira se uvođenje pravilne prehrane i redovno bavljenje fizičkim aktivnostima još od dječije dobi. Cilj rada je bio utvrditi da li ispitanici razumiju šta podrazumijeva zdrava prehrana, kao i koliko je važna fizička aktivnost u svakodnevnoj rutini. S tim ciljem formulisana je anketa koja je sadržavala 14 pitanja. Anketu je popunilo 40 učenika osnovne škole, u dobi od 12 do 15 godina. Rezultati su pokazali da čak 82% ispitanika smatra da je zdrava prehrana veoma važna, a samo 5% smatra da nije važna. 36% ispitanika je svoje znanje o pravilnoj prehrani ocijenilo sa ocjenom 5 (na skali od 1 do 5). Rezultati provedene ankete upućuju na svjesnost većine učenika o važnosti prevencije oboljenja i promocije zdravlja s ciljem poboljšanja kvalitete života.

Ključne riječi: pravilna prehrana, zdrave životne navike, diabetes mellitus

3-O-5

Connection of life habits of children from 12 to 15 years with the occurrence of Diabetes mellitus

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Abstract

The importance of healthy life habits and healthy eating is, in many ways, an extremely important factor for the overall psychophysical state of an individual. Education, and learning about the importance of a healthy life, and proper nutrition, in the adolescent phase is the responsibility of every individual, especially the healthcare professionals, who meet younger patients in their work. The possibility for developing diabetes mellitus is up to 50% higher in obesity. To combat the onset of diseases, most which are ultimately life-threatening, the promotion of proper nutrition and regular physical activity since childhood is promoted. The aim of the study was to determine whether the subjects understand what a healthy diet is and how important physical activity is in their daily routine. With this goal, a questionnaire was created, with 14 questions. The questionnaire was completed by 40 elementary school students, ages 12-15. The results showed that as many as 82% of respondents believed that a healthy diet was very important and only 5% that it was not. 36% rated their knowledge of proper nutrition on a scale of 1 to 5 a score of 5. Based on the results of the survey, we can conclude that students are overwhelmingly aware of the importance of participating in the prevention and maintenance of their own health and life.

Keywords: *proper nutrition, healthy habits, diabetes mellitus*

Ispitivanje stavova i ponašanja vezanih za ishranu školske djece u Srednjobosanskom kantonu

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Sažetak

Rast i razvoj školske djece uvjetovan je nizom faktora koji mogu biti promjenjivi i nepromjenjivi. Jedan od najvažnijih promjenjivih faktora je ishrana. Pravilna ishrana je osnovna baza dobrog zdravlja i podrazumjeva pravilan, izbalansiran i raznovrstan izbor namirnica. Ciljevi ovog rada bili su ispitivanje prehrambenih navika školske djece prema dobi i spolu. Ispitivanje uticaja odabranih socijalno-ekonomskih faktora okruženja na stavove školske djece u pogledu njihovih prehrambenih navika, na području Srednjobosanskog kantona. Istraživanje je sprovedeno na uzorku od 300 ispitanika od maja do decembra 2018. godine. Istraživanje je bilo dobrovoljno i anonimno, uz prethodno informisanje roditelja i nastavnog osoblja. Korištenje međunarodno standardizovani upitnik HBSC (Health Behaviour School Children). Od ukupnog broja ispitanika 73,7% doručkuje svaki radni dan. Više od polovine ispitanika 59,0% konzumira slatkiše svakodnevno jednom i više puta. Koka kolu i druga gazirana pića svakodnevno jednom i više puta dnevno konzumira 27,3 % ispitanika. Rijetko ili nikad ne konzumira brzu hranu 48,0% ispitanika. Utvrđena je statistički signifikantna pozitivna korelacija između konzumiranja brze hrane među ispitanicima i udaljenosti fast food objekata od škole, $R=0.104$ i vrijednošću $p=0.049$. Zabilježeno je učestalije konzumiranje brze hrane među ispitanicima, koji pohađaju školu u čijoj se neposrednoj blizini nalaze fast food objekti. Socijalni faktori okruženja utiču na stavove i ponašanje školske djece u pogledu prehrambenih navika. Neophodno je uticati na postepenu promjenu svijesti i životnih navika koje se odnose na ishranu, što će osigurati pravilan fizički i duhovni razvoj djece u Bosni i Hercegovini.

Ključne riječi: *ishrana, školska djeca, prehrambene navike*

3-O-6

Behaviour and attitude research related to the nutrition of children in school in the Central –Bosnia Canton

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Abstract

Growth and involvement of children in school is influenced by number of factors that can be variable and unvariable, and one of the most important variable factors is nutrition. Proper nutrition is the main basis of children's health, and it requires a regular, balanced and various diet. Aim of this work was to examination of eating habit of school children according to age and gender, including the influence of social-economic environment factors on their eating behaviour in the area of Central Bosnia Canton. This research was conducted on a sample of 300 respondents from May to December 2018. The research was on anonymous and voluntary basis, with previously informed parents and teaching staff. This research also includes HBSC (Health Behaviour School Children) – The international standard questionnaire. Out of all of respondents, 73.7% have breakfast every working day. More than half of respondents 59.0% they eat sweets once everyday or more. Coca Cola and other carbonated beverages everyday once and repeatedly consumed by 27.3% respondents. 48.0% of respondents rarely or never consume fast food. Established a statistically significant positive correlation between fast food consumption and the distance of fast food facility from school, $R= 0.104$ and by value $p= 0.049$. Increased consumption of fast food was observed in respondents attending school near fast food establishments. Eating habits and behaviour of school children is influenced by environmental factors. It is necessary to influence the gradual change of consciousness and lifestyle related to nutrition, which will ensure the true physical and spiritual development of children in Bosnia and Herzegovina.

Key words: *nutrition, eating habit, school children*

Unos proteina i fizička aktivnost među stanovništvom na području grada Sarajeva

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Sažetak

Danas je sve naglašenija važnost prehrane i fizička aktivnosti u održavanju zdravlja te prevenciji i liječenju mnogobrojnih bolesti. Redovna konzumacije namirnica bogatih proteinima u sklopu raznolike i uravnotežene prehrane značajna je za sve dobne skupine stanovništva. Proteini kao makronutrijenti su uz vodu važne hranjive materije u organizmu, i predstavljaju preduslov za rast i razvoj svih tjelesnih tkiva, naročito mišića. Cilj rada bio je ispitati učestalost konzumiranja namirnica bogatih proteinima, kao i učestalost bavljenja fizičkom aktivnošću među stanovništvom na području grada Sarajeva. Utvrditi u kojoj mjeri su te vrijednosti u skladu s preporučenim. U istraživanju je učestvovalo 115 ispitanika, oba spola, starijih od 18 godina. Istraživanje je sprovedeno u mjesecu oktobru kao presječna studija, a kao instrument istraživanja korišten je anonimni anketni upitnik. Više od polovine ispitivane populacije 56,52 % obavezno doručkuje u toku dana. Konzumna jaja doručkuje 34,78 % ispitanika. Mlijeko kao namirnica za doručak izbor je 51,30 % ispitanika. Prednost se daje konzumaciji pilećeg mesa u odnosu na crveno meso i ribu. Skoro dvije trećine ispitanika ne bavi se sportom. Kao jedini vid fizičke aktivnosti praktikuju pješaćenje od pola sata i više. Dva do pet sati pred računarom ili televizorom provede 29,56 % ispitanika. Unos namirnica bogatih proteinima kroz redovne dnevne obroke je zadovoljavajući. Nizak nivo fizičke aktivnosti i sedatarni način života ukazuje na potrebu za promotivno-preventivnih aktivnosti u cilju podizanja svijesti građana.

Ključne riječi: *ishrana, proteini, fizička aktivnost*

3-O-7

Protein intake and physical activity among the population in the city of Sarajevo

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Abstract

The importance of nutrition and physical activity in maintaining health and preventing and treating many diseases is increasingly emphasized today. Regular consumption of foods rich in protein as part of a diverse and balanced diet is important for all age groups. Proteins as macronutrients are an important nutrient in the body along with water and they are a prerequisite for the growth and development of all body tissues, especially muscles. Objective of this study was to examine the frequency of consumption of protein-rich foods, as well as the frequency of physical activity among the population in the city of Sarajevo. Determine whether these values are in accordance with the recommended values. The survey involved 115 respondents, both genders, over 18 years old. The survey was conducted in October as a cross-sectional study, and an anonymous survey questionnaire was used as a survey instrument. More than half of the surveyed population 56.52% have breakfast during the day. 34.78% of the respondents eat eggs for breakfast. Milk as a breakfast food is the choice of 51.30% of respondents. Respondents prefer poultry meat than red meat and fish. Almost two-thirds of the respondents do not play sports. As the only form of physical activity, they practice walking for half an hour or more. 29.56% of respondents spend two to five hours in front of a computer or TV. Intake of protein-rich foods through regular daily meals is satisfactory. The low level of physical activity and sedentary lifestyle indicates the need for promotional and preventive activities in order to raise the awareness of citizens.

Key words: *nutrition, proteins, physical activity*

Prehrambene navike i fizička aktivnost učenika 4. i 5. razreda osnovnih škola u Kantonu Sarajevo

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Sažetak

Fizička aktivnost je sastavni dio čovjekovog života, posebno djece mlađeg školskog uzrasta. Odrastanje i dolazak u formalni sistem obrazovanja vrši veliki uticaj na njihovu fizičku aktivnost i prehranu. Pravilnom ishranom se utiče na fizički razvoj djeteta i to prvenstveno na pravilan razvoj lokomotornog aparata koji je ključan za obavljanje svih fizičkih aktivnosti. Također, pravilnom ishranom se utiče i na kognitivne sposobnosti učenika. Cilj ovog istraživanja je bio da se uspostavi korelacija između prehrambenih navika i fizičke aktivnosti učenika mlađe školske dobi u Kantonu Sarajevo. Ciljna skupina ispitanika su bili učenici 4. i 5. razreda osnovnih škola u pet općina Kantona Sarajevo: Novi Grad, Ilidža, Novo Sarajevo, Centar i Stari Grad. U svrhu istraživanja ispitano je 150 učenika u pet osnovnih škola (jedna iz svake od navedenih općina). Anketni upitnik korišten je kao instrument istraživanja. Ankete su sadržavale pitanja koja se odnose na prehrambene navike učenika i njihovu fizičku aktivnost u odnosu na različite parametre kao što su: spol ispitanika, godine, školski raspored, vannastavne aktivnosti i slično. Ovim istraživanjem željeli smo ukazati na važnost pravilne ishrane u ovom periodu kao osnov za usvajanje pravilnih prehrambenih navika i obavljanje svakodnevnih fizičkih aktivnosti kao i negativne posljedice nepravilne ishrane. Ishodi istraživanja i konačni zaključak bit će objavljeni u prezentaciji.

Ključne riječi: djeca mlađeg školskog uzrasta, fizička aktivnost, pravilna ishrana

3-O-8

Nutrition and physical activity of students in the 4th and 5th grade of elementary school in the Canton of Sarajevo

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Abstract

Physical activity is a structural part of human life, especially of children of the lower elementary school age. Growing up and getting into the process of formal education have a major influence on their physical activities and nutrition. Proper nutrition has a big impact on the physical development of a child, mainly affecting the proper development of the locomotor apparatus which is crucial for performing all kind of physical activities. Furthermore, proper nutrition affects the cognitive abilities of students. The main goal of this research was to establish a correlation between eating habits and usual physical activities of students of the lower elementary school age in the Canton of Sarajevo. The target group of the research were students of the 4th and 5th grade of elementary school in five main municipalities in the Canton of Sarajevo: New Town, Ilidža, New Sarajevo, Center and Old Town. For the purpose of the research, 150 students in five elementary schools were examined (one school from each municipality). A questionnaire was used as the research instrument. The questionnaire contained items regarding the students' eating habits and their usual physical activities and in relation to different parameters: sex, age, school timetable, extracurricular activities etc. With this research, we wanted to point out the importance of proper nutrition at this stage of life as a basis for proper eating habits and everyday activities, as well as the negative consequences of improper eating habits. The outcomes of the research and the final conclusion will be published in the presentation.

Keywords: children of lower elementary school age, physical activity, proper nutrition

Utjecaj ishrane na filogenetsku redukciju zuba

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Sažetak

Kod gotovo dvije trećine moderne ljudske populacije javit će se određeni vid poteškoća s trećim molarima, bilo da je riječ o njihovoj otežanoj erupciji, impakciji ili agenezi. Osim toga, danas jedna od najčešće prisutnih anomalija kraniofacijalnog sistema jeste hipodoncija, ili smanjeni broj zuba, koja se, osim spomenutih trećih molara, kod većine pacijenata odnosi i na nedostatak gornjih lateralnih inciziva i stalnih drugih premolara, a njena prevalenca kod nekih populacionih skupina iznosi i do 6,9%. Prisustvo ovih fenomena, zajedno sa smanjenjem veličine vilica, prema određenom broju teorijadio je filogenetske redukcije i potvrda da je evolucija proces koji se i dalje kontinuirano odvija kod ljudi. Tokom historije ljudskog postojanja, uslijed rapidnog kulturološkog i tehnološkog napretka civilizacije, došlo je do velikih izmjena u svim životnim navikama, a osobito u ishrani kao osnovi preživljavanja. Uvođenje mesa u svakodnevnu prehranu, nastanak kuhanja kao glavnog termičkog procesa u obradi hrane, pojava poljoprivrede kao novog izvora biljne ishrane, te gajenje domaćih životinja, faktori su koji su, osim genetskih, značajno utjecali na evolutivni proces čovjeka i, samim time, na promjene u strukturama kraniofacijalnog sistema. Cilj ovog rada jeste istražiti, na osnovu postojeće literature i podataka, na koji su način priprema, vrsta i konzistencija hrane kroz vrijeme mogli djelovati na debljinu cakline, veličinu određenih grupa zuba i njihovo sve češće odsustvo kod modernog čovjeka.

Ključne riječi: *filogenetska redukcija, evolucija, zubi, ishrana*

3-O-9

The influence of the diet on phylogenetic reduction

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Abstract

In almost two-thirds of modern human population exists some type of issues with third molars, whether by impaction, difficult eruption or agenesis. Except that, one of the most common anomalies of craniofacial system is hypodontia, or absence of one or more teeth, which mostly affects, except already mentioned third molars, upper lateral incisors and permanent second premolars, with its prevalence up to 6.9% within some populations. According to some theories, presence of these phenomena, together with reduction of jaw size, is a part of phylogenetic reduction and a verification of evolution as an ongoing process in humans. Rapid culturological and technological improvement of civilization during the human history resulted in a big shifts in all life habits, but especially in diet as a base of survival. Introduction of meat in everyday diet, invention of cooking as a main thermal process in food processing, appearance of agriculture as a new source of vegetable diet, and animal domestication are factors which, beside genetics, significantly influenced human evolutionary process and, subsequently, changes in craniofacial structures. The goal of this paper is to research, based on existing literature and facts, in what way preparing, type and consistency of food have affected thickness of enamel, size of specific teeth groups and their continually absence in modern human during the time.

Keywords: *phylogenetic reduction, evolution, teeth, diet*

Razlike u prehrambenim navikama kod učenika četvrtog i petog razreda osnovnih škola u odnosu na spol

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Sažetak

Pravilna prehrana je važan faktor za unapređenje i očuvanje zdravlja, posebno u razdoblju odrastanja. Osiguravanjem uvjeta za odgovarajući psihofizički razvoj, zdrave prehrambene navike koje djeca steknu u ranom djetinjstvu utječu i na odabir namirnica i način prehrane i u kasnijem životnom razdoblju, a time i na zdravlje u odrasloj dobi. Nepravilna prehrana može značajno utjecati na rast i razvoj djece i omladine, te privremeno ili trajno ugroziti njihovo zdravstveno stanje i vremenom dovesti prvo do gojaznosti, a kasnije i do drugih oboljenja. Cilj ovog istraživanja bio je ispitati općenito prehrambene navike učenika četvrtog i petog razreda osnovnih škola te utvrditi postoje li određene razlike u navedenim karakteristikama s obzirom na spol. U istraživanje je bilo uključeno 120 učenika. Anketiranje učenika je obavljeno u mjesecu maju 2018. godine. Rezultati našeg istraživanja su pokazali da većina učenika konzumira kuhani ručak dva ili više puta sedmično gdje su djevojčice u blagoj prednosti, a što se tiče konzumiranja gaziranog pića većina učenika konzumira ponekad a primjetna je mala razlika i među učenicima koji konzumiraju češće gazirana pića gdje su dječaci ti koji konzumiraju češće. Na osnovu rezultata dobivenih iz ankete možemo zaključiti da postoji određena razlika u prehrambenim navikama o čemu će se detaljnije govoriti u prezentaciji istraživanja.

Ključne riječi: pravilna prehrana, prehrambene navike, učenici razredne nastave

3-O-10

Differences in dietary habits among pupils of the fourth and fifth grade of primary schools in relation to gender

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Summary

Proper nutrition is an important factor in improving and preserving health, especially during the growing season. By ensuring the conditions for appropriate psychophysical development, the healthy eating habits children acquire in early childhood also affect the selection of foods and the way of eating in the later life period, and consequently also on health in adulthood. Improper nutrition can significantly affect the growth and development of children and youth, and temporarily or permanently endanger their health, and in the first place lead to obesity, and later to other illnesses. The aim of this study was to examine the general eating habits of students of the fourth and fifth grade of elementary schools and to determine whether there are certain differences in the mentioned characteristics with respect to gender. The research involved 120 students. The survey was conducted in May 2018. The results of our research have shown that when it comes to cooking, most pupils consume cooked lunch two or more times a week where girls are in a mild advantage. As for the consumption of carbonated beverages, most students consume it sometimes, and there is a slight difference between students who consume more carbonated sugar-sweetened beverages where boys are more likely to consume. Based on the results obtained from the survey, we can conclude that there is a certain difference in eating habits, which will be discussed in more detail in the presentation of the research.

Key words: proper nutrition, eating habits, classroom classes

Važnost pravilne ishrane u razvoju koštano-mišićnog sistema kod djece i adolescenata

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Sažetak

Pravilna ishrana podrazumijeva zadovoljenje potreba organizma za dnevnim unosom energije i količinom gradivnih i zaštitnih materija neophodnih za održavanje mentalnih i tjelesnih sposobnosti, fizioloških funkcija organizma i zdravlja. Pravilna ishrana tokom djetinjstva i adolescentnog doba odražava se prvenstveno na zdravlje u tim periodima, ali i na zdravlje tokom odraslog doba. U toku intenzivnog rasta i razvoja djece optimalni unos hranljivih materija ima poseban značaj, ne samo zbog trenutnog zdravlja, već i za kompletan psiho-fizički razvoj ličnosti. Za razvoj koštano-mišićnog sistema kod djece i adolescenata vrlo je bitna raznolika i hranljiva prehrana bogata bjelančevinama, mastima, ugljiko hidratima, mineralima i vitaminima. Cilj rada je da se kroz pregled dostupne literature ispita, analizira i prezentuje uticaj pravilne ishrane na razvoj koštano-mišićnog sistema kod djece i adolescenata. Istraživanje je provedeno pregledom dostupne literature, odnosno deskriptivnim istraživanjem u relevantnim bazama podataka (Google Scholar, MEDLINE, PubMed, Scopus, Cochrane) iz kojih su izdvojenioni članci koji najbolje analiziraju uticaj pravilne ishrane na razvoj koštano-mišićnog sistema kod djece i adolescenata. Istraživanje je pokazalo da je ishrana današnje djece i adolescenata zabrinjavajuća i nije u skladu sa preporučenim dnevnim unosima za energiju, mikronutrijente i makronutrijente. Preskakanje obroka, često konzumiranje hrane velike energetske, a male hranljive vrijednosti, kao i nedovoljan unos voća, povrća i mlijeka utičena to da veliki broj djece pati od poremećaja koštano-mišićnog sistema i prisutan je nepravilan razvoja organizma u cjelini. Pravilan razvoj kostiju i mišića zavisi od adekvatnog unosa energije, aminokiselina, minerala (Ca, Mg, Cu, P), vitamina D i K, ugljenih hidrata, proteina, natrija, oligosaharida, mlječnih proizvoda i mnogih drugih. Samo pravilnim odabirom i kombinacijom različitih namirnica može se ostvariti suštinski pravilna ishrana, koja je od izuzetnog značaja za razvoj cijelog organizma, ali prvenstveno za razvoj koštano-mišićnog sistema.

Ključne riječi: *koštano-mišićni sistem, prehrana, energija, vitamini, minerali*

3-O-11

The importance of proper nutrition in the development of the musculoskeletal system in children and adolescents

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Abstract

Proper nutrition means meeting the body's needs for daily energy intake and the amount of building and protective substances necessary to maintain mental and physical abilities, physiological functions of the body and health. Proper nutrition during childhood and adolescence reflects primarily on health during these periods, but also on health during adulthood. In the course of intensive growth and development of children, optimal nutrient intake is of particular importance, not only because of current health, but also for the complete psycho-physical development of personality. For the development of the musculoskeletal system in children and adolescents, a diverse and nutritious diet rich in protein, fat, carbohydrates, minerals and vitamins is very important. The aim of this paper is to examine, through the review of available literature, analyze and present the impact of proper nutrition on the development of the musculoskeletal system in children and adolescents. The study was conducted through a review of available literature, respectively descriptive research in relevant databases (Google Scholar, MEDLINE, PubMed, Scopus, Cochrane), from which articles were extracted to best analyze the impact of proper nutrition on development of the musculoskeletal system in children and adolescents. Research has shown that the nutrition of today's children and adolescents is worrying and does not comply with the recommended daily intakes for energy, micronutrients and macronutrients. Skipping meals, frequent consumption of food of high energy value and low nutritional values, as well as insufficient intake of fruits, vegetables and milk, affects that a large number of children suffer from musculoskeletal disorders and are present irregular development of the organism as a whole. Proper bone and muscle development depends on adequate intake of energy, amino acids, minerals (Ca, Mg, Cu, P), vitamins D and K, carbohydrates, proteins, sodium, oligosaccharides, dairy products and many others. Only by proper selection and combination of different foods can a substantially proper nutrition be achieved, which is of great importance for the development of the whole organism, but primarily for the development of the musculoskeletal system. Adequate nutrition is the „cornerstone” for proper musculoskeletal development in children and adolescents.

Keywords: *musculoskeletal system, nutrition, energy, vitamins, minerals*

Upotreba suplemenata i stimulativnih sredstava u fudbalu

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Sažetak

Uzimanje dodataka prehrani sportaša još je uvijek velika nepoznanica na području Bosne i Hercegovine i ovom dijelu Europe. Ova studija provedena je s ciljem ispitivanja različitih aspekata uzimanja dodataka prehrani, prevalencije i vrste kod osoba koje se aktivno bave sportom u ovom slučaju fudbalom. Glavni cilj našeg istraživanja bio je da ispitamo u kojoj mjeri se suplementi koriste, na koji način i koliko su sportaši kao vodeća grupacija korisnika suplemenata upoznati sa istim. U istraživanju su učestvovali igrači iz tri fudbalska kluba iz Tuzle i Sarajeva. Za te potrebe kreirana je anketa sa posebno strukturiranim pitanjima. U našem istraživanju učestvovalo je 59 ispitanika, od čega njih 16 ne koristi suplemente, tj. 73% ispitanika je odgovorilo da koristi suplemente, dok njih 27% ne koristi. Najčešće korišteni suplementi su proteini, te vitaminsko-mineralni dodaci. Ono što je zanimljivo u rezultatima jeste da najveći procenat sportaša koristi suplemente preporučene od ljekara, nutricioniste ili ipak fizioterapeuta. To dovoljno govori o ulozi koju imaju zdravstveni radnici, ali i velikoj odgovornosti koju nose sa sobom. Kako je sport, posebno fudbal kao najpopularniji, postao svojevrsna industrija i kako za posljedicu ima sticanje ogromnog profita, otuda težnja i za vještačkim podizanjem biomotoričkih sposobnosti koje u sportu/fudbalu imaju najveću vrijednost. Zaključno, rezultati istraživanja ukazuju na potrebu edukacije mladih sportaša i njihovih trenera o objektivnosti i potrebi uzimanja suplemenata, njihovom utjecaju na zdravlje te o važnosti znanja o suplementima koju moraju imati i sportaši i treneri ukoliko žele poboljšati svoju sportsku izvedbu i pri tome sačuvati zdravlje.

Ključne riječi: *suplementi, fudbal, vitamini, minerali*

Use of supplements and stimulants in football

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Summary

Taking nutritional supplements for athletes is still a huge unknown in Bosnia and Herzegovina and this part of Europe. This study was conducted to examine the various aspects of dietary supplementation, prevalence and type in people actively engaged in sports in this case football. The main aim of our research was to examine the extent to which supplements are used, how and to what extent athletes, as a leading group of supplements users, are familiar with them. Players from three football clubs from Tuzla and Sarajevo participated in the survey. For this purpose, a survey was created with specially structured questions. In our study, 59 subjects participated, of which 16 did not use supplements, ie 73% of respondents answered that they use supplements, while 27% did not use them. The most commonly used supplements are proteins and vitamin-mineral supplements. What is interesting about the results is that the highest percentage of athletes use supplements recommended by doctors, nutritionists, or physiotherapists. This speaks volumes about the role that healthcare professionals play, but also about the great responsibility they carry with them.

As sport, especially football as the most popular, has become a kind of industry, and as a result it has gained enormous profits, hence the pursuit of artificially enhancing the biomotor skills that are of the highest value in sports / football. In conclusion, the results of the research indicate the need to educate young athletes and their coaches about the objectivity and need to take supplements, their impact on health, and the importance of knowing the supplements that athletes and coaches must have if they want to improve their athletic performance while maintaining their health.

Keywords: *supplements, football, vitamins, minerals*

Utjecaj reklamnog sadržaja na formiranje prehrambenih navika i oralnog zdravlja kod djece

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Sažetak

Poznato je da veliki utjecaj na odrastanje djeteta ne čini samo porodica nego i zajednica i okolina u kojoj se dijete nalazi. Reklamni sadržaj hrane i napitaka često značajno utiče na oralno i opće zdravlje djeteta kao i njegove prehrambene navike. Cilj ovog istraživanja jeste analizirati reklamni sadržaj i omjer prikazivanja prehrambenih, te reklama koje promoviraju oralno zdravlje. Uzorak za ispitivanje čine najgledaniji komercijalni TV programi u jutarnjem, popodnevnom i najgledanijem večernjem terminu. Pregledan je veliki broj reklamnog sadržaja na ovim programima koji uključuje različite kategorije hrane, pića, te sredstava za održavanje oralne higijene. Hrana koja se najviše reklamira u vrijeme kada djeca gledaju TV je hrana sa visokim udjelom masti i šećera. U jutarnjem programu, svega 9% reklamnog sadržaja otpada na sredstva za oralnu higijenu. Poslijepodnevni reklamni program čine: 18,8% reklama za grickalice, 15,9% slatkiši, 5,7% reklama za sredstva za oralnu higijenu. U večernjem terminu se najviše prikazuje kariogena hrana. Educiranjem roditelja, te promoviranjem reklama nutritivne ishrane i sredstava za održavanje oralne higijene možemo u velikoj mjeri utjecati na normalizaciju i poboljšanje prehrambenih navika, a samim time i općeg zdravstvenog stanja kod djece.

Ključne riječi: *djeca, TV, reklamni sadržaj, oralno zdravlje*

3-O-13

The influence of advertising content on the dietary habits formation and oral health in children

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Abstract

We know that not only family, but also the community and the environment the child is in greatly influence the child's development. Advertising content of food and beverages often significantly influences the child's general health along with their dietary habits. Aim of this research is to analyse the advertising content and the ratio of advertisements for food and for promoting oral health. Research sample are the most watched commercial TV-programmes in the morning, afternoon and evening. We reviewed many advertisements including different categories of food, beverages, and oral hygiene products. The food most advertised during the times when children are watching TV has a high percentage of fats and sugars. During the morning programmes only 9% of advertisements are allotted to the oral hygiene products. Afternoon programme is 18.8% advertisements for snacks, 15.9% for sweets, and 5.7% for oral hygiene products. Evening programmes mostly advertise cariogenic food. By educating the parents and promoting the advertisements for nutritive diet and oral hygiene products we can largely influence the normalisation and betterment of children's dietary habits and therefore also their general health.

Keywords: *children, TV, advertisements, oral health*

Procjena dnevnog energetskeg unosa masti, proteina, ugljikohidrata

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Sažetak

Pravilna ishrana je od suštinskog značaja za zdravlje pojedinca. Pravilnim izborom hrane i pića omogućavamo unos potrebne količine masti, ugljikohidrata, bjelanjčevina, vitamina i minerala. Ovom prehranom podmiruju se potrebe organizma za energetske, gradivne i zaštitivne tvari. Energetske potrebe organizma zavise o bazalnom metabolizmu, dinamičkom djelovanju hrane i fizičkoj aktivnosti. Energetski unos i potrebe moguće je izračunati pomoću formula ili softverskih programa koji su dostupni na internetu. Energetske potrebe čovjeka su definisane kao energetski unos uravnotežen sa energetske rashodom, koji treba da održi energetsku ravnotežu osobe, čija je uhranjenost i tjelesni sastav, kao i stepen fizičke aktivnosti sasvim u skladu sa dobrim zdravljem. Energetske potrebe za djecu, trudnice i dojilje se razlikuju i uključuju energiju potrebnu za rast i razvoj ili sekreciju mlijeka. Organizam zadovoljava dnevne energetske potrebe unosom ugljenih hidrata, masti, proteina i alkohola. Faktori koji doprinose formiranju energetske potrebe su različiti: masa tijela, tjelesni sastav, uzrast, spol, postprandijalna termogeneza, genetski faktori, zdravstveno stanje organizma, kao i elementi životne sredine. Ciljevi ovog istraživanja su bili da se ustanovi dnevna energetska potreba (DEP) zdravih ispitanica koje su imale različite fizičke aktivnosti, te na osnovu dobivenih podataka procjeniti odgovaraju li dobiveni rezultati smjernicama pravilne prehrane. Praćena je prehrana ispitanica pomoću dnevnika prehrane. Prikupljeni podaci su analizirani primjenom softverskog programa NutriSurvey. Ispitivano je pet osoba, starosne dobi od 18 do 30 godina. U provedenom istraživanju, dnevni energetski unos, koji smo procijenili na osnovu prehrane ispitanica u većini slučajeva ne zadovoljava dnevne energetske potrebe, dobivene izračunavanjem DEP pomoću formula. Formule uključuju bazalni metabolizam, fizičku aktivnost, te količinu energije utrošenu na probavu, apsorpciju i asimilaciju obroka.

Ključne riječi: *pravilna ishrana, energetske potrebe, energetski unos*

3-O-14

Estimation of daily energy intake of fats, proteins, carbohydrates

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Abstract

Proper nutrition is essential for an individual's health. Proper selection of food and beverages enables the intake of the necessary amount of fats, carbohydrates, proteins, vitamins and minerals. This diet meets the body's needs for energy, building materials and protective substances. The energy needs of the organism depend on basal metabolism, the dynamic action of food and physical activity. Energy input and needs can be calculated using formulas or software programs available on the Internet. Human energy needs are defined as energy intake balanced with energy expenditure, which is to maintain a person's energy balance, whose nutrition and physical composition, as well as the degree of physical activity, are in harmony with good health. The energy needs for infants, pregnant women and nursing mothers vary and include the energy required for the growth and development or secretion of milk. The body meets its daily energy needs by consuming carbohydrates, fats, proteins and alcohol. The factors that contribute to the formation of energy needs are different: body weight, body composition, age, sex, postprandial thermogenesis, genetic factors, health status of the organism, as well as environmental elements. The aim of this study was to determine the daily energy requirement of healthy subjects who had different physical activities and to evaluate on the basis of the obtained data whether the results obtained correspond to the guidelines of proper nutrition. The diet of the subjects was monitored using a diary. The data collected were analyzed using NutriSurvey software. Five people, ages 18 to 30, were examined (all were women). In the study conducted, the daily energy intake obtained from the diet of the subjects in most cases did not meet the daily energy requirements obtained by calculating the DEP using formulas. Formulas include basal metabolism, physical activity, and the amount of energy spent on digestion, absorption and assimilation of meals.

Keywords: proper nutrition, energy needs, energy intake

Učestalost konzumiranja vode

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Sažetak

Voda je najvažniji faktor ljudskog postojanja, obzirom da čini prosječno od 65 do 70% mase odraslog čovjeka. Stepem zastupljenosti vode u organizmu zavisi od građe tijela s tim da različite ćelije sadrže različite količine vode. Voda je potrebna za izgradnju organizma i normalno odvijanje svih fizioloških funkcija u organizmu. Cilj istraživanja je da se kroz uvid u najnoviju naučnu literaturu analizira unos vode kod različitih populacionih skupina. Istraživački dio rada je oblikovan kao neeksperimentalno kvalitativno istraživanje odnosno naučni pregled literature. Studije koje su se bavile ispitivanjem unosa vode kod različitih populacionih skupina pokazuju da u prosjeku najveću količinu vode konzumiraju odrasli u dobi od 45-54 god. odnosno u dobi radno aktivnog stanovništva. Za razliku od starijih osoba u dobi od 55-64 god. koji unose u prosjeku najmanju količinu vode u organizam. Rezultati istraživanja su pokazali da u prosjeku najveću količinu vode prema statusu uhranjenosti konzumiraju pretili ispitanici (1,37 l/dan), a najmanje (1,12 l/danu) ispitanici normalnog statusa uhranjenosti. Ne postoji značajna razlika u znanju o povezanosti unosa vode u odnosu na stupanj obrazovanja ispitanika. Voda je neophodna za život i održavanje optimalne razine hidratacije. Unos vode ima ulogu u prevenciji hroničnih oboljenja. Kontinuiranom edukacijom stanovništva, posebno vulnerabilnih skupina, putem promotivnih materijala-brošura, plakata i zdravstvenih radionica o pravilnom unosu vode usvajaju se zdravije životne navike te se na taj način utiče na dužinu i kvalitet života.

Ključne riječi: *unos vode, fiziološki procesi, hidratacija*

3-O-15

Frequency of water consumption

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Summary

Water is the main reason of human existence, since its average amount is 65% to 70% mass of an adult human being. Degree of water representation in the body depends on body structure because different cells contain different amounts of water. Water is required for the construction of the organism and the normal functioning of all physiological functions in the body. The goal of the research is to analyze the intake of water in different population groups through insight into the latest scientific literature. The research part of the paper is designed as a non-experimental qualitative research or scientific review of the literature. Studies examining water intake in different population groups show that, on average, the largest amount of water is consumed by adults aged 45-54, mainly working age population. Unlike the elderly aged 55-64. which bring the least amount of water into the body on average. The results of the study showed that, on average, the largest amount of water according to the nutritional status was consumed by obese subjects (1.37 L/day) and the least (1.12 L/day) by subjects with normal nutritional status. There is no significant difference in knowledge about the correlation between water intake and the level of education of the respondents. Water is essential for living and maintaining an optimal level of hydration. Water intake plays a role in the prevention of chronic diseases. Continuous education of the population, especially of vulnerable groups, through healthy promotional materials - brochures, posters and health workshops on the proper intake of water, help people to adopt healthier life habits and thus affects the length and quality of life.

Keywords: *water intake, physiological processes, hydration*

Znanje i stavovi o prehranbenim navikama studenata

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Sažetak

Prema Svjetskoj zdravstvenoj organizaciji (SZO) prehrana predstavlja unos namirnica, koje zadovoljavaju prehrambene potrebe tijela. Dobra, zdrava-adekvatna ishrana i dobro uravnotežena ishrana u kombinaciji sa redovnom fizičkom aktivnošću - temelj je dobrog zdravlja. Loša prehrana može dovesti do smanjenog imuniteta, povećanepodložnosti bolestima, narušenog fizičkog i mentalnog razvoja i smanjene produktivnosti. Pravilna prehrana ima ključnu ulogu u očuvanju zdravlja osobe. Tokom studija mladi ljudi su često izloženi većem stresu i povećanom psihološkom naporu, te je pravilna prehrana u ovom razdoblju od izuzetne važnosti za pravilan psihički i fizički razvoj. Cilj ovog istraživanja je ispitati znanje i stavove studenata o prehranbenim navikama studenata različitih fakulteta i utvrditi da li postoje razlike u odnosu na vrstu studije. Istraživanje je prospektivna epidemiološka studija na uzorku studenata Univerziteta u Sarajevu sa četiri fakulteta, Mašinski, Arhitektonski, Medicinski i Stomatološki fakultet sa klinikama u Sarajevu. Za realizaciju istraživanja provedeno je anketiranje studenata. Anketa se sastojala od 10 pitanja sa ponuđenim odgovorima. Istraživanjem je bilo obuhvaćeno 546 ispitanika, od kojih je 371 (67,95%) ispitanika bilo ženskog spola i 175 (32,05%) ispitanika muškog spola. Unutar uzorka su bile četiri grupe ispitanika, tj. studenti Stomatološkog, Medicinskog, Arhitektonskog i Mašinskog fakulteta. Rezultati su pokazali da postoje razlike u znanju i stavovima o prehranbenim navikama studenata različitih fakulteta. Prisutne su razlike u znanju i stavovima o prehranbenim navikama studenata medicinske grupacije u odnosu na studente grupacije tehničkih nauka.

Ključne riječi: *prehrambene navike, studenti, znanje, stav*

3-O-16

Knowledge and attitudes of dietary habits among students

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Summary

According to the World Health Organization (WHO) nutrition is the intake of food, considered in relation to the body's dietary needs. Good nutrition –an adequate, well balanced diet combined with regular physical activity – is a cornerstone of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity. Proper nutrition plays a key role in preservation of a person's health. During the studies, college students are often exposed to great amount of stress and increased psychological strain, and proper nutrition during this period is of the utmost importance for proper mental and physical development. The aim of this research was to examine students' knowledge and attitudes about their dietary habits of different faculties and to determine if there were any differences in order to the faculty they were studying. This research is a prospective epidemiological study based on a sample of students from the University of Sarajevo, including four faculties - the Faculty of Mechanical Engineering, the Faculty of Architecture, the Faculty of Medicine and the Faculty of Dentistry with Clinics in Sarajevo. To realise the research as an instrument, survey questionnaires on students were used. The survey consisted of 10 questions with offered answers. The study included 546 respondents, of whom 371 (67.95%) were female and 175 (32.05%) were male. There were four groups of subjects within the sample, including, students of the Faculty of Dentistry, Medical faculty, Architectural and Mechanical Engineering. The results showed that there are differences in knowledge and attitudes of dietary habits among students of different faculties. There are differences in knowledge and attitudes of dietary habits between the medical group and technical group of students.

Keywords: *eating habits, students, knowledge, attitude*

Učestalost korištenja namirnica biljnog porijekla među stanovništvom na području grada Sarajeva

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Sažetak

Planiranje pravilne, dobro izbalansirane ishrane ima za cilj da unaprijedi zdravlje i prevenira nastanak mnogih bolesti. Neprilagođena ishrana može dovesti do smanjenog imuniteta, povećane osjetljivosti na bolesti, narušenog fizičkog i mentalnog razvoja i smanjene produktivnosti. Svakodnevna ishrana bogata svježim namirnicama osigurava dostatnu količinu esencijalnih hranjivih materija. Ishrana bogata povrćem i voćem znatno smanjuje rizik od gojaznosti, koronarnih bolesti, moždanog udara, dijabetesa i nastanka karcinoma. Cilj ovog rada bio je ispitati prosječan dnevni unos namirnica biljnog porijekla među stanovništvom na području grada Sarajeva, te utvrditi da li dobivene vrijednosti odstupaju od preporučenog. Tokom mjeseca oktobra provedena je studija presjeka kada je metodom slučajnog izbora anketirano 115 ispitanika, stanovnika grada Sarajeva. U istraživanje su uključeni ispitanici oba spola, stariji od 18 godina koji su dali informirani pristanak. Instrument istraživanja bio je anonimni anketni upitnik. Najveći broj ispitanika konzumira povrće i voće do dva puta dnevno, dok više od polovine ispitivane populacije, njih 56,52%, redovno konzumira sirovo povrće tokom dnevnih obroka. Skoro polovina ispitanika, njih 40%, tokom obroka konzumira više od četiri kriške hljeba, dajući prednost bijelom hljebu u odnosu na crni i raževi hljeb. Skoro jedna trećina ispitanika konzumira slatkiše i grickalice na dnevnom nivou. Stanovništvo grada Sarajeva u svojoj ishrani ima zadovoljavajući procenat dnevnog unosa namirnica biljnog porijekla. Međutim, potrebno je sprovesti dodatnu edukaciju stanovništva o negativnim posljedicama koje može izazvati neprilagođena ishrana, naročito u pogledu prekomjernog unosa natrija (uključujući i sol) i šećera.

Ključne riječi: *hrana, ishrana, zdravlje*

3-O-17

Frequency of use plant origin food among the population in the city of Sarajevo

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Abstract

Planning a proper and well-balanced diet aims to improve health and prevent many diseases. Unadapted diet can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity. A daily nutrition rich of fresh foods provides a sufficient amount of essential nutrients. Nutrition rich in vegetables and fruit have a significantly lower risk of obesity, heart disease, stroke, diabetes and cancer. Objective of this study was to examine the frequency of use plant origin food among the population in the city of Sarajevo and whether the values obtained deviate from the recommended. A cross-sectional study was conducted during the month of October. A random sample of 115 respondents from Sarajevo was surveyed. Both genders, over 18 years of age, who provided informed consent were included in the study. The research instrument was an anonymous survey questionnaire. Most respondents consume vegetables and fruits up to twice a day, while more than half of the surveyed population, 56.52% of them, regularly consumes raw vegetables during daily meals. Nearly half of the respondents, 40% of them, consumed more than four slices of bread during the meal, favoring white bread over black and rye bread. Almost one-third of the respondents consumed sweets and snacks on a daily basis. The population in the city of Sarajevo has a satisfactory percentage of daily intake of plant origin food in its diet. However, there is a need to further educate the population on the negative effects that malnutrition can cause, especially with regard to excessive intake of sodium (including salt) and sugar.

Key words: *food, nutrition, health*

Povezanost indeksa tjelesne težine (bmi) i oralnog zdravlja

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Sažetak

Pretilost i oralno zdravlje su međusobno povezani i dijele zajedničke faktore rizika. Loše prehrambene navike negativno utiču kako na regulaciju tjelesne težine, tako i na oralno zdravlje. Cilj rada je bio ispitati povezanost između indeksa tjelesne mase (BMI), kao najčešće korištenog parametra uhranjenosti osobe i KEP indeksa oralnog zdravlja odraslih pojedinaca. Istraživanje je koncipirano tako da se kroz upitnik definišu faktori rizika i BMI pojedinca, kliničkim pregledom odredi KEP indeks, a zatim utvrdi veza i uticaj pretilnosti na oralno zdravlje odraslih. Rezultati provedenog istraživanja upućuju na zabrinjavajuće visoke vrijednosti KEP indeksa odraslih, kao i visok procenat osoba sa prekomjernom tjelesnom masom. Visok KEP indeks je pronađen kod 94% ispitanika, dok je kategoriji osoba sa prekomjernom tjelesnom težinom pripadalo 39% osoba. Svega 1% ispitanika je imalo niske vrijednosti KEP indeksa, dok je 45% njih imalo idealnu težinu. Rezultati ukazuju da je KEP indeks veći kod osoba sa prekomjernom tjelesnom masom i pretilih, međutim bez značajne povezanosti između BMI i KEP indeksa. Zaključak rada je da oralno zdravlje i praktikovanje zdravog načina života nisu na zadovoljavajućem nivou. Iz navedenog proizilazi potreba ka razvijanjem programa koji bi kroz edukaciju odraslih pacijenata povećali svijest o važnosti oralnog zdravlja. Također su neophodni i programi koji bi promovirali zdravu ishranu, zdrav načina života i važnost fizičke aktivnosti. Na ovaj način bi se smanjio procenat BMI u odrasloj populaciji i unaprijedilo opšte zdravlje pojedinca, te spriječio dalji porast KEP indeksa ovih ispitanika i poboljšalo oralno zdravlje.

Ključne riječi: *indeks tjelesne mase, oralno zdravlje, pretilost, prehrambene navike*

Relationship between body mass index (BMI) and oral health

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Abstract

Obesity and oral health are connected and share common risk factors. Bad eating habits have a negative effects on both, weight regulation and oral health. The aim of the study was to examine the association between body mass index (BMI), as the most commonly used parameter of a person's nutritional status and KEP index of adult's oral health. The study was designed to define the risk factors and BMI of the individual through the questionnaire, then determine KEP index by clinical examination, and finally establish the link between obesity and oral health and also discover influence of obesity on adult oral health. The results of the study show high values of adult's KEP index as well as the high percentage of overweight people. The high KEP index was found in 94% of the subjects, while owerweight was found in 39% of the subjects. Only 1% of respondents had low KEP index values, while 45% had ideal weight. The trial's results indicate that the KEP index is higher in overweight and obesity groups of people in comparision to ideal weight group of people, but without significant relation between BMI and KEP index. The conclusion is that oral health and healthy lifestyle are not on satisfactory level. There is a need for different programs which will improve knowledge about oral health throught the educations of adults. Promotion of healthy eating habits, healthy lifestyle and the importance of physical activity is also needed. This would reduce the persentage of BMI in adult's population, improve general health of individuals, and prevent further increase of KEP index of these subjects with improve oral health.

Keywords: *body mass index, oral health, obesity, food preferences*

Zdrava ishrana djece predškolskog i školskog uzrasta

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Sažetak

Preporuke Svjetske zdravstvene organizacije su da svaka zemlja usvoji sopstvene prehrambene smjernice koje bi uzele u obzir lokalnu zdravstvenu sliku ciljane populacije, kao i lokalne prehrambene navike, jela i raspoložive namirnice. Ishrana se ubraja u najznačajnije zdravstvene faktore rizika, pa znamo da tako i utiče na rast i razvoj, te sveukupno zdravlje pojedinca i populacije. Hrana mora sadržati potrebnu energiju, bjelančevine, vitamine, minerale. Nepravilna prehrana može rezultirati i pretjerano niskom tjelesnom težinom, razvojem anemija zbog nedostatka željeza, smanjenom otpornošću organizma. Kada su u pitanju prehrambene navike, provedena istraživanja u FBiH pokazuju da oko 16% školske djece, uzrasta 11-13 godina, nikada ne doručkuje radnim danima, a čak 52% radnim danima užina tri i više puta dnevno. Kako bi djeca usvojila pravilne prehrambene navike, neophodno je da se one formiraju i njeguju u porodici, ali i u predškolskim i školskim ustanovama. Primjena normativa i standarda ishrane je osnov za pravilno planiranje, organizovanje i kontrolu ishrane. Primarni cilj ovog rada bio je upoznavanje sa značajem ishrane kod djece, kao jednom od glavnih odrednica za zdravlje u kasnijem životu. Dodatno cilj je bio upoznati se s normativima i standardima za ishranu djece u odgojno-obrazovnim ustanovama, koje se smatraju fundamentalnim mjestima za osiguranje i promoviranje pravilne ishrane, te stjecanje zdravih prehrambenih navika.

Ključne riječi: *ishrana, djeca, zdravstveni faktor, promoviranje pravilne ishrane, zdrave prehrambene navike*

3-O-19

Healthy nutrition of preschool and school-age children

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Abstract

World Health Organization recommends that every country adopts its own dietary guidelines that would take into account the local health picture of the targeted population, as well as local eating habits, meals and available foods. Nutrition is one of the most significant health risk factors, so we know that it affects growth and development, as well as the overall health of the individual and the population. The food must contain the necessary energy, protein, vitamins, minerals. Improper diet can result in excessively low body weight, the development of anemia due to iron deficiency, and decreased immunity. When it comes to eating habits, research conducted in the FBiH shows that about 16% of school children, ages 11-13, never have breakfast on weekdays, and as much as 52% on weekdays, have three or more meals a day. In order for children to adopt proper eating habits, it is necessary for them to be formed and nurtured in the family as well as in preschools and schools. The application of nutrition norms and standards is the basis for proper nutrition planning, organization and nutrition control. The primary objective of this paper was to introduce the importance of nutrition in children, as one of the major determinants of later life health. Additionally, objective was to become acquainted with the norms and standards for the nutrition of children in educational institutions, which are considered to be fundamental places for securing and promoting proper nutrition and the acquisition of healthy eating habits.

Keywords: diet, children, health factor, promoting good nutrition, healthy eating habits

Socijalna i psihološka funkcija hrane: Blagodati zajedničkih porodičnih obroka za djecu

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Sažetak

Zdravlje je službeno definisano od strane Svjetske zdravstvene organizacije kao stanje potpunog fizičkog, mentalnog i socijalnog blagostanja, a ne samo odsustva bolesti. Hrana i probava imaju veliki uticaj na sve komponente zdravlja, ne samo na fizičko blagostanje. Novi koncept odnosa između mozga, ponašanja kod jedenja i probavnog sistema pružaju novi uvid u sve funkcije hrane. Socijalna i psihološka funkcija hrane i pažljive navike u prehrani predstavljaju vrlo važne faktore za očuvanje i unapređenje zdravlja, te prevenciju mnogih bolesti. Zajednički porodični obroci donose veliku korist za djecu u mentalnom, socijalnom i prehrambenom aspektu. U protekle tri decenije, vrijeme porodice za stolom i porodični razgovori značajno su smanjeni i to za više od 30%. Iskustvo za porodičnim stolom drastično je oslabljeno s porastom distrakcija kao što su društveni mediji, ali i užurbanim rasporedom članova porodice. Cilj rada je procijeniti i sažeti nova saznanja o hrani, socijalnoj i psihološkoj funkciji hrane i njenom uticaju na zdravlje i kvalitetu života djece. Tokom posljednjih 10 godina, istraživanja su otkrila da porodični obroci smanjuju učestalost poremećaja prehrane kao što su prejedanje, anoreksija nervoza i depresija za 35%, smanjuju indeks tjelesne mase za 28%, smanjuju rizik od zloupotrebe droga, alkohola i nikotina i sprječavaju pretilost. Mnogo je prednosti zajedničkog porodičnog obroka, posebno u zaštiti adolescenata od negativnog, rizičnog ponašanja. Roditeljima je potrebno savjetovati da uživaju u obrocima zajedno sa svojom djecom. Obrazovne i javnozdravstvene inicijative usmjerene na promovisanje zajedničkih porodičnih obroka mogu poboljšati prehrambeno zdravlje djece i adolescenata.

Ključne riječi: funkcije hrane, zajednički porodični obroci, dječje zdravlje, pretilost

3-O-20

Social and psychological function of food: The benefit to children of eating together around a table as a family

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Summary

Health is officially defined by the World Health Organisation as a state of complete physical, mental, and social well-being, not merely the absence of disease. Food and digestion have great influence on all components of health not only for physical well-being. The new concept of relationships among the brain, eating behaviours and the digestive system provide new insights into all functions of food. Over the past three decades, family time at the dinner table and family conversation in general has declined by more than 30%. Experience at the family table has been dramatically impaired with increase in distractions such as social media and overall busy family schedule. The aim of the paper is to evaluate and summarise new knowledge from the science of food about social and psychological functions of food and its influence on health and the quality of life of children. During the past 10 years, studies have found, that family table eating reduces the prevalence of eating disorders such as binge eating, anorexia nervosa, and depression by 35%, reduces in body mass index by 28%, decreases risk of drug, alcohol and nicotine use and prevents obesity. There are many benefits of the family meal, especially in protecting adolescents from negative, high-risk behaviours. It is necessary to promote to parents the enjoyment of meals together with their children. Educational and public health initiatives aimed at promoting shared family mealtimes may improve nutritional health of children and adolescents.

Keywords: functions of food, family table meal, children's health

Razlike posta među religijskim konfesijama u BiH i njegov utjecaj na studente

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Sažetak

U mnogim religijama pa tako i u katoličanstvu, pravoslavlju, islamu i judaizmu post se smatra fizičkim, psihičkim i duhovnim pročišćenjem. Većina studenata pripada jednoj od navedenih religija te se shodno tome odlučuju za post kao svoju religijsku obavezu. Međutim, post se u ovim religijama ne prakticira na isti način. Kod katolika post podrazumijeva samo jedan puni obrok u danu te po potrebi dva manja obroka, a nemrs označava suzdržavanje od mesa i mesnih prerađevina, dok se kod pravoslavaca post izjednačuje sa nemrsom dakle ne jede se meso, mast, mlijeko, jaja niti proizvodi od tih namirnica. U islamu ramazanski post predstavlja potpuno odricanje od hrane, pića, pušenja, spolnih i bilo kojih drugih tjelesnih zadovoljstava tijekom mjeseca ramazana od izlaska do zalaska sunca. U judaizmu posti se šest dana u godini i tada je zabranjeno i jesti i piti od zalaska sunca proteklog dana ili od zore do zalaska sunca tog dana. U našem radu sprovedi smo anketu među studentima Pedagoškog fakulteta Univerziteta u Sarajevu na pitanje kako post utječe na njihovo funkcioniranje za vrijeme predavanja te na spremanje ispita i drugih obaveza u sklopu fakulteta. Tijekom našeg istraživanja spoznali smo da različito praktikovanje posta različito utječe na studente.

Ključne riječi: *nemrs, post, religije, studenti*

3-O-21

**Differences in fast between different religions in Bosnia and Herzegovina
and its affection on students**

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Summary

In many religions like Catholicity, Orthodoxy, Islam and Judaism fasting is considered to be physical, psychic and spiritual purification. Most of the students belong to one of those religions and so accordingly they are fasting because they see it as their religious duty. But the fast is not the same in these religions. In Catholic religion fast considers one full meal in a day and if needed two smaller ones. The abstinence means sustaining from meat and meat products, while in Orthodox Church fast is the same as abstinence. So they do not eat meat, fat, milk, eggs or products from these groceries. In Islamic religion fast represents complete sustain from eating, drinking, smoking, sexual or any other body pleasures during the Ramadan month from sunrise until dusk. Jews fast six days in year. Throughout these days it is forbidden to eat and drink from dusk the day before or from sunrise till dusk the day. In our paper we had a questionnaire within students of Pedagogy Faculty of Sarajevo. The question was how the fast affects on them during the classes and exam prepare and other tasks. During our research we comprehended that the fasting differently affects students.

Keywords: *abstinence, fast, religion, students*

Stavovi i znanja učenika razredne nastave o elementarnim sadržajima o zdravlju

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Sažetak

Zdravlje je jedna od osnovnih ljudskih potreba bez koje život ne bi bio moguć. Ljudi imaju zadatak da se brinu o vlastitom zdravlju i unapređuju svoje mogućnosti što je neophodno za rast i razvoj pojedinca ali i ljudske vrste u cjelosti. Zdravstvene navike se uče po rođenju i kontinuirano se trebaju održavati i dopunjavati. Školski sistem, kroz koji mora proći svaki pojedinac, pruža spektar mogućnosti proširivanja i dopune zdravstvenih navika i na taj način ima pozitivno djelovanje na zdravstveni odgoj. Cilj ovog istraživanja je bio ispitati stavove učenika razredne nastave o važnosti zdravlja za ljudski život, te utvrditi njihova znanja kada je u pitanju zdravstvena tematika. U istraživanju je bilo uključeno 200 učenika razredne nastave, deset osnovnih škola sa područja Kantona Sarajevo i Zeničko-dobojskog kantona, anketiranje je bilo anonimno a obavljalo se u mjesecu maju 2019. godine. Rezultati našeg istraživanja su pokazali da većina učenika smatra da je zdravlje izuzetno važno za život, da su sadržaji koje uče u školi o zdravlju motivirajući i da navedena znanja nastoje primjeniti u praksi. Osim toga analizom ankete došli smo do sljedećih saznanja: većina učenika zna broj hitne pomoći, zna da su gazirana pića štetna za zdravlje, međutim tematiku o pravilnoj ishrani učenici nisu dovoljno savladali. Rezultati našeg istraživanja pokazali su da znanja učenika o zdravlju nisu zadovoljavajuća, te se ona mogu unaprijediti s obzirom na veliki utjecaj pravilnih zdravstvenih navika na kvalitet života, o čemu će se detaljnije govoriti u prezentaciji istraživanja.

Ključne riječi: učenici razredne nastave, zdravlje, zdravstveni odgoj, život

3-O-22

Attitudes and knowledge of elementary school students about elementary health content

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Summary

Health is one of the basic human needs and without health life would not be possible. People are tasked with taking care of their own health and enhancing their capabilities, which is essential for the growth and development of the individual as well as the human species as a whole. Health habits are learned at birth and should be continually maintained and supplemented. The school system, through which each individual must go, provides a range of opportunities to expand and supplement health habits and on that way have a positive effect on health education. The aim of this research was to examine the attitudes of students in the classroom on the importance of health for human life and to determine their knowledge when it comes to health topics. The survey included 200 elementary school students, ten elementary schools in the Sarajevo Canton and Zenica-Doboj Canton, and the survey was anonymous and was conducted in May 2019. The results of our research have shown that most students think that health is extremely important for life, that the content they learn in school is about health and that they try to put this knowledge into practice. In addition to the analysis of the survey, we came to the following findings: most students know the number of ambulances, they know that carbonated drinks are harmful to health, but the topic of proper nutrition is not sufficiently mastered by students. The results of our research have shown that students' knowledge of health is not satisfactory and can be improved given the large impact of proper health habits on quality of life, which will be discussed in more detail in the presentation of the research.

Key words: *classroom teaching, health, health education, life*

Analiza reklamnog sadržaja – Uticaj na formiranje prehrambenih navika djece

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Sažetak

U posljednje vrijeme, razvojem marketinga ljudskoj populaciji dostupan je sve veći broj reklamnih panela koji sadrže veoma mali broj reklama sa korisnim sadržajem, a nažalost veliku količinu beskorisnog sadržaja. Istraživanje se posebno bazira na uticaj spomenutih reklama na djecu školskog uzrasta. Cilj ovog istraživanja je ispitati postotak korisnog reklamnog sadržaja na reklamnim panelima sa posebnim osvrtom na oralno zdravlje i uticaj različitih proizvoda, prvenstveno hrane i pića na oralno zdravlje. Područje istraživanja obuhvatilo je centar grada gdje su smještene obrazovne institucije, parkovi, šetalište, te igrališta gdje djeca provode vrijeme. Ovaj dio grada je jedan od prometnijih, te je samim tim prisutan veliki broj reklamnog sadržaja u vidu printanih panoa ili reklamnih panela koji također pasivno nameću proizvode školskoj populaciji. Rezultati pokazuju da su reklame za brzu hranu zastupljene u najvećem procentu od ukupnog broja reklama. Slatki napici i ljepljiva hrana su prisutni u nešto manjem procentu, dok je reklama za zdravu hranu prisutna samo na jednom reklamnom panelu. Pored toga, prisutna je samo jedna reklama na kojoj je četkica za zube. Reklame ponekad imaju pozitivan učinak, ali donose mnogo više beskorisnog sadržaja koji stvara loše prehrambene navike, te nemarnost prilikom održavanja oralne higijene. Ukoliko bi se zdravstvo i školstvo više posvetilo promociji sadržaja putem kvalitetnog reklamnog sadržaja, mogućnost ka povećanju kvaliteta svijesti o oralnom zdravlju i prehrambenim navikama školske populacije bi bila znatno povećana, što bi za cilj imalo zdraviju mladu populaciju koja bi bila dobar primjer i uticaj na nove, mlađe generacije.

Ključne riječi: reklamni paneli, prehrambene navike, oralno zdravlje, printani panoi

Advertising content analysis - Influence on children's eating habits

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Abstract

In recent times, the distribution of the human population has been available in an increasing number of advertising pane which is a very small number of advertisements with useful content, unfortunately a large number of useless content. Research is particularly based on the impact of the aforementioned commercials on school-age children. The aim of this research is to examine the percentage of useful advertising content on advertising panels with a particular focus on oral health and the impact of various products , primarily food and beverages, on oral health. The scope of research covered downtown. This part of the city is one of the busiest, and therefore there is a large amount of advertising content in the form of billboards or billboards that also passively impose products on the school population. The results show fast food advertisements represent the largest percentage of the total number of advertisements. Sweet drinks and sticky foods are present in a slightly smaller percentage, while healthy food ads are present in only one advertising panel. In addition, there is only one advertisement featuring a toothbrush. Reclams sometimes have a positive effect, but they bring much more useless content that creates poor eating habits and negligence in maintaining oral hygiene. If health and education were more dedicated to promoting content through quality advertising content, young population would be healthier with a more developed awareness of eating habits.

Keywords: *billboards, eating habits, oral health, billboards*

Uloga učitelja u promociji zdravih prehrambenih navika kod učenika razredne nastave

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Sažetak

Stvaranje zdravih prehrambenih navika kod djece uvodi se već u prvim godinama života. Prvi redoviti obroci izvan kuće počinju u predškolskim ustanovama. Obroci u vrtićima su planirani, svakodnevno se pripremaju i nutritivno su prilagođeni djeci tog uzrasta. Polaskom u osnovnu školu situacija se znatno mijenja. Učenici sve rjeđe nose užine spremljene od strane roditelja. Sve je više učenika koji su pretplaćeni na školske užine ili kupuju sebi užine u školskim prodavnicama. To su obično: peciva, pite, pice, sendviči, grickalice, sokovi, pa čak i gazirani napici. Cilj ovog rada bio bi istaći učiteljsku ulogu u promociji zdravih prehrambenih navika kod učenika razredne nastave. Prikazat ćemo ideju kako bi učitelj mogao inkorporirati aktivnosti vezane za zdravu ishranu u svakodnevni nastavni proces. Učitelj bi svakako trebao biti pozitivan uzor učenicima. Pored roditelja učitelj je veliki uzor i najvažnija figura za identitet učenika. Učenici posmatraju rad i ponašanje svog učitelja i na jedan način pokušavaju da ih imitiraju. Ono što je roditelj kući, to je učitelj u školi. Učitelj pun ljubavi, pažnje i odgovornosti, učenicima daje sigurnost, dobre lekcije i dobre temelje za njihov dalji život.

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

The role of teachers in promoting healthy eating habits with their elementary-level pupils

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Summary

Instituting healthy eating habits with children starts during their early years of life. First regular meals outside the house start in kindergarten institutions. Meals in kindergartens are planned, prepared daily and are nutritiously adjusted to children of a certain age. Starting with elementary education, the situation changes significantly. Pupils keep bringing homemade snacks more and more rarely. The number of pupils subscribed to school-made snacks keeps increasing or they buy snacks for themselves in school shops. Those usually consist of: bagels, pizzas, pies, sandwiches, snacks, juices and even sodas. The goal of this work would be to exemplify the role of teachers in promoting healthy eating habits with their elementary-level pupils. We will show the idea of how a teacher might incorporate activities tied to healthy eating habits into their daily teaching curriculum. A teacher should, of course, be a healthy role-model to their pupils. Aside from parents, teachers are looked up to and a large figure in a pupils' identity. Pupils watch and keep track of teacher's behaviour and try to, in a way, imitate it. What a parent is at home, that is what a teacher is at school. A teacher full of love, attention and responsibility, gives their pupils security, great lectures and a firm foundation for their future life.

Keywords: *healthy eating habits, healthy ingredients, elementary-level pupils, teacher*

Ishrana dijabetičara u sportu na prostoru Bosne i Hercegovine

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Sažetak

Dijabetes je bolest metabolizma koja nastaje kao posljedica poremećaja stvaranja inzulina u gušterači ili blokade inzulina u cirkulaciji krvi. Postoje 2 osnovna tipa: *Diabetes mellitus* tip 1 i *Diabetes mellitus* tip 2. Cilj rada bio je ispitati kako se hrane dijabetičari aktivni u sportu, te da li im pomenuta bolest predstavlja neku barijeru u tom polju. Istraživanje je vršeno na uzorku od 40 ispitanika putem ankete od 13 pitanja, na osnovu čega je utvrđena brojčana i procentualna vrijednost. Pomenutih 40 ispitanika, u prosjeku boluje od dijabetesa 7 godina te svi ispitanici boluju od *Diabetes mellitus* tip 1. Čak 87,7% ispitanika u porodičnoj historiji nema nekog ko je bolovao od pomenute bolesti te kod 92,5% ishrana nije doprinijela nastanku iste. Nakon saznanja o bolesti, 95% ispitanika promijenilo je svoj način ishrane, stoga se danas njih 73% pridržava zdravog načina ishrane te konzumira namirnice kao što su: voće, povrće, jaja, bijelo meso.. Njihova tjelovježba uveliko utječe na regulaciju šećera u krvi te kod rijetkih postoje namirnice koje ometaju njihov angažman u sportu (npr: hljeb, tjestenina, riža, slatkiši..). Anketom smo utvrdili da svaki od ispitanika aktivnih u sportu koristi inzulin 4-5x dnevno, ali i da je kod 90% ispitanika unos inzulina zbog fizičke aktivnosti manji. Slatkiše uglavnom konzumiraju kada osjete potrebu za njima (27%) ili 2-3x sedmično (25%). Kroz ovu anketu zaključujemo da je ishrana dijabetičara u sportu na prostoru BiH vrlo kvalitetna i zdrava te da im ova bolest ne predstavlja barijeru u sportu.

Ključne riječi: *dijabetes, dijabetičari, ishrana, sport*

3-P-1

Nutrition of diabetics in sports in Bosnia and Herzegovina

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Abstract

Diabetes is a metabolic disease that occurs as a result of disorders in the production of insulin in the pancreas or blockage of insulin in the blood circulation. There are 2 basic types: Diabetes mellitus type 1 and Diabetes mellitus type 2. The aim of the study was to examine how diabetics who are active in sports are fed and whether the aforementioned disease represents a barrier in this field. The survey was conducted on a sample of 40 respondents through a survey of 13 questions, on the basis of which numerical and percentage values were determined. The mentioned 40 respondents have an average of 7 years of diabetes and all of them suffer from Diabetes mellitus type 1. Even 87.7% of family history respondents do not have someone suffering from the mentioned disease, and 92.5% of the nutrition didn't contribute to their emergence. After cognition about the disease, 95% of respondents changed their nutrition, so today 73% adhere to a healthy nutrition and consume foods such as: fruits, vegetables, eggs, white meat. Their exercise greatly influences the regulation of blood sugar, and for the few, there are foods that interfere with their involvement in sports (eg: bread, pasta, rice and sweets). The survey found that each of the subjects active in sports uses insulin 4-5x a day, but also that 90% of the subjects have insulin intake due to physical activity. They mostly consume sweets when they feel the need for them (27%) or 2-3x a week (25%). Through this survey we conclude that the nutrition of diabetics in sports in BiH is very high quality and healthy and that this disease doesn't represent a barrier to sports.

Keywords: *diabetes, diabetics, nutrition, sports*

Prehrambene navike odbojkaša/ica na prostoru Bosne i Hercegovine

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Sažetak

Fizički aktivne osobe imaju veću energetska potrošnju te se shodno tome i njihove nutritivne potrebe povećavaju. Zbog toga je neophodan dobar program ishrane za sportistu koji za cilj ima poboljšanje rezultata vezanih za sport kojim se bavi, ali i brigu o specifičnim potencijalnim ograničenjima i zahtjevima za svakog sportistu pojedinačno. Ishrana sportista mora da bude dobro isplanirana i individualno prilagođena na osnovu tjelesnih karakteristika, učestalosti, dužine i intenziteta treninga. Cilj ovog rada bio je utvrđivanje prehrambenih navika kod odbojkaša/ica na prostoru Bosne i Hercegovine. Istraživanje je sprovedeno na uzorku od 200 ispitanika iz različitih odbojkaških klubova. Anketni upitnik se sastojao od 15 pitanja, te je primjenom deskriptivne statistike utvrđena brojevana i procentualna vrijednost podataka. Rezultati analize pokazuju da se radi o aktivnim sportistima, od kojih čak 61% aktivno trenira od 3-5x sedmično, u prosjeku već 3 godine i više. Većina odbojkaša/ica praktikuje da jede 2h prije treninga, čak 46,6% ispitanika, te da uzimaju 2-3 obroka dnevno uz užinu (35,8%). Za doručak 35,4% ispitanika praktikuje da jede jaja, 23,4% žitarice (zobene pahuljice), dok su u manjem procentu odgovori da za doručak ovi sportisti konzumiraju konzerviranu hranu ili da nemaju doručak nikako. Za užinu, kao i poslije treninga 57,5% ispitanika preferira konzumaciju voća, kao i konzumaciju vode od 1,5-2l tokom dana. Rezultati ukazuju na to da su sportisti dobro informisani i posjeduju znanja o važnosti pravilne ishrane u sportu. Na osnovu rezultata provedene analize zaključujemo da odbojkaši/ice na prostoru Bosne i Hercegovine vode računa o svojoj ishrani, brinući za svoje zdravlje i sportske rezultate.

Ključne riječi: *odbojkaši/ce, prehrambene navike, ishrana*

The eating habits of volleyball players in Bosnia and Herzegovina

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Abstract

Physically active individuals are more energy consumed and their nutritional needs are increasing accordingly. Therefore, a good nutrition program for the athlete is needed, which aims to improve the performance of the sport he/she is doing, as well as taking care of the specific potential restrictions and requirements for each athlete individually. The athlete's nutrition must be well-planned and individually tailored based on physical characteristics, frequency, length and intensity of training. The aim of this paper was to determine the eating habits of volleyball players in Bosnia and Herzegovina. The survey was conducted on a sample of 200 respondents from different volleyball clubs. The questionnaire consisted of 15 questions and the numerical and percentage value of the data was determined using descriptive statistics. The results of the analysis show that these are active athletes, of whom as much as 61% of them actively train from 3-5x per week, on average for 3 years and more. Most volleyball players practice eating 2 hours before training, as many as 46.6% of respondents and take 2-3 meals a day with a snack (35.8%). For breakfast, 35.4% of those surveyed practice eating eggs, 23.4% cereals (oatmeal), while a smaller percentage say that these athletes consume canned food for breakfast or have no breakfast at all. For snack, as well as after training, 57.5% of the respondents prefer fruit consumption as well as 1.5-2l water consumption during the day. The results are an indicator of good awareness and knowledge of the importance of nutrition and its contribution to sports. Based on the aforementioned analysis, we conclude that volleyball players in the territory of Bosnia and Herzegovina take care of their nutrition for the best possible health and sports results.

Keywords: volleyball players, eating habits, diet

Učestalost konzumiranja kofeinskih napitaka na području Grada Mostara

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Sažetak

Kafa je još od davnina bila cijenjena zbog svog okusa i, što je još važnije, stimulativnog djelovanja. S obzirom na tradiciju ispijanja kafe u našem društvu i veliki broj različitih vrsta kafe dostupnih na domaćem tržištu, određivanje količine unesenog kofeina je od velikog značaja. Kofein je najpopularniji prirodni stimulans tj. biljni alkaloid koji ima pozitivan učinak na mentalne i tjelesne funkcije. Iako je pronađen u 60-tak biljnih vrsta, kofein se najčešće unosi u organizam konzumiranjem kafe, čaja, coca-cole, proizvoda s ekstraktom guarane i konzumiranjem energetskih napitaka. Međutim, zbog potencijalnih zdravstvenih rizika konzumiranja kofeina izrazito je važno voditi računa o konzumiranim količinama. Tokom 2019. godine izvršena je analiza sadržaja kofeina u 3 različitanapitka od kafe (Nescafe macchiato 3 u 1; Nescafe Classic 3 in 1; Nescafe strong 3 u 1) metodom tekuće hromatografije visoke djelotvornosti (HPLC). S ciljem procjene učestalosti konzumiranja kofeinskih napitaka i poznavanja štetnosti kofeina provedeno je anketno istraživanje u Gradu Mostaru, u kojem je učestvovalo 328 ispitanika. Raspon koncentracija sadržaja kofeina u uzorcima se kretao 0,206 g/ml; 0,283 g/ml i 0,372 g/ml u jednom serviranju od 200 ml. Procjenjen dnevni unos napitaka od kafe na osnovu anketnog istraživanja iznosi 228,01ml. Na osnovu procjenjenog unosa i obzirom na nađeni sadržaj kofeina u ispitivanim uzorcima zaključujemo da nema rizika po konzumente.

Ključne riječi: *kafa, kofein, rizik po zdravlje, HPLC*

Frequency of caffeine beverages consumption in the City of Mostar

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Summary

Coffee has long been appreciated for its taste and, more importantly, its stimulating effect. Given the tradition of drinking coffee in our society and the many number of different types of coffee available on the domestic market, determining the amount of caffeine which is ingested is very important.

Caffeine is the most popular natural stimulant, a plant alkaloid that has a positive effect on mental and physical functions. Although found in 60 plant species, caffeine is most commonly introduced into the body by consuming coffee, tea, coca-cola, guarana extract products and consuming energy drinks. However, because of the potential health risks of consuming caffeine, it is very important to keep in mind the amounts consumed.

In 2019, an analysis of caffeine content in 3 different coffee beverages (Nescafe macchiato 3 in 1; Nescafe Classic 3 in 1; Nescafe strong 3 in 1) by high performance liquid chromatography (HPLC) method was carried out.

In order to evaluate the frequency of consumption of caffeine beverages and to know the harmfulness of caffeine, a survey was conducted in the City of Mostar, in which 328 participants participated. The range of concentrations of caffeine in the samples ranged from 0.206 g / ml; 0.283 g / ml and 0.372 g / ml in one serving of 200 ml. The estimated daily intake of coffee beverages based on a survey is 228.01ml.

Based on the estimated intake and the caffeine content found in the tested samples, we conclude that there is no risk for consumers.

Keywords: *coffee, caffeine, health risk, HPLC*

Prehrambene navike djece ranog školskog uzrasta

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Sažetak

Različita hrana nosi različite utjecaje na stanje oralnog zdravlja. Na pojavu zubnog karijesa utječu sastav zuba, vrsta i količina oralnih bakterija, sastav i brzina protoka pljuvačke, prisustvo fluorida te vrsta hrane. Kariogena hrana predstavljena faktor rizika za nastanak zubnog karijesa. Cilj ovog rada bio je ispitati prehrambene navike djece ranog školskog uzrasta za vrijeme njihovog boravka u školi, te porediti vrstu hrane i učestalost konzumacije obroka sa preporukama Svjetske zdravstvene organizacije Prikupljeni su, a potom evaluirani javno dostupni jelovnici iz produženog boravka nasumično odabranih deset osnovnih škola sa područja Kantona Sarajevo, a koje pohađaju djeca uzrasta 6 do 10 godina. Rezultati provedenog istraživanja ukazuju da se u produženim boravcima jedu veće količine potencijalno kariogene hrane, što rezultira većim rizikom za nastanak karijesa kod ove djece. Prehrambene navike djece ranog školskog uzrasta potrebno je dodatno unaprijediti. Smjernice uključuju: poticanje prehrambenih obrazaca u skladu s piramidom zdrave hrane, izbjegavanje učestalog konzumiranja soka ili drugih pića koja sadrže šećer u boci ili šoljici, ograničavanje grickalica koje sadrže šećer koje se polako jedu, promoviranje nekariogene hrane za grickalice, brzo uklanjanje kariogene hrane iz usne šupljine. Uz prehrambene faktore, sveobuhvatni pristup prevenciji zubnog karijesa kod djece mora uključivati i poboljšanje oralne higijene, odgovarajuću upotrebu fluorida, redovne kontrole kod doktora dentalne medicine, te niz drugih preventivnih mjera.

Ključne riječi: *djeca, karijes, ishrana*

Eating habits of early school-age children

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Sažetak

Different foods have different effects on oral health. On the appearance of dental caries influences the structure of the tooth, the type and amount of oral bacteria, the composition and flow rate of saliva, the presence of fluoride and type of food. Cariogenic foods are risk factor for dental caries. The aim of this study was to examine the eating habits of early school-age children during their time at school, compare the type of food and frequency of meals with recommendations of *World Health Organization*. Publicly available menus from the extended stay in 10 elementary schools in the Canton of Sarajevo, that is attended by children aged 6 to 10, were randomly selected, collected and then evaluated. The results of the study indicate that larger quantities of potentially cariogenic foods are consumed in extended stays, which results with higher risk of caries in these children. The early childhood eating habits should be more improved. The guidelines include: encouraging dietary patterns which are in line with the pyramid of healthy foods, avoiding frequent consumption of juice or other drinks which contain sugar in a bottle or cup, restricting sweet foods which children eat slowly, promoting non-carcinogenic snack foods, rapid removal cariogenic food from the oral cavity. In addition to nutritional factors, a comprehensive approach to the prevention of dental caries in children must include improvements of oral hygiene, appropriate use of fluoride, regular controls to dental doctors, and other preventive measures.

Keywords: *children, caries, nutrition*

Prehrana u odnosu na upalne bolesti crijeva

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Sažetak

Kronične upalne bolesti crijeva (IBD) pojavljuju se u dva osnovna entiteta kao ulcerozni kolitis i Chronova bolest, a obilježene su dugotrajnim ponavljajućim i remisijskim tijekom bolesti. Uzrok nastanka ovih bolesti još uvijek nije poznat. Ulcerozni kolitis predstavlja kontinuiranu kroničnuupalu sluznice rektuma i kolona, za razliku od Crohnove bolesti koja može zahvatiti bilo koji dio probavne cijevi, od usne šupljine do anusa. Istraživanje je usmjereno prema učestalosti konzumacije određene grupe namirnica u odnosu na oblik upalne bolesti crijeva. Temelji se na medicinskoj dokumentaciji oboljelih od IBD-a, koji su liječeni u bolnicama na području osječko – baranjske županije u razdoblju od 2000. do 2014. godine. Ono je dio sveučilišnog projekta pod vodstvom prof.dr.sc. A. Včev naziva: „Povezanost polimorfizama jednog nukleotida u NOD 2 i MDR 1 genima s nastankom upalnih bolesti crijeva“. Podaci iz istraživanja dio su doktorske disertacije glavnog istraživača Marinka Žulja, dr.med. Za prikupljanje podataka korištena su anketna pitanja povezana s konzumacijom određene vrste namirnica u odnosu na oblik upalne bolesti crijeva bolesnika. U ponuđene grupe namirnica uvršteni su: voće i povrće, crveno meso, bijelo meso, ribu i slastice. Prema prikupljenim podacima od ukupno 80 bolesnika, voće i povrće konzumira 78 (98%) ispitanika, crveno meso 73 (91%), bijelo meso 76 (95%), ribu 62 (79%) i slastice u prehrani koristi 71 (89%) ispitanik. Prema Fischerovom egzaktnom testu oboljeli od ulceroznog kolitisa mnogo češće prakticiraju prehranu s bijelim mesom u odnosu na oboljele od Chronove bolesti (P = 0,02).

Ključne riječi: *Chronova bolest, prehrana, ulcerozni kolitis*

3-P-5

Nutrition in relation to inflammatory bowel diseases

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Summary

Chronic inflammatory bowel disease (IBD) occurs in two basic entities as ulcerative colitis and Chron disease, and is characterized by protracted relapsing and remission course. The cause of these diseases is still unknown. Ulcerative colitis is a continuous chronic inflammation of mucous membranes of the rectum and colon, unlike Crohn's disease, which can affect any part of the digestive tube, from the oral cavity to the anus. The study was focused on the frequency of consumption of a particular group of foods in relation to the form of IBD. It is based on the medical records of patients with IBD, who were treated in hospitals at Osijek-Baranja County from 2000. to 2014. It is part of a university project led by prof.dr.sc. A. Včev, called: „*Povezanost polimorfizama jednog nukleotida u NOD 2 i MDR 1 genima s nastankom upalnih bolesti crijeva*“. The data from the research are part of the doctoral dissertation of the principal researcher Marinko Žulj, MD. The needed answers about consumption of a particular type of foodstuff were obtained with survey questions. Food groups were divided into five groups which included: fruits and vegetables, red meat, white meat, fish and sweets. According to the collected data from 80 patients in total, 78 (98%) subjects consumed fruits and vegetables, 73 (91%) red meat, 76 (95%) white meat, 62 (79%) fish and 71 (89%) consumed desserts. According to Fischer's exact test, patients with ulcerative colitis were eating more often white meat than patients with Chron's disease (P = 0.02).

Keywords: *Chron's disease, diet, ulcerative colitis*

4. DIJETOTERAPIJA
DIETOTHERAPY

Uloga kokosovog ulja u prehrani i zdravlju

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Sažetak

Kokosovo i palmino ulje su vijekovima bili glavni izvor jestivih masti u većem dijelu Zapadne Afrike. Najnovije informacije pokazuju neke korisne učinke ovih ulja, posebno njihovu ulogu u prehrani, zdravlju i nacionalnom razvoju. Kokosovo ulje se promovira kao zdravo ulje, s prednostima kao što je pospješivanje zdravlja srca. Da bi se procijenila osnova ove tvrdnje, pregledana je literatura o utjecaju konzumacije kokosa na kardiovaskularne faktore rizika i ishode kod ljudi. Većina je ispitala učinak kokosovog ulja ili proizvoda od kokosa na lipidne profile seruma. Kokosovo je ulje uglavnom podizalo ukupni holesterol niske gustine lipoproteina i u većoj mjeri u odnosu na cis nezasićena biljna ulja, ali u manjoj mjeri od maslaca. Uticaj konzumacije kokosa na omjer ukupnog kolesterola i holesterola visoke gustoće lipoproteina obično se ne ispituje. Studije na pojedincima sa suhom kožom pokazuju da kokosovo ulje može poboljšati sadržaj vlage u koži. Takođe može da smanji simptome ekcema. Kokosovo ulje može biti efikasno u smanjenju masnoća abdomena, koje se nalazi u trbušnoj šupljini i oko organa. Iako kokosovo ulje može imati koristi za zdravlje, ono sadrži visoku količinu zasićenih masti, te je neumjerena konzumacija štetna.

Ključne riječi: *kokosovo ulje, prehrana, zdravlje*

4-O-1

Coconut oil role in nutrition and health

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Abstract

Coconut and palm oils which were the major sources of dietary fats for centuries in most of West Africa. Recent information however, indicates some beneficial effects of these oils particularly their roles in nutrition, health and national development. Coconut oil is being heavily promoted as a healthy oil, with benefits that include support of heart health. To assess the merits of this claim, the literature on the effect of coconut consumption on cardiovascular risk factors and outcomes in humans was reviewed. The majority examined the effect of coconut oil or coconut products on serum lipid profiles. Coconut oil generally raised total and low-density lipoprotein cholesterol to a greater extent than cis unsaturated plant oils, but to a lesser extent than butter. The effect of coconut consumption on the ratio of total cholesterol to high-density lipoprotein cholesterol was often not examined. Studies on individuals with dry skin show that coconut oil can improve the moisture content of the skin. It can also reduce symptoms of eczema. Coconut oil appears to be especially effective at reducing belly fat, which lodges in the abdominal cavity and around organs. While coconut oil may have health benefits, it is high in saturated fat, and eating too much can be harmful.

Keywords: *coconut oil, nutrition, health*

Higijensko-dijetetski režim kod onkoloških pacijenata

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Sažetak

Maligne neoplazme su jedan od najvećih zdravstvenih i društvenih problema današnjice zbog velike učestalosti, visoke smrtnosti, patnje koju nanose oboljelim i njihovim porodicama, te velikog finansijskog i socijalnog opterećenja zdravstvenih sistema i društva u cjelini. Prehrana je vrlo značajan faktor u pojavi velikog broja hroničnih oboljenja, uključujući i nastajanje malignih neoplazmi. Onkološki pacijenti imaju poseban režim prehrane jer njihov organizam zahtjeva veće količine kalorija i proteina kako bi se mogao boriti protiv učinka malignih alteracija. Kod velikog broja onkoloških pacijenata već pri postavljanju dijagnoze uočavamo znatan gubitak tjelesne mase, masnog tkiva, a posebno proteina uz naglašenu upalnu aktivnost. Takvo tjelesno propadanje kod onkoloških pacijenata nazivamo sindromom tumorske kaheksije uz često prisutnu anoreksiju. Liječenje onkoloških pacijenata, uključujući higijensko-dijetetski režim, se provodi multidisciplinarno u specijaliziranim onkološkim centrima (bolnice, hospisi, primarna zdravstvena zaštita). Zdravstvena njega koju provodi bachleor zdravstvene njege zahtjeva holistički odnosno sistematizovan pristup, a provodi se na svim nivoima zdravstvene zaštite. Nakon uzimanja detaljne anamneze zdravstvene njege, u daljim fazama procesa zdravstvene njege definišu se problemi vezani za fizičku aktivnost „prehrana“ kao što su: učestalost mučnine i povraćanja, problemi u održavanju tjelesne mase i slično. Psihička podrška i edukacija pacijenata omogućava njihov brži oporavak te smanjuje pojavu brojnih komplikacija, čime se unapređuje kvalitet života oboljelih od maligne bolesti. Cilj istraživanja jeste identificirati faktore koji utiču na raširenost pojave problema koji su vezani za prehranu kod onkoloških pacijenata.

Ključne riječi: *prehrana, onkološki pacijenti, zdravstvena njega*

4-O-2

Hygienic-dietary regime in oncological patients

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Abstract

Malignant neoplasms represent one of the greatest health and societal problems of today, due to their increasing frequency, high mortality rates, the suffering that they cause to patients and their families, and the enormous financial and social burden on the health system and society as a whole. Nutrition is a highly notable factor in the emergence of a great number of chronic diseases, including the formation of malignant neoplasms. Oncological patients have a special dietary regime, since their organism requires ever-increasing amounts of calories and proteins in order to fight the effects of malignant alternations. In a large number of oncological patients, as early as the initial diagnosis, we can notice a significant loss a body mass, fat tissue and especially proteins with a prominent inflammatory activity. This kind of physical deterioration present in oncological patients is known as the tumor cachexia syndrome with commonly present anorexia. The treatment of oncological patients, including the hygienic-dietary regime, is conducted in a multidisciplinary manner in specialized oncological centers (hospitals, hospices, primary health care). Health care conducted by a Bachelor of Nursing requires a holistic, or in other words a systematic and wholesome approach to every patient, and it is conducted on all levels of medical care. After accounting for the detailed anamnesis of health care, in latter stages of health care issues related to the vital activity of „nutrition“ are defined, such as: the frequency of nausea and vomiting, problems in maintaining body mass and similar. Psychological support and education of patients enables their faster recovery and decreases the occurrence of numerous complications, thereby improving the quality of life for those suffering from the malignant disease. The aim of the study is to identify factors that influence the prevalence of nutrition-related in oncological patients.

Keywords: *nutrition, oncological patients, health care*

Trudnoća i dojenje-primjena i nutritivni značaj dodataka prehrani

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Sažetak

U periodima trudnoće i dojenja, zbog fizioloških promjena, povećanih nutritivnih potreba ili drugih razloga, nije moguće unijeti hranljive sastojke u optimalnim količinama, pa se često koriste dodaci prehrani.

Cilj istraživanja je bio da se deskriptivnom i opservacionom metodom ispita poznavanje i primjena dodataka prehrani kod trudnica i dojilja na području BiH. Anonimno anketiranje kroz dvije online ankete je sprovedeno na uzorcima trudnica (n=325) i dojilja (n= 246).

Na osnovu distribucije podataka dodatke prehrani je koristilo 78,8% trudnica. 86,3% ih je koristilo po preporuci ljekara ginekologa. U prvom trimestru trudnoće prenatal je koristilo 63, folnu kiselina 57, magnezij 19 trudnica. U drugom trimestru prenatal je koristilo 87, magnezij 31, folnu kiselinu 6, a željezo 9 trudnica. U trećem trimestru prenatal je koristilo 79, magnezij 29 trudnica, nešto manje željezo i folnu kiselinu.

Distribucijom rezultata ankete za dojilje, 66,7% dojilja je izjavilo da je sa suplementacijom počelo manje od mjesec dana poslije poroda. Od ukupnog broja anketiranih, njih 83 se izjasnilo da je tokom dojenja koristilo sljedeće: prenatal 64, željezo 4, folnu kiselinu 3, kalcij 9, magnezij 8 dojilja. 93,4% dojilja je koristilo folnu kiselinu tokom trudnoće, dok je 73,7% sa primjenom folne kiseline počelo prije trudnoće.

Tokom istraživanja došli smo do zaključka da je, zbog široke zastupljenosti primjena dodataka prehrani među trudnicama i dojiljama na području BiH, neophodna edukacija zdravstvenih radnika i korisnika, kako bi se zbog neželjenih efekata njihova primjena učinila bezbijeđnom i racionalnom.

Ključne riječi: *trudnoća, dojenje, dodaci prehrani, vitamini, minerali*

4-O-3

Pregnancy and lactation-use and nutritional significance of dietary supplements

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Abstract

During pregnancy and the lactational period there is an increased need for specific nutrients due to physiological changes in female body. Sometimes it is not possible to get all nutrients in optimal amount therefore women use specific dietary supplements to compensate them. The aim of the study was to investigate the level of knowledge about supplements and their use among pregnant and breastfeeding women in Bosnia and Herzegovina using a descriptive and observational method. Two anonymous online surveys were given to pregnant women (N=325) and breastfeeding women (N=246). Based on the distribution of data 78.8% of pregnant women used dietary supplements, 86.3% used them as recommended by gynecologists. In the first trimester of pregnancy prenatal pregnant women used 63, folic acid 57, magnesium 19. In the second trimester prenatal pregnant women used 87, magnesium 31, folic acid 6, and iron 9. In the third trimester prenatal pregnant women used 79, magnesium 29. This was a slightly less number of them used iron and folic acid. By distributing the results of the survey of breastfeeding women, 66.7% of them stated that they started supplementing less than one month after giving birth. Out of the total number of respondents, 83 stated that they used the following supplements during breastfeeding: prenatal 64, iron 4, folic acid 3, calcium 9, magnesium 8 women. 93.4% of breastfeeding women used folic acid during pregnancy, while 73.7% started using folic acid before pregnancy. During the research, we came to the conclusion that due to the widespread use of nutritional supplements among pregnant women and breastfeeding women in Bosnia and Herzegovina education of health professionals and users is seen as necessary in order to make their use safe and rational due to the side effects.

Keywords: *pregnancy, breastfeeding, dietary supplements, vitamins, minerals*

Interakcije oralnih hipoglikemika sa sastojcima u hrani i piću

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Sažetak

Oralni hipoglikemici su lijekovi koji snižavaju povišen nivo glukoze u krvi, te se koriste u liječenju dijabetesa tipa 2. Cilj ovog rada bio je da se prikažu neke od mogućih interakcija oralnih hipoglikemika sa sastojcima u hrani i piću. Đumbir (*Zingiber Officinale*) pokazuje renalne protektivne efekte kada se koristi sa metforminom, a kombinacija đumbira i glibenklamida pokazuje veću redukciju u nivou glukoze natašte u odnosu na primjenu samog glibenklamida. Gorka dinja (*Momordica Charantia*) u kombinaciji sa hipoglikemicima može uzrokovati ozbiljnu hipoglikemiju. Unos gorke dinje povećava broj beta ćelija u pankreasu i potencira oslobađanje inzulina. Bijeli luk (*Allium sativum*) također posjeduje hipoglikemička svojstva, te može uzrokovati hipoglikemiju u kombinaciji sa oralnim hipoglikemicima. A postoje i podaci koji govore da je antidijabetički efekat ekstrakta bijelog luka efikasniji od primjene glibenklamida. Susamovo ulje (*Oleum Sesami*) pokazuje sinergistički efekat u kombinaciji sa glibenklamidom, koji se ogleda ne samo u većem hipoglikemičkom učinku, već i u porastu nivoa enzimatskih i neenzimatskih antioksidanasa. Sok od grejpa blago povećava efekat repaglinida, snižava nivo glukoze u plazmi, poboljšava kontrolu tjelesne mase i osjetljivost na inzulin kod pacijenata sa metaboličkim sindromom. Također, može povećati incidencu laktatne acidoze kod pacijenata koji uzimaju metformin. Hlorogenska kiselina, koje najviše ima u kafi i zelenoj kafi može smanjiti apsorpciju ugljenih hidrata. Veoma je važno ukazati na lijek-hrana interakcije, jer one mogu dovesti ili do povećanja bioraspoloživosti lijeka, čime se povećava kako učinak, tako i rizik za pojavu neželjenih efekata, ili do smanjenja bioraspoloživosti lijeka što može rezultirati terapijskim neuspjehom.

Ključne riječi: *oralni hipoglikemici, interakcije, hrana*

Food-drug interactions of oral hypoglycemics

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Abstract

Oral hypoglycemics are drugs used to treat diabetes type 2 due to their ability to reduce high levels of glucose in blood. The aim of this paper was to present some of the possible interactions of oral hypoglycemics with food ingredients. Used with metformin, ginger (*Zingiber Officinale*) shows protective renal effects. Combination of ginger with metformin has bigger effect in reducing of fasting glucose, than the administration of glibenclamide alone. Bitter melon (*Momordica Charantia*) in combination with hypoglycemics can cause severe hypoglycemia. Bitter melon intake increases the number of beta cells in pancreas and potentiates insulin release. Garlic (*Allium sativum*) also has hypoglycemic properties and it can cause hypoglycemia in combination with oral hypoglycemics. And there is some evidence that the antidiabetic effect of garlic extract is more effective than the one of glibenclamide. Sesame oil (*Oleum Sesami*) exhibits a synergistic effect in combination with glibenclamide, which is reflected not only in a greater hypoglycemic effect, but also in an increase in the levels of enzymatic and non-enzymatic antioxidants. Grapefruit juice slightly increases the effect of repaglinide, lowers plasma glucose, improves weight control and insulin sensitivity in patients with metabolic syndrome. It can also increase the incidence of lactic acidosis in patients who take metformin. Chlorogenic acid, which is most commonly found in coffee and green coffee can reduce carbohydrate absorption. It is very important to consider drug-food interactions because they can have 2 clinical relevant effects. These interactions either increase the bioavailability of the drug, which increases both, the effect and the risk of side effects, or reduce the bioavailability of the drug, which can result in therapeutic failure.

Keywords: *oral hipoglycemics, interaction, food*

Borba protiv depresije počinje u kuhinji – uticaj ishrane na psihičko zdravlje i liječenje depresije i anksioznosti

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Sažetak

Depresija je stanje niskog raspoloženja i averzije prema aktivnostima što može dovesti do negativnih efekta na misli, ponašanje, emocije, pogled na svijet te tjelesno stanje osobe. Činjenica da su uzroci depresije brojni i raznoliki, otežava mnoga istraživanja ove bolesti, s obzirom da svaki pacijent može različito da doživi poremećaj i čak da različito reaguje na uspostavljene terapije. Heterogena i spontana priroda ove bolesti ukazuje na to da i terapija treba biti takva. Mora biti prilagođena svakom pacijentu individualno, uzimajući u obzir njegove životne navike i okruženja, također uključujući i fizičke i psihičke aspekte liječenja. Srećom, postoji širok spektar terapija, od antidepresiva do kognitivno-bihevioralne terapije. Jako su efektivne, ali to i dalje ne znači da je brzo ozdravljenje zagarantovano, a kamoli trajno. Promjene načina života su krucijalne i moraju biti sprovedene, s obzirom da to podrazumijeva signifikantnu optimizaciju liječenja. Pogotovo one promjene koje obuhvataju navike u ishrani. Izbori i odluke u ishrani znatno utiču na kvalitet i dužinu života, zdravlje, i čak mogu imati i pozitivan ili negativan učinak na dejstvo uspostavljene terapije. Hrana i namirnice koje sadrže biohemijski aktivne supstance su se stoljećima koristile kao lijekovi i funkcionišu i dalje kao komplementaran dodatak terapiji. Omega-3 masne kiseline, folna kiselina i B vitamini dokazano imaju blagotvorno dejstvo na psihičko zdravlje, pa su izvori ovih supstanci neizostavni u ishrani, kao terapija i kao prevencija. Stoga liječenje depresije ne može biti bazirano samo na terapijskim supstancama, nego mora biti višestrano i sveobuhvatno. Cilj ovog rada je destigmatizacija depresije i anksioznosti te ukazivanje na to kako se uvođenjem jednostavnih promjena u načinu života može postići optimalan učinak terapije. Rad se bazira na literaturi koja je dostupna u bibliotekama Univerziteta u Beču. Unošenje namirnica koje su bogate omega-3 masnim kiselinama, folnom kiselinom i vitaminima B u svakodnevnu ishranu, zajedno sa redovnim i pravilno pripremljenim obrocima, ne samo da je veoma učinkovita prevencija protiv psihičkih poremećaja, nego i ubrzava i upotpunjuje proces liječenja istih.

Ključne riječi: *depresija, anksioznost, prevencija depresije, mediteranska dijeta, Omega-3 masne kiseline*

4-O-5

Eat your depression away – The effect of nutrition on mental health and the treatment of depression and anxiety

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Abstract

Depression is a chronic mental disorder that causes changes in mood, thoughts, behavior and physical health. Depression is the leading global disability, additionally, it is the 10th leading cause of early death. The fact that there are numerous and diverse factors which are a contribution to the development of this disability, makes it even harder to decide what exactly the primary cause is. Every single patient may experience it differently. A certain therapy may work perfectly for one patient, but for the other, it may even cause more harm than good. The therapeutic process has to be versatile as well. It has to be tailored for each individual separately, in accordance with their life and circumstances, including both physical and mental aspects. Luckily, there is a wide array of therapeutical options. From antidepressants to cognitive behavior therapy. They are indeed very effective, but that is still not a guarantee for fast, nor long-term recovery. Major lifestyle reforms ought to be executed to reach the maximum potential and efficiency of the therapy. Segment that has a tremendous impact on our physical and mental health are dietary habits. Dietary habits and choices play a significant role in the quality of life, health, longevity and even in the quality and effectiveness of a certain drug or other forms of therapy. Foods containing biochemically active substances have been used therapeutically throughout the ages and continue to function as important adjuncts to drug therapy, which is why they mustn't be neglected. For example, substances like Omega-3 fatty acids, folic acid, and other B vitamins are proven to be beneficial for mental health, as a therapy and as a prevention equally. This project aims to destigmatize mental illnesses like depression and anxiety, and to show how the therapy can be easily advanced by implementing rather simple, healthy dietary habits into the daily routine. The project is mainly based on literature which is available at the Library of the University of Vienna. Including certain nutrients like omega-3 fatty acids, B Vitamins, folic acid, etc., into the daily diet, and changing detrimental dietary habits, can leave a positive mark on mental health, thus it is useful as a prevention, and as an adjunct to drug therapy.

Keywords: depression, anxiety, preventing depression, Mediterranean diet, Omega-3 fatty acids

Interakcije digoksina sa hranom i suplementima prehrane

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Sažetak

Digoksin se primjenjuje u terapiji srčane insuficijencije i metabolizira se preko efluksnog transportera, P-glikoproteina (P-gp). Inhibicijom ili indukcijom P-gp može se značajno izmijeniti njegov farmakokinetički profil. Cilj ovog rada je prikazati moguće interakcije i mehanizme nastanka interakcija digoksina sa hranom i suplementima prehrane. Administracijom digoksina sa hranom bogatom vlaknima, njegova bioraspoloživost se smanjuje za 20% te se treba primjenjivati 1 sat prije ili 2 sata poslije obroka. Primjena tableta digoksina uz standardni obrok smanjuje brzinu apsorpcije, a hrana bogata vlaknima smanjuje i brzinu i obim apsorpcije. Slabiji efekat na bioraspoloživost digoksina se javlja kada se on primijeni u inkapsuliranom obliku. Sok od grejpa je inhibitor enzima CYP3A4 i intestinalnog P-gp pa se preporučuje oprez prilikom istovremene primjene kako ne bi došlo do pojave previsokih serumskih koncentracija digoksina. Opres je neophodan i prilikom suplementacije preparatima kalcija jer konkomitantna terapija digoksinom može pogoršati aritmogene efekte hiperkalcijemije, dovodeći do simptomatskog poremećaja ritma. Mehanizam nastanka aritmija povezan je sa aditivnim inotropnim efektima digoksina i kalcija na miokard. Vitamin D3 je induktor P-gp, a može uzrokovati i hiperkalcijemiju što dalje može dovesti do intoksikacije digoksinom i ozbiljnih aritmija. Serumski nivoi digoksina, kalcija i fosfora se trebaju nadzirati pri istovremenoj primjeni sa vitaminom D i njegovima analogima. Alkohol pogoršava neželjene efekte digoksina na nivou CNS-a kao što su pospanost, konfuzija, poremećaji ravnoteže, dezorijentacija i amnezija. Obzirom na uzak terapijski indeks digoksina, potrebno je ukazati na mogućnost i značaj nastanka spomenutih interakcija sa hranom i suplementima prehrane kako bi se izbjegla pojava intoksikacije ili izostanka terapijskog efekta.

Ključne riječi: *digoksin, interakcije, P-glikoprotein, hrana*

4-O-6

Interactions of digoxin with food and food supplements

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Abstract

Digoxin is used for treatment of heart failure and it's metabolized by efflux transporter P-glycoprotein (P-gp). Inhibition or induction of P-gp can significantly change pharmacokinetics of digoxin. The aim of this work was to present possible interactions and mechanism of interactions between digoxin, food and food supplements. Concurrent administration of digoxin and food rich in fiber decreases digoxin's bioavailability for 20% so digoxin should be applied one hour before or two hours after the meal. Administration of digoxin tablets with regular meal decreases rate of absorption. Administration of digoxin and food rich in fiber decreases both rate and range of absorption. These effects on bioavailability are lesser when digoxin is encapsulated. Grapefruit juice inhibits enzyme CYP3A4 and intestinal P-gp. It's recommended to be cautious when it's used at the same time with digoxin because grapefruit juice can increase serum levels of digoxin. Contemporaneous use of digoxin and calcium can worsen arrhythmogenic effects of hypercalcemia, leading to symptomathic rhythm disruption. Development of arrhythmia is connected with additive inotropic effects of digoxin and calcium on myocard. Vitamine D3 induces P-gp and it can cause digoxin intoxication and severe arrhythmia. According to that, digoxin, calcium and phosphorus levels should be monitored during concurrent administration of vitamin D and its analogs. Alcohol detoriates digoxin side effects on central nervous system such as somnolence, confusion, balance disorders, disorientation and amnesia. Considering narrow therapeutic range of digoxin, it is necessary to point out the possibility and significance of above mentioned interactions with food and food supplements. That's the proper way to avoid intoxication or absence of therapeutic effects.

Key words: *digoxin, interactions, P-glycoprotein, food*

Enteralna prehrana u Chronovoj bolesti

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Sažetak

Chronova bolest je upalna bolest probavnog sistema, mada tačan uzrok nije poznat, sumnja se na genetske sklonosti i faktore okoliša. Simptomati su: rane u ustima, gubitak težine, umor, proljev etc. Enteralna ishrana je jednostavna, ne izaziva česte ili ozbiljne komplikacije, jeftiniji je način ishrane od parenteralne ishrane, ali dovodi do probavnih smetnji. Brojne studije su pokazale učinkovitost enteralne prehrane upravo u pogledu remisije bolesti. Već u toku uspostavljanja dijagnoze, kod velikog broja pacijenata zabilježen je nutritivni deficit, koji se tokom napredovanja bolesti pogoršava. U akutnoj fazi bolesti ishrana se svodi na lahko probavljive namirnice. Nakon određenog vremena pacijentu se može davati čvrsta hrana. Unos mlijeka u organizam nije preporučljiv u ovoj fazi. Također, unos začinjene hrane i masti treba svesti na minimum. Kada nastupi remisija bolesti, kreće se eliminacijskom dijetom. Eliminacijska dijeta podrazumijeva prehranu bez mliječnih, pekarskih proizvoda, mesa, konzerviranih proizvoda i proizvoda sa emulgatorima, životinjske masti, hrane bez glutena itd. Ukoliko se pacijentu od određene namirnice počne pogoršavati stanje, ta se namirnica mora izbaciti iz prehrane, ali se ne smije izbjegavati cijela grupa namirnica. Postoje tzv. posebni pripravci, napravljeni za pacijente sa dijagnozom Chronove bolesti. Oni su obogaćeni omega 3 masnim kiselinama i faktorom rasta. U ovom radu prikazani su rezultati studije Specifična ugljikohidratna dijeta za upalne bolesti crijeva učestvovali su pacijenti sa remisijom ove bolesti, a koji su primjenjivali datu dijetu. Rezultati su pokazali da je enteralna prehrana prvi izbor terapije akutne faze Chronove bolesti posebno kod djece, a može da zamjeni terapiju sa kortikosteroidima.

Ključne riječi: *Chronova bolest, enteralna ishrana*

Enteral nutrition in Crohn's disease

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Abstract

Crohn's disease is an inflammatory disease of the digestive system. Although the exact cause is unknown, genetic preferences and environmental factors are suspected. Symptoms are: sores in the mouth, weight loss, fatigue, diarrhea etc. Enteral nutrition is simple, it does not cause frequent or serious complications, it is a cheaper way of nutrition than parenteral nutrition, but it does cause digestive problems. Numerous studies have shown the efficacy of enteral nutrition in terms of remission. At the time of establishing diagnosis, many of patients had a nutritional deficit, which worsens the disease progresses. In the acute phase of the disease, nutrition is reduced to easily digestible foods. After some time the patient may be given solid food. Milk intake is not recommended at this stage. Also, the intake of spicy foods and fats should be minimized. When remission occurs, it moves on to an elimination diet. Elimination diet involves eating dairy free, bakery products, meat, canned and emulsifier products, animal fat, gluten free foods, etc. If a patients' state begins to worsen from a particular food item, that food item should be eliminated from the diet, but this whole group of foods should not be avoided. There are so-called special preparations made for patients diagnosed with Crohn's disease. They are enriched with omega 3 fatty acids and growth factor. In this papaer the results of the study Specific Carbohydrate Diet for Inflammatory Bowel Disease was presented. This study was attended by patients with remission of this disease, who applied the given diet. Results sugested that enteral nutrition is the first choice of acute phase therapy for Crohn's disease, especially in children, and may replace corticosteroid therapy.

Key words: *Crohn's disease, enteral nutrition*

Dijetoterapija kod sportskih povreda

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Sažetak

Svi sportisti bez obzira na stepen aktivnosti, profesionalci ili rekreativci, su u potencijalnoj opasnosti razvijanja sportskih povreda. Povrede su najčešće vezane za muskuloskeletni sistem, koje u krajnjem slučaju mogu rezultirati periodom imobilizacije. Povrede skeletnih mišića obuhvataju oko 40% svih povreda, sa donjim ekstremitetima kao vodećim dijelovima podložnim povredama. Ostale česte povrede uključuju frakture, posebice stres frakture, te povrede tetiva i ligamenata. Period oporavka može biti težak za sportistu zbog fizičke neaktivnosti koja dovodi do slabljenja snage i mišićne mase. Dobra nutritivna strategija može u velikom dijelu pomoći kod smanjenja negativnih simptoma koji se dešavaju kod povreda izazvanih vježbanjem. Glavni cilj ovog rada jeste da se objasni kako dobra ishrana može osigurati brži povratak sportiste, zatim prikaz nekih nutritivnih strategija, te preporuke tretmana ishranom koje se baziraju na korištenju glavnih nutritivnih elemenata koji pomažu u oporavku povreda. Izvori informacija za ovaj rad su bili mnogobrojni izabrani naučni radovi, od kojih su neki obuhvatali klinička istraživanja vezana za sportske povrede kod visoko aktivnih sportista, neovisno od sportske discipline, te kod imobiliziranih pacijenata. Rezultati su pokazali da iako ishrana ima slab ili nikakav uticaj kod prevencije sportskih povreda izazvanih jakim ili nepravilnim treningom, kao dio sveukupnog tretmana nakon povrede ishrana igra veliku ulogu u brzini fiziološkog odgovora tijela, što može dovesti do bržeg i sigurnijeg povratka sportiste, potpunog oporavka te manje učestalosti povreda.

Ključne riječi: *sportske povrede, nutritivni pristup, oporavak*

Diethotherapy in sports injuries

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Abstract

All athletes regardless of their level of sporting participation, elite or recreational, are at risk of developing an injury. Injuries usually occur within the musculoskeletal system which can result in a period of immobilization. Injuries to skeletal muscle account for over 40% of all injuries, with the lower leg being the predominant site of injury. Other common injuries include fractures, especially stress fractures, and injuries to tendons and ligaments. The recovery period can be a hard time for athlete due to physical inactivity with expected losses in strength and muscle mass. Good nutrition plan is a powerful method for reducing the negative impact of an exercise-induced injury. The main objective of this work is to explain how nutrition can ensure a faster comeback of athletes, some nutritional strategies and recommendations after a sports injury, emphasizing the use of main nutrients and elements for the injury recovery. Sources of information were many selected articles which included clinical trials related to sports injuries in high-performance athletes, in any sports discipline or in immobilized patient. Results showed that although nutrition have zero or little role in preventing injuries related to overuse or improper training, as a part of the treatment after the injury happens, the nutritional approach is key to improve the physiological response and maintain the body composition to promote a quick and safe return to the play, complete healing and less frequent injury recurrence.

Key words: *sports injuries, nutritional approach, recovery*

Interakcije dodataka ishrani i lijekova

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Sažetak

Dodaci prehrani, odnosno dijetetski suplementi, široko su upotrebljavani proizvodi s ciljem ostvarivanja povoljnog učinka na zdravlje organizma. To su preparati koji nadopunjuju normalnu ishranu i predstavljaju koncentrovane izvore vitamina, minerala i drugih supstanci sa hranljivim i fiziološkim efektima. No, dijetetski suplementi mogu dovesti do neželjenih djelovanja uslijed neprimjerenog konzumiranja ili interakcija. Cilj ovog rada je ispitati prevalenciju korištenja dodataka prehrani te procijeniti stavove, znanja i informiranost ispitanika o interakcijama dijetetskih suplemenata i lijekova. Instrument kojim je provedeno ovo istraživanje su dva anketna upitnika. Jedan anketni upitnik je namijenjen korisnicima dijetetskih suplemenata i proveden je na uzorku od 252 korisnika. Drugi anketni upitnik je namijenjen magistrima farmacije koji su zaposleni u apotekarskoj djelatnosti, te je proveden na uzorku od 15 farmaceuta. Najveći broj ispitanika smatra da su nam dijetetski suplementi neophodni za normalno funkcionisanje organizma. To ukazuje na važnost informisanja korisnika o dijetetskim suplementima. Ispitanici, najčešće, informacije o dijetetskim suplementima traže od zdravstvenih radnika (59,4%), što ukazuje na važnost njihove educiranosti. 19,4 % ispitanika nije znalo odgovor na pitanje o mogućim posljedicama istovremene primjene lijeka i dodatka prehrani. Najviše ispitanika (21,4%) je bilo upoznato sa interakcijom vitamina K i varfarina. Povratna informacija prilikom anketiranja farmaceuta je bila ispod prosjeka, uslijed nedostatka vremena i obima posla koji su farmaceuti imali u trenutku anketiranja. Ispitanici su pokazali da nisu adekvatno informisani i upoznati sa ovom temom, te se dolazi do zaključka da su edukacije o interakcijama lijekova i dijetetskih suplemenata potrebe.

Ključne riječi: *dodaci prehrani/dijetetski suplementi, lijekovi, interakcije*

4-O-9

Interaction of dietary supplements and medication

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Abstract

Dietary supplements are worldwide used products with aim to make positive effect on human health. These products are intended to supplement diet and they are concentrated sources of vitamins, minerals and other substances with nutritional and physiological effects. Dietary supplements can lead to adverse effects, as a result of inappropriate consumption or interactions. The aim of this paper is to examine the prevalence of the use of dietary supplements and to evaluate the opinions, knowledge and information on the interactions of dietary supplements and medications. The instrument used to conduct this research are two questionnaires. One questionnaire is intended for dietary supplement users and conducted on a sample of 252 users. The second questionnaire was designed for pharmacy masters employed in pharmacy and was conducted on a sample of 15 pharmacists. The majority of respondents believe that dietary supplements are necessary for normal functioning of the body. This points to the importance of informing users about dietary supplements. Respondents, most often, seek information about dietary supplements from health care workers (59.4%), indicating the importance of their education. 19.4% of respondents did not know the answer to the question about the possible consequences of consuming drugs and dietary supplement at the same time. Most respondents (21.4%) were familiar with the interaction of vitamin K and warfarin. Pharmacist survey feedback was below average due to the lack of time and amount of work that pharmacists had at the time of the survey. Respondents indicated that they were not adequately informed and aware of the topic, and concluded that education on drug-dietary supplement interactions is needed.

Keywords: *dietary supplements, drugs, interactions*

Zdravstveni efekti konjugovane linolne kiseline

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Sažetak

Konjugovana linolna kiselina (CLA) vodi svoje porijeklo u hrani, kao posljedica niza procesa biohidrogenacije nezasićenih masnih kiselina, pod utjecajem bakterija koje se nalaze u traktu preživara, ponajviše krava. S obzirom da je konjugovana linolna kiselina skupina različitih izomera, svaki od tih izomera može imati različite efekte, ili djelovati sinergistički. CLA predstavlja i prirodnu, polinezasićenu masnu kiselinu koja je privukla značajnu pažnju u proteklih nekoliko decenija zbog svojih potencijalnih pozitivnih bioloških efekata, uključujući i protektivne efekte za određene vrste kancera, ateroskleroze i pretilost. Ciljevi rada bili su istražiti mehanizme i značaj djelovanja CLA u vezi sa strukturom, te koje su dnevne količine potrebne da bi se postigao pozitivan terapijski učinak. Rezultati istraživanja pokazali su da dijetalna primjena mješavine dva izomera konjugirane linolne kiseline (CLA), trans-10 i cis-12, inhibiraju progresiju i induciraju regresiju prethodno uspostavljene ateroskleroze. Također, dokazano je da dodatak CLA značajno poboljšava metabolizam TAG (triacilglicerola) i VLDL (lipoproteini vrlo male gustine), te da je određene kardio-protektivne efekte CLA, dokazani na životinjskim modelima, moguće ekstrapolirati i na organizam čovjeka. Još jedan od važnijih rezultata jeste i da CLA odlaže početak dijabetesa kod pacova djelovanjem na masno tkivo. Istraživanja su pokazala da konjugirana linolna kiselina ima i hemoprotektivnu aktivnost kod raka dojke štakora. Djelimično, CLA djeluje izravno na epitel dojke kako bi inhibirala sintezu DNA i stumilirala apoptozu. Kliničkom studijom pokazana je značajna efikasnost CLA na redukciju abdominalne gojaznosti kod muškaraca u odnosu na placebo grupu. Zaključno, rezultati do sada provedenih istraživanja pokazuju da se CLA može smatrati bioaktivnom molekulom sa potencijalnom primjenom u medicini.

Ključne riječi: konjugovana linolna kiselina, ateroskleroza, antikancerogeno djelovanje, pretilost, dijabetes

Health effects of conjugated linoleic acid (CLA)

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Abstract

Conjugated linoleic acid (CLA) leads its source in food, as an outcome of many processes bio-dehydrogenation of unsaturated fatty acids, under effects of bacteria from the tract of ruminants, mostly cows. Considering the fact that conjugated linoleic acid is the group of different isomers, all of them can have different effects, or act synergistically. CLA is also a natural, polyunsaturated fatty acid, which has attracted attention for the past several decades because of its positive biological effects, including protective effects for several types of cancer, atherosclerosis and obesity. The aims of this work were to investigate structure related mechanism of action and significance of health effects and to find out the daily amount needed to achieve positive therapeutic effect. The results of research have shown that administration of two isomers mixture of CLA trans-10 and cis-12 inhibit the progression and induce the regression of previously established atherosclerosis. It has also been proved that CLA addition significantly improves TAG metabolism (triacylglycerol) and VLDL (very low density lipoproteins) and that some of cardio-protective CLA effects, proven on animal models, can be extrapolated on humans. Another important result is that CLA postpones beginning of diabetes in rats by affecting fat tissue. Research has shown that CLA also has chemo protective activity for breast cancer in rats. Partially, CLA can directly affect breast epithelium to inhibit DNA synthesis and stimulate apoptosis. Clinical study has shown significant CLA efficiency on reduction of abdominal obesity in men compared to placebo group. In conclusion, the results of so far conducted research show that CLA can be considered as a bioactive molecule with potential application in medicine.

Key words: *conjugated linoleic acid, atherosclerosis, anticancer effects, obesity, diabetes*

Poređenje efikasnosti dijete „dijetalni pristupi sprječavanju hipertenzije“ i mediteranske dijete kao nefarmakoloških mjera u tretmanu hipertenzije

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Sažetak

Dijeta „dijetalni pristupi sprječavanju hipertenzije“ (engl. *Dietary Approaches to Stop Hypertension; DASH*) se temelji na unosu hrane sa smanjenim sadržajem ukupnih masti, zasićenih masti, holesterola i natrija (uključuje ograničen unos crvenog mesa i rafiniranih ugljikohidrata) i povećanim sadržajem vlakana, kalija, kalcija i magnezija (uključuje intenzivan unos voća, povrća, integralnih žitarica, nemasnih mliječnih proizvoda, ribe, peradi i orašastih plodova). Mediteranska dijeta (engl. *the Mediterranean Diet; MedDiet*) se temelji na povećanom unosu voća, povrća, orašastih plodova, integralnih žitarica, biljnih ulja i ribe, umjerenom unosu peradi i mliječnih proizvoda te smanjenom unosu crvenog mesa i rafiniranih ugljikohidrata. Cilj ovog rada je uporediti efikasnost i uticaj DASH dijete i MedDiet na smanjenje krvnog pritiska kod hipertenzivnih ljudi. DASH dijeta definiše preporučeni dnevni unos osnovnih grupa namirnica. MedDiet daje preporuke i o dnevnom i o sedmičnom unosu pojedinih grupa namirnica. Glavne razlike između DASH dijete i MedDiet su manji sadržaj natrija (ispod 100 mmol dnevno) koji se preporučuje u DASH dijeti i veći sadržaj mononezasićenih i omega-3 masnih kiselina koji se preporučuje u MedDiet. Stoga, DASH dijeta je pokazala uticaj na smanjenje krvnog pritiska (2,9-3,5 mmHg). MedDiet je imala povoljan uticaj na smanjenje krvnog pritiska (4,0 mmHg sistolni, 4,3 mmHg dijastolni), te nivoa glukoze i lipida u krvi u hipertenzivnih osoba. Najbolji rezultati su ostvareni kombinacijom obje dijete, posebno kod osoba sa hipertenzijom, i to onih koji su se dugoročno pridržavali dijetalnih promjena. Potrebno je provesti još istraživanja da bi se bolje razumio uticaj ove dvije dijete na promjene krvnog pritiska.

Ključne riječi: hipertenzija, mediteranska dijeta, dijetalni pristupi sprječavanju hipertenzije

4-O-11

Comparison of the effectiveness of the „dietary approaches to stop hypertension“ diet and the Mediterranean diet as non-pharmacological measures in the treatment of hypertension

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Abstract

„Dietary approaches to stop hypertension“ (*DASH*) diet is based on the intake of foods with a reduced content of total fats, saturated fats, cholesterol and sodium (restricted intake of red meat and refined carbohydrates) and an increased content of fibers, potassium, calcium and magnesium (significant intake of fruits, vegetables, whole grains, low-fat dairy products, fish, poultry and nuts). Mediterranean diet (*MedDiet*) is based on a greater intake of fruits, vegetables, nuts, whole grains, vegetable oils and fish, moderate intake of poultry and dairy products and limited intake of red meat and refined carbohydrates. The objective of this paper is to compare effectiveness and impact of DASH diet and MedDiet on reducing blood pressure in hypertensive people. DASH diet defines the recommended daily intake of essential food groups. MedDiet provides recommendations for both daily and weekly intake of particular food groups. The main differences between DASH diet and MedDiet are the lower amount of sodium, below 100 mmol per day (DASH diet) and the higher amount of monounsaturated and omega-3 fatty acids (MedDiet). DASH diet showed an effect on reducing blood pressure (2,9-3,5 mmHg). MedDiet had a favorable effect on reducing blood pressure (4,0 mmHg systolic, 4,3 mmHg diastolic) and blood glucose and lipid levels in hypertensive people. The best results were achieved when combining both diets, especially in people with hypertension, primarily those who adhered to long-term dietary changes. More research is needed to better understand the impact of these two diets on changes in blood pressure.

Keywords: *hypertension, the Mediterranean diet, dietary approaches to stop hypertension*

Antiinflamatorna dijeta

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Sažetak

Antiinflamatorna dijeta je dijeta koja se primjenjuje u cilju smanjenja i prevencije hroničnih upalnih procesa u organizmu. Uloga antiinflamatorne dijeta u procesima inflamacije se ogleda u tome što prilikom primjene ove dijeta dolazi do smanjenja proizvodnje proinflamatornih citokina i povećanja proizvodnje antiinflamatornih citokina. Antiinflamatorna dijeta ima značajnu ulogu u prevenciji i usporavanju progresivnog toka mnogih hroničnih bolesti u čijoj pozadini se nalaze inflamatorni procesi. Primjena antiinflamatorne dijeta u terapiji autoimunih bolesti dovodi do poboljšanja kliničkih znakova bolesti, kao naprimjer smanjenje disabiliteta kod multiple skleroze. Uloga antiinflamatorne dijeta u terapiji i prevenciji kardiovaskularnih bolesti se ogleda u prvenstveno njenom antisklerotskom učinku. Antiinflamatorna dijeta također putem različitih mehanizama pokazuje efekat u prevenciji i usporavanju razvoja maligniteta. Antiinflamatorna dijeta predstavlja najsigurniji pristup liječenju ovih hroničnih bolesti i može se primjenjivati istovremeno sa farmakoterapijom prilikom liječenja ili sama kao vid prevencije kod osoba koje imaju povećan rizik od nastanka ovih bolesti. Kao vid antiinflamatorne dijeta može se primjeniti mediteranska dijeta koja je relativno ukusna, a ne dovodi do drastičnih promjena u ishrani.

Ključne riječi: *antiinflamatorna dijeta, hronični upalni procesi, mediteranska dijeta*

Anti-inflammatory diet

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Summary

Anti-inflammatory diet is a type of diet used to decrease and prevent chronic inflammation within the organism. Anti-inflammatory diet surpresses inflammation by decreasing the production of proinflammatory cytokines and increasing the production of anti-inflammatory cytokines. The diet has a significant role in prevention and postponing the progress of many chronic diseases, that are associated with inflammatory processes. The use of anti-inflammatory diet in treatment of autoimmune diseases leads to more beneficial clinical outcomes, e.g. decrease in disability of patients with multiple sclerosis. Anti-inflammatory diet also has an anti-sclerotic effect and therefore a significant role in prevention and treatment of cardiovascular diseases. The effect of anti-inflammatory diet in prevention and postponement of malignant progress has also been proven. Anti-inflammatory diet presents the safest treatment approach of many chronic diseases and it can be combined with pharmacotherapy in treatment of these diseases or it can be used alone as a form of prevention in persons who have a high risk of developing these diseases. One of the anti-inflammatory diets is Mediterranean diet which does not have drastic diet changes and is relatively flavourful, and therefore more tolerated by the patients.

Keywords: anti-inflammatory diet, chronic inflammation, mediterranean diet

Utjecaj konzumiranja mliječnih proizvoda na pojavnost akni

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Sažetak

Acne vulgaris je kronična polietiološka dermatoza koja zahvaća pilosebacealnu jedinicu. Karakterizira je povećana proizvodnja loja, nakupljanje loja zbog suženja pilosebacealnog ušća, kolonizacija bakterijom *Propionibacterium acnes* i posljedična upala. Važnu ulogu u nastanku akni ima genetska predispozicija, ali također i prehrana. Nasljeđivanje akni ne objašnjava njihovu veliku prevalenciju od preko 80% u razvijenim zemljama. Dugo se raspravljalo pridonose li zapadnjačke dijete same po sebi prevalenciji i ozbiljnosti akni ili pak specifične dijetetske komponente. Između ostalih prehrambenih namirnica, istraživanja su pokazala značajnu povezanost mlijeka i mliječnih proizvoda ovim kožnim oboljenjem. Mlijeko i mliječni proizvodi utječu na pojavnost akni podižući plazmatske razine inzulinu sličnog faktora rasta (IGF-1) kao i putem hormonskih medijatora, koji potiču lipogenezu lojnih žlijezda. Ovdje se posebno ističe obrano mlijeko koje u usporedbi s punomasnim mlijekom sadrži manje estrogena, hormona koji je poznat da smanjuje pojavnost akni. Hormonalni utjecaj se također utvrdio konzumacijom sira i jogurta, a poznato je da fermentacija dovodi do produkcije više testosterona nego njegovi prekursori u mlijeku. U posljednje vrijeme utjecaj mlijeka i mliječnih proizvoda na pojavu akni privlači veliku pozornost budući da najvažniji izvor kalcija proizlazi upravo iz tih prehrambenih namirnica, te djeluju kao pokretači rasta i mineralizacije kostiju, dok se s druge strane pokazalo da akne imaju sve više psihološkog utjecaja jer mogu uzrokovati smanjeno samopouzdanje, socijalno povlačenje i depresiju što je naročito izraženo kod adolescenata.

Ključne riječi: *acne vulgaris*, prehrana, mlijeko i mliječni proizvodi

4-O-13

Influence of dairy consumption on the incidence of acne

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Abstract

Acne vulgaris is a chronic polyetiological dermatosis affecting the pilosebaceous unit. It is characterized by increased tallow production, tallow accumulation due to narrowing of the pilosebaceous estuary, colonization by *Propionibacterium acnes* and subsequent inflammation. Genetic predisposition, but also nutrition, play an important role in acne formation. Acne hereditary does not explain their high prevalence of over 80% in developed countries. It has long been debated whether Western diets or a specific dietary component contribute to the prevalence and severity of acne. Among other foods, research has shown a significant association of milk and dairy products with this skin condition. Milk and dairy products affect the incidence of acne by raising plasma levels of insulin-like growth factor (IGF-1) as well as via hormonal mediators, which promote lipogenesis of sebaceous glands. The highlight here is skim milk, which, compared to whole milk, contains less estrogen, a hormone known to reduce the incidence of acne. Hormonal influence has also been found by consuming cheese and yogurt, and fermentation is known to produce more testosterone than its precursors in milk. Lately, the influence of milk and dairy products on the appearance of acne has been attracting a lot of attention, since the most important source of calcium comes from these foods, and they act as drivers of bone growth and mineralization, while acne has been shown to have more and more psychological impact because they can cause decreased self-esteem, social withdrawal, and depression, which is particularly seen in adolescents.

Keywords: *acne vulgaris*, *nutrition*, *milk and dairy products*

Specifičnosti nutricionističke epidemiologije koje otežavaju formiranje dijetarnih preporuka

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Sažetak

Informacije o tome kako ishranom unaprijediti zdravlje i prevenirati određena oboljenja se dostavljaju stanovništvu putem vodiča za pravilnu ishranu koje publikuju različiti zdravstveni organi i nevladine organizacije. Sve preporuke u njima moraju biti utemeljene na dokazima visoke kvalitete. Iako se jačina dokaza za svaku preporuku unutar vodiča procjenjuje na osnovu objektivnih kriterija, oni su veoma podložni kritici. Tijelo dokaza u nutricionizmu najvećim dijelom čine rezultati observacionih, a ne randomiziranih kontroliranih studija, koje pružaju dokaze najveće kvalitete. Pored toga je prisutan i veliki broj rezultata slabe statističke snage, te nekonzistentni rezultati studija sa istim hipotezama. Iza ovoga stoje specifičnosti nutricionističke epidemiologije koje treba imati u vidu prilikom analiziranja rezultata studija i koje otežavaju formiranje jasnih preporuka. Ovaj rad prikazuje izazove s kojima se naučnici u ovom polju susreću pri dizajniranju studija, mjerenju izloženosti i korištenju baza podataka. Razlog manjoj zastupljenosti randomiziranih kontroliranih studija jeste što ih je u nutricionizmu veoma teško dizajnirati, s obzirom na kompleksnost ishrane. Iz istog razloga je i mjerenje izloženosti u vidu ishrane teško. Niti jedan od najčešće korištenih instrumenta ne daje precizne podatke o unosu pošto se baziraju na metodi samoprocjene i na memoriji ispitanika, te mijenjaju obrazac ishrane tokom perioda praćenje. Prikupljeni podaci se potom kvantificiraju kroz baze podataka, koje uglavnom ne postoje na lokalnim nivoima ili nisu međusobno komparabilne, tečesto ne sadrže složena jela i različite načine pripreme. Poznavanjem ovih specifičnosti, rezultati nutricionističkih studija se mogu pravilno interpretirati, što je ključno za formiranje dijetarnih preporuka, koje daju značajan doprinos javnom zdravlju.

Ključne riječi: nutricionistička epidemiologija, vodiči za pravilnu ishranu, dijetarne preporuke, mjerenje unosa hrane, dizajn studije

4-O-14

Challenging factors of nutritional epidemiology in making dietary recommendations

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Abstract

Information of health benefits of nutrition is presented to the population through dietary guidelines which are published by public health agencies and non-governmental agencies. All of the recommendations within them have to be based on the highest quality evidence. Although the evidence in nutrition is judged by the objective criteria, the guidelines are sometimes criticised. The body of evidence is consisted mostly of the results from observational studies, instead of interventional ones, which are considered to give the highest quality evidence. Also, a large number of studies with statistically weak results and inconsistencies in findings are present. These can be explained with particularities of nutritional epidemiology which have to be considered during the evidence analysis and which make the process of recommendation making difficult. This paper reviews the limitations of study design, exposure measurement and databases. The number of randomised controlled studies in nutrition is limited due to the difficulties in designing them, because of the complexity of the human diet. This is also the reason for the difficulties in measuring dietary exposure. None of the most commonly used instruments collects data precisely because they are based on self-reporting. Another issues which occur are relying on the respondents' memory, changes in respondents' dietary pattern during the measurement period and difficulties in evidencing long-term usual diet. Collected data are then quantified in nutritional databases. Problems are the lack of local databases, the lack of data for complex meals and different methods of food preparation and incomparability of databases across countries. Despite their criticism, dietary guidelines have made an important contribution to public health. Awareness of abovementioned limitations helps in the objective analysis of evidence coming from nutritional studies.

Keywords: nutritional epidemiology, dietary guidelines, dietary recommendations, dietary intake assessment, study design

Peptidi iz hrane kao inhibitori angiotenzin-konvertirajućeg enzima

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Sažetak

Kardiovaskularne bolesti, uz maligna oboljenja, predstavljaju najčešći uzrok smrtnosti u razvijenim zemljama, ali i u Bosni i Hercegovini. Hipertenzija je jedan od osnovnih uzroka nastanka kardiovaskularnih bolesti, pa danas postoji više grupa lijekova koji se koriste za kontrolu i regulaciju povišenog krvnog pritiska. Inhibitori angiotenzin-konvertirajućeg enzima (ACE inhibitori) su najčešće korištena grupa lijekova, koja uz brojne benefite za pacijenta, posjeduje i određena neželjena djelovanja. Tu se prije svega misli na njihovo fetotoksično djelovanje što ih čini kontraindiciranim za upotrebu u trudnoći. Već je izvjesno vrijeme poznato da postoje peptidi malih molekulskih masa koji su sastavni dio proteina prisutnih u različitim vrstama hrane i koji ostaju u latentnoj formi sve dok se ne oslobode enzimatskom hidrolizom, prilikom obrade hrane, ili prilikom varenja hrane u gastrointestinalnom traktu. Uglavnom se radi o peptidima koji u svom sastavu imaju do pet aminokiselina, a porijeklom mogu biti iz humanog ili animalnog mlijeka, animalnih ili biljnih sirovina, uključujući i alge i kvasce. Cilj ovog rada je da se predstavte takvi peptidi, prikaže njihova struktura, mehanizam djelovanja i moguća upotreba kao sastojaka proizvoda iz grupe funkcionalne hrane koji bi mogli ispoljavati zdravstvene benefite, posebno kod rizičnih grupa pacijenata koji ne mogu koristiti klasične ACE inhibitore. Mada neki od ovakvih proizvoda već postoje na tržištu, dalje istraživanje peptida sa inhibitornim djelovanjem na angiotenzin-konvertirajući enzim, metoda njihove izolacije i stabilizacije nakon primjene u konačnom proizvodu predstavlja korist i za pripadnike rizične populacije, jednako kao i za prehrambenu industriju.

Ključne riječi: *angiotenzin-konvertirajući enzim, inhibitori, peptidi, hrana*

4-O-15

Angiotensin-converting enzyme inhibitory peptides from food

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Summary

Cardiovascular diseases, along with malignancies, are the most common cause of mortality both in developed countries and in Bosnia and Herzegovina. Hypertension is one of the main causes of cardiovascular disease, so today there are several groups of drugs used to control and regulate high blood pressure. Angiotensin-converting enzyme inhibitors (ACE inhibitors) are the most commonly used group of medicines, which in addition to its many benefits for the patient, also has certain side effects. It is primarily their fetotoxic activity that makes them contraindicated for use in pregnancy. It has been known for some time that there are peptides of low molecular weight, which are an integral part of proteins present in various types of food and which remain in latent form until released by enzymatic hydrolysis, during food processing or during digestion of food in the gastrointestinal tract. These are mainly peptides that have up to five amino acids in their composition, and can be derived from human or animal milk, animal or vegetable raw materials, including algae and yeasts. The aim of this paper is to present such peptides, to show their structure, mechanism of action and possible use as constituents of functional food group products that could have health benefits, especially for at-risk patients who cannot use conventional ACE inhibitors. Although some of these products are already on the market, further research into peptides with an inhibitory effect on the angiotensin-converting enzyme, the method of isolating and stabilizing them after use in the final product, is of benefit to members of the at-risk population as well as to the food industry.

Keywords: *angiotensin-converting enzyme, inhibitors, peptides, food*

Povezanost celijakije i Hashimoto tireoiditisa

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Sažetak

Kod pacijenata, koji su oboljeli od celijakije, često se javljaju i druga autoimuna oboljenja. Pacijenti, koji nakon što obole od celijakije, obole i od Hashimoto tireoiditisa, za to imaju genetsku predispoziciju. Procijenjeni rizik nastanka hipotireoze kod oboljelih od celijakije je prisutan i kod žena i kod muškaraca. Što se tiče spolnih razlika u povezanosti bolesti štitne žlijezde i celijakije, one mogu biti posljedica slučajnosti, te mogu odražavati spolno specifične varijacije u fenotipovima autoimune bolesti. U naučnim studijama, koje su do sada urađene, dokazano je da postoji veći rizik od razvoja celijakije kod bolesnika koji boluju od autoimune tiroidne bolesti. S druge strane pacijenti sa celijakijom imaju i do četiri puta veći rizik, nego drugi pacijenti, od razvoja Hashimotovog tireoiditisa. Ovaj rad predstavlja pregled rezultata deskriptivnih studija, objavljenih u stručnim i naučnim časopisima, koje se bave vezom celijakije i Hashimoto tireoiditisa. Rezultati ovih studija pokazuju da ukoliko se bezglutenska ishrana primjeni u ranom djetinjstvu neće doći do razlike u pojavi autoimunih bolesti i da su godine pacijenata ključne za predviđanje razvoja autoimunih stanja kod odraslih pacijenata koji boluju od celijakije, a ne period izlaganja glutenu. Vrlo je bitno da se pacijenti s celijakijom kontrolišu zbog prevencije mogućeg razvoja autoimune tiroidne bolesti.

Ključne riječi: Hashimoto tireoiditis, Celijakija, Autoimune bolesti, povezanost celijakije i Hashimotovog tireoiditisa

4-P-1

Celiakia and Hashimoto thyroiditis connection

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Abstract

In patients with celiac disease, other autoimmune diseases often occur. Patients who, after having celiac disease, also contract Hashimoto's thyroiditis, have a genetic predisposition. The estimated risk of hypothyroidism in celiac patients is present in both women and men. Regarding sex differences in the interplay of thyroid and celiac disease, it may be due to chance, and gender-specific variations in the phenotypes of autoimmune diseases may develop. In the unusual studies conducted so far, it has been shown that there is a higher risk of developing celiac disease in patients with autoimmune thyroid diseases. On the other hand, patients with celiac disease are also four times more likely than normal patients to develop Hashimoto's thyroiditis. Our work represents review of results of descriptive studies, published in professional and scientific journals, dealing with celiac disease and Hashimoto thyroiditis. These results showed that a gluten-free diet observed in early childhood will not make a difference in the incidence of autoimmune diseases and that in a year the patient may predict the development of autoimmune conditions in adult patients starting from celiac disease rather than a gluten exposure period. It is essential that patients with celiac disease be monitored for the prevention of the possible development of autoimmune thyroid disease.

Keywords: Hashimoto thyroiditis, Celiac disease, Autoimmune diseases, Relationship between celiac disease and Hashimoto's thyroiditis

Pregled sastava i učestalosti upotrebe dijetetskih suplemenata u sportu na tržištu u Sarajevu

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Sažetak

Upotreba dijetetskih suplemenata prisutna je u mnogim sportovima, kako među vrhunskim sportistima tako i među rekreativcima, ali u današnje vrijeme i kao zamjena pojedinih obroka, naročito među mladim ljudima. Povećana potrošnja dijetetskih suplemenata proizilazi iz vjerovanja da suplementi mogu unaprijediti sportske sposobnosti. U EU, za samo nekoliko aktivnih sastojaka dijetetskih suplemenata za sportiste, kao što su proteini, kreatin, vitamini i minerali postoje odobrene zdravstvene tvrdnje evaluirane od strane EFSA (European Food Safety Authority). Osnovni cilj rada je da se kvantitativno i kvalitativno analizira upotreba dijetetskih suplemenata među rekreativnim sportistima u našem okruženju. Pregledom suplemenata dostupnih na tržištu u Sarajevu, nisu pronađeni nikakvi zabranjeni sastojci. U radu se detaljnije analizirane karakteristike čestih sastojaka u ovim proizvodima (umjetnih zaslađivača – sukraloze i aspartama, te kreatina), kao i na njihova neželjena dejstva i efekat na zdravlje, ali i na sve popularniji ekstrakt biljke *Tribulus terrestris*. Sprovedbom i evaluacijom ankete, koju su ispunile 72 osobe (36 muškaraca i 36 žena), dobi od 18 do 26 godina, zaključeno je da je upotreba suplemenata u sportu opće prisutna, te da osobe koje ih upotrebljavaju najčešće to rade samoinicijativno i bez ljekarskog nadzora jer smatraju da će na taj način lakše postići željene rezultate.

Ključne riječi: *dijetetski suplementi, sukraloza, aspartam, kreatin, Tribulus terrestris*

4-P-2

An overview of the composition and frequency of use of dietary supplements in sports found in the Sarajevo market

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Abstract

The use of dietary supplements is present in many sports, both in professional athletes and in recreational athletes, but nowadays it is also a substitute for certain meals, especially among young people. Increased consumption of dietary supplements stems from the belief that supplements can enhance the athletic ability. In the EU, only a few active ingredients of dietary supplements for athletes, such as proteins, creatine, vitamins and minerals, have been approved by EFSA (European Food Safety Authority). The main goal of the paper is to quantitatively and qualitatively analyze the use of dietary supplements among recreational athletes in our environment. The examined supplements available on the Sarajevo market did not contain any prohibited ingredients. The paper deals with the characteristics of common ingredients in these products (artificial sweeteners - sucralose, aspartame and creatine), as well as their side effects and health effects, as well as the increasingly popular extract of *Tribulusterrestris*. The characteristics of common ingredients in these products (artificial sweeteners - sucralose, aspartame and creatine), as well as their side effects and effects on health, as well as the popular extract of *Tribulusterrestris*, are discussed in this paper. By implementing and evaluating a survey completed by 72 people (36 men and 36 women) it has been concluded that supplements are widely used in sports, and that people who use them are most likely to do it on their own initiative and without medical supervision, as they believe that this will make it easier to achieve the desired results.

Keywords: *dietary supplements, sucralose, aspartame, creatine, Tribulusterrestris*

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

Inzulinski indeks hrane

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Sažetak

Inzulinski indeks hrane predstavlja mjeru inzulina kojeg pankreas izluči kao odgovor na uneseni obrok u periodu od dva sata nakon unosa jela. Uveden je u praksu u cilju što bolje kvantifikacije obroka a ujedno i boljeg izračunavanja kalorijske vrijednosti sastojaka hrane. Značajan je parametar kod osoba koje boluju od *Diabetes mellitus* kao i u prevenciji razvoja same bolesti. Cilj rada je prikazati način izračunavanja inzulinskog indeksa nekih od osnovnih namirnica koje su zastupljene u svakodnevnoj ishrani, te objasniti razliku između inzulinskog indeksa i glikemijskog indeksa i opterećenja koji se koriste u kalkulisanju u odabiru sastojaka u obrocima. Za računanje inzulinskog indeksa, kao referentna namirnica uzet je bijeli hljeb, čija vrijednost iznosi 100. Sve ostale testirane namirnice su sortirane prema vrijednostima ispod i iznad bijelog hljeba. Korelativna veza inzulinskog indeksa sa glikemijskim indeksom je u velikoj mjeri u korelaciji samo kod mjerenja namirnica bogatim ugljikohidratima, dok se za istraživanje drugih vrsta namirnica koje sadrže proteine, masti i druge nutrijente, koristi inzulinski indeks kao mjerilo. Rad na ovu temu predstavlja teorijsko i bibliografsko istraživanje u vidu pregleda dostupne medicinske i stručne literature, naučnih članaka i medicinskih baza podataka. Računanjem datih indeksa, ljudima se omogućuje uvid u štetnost mnogih namirnica, ali ujedno im se pruža mogućnost individualizacije obroka i izbjegavanja nutrijenata koji pokazuju visoke vrijednosti tih parametara.

Ključne riječi: *inzulinski indeks, glikemijski indeks, Diabetes mellitus*

Food insulin index

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Summary

The food insulin index is a measure of the insulin secreted by the pancreas as a response to a meal, two hours after it has been consumed. It has been put into practice in order to better quantify the meals and at the same time to better calculate the calorific value of the food ingredients. It is an important parameter in people suffering from Diabetes mellitus as well as in the prevention of the development of the disease itself. The aim of the paper is to present a method for calculating the insulin index of some of the essential foods that are present in the daily diet, and to explain the difference between the insulin index and the glycemic index and the load used in calculating the selection of ingredients in meals. For the calculation of the insulin index, white bread, whose value is 100, was taken as the reference food. All other foods tested were sorted by values below and above white bread. The correlative relationship of the insulin index to the glycemic index is highly correlated only in the measurement of carbohydrate-rich foods, while the insulin index is used as a benchmark to investigate other types of foods containing proteins, fats, and other nutrients. The work on this topic represents theoretical and bibliographic research in the form of an overview of available medical and professional literature, scientific articles and medical databases. By calculating the given indices, people are given insight into the harmfulness of many foods, but at the same time they are given the opportunity to individualize meals and to avoid nutrients that show high values for these parameters.

Keywords: *insulin index, glycemic index, Diabetes mellitus*

Polifenoli u otpadnim tvarima vinske proizvodnje – prilika za kozmetičku industriju

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Sažetak

Antioksidansi u zadnje vrijeme pobuđuju izuzetan interes, kako u znanstvenoj literaturi, tako i u popularnim člancima. Razlog za ovo je što se posljednjih 15-20 godina pojavio čitav niz studija kojima se dokazuje da spojevi koji pokazuju antioksidativno djelovanje mogu iskazati blagotvorno djelovanje u prevenciji nastanka čitavog niza patoloških stanja, u prvom redu kardiovaskularnih bolesti. Osim što postoje dokazi da polifenoli iz biljnog materijala, u prvom redu resveratrol, mogu prodrijeti kroz kožu i djelovati protiv starenja, na tržištu postoji i čitav niz kozmetičkih proizvoda koji u svom sastavu imaju resveratrol i druge polifenolne spojeve porijeklom iz grožđa i bobičastog voća. Ovi proizvodi stimuliraju proliferaciju fibroblasta i povećavaju koncentraciju kolagena III. Nadalje, resveratrol je agonist estrogenih receptora zbog čega dovodi i do stimulacije produkcije kolagena tipa I i II. Posljednjih godina u Hercegovini je zabilježena ekspanzija vinograda i vinarija koje proizvode izuzetno kvalitetna vina. Ova proizvodnja je ujedno praćena i velikom količinom organskog otpada koji sadrži čitav niz biološki aktivnih spojeva, u prvom redu polifenole kao što su resveratrol, antocijanini, proantocijanidini, flavoni i drugi. Ekstrakti dobiveni iz pulpe grožđa i vinskog taloga, ekstarkcijom sa i bez mikrovalne obrade pokazuju značajno antioksidativno djelovanje, što je jedna od osnovnih karatreistika polifenola, a analiza tekućinskom kromatografijom visoke moći razlučivanja (HPLC) ukazuje na značajan sadržaj resveratrola. Ujedno su testovi *in vitro* pokazali da su ekstrakti ostataka nakon proizvodnje crnog vina najučinkovitiji inhibitori elastaze, metaloproteinaze-1 i tirozinaze. Rezultati potvrđuju da su otpadne tvari proizvodnje vina vrijedni izvori prirodnih sastojaka s velikim potencijalom za kozmetičku upotrebu.

Ključne riječi: *polifenoli, kozmetički proizvodi, ostaci nakon proizvodnje vina*

5-O-2

Polyphenols in wine waste products - an opportunity for the cosmetic industry

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Abstract

Antioxidants have aroused great interest lately, both in the scientific literature and in popular articles. The reason for this is that in the last 15 to 20 years, several studies have emerged to prove that compounds showing antioxidant activity can have beneficial effects in preventing the occurrence of a range of pathological conditions, primarily cardiovascular diseases. In addition to the evidence that plant polyphenols, primarily resveratrol, can penetrate the skin and act against aging, there are also many cosmetic products on the market that contain resveratrol and other polyphenolic compounds originating from grapes and berries. These products stimulate fibroblast proliferation and increase collagen III concentration. Furthermore, resveratrol is an estrogen receptor agonist, which leads to stimulation of type I and II collagen production. In recent years, an expansion of vineyards and wineries producing high-quality wines has been recorded in Herzegovina. The wine production is also accompanied by a large amount of organic waste containing a range of biologically active compounds, primarily polyphenols such as resveratrol, anthocyanins, proanthocyanidins, flavones, and others. Extracts obtained from grape pulp and wine slurry, by extraction with and without microwave treatment, show significant antioxidant activity, which is one of the basic characteristics of polyphenols, and high-performance liquid chromatography (HPLC) analysis indicates a significant content of resveratrol. At the same time, *in vitro* tests have shown that residue extracts after the production of red wine are the most effective inhibitors of elastase, metalloproteinase-1, and tyrosinase. The results confirm that wine production wastes are valuable sources of natural ingredients with great potential for cosmetic use.

Keywords: *polyphenols, cosmetic products, residues after wine production*

Veterinarsko zdravstveni pregled riba, rakova, školjkaša i morskih plodova

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Sažetak

Cilj ovog rada je da opiše i objasni značaj veterinarskog kadra prizdravstvenom pregledu i kontroli riba, rakova, školjkaša i ostalih morskih plodova. Pri pregledu akvakulture, mora se ustanoviti da li su sirovine higijenski ispravne, uslovno ispravne ili neispravne za javnu potrošnju. Da bi se meso riba i ostalih morskih plodova, kao i njihovi proizvodi stavili u promet, moraju zadovoljiti određene uslove. Neki od uslova su da moraju biti usmrćena pri određenim higijenskim i humanim uslovima i zadovoljavati mikrobiološke norme navedene u „Pravilniku o mikrobiološkim kriterijima za hranu“ Zakona o hrani („Službeni glasnik BiH“). Prvo se radi organoleptički pregled prema pravilima navedenim u „Službenom glasniku BiH“ Zakona o veterinarstvu u BiH, zatim se rade specijalne laboratorijske metode pregleda. Obavezan je pregled na viruse, bakterije i parazite da bi se isključila oboljenja koja mogu biti rizična za ostale vrste u lancu ishrane. Osim mikrobiološkog pregleda, obavezna je analiza na farmakološke rezidue, histamin, teške metale i u novije vrijeme, sve više se radi analiza na mikroplastiku.

Ključne riječi: *akvakultura, higijenska ispravnost, ishrana, mikrobiologija*

Veterinary health examination of fish, crabs, shellfish and seafood

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Abstract

The objective of this scientific article is to describe and explain the significance of veterinary profession in public health inspection and control of fish, crabs, shellfish and other seafood. During the examination of aquaculture, it has to be established whether the food products are hygienically suitable, conditionally suitable or not suitable for public use. In order to be placed for public use and consummation, fish meat, other seafood as well as their products, must fulfill certain demands and requirements. Some of those requirements are that those animals have to be put to death under specific hygienic and human conditions. They also have to meet microbiological standards listed in Statute of food safety, "Rulebook of microbiological criterion for food" ("Official papers of BiH"). Firstly, organoleptic procedure has to be done according to legislation stated in "Official papers of Bosnia and Herzegovina", Statute of veterinary medicine in BiH. Afterward, special laboratory methods are set to be done. Inspection of the presence of viruses, bacteria, and parasites is obligatory in order to exclude diseases that can be risky for other species in food chain. Apart from the microbiological examination, analysis of pharmacological residues, histamine, heavy metals and in recent years, analysis of microplastics, is obligatory.

Keywords: *aquaculture, hygienically suitable, microbiology, food*

Utjecaj lokaliteta na sadržaj bioaktivnih komponenti u šumskoj borovnici (*Vaccinium myrtillus* L.)

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Sažetak

Bobičasto voće spada u jako dobre prehrambene izvore bioaktivnih komponenti. Pored jako dobrog okusa i mirisa zbog antioksidativnih svojstava od velikog je interesai za nutricioniste i prehrambene tehnologe zbog mogućnosti korištenja bioaktivnih komponenti kao sastojaka funkcionalne hrane. Kao materijal analize korištena su tri različita uzorka šumske borovnice (*Vaccinium myrtillus* L.): borovnica sa lokaliteta općine Srebrenica i Fojnica, te komercijalno dostupna borovnica proizvođača Ledo. Cilj rada je bio odrediti antioksidativni kapacitet uzoraka borovnice spektrofotometrijskom FRAP metodom, sadržaj antocijanina pH diferencijalnom spektrofotometrijskom metodom, sadržaj ukupnih fenola Folin-Ciocalteu spektrofotometrijskom metodom i ukupnih taninskih materijati-tracijskom metodom, te utjecaj ekstrakcionog sredstva na ekstrakciju taninskih materija iz borovnice. Analizom je utvrđeno da se zamrznuti uzorci šumske borovnice i komercijalno dostupne borovnice značajno razlikuju u sadržaju taninskih materija, fenola, antocijanina i antioksidativnom kapacitetu. Uzorak šumske borovnice sa lokaliteta Srebrenica ima najveću koncentraciju antocijanina, fenola i najveći antioksidativni kapacitet. Utvrđen je i utjecaj vrste ekstrakcionog sredstva na sadržaj tanina ekstrahovanih iz uzoraka. Najlošije ekstrakciono sredstvo u svim analizama je voda. U slučaju visokih koncentracija taninskih materija nije utvrđena značajna razlika između 50% etanola i 70% etanola. Kod niskih koncentracija taninskih materija utvrđeno je da se tanini najbolje ekstrahuju 50% etanolom.

Ključne riječi: *borovnica, fenoli, tanini, antocijanini, antioksidansi*

**The Effect of Locality on Content of Bioactive Components in the Forest
Blueberry (*Vaccinium myrtillus* L.)**

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Abstract

Berries are very good nutritional sources of bioactive compounds. In addition to its very good taste and odor, it is of great interest to nutritionists and food technologists for its antioxidant properties because of the possibility of using bioactive components as ingredients of functional food. Three different blueberry samples were used as the analysis material: forest blueberries from the Srebrenica and Fojnica municipalities, and commercially available blueberries from Ledo producer. The aim of this study was to determine the antioxidant capacity of blueberry samples by FRAP spectrophotometric method, anthocyanin content by pH differential spectrophotometric method, total phenols content by Folin-Ciocalteu spectrophotometric method and total tannins content by titration method, and the effect of extraction agent on extraction of tannins. The analysis found that frozen samples of forest blueberries and commercially available blueberries differ significantly in the content of tannins, phenols, anthocyanins and antioxidant capacity. The blueberry sample from the Srebrenica site has the highest concentration of anthocyanins, phenols and the highest antioxidant capacity. The effect of the type of extractant on the content of tannins extracted from blueberry samples was also determined. The worst extraction agent in all analysis was water. In the case of high concentration of tannins, no significant difference was found between 50% ethanol and 70% ethanol. At low concentrations of tannins, tannins have been found to be best extracted with 50% ethanol.

Keywords: *blueberries, phenols, tannins, anthocyanins, antioxidants*

Određivanje proteina u domaćem i kupovnom mlijeku

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Sažetak

Mlijeko je veoma važan izvor hrane za ljude, bilo kao svježa tečnost ili prerađen u brojne mliječne proizvode. Na tržištu je moguće pronaći industrijski proizvedeno trajno mlijeko i domaće neprerađeno mlijeko. Proteini, koji su najvažniji sastojak mlijeka, imaju višestruke funkcije u humanom organizmu kao što su gradivna, transportna, energetska, zaštitna, regulatorna uloga, zatim uloga u održavanju koloidno-onkotskog pritiska, te kao puferski sistemi. U skladu s tim, čak i vrlo male promjene u strukturi proteina mogu prouzrokovati njihovu nefunkcionalnost. Eksperimentalni dio rada se zasnivao na određivanju sadržaja proteina u domaćem i kupovnom (industrijski prerađenom) mlijeku metodom po Pyneu. Analiza se zasniva na određivanju sadržaja kazeina kao osnovnog mliječnog proteina, fosfoproteida u kojem je fosfatna kiselina esterski vezana za aminokiselinu serin, a koji se u uzorku nalazi u formi kompleksa kalcijum-kazeinata i trikalcijum-fosfata. Nakon izvršene titracije i analize dobivenih rezultata, zaključuje se da je sadržaj proteina veći u domaćem mlijeku u odnosu na kupovno. Srednja vrijednost postotka proteina za domaće mlijeko iznosi 4.09%, a kupovno 3.26%. Određivanje sadržaja proteina u prehrambenim izvorima proteina izvodi se s ciljem utvrđivanja da li prehrambeni proizvod može da zadovolji metaboličke potrebe organizma za proteinima, odnosno da li sadržaj nitrogena i aminokiselinski sadržaj proteina može da zadovolji potrebe organizma s aspekta postizanja adekvatnog balansa nitrogena.

Ključne riječi: *domaće mlijeko, trajno mlijeko, proteini*

Determination of protein in domestic and commercial milk

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Abstract

Milk is a very important source of food for humans, whether as fresh liquid or processed into numerous dairy products. On the market, it is possible to find industrially produced (commercial) milk and domestic unprocessed milk. Proteins, which are the most important constituent of milk, have multiple functions in the human body such as the development, transport, energy, protective, regulatory role, then the role in maintaining oncotic pressure, and as buffering systems. Accordingly, even very small changes in protein structure can cause their dysfunction. The experimental part of the paper was based on the determination of protein content in domestic and commercial (industrially processed) milk by the Pyne method. The analysis is based on the determination of the casein content as a basic milk protein, phosphoprotein where phosphoric acid is ester bound to the amino acid serine, which in the sample is in the form of a complex of calcium caseinate and tricalcium phosphate. After titration and analysis of the obtained results, it is concluded that the protein content is higher in domestic milk compared to commercial milk. The mean percentage of protein for domestic milk is 4.09% and 3.26% for commercial milk. Determination of protein content in nutritional sources of proteins is performed in order to determine whether a food product can meet the body metabolic needs for proteins, or whether the nitrogen content and amino acid content of the protein can meet the needs of the body in terms of achieving an adequate balance of nitrogen.

Keywords: *homemade milk, commercial milk, proteins*

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