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SCIENCE AND TECHNOLOGICAL DEVELOPMENT OF THE REPUBLIC OF SERBIA**

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KEYNOTE PLENARY LECTURE

ENVIRONMENT AND HEALTH IMPACT ASSESSMENT

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The environment and health agenda for Europe is set by Member States of the WHO, as reflected in the Declaration of the 2017 6th Ministerial Conference on Environment and Health, held in Ostrava, Czechia. The priority themes are: air quality, water and sanitation, waste and contaminated sites, hazardous chemicals, cities, sustainable health systems and climate change. A prerequisite for effective and health-friendly policy action in these and other domains is the availability of information and evidence on how and to what extent human health is affected by the many risk factors that are involved. At the same time, evidence is needed on the positive influences that can be increased by appropriate policies and decisions.

The diversity of the themes and priorities of the Ostrava Declaration is such that a variety of methods and strategies are necessary. In some cases, such as air pollution, robust and detailed evidence is available and can be used to derive reliable quantitative estimates of

the health impacts of certain levels of pollution. For other themes, such as waste and local contamination, involving multiple risk factors, assessments are more uncertain. Health impact assessment (HIA), nowadays, refer to a broad spectrum of approaches, methods, techniques that can be used to deal with such diverse situations, where the ultimate goal is to inform health-friendly policy making. On the one hand, rigorous methods, deriving from risk assessment, can be applied where the focus is, for example, a regulatory one on individual contaminants. When more complex, multi-factorial scenarios are of interest, HIA can be designed in a way where a participatory process is put in place to identify healthy and equitable courses of policy action. In all cases, the importance of appropriate stakeholder involvement, openness in communication, clarity on assumptions, transparency on possible conflicts of interest are widely recognised as key ingredients of good quality HIA in environment and health.

ENVIRONMENT AND HEALTH

INVITED LECTURES

ENVIRONMENTAL TOBACCO SMOKE AND HEALTH – RECENT ADVANCES IN RESEARCH

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INTRODUCTION

Exposure to environmental risk factors has a negative impact on health, especially in vulnerable population groups, which include the children, mothers and pregnant women. ETS – Environmental Tobacco Smoke is one of the most frequent and toxic environmental exposures.

AIM

The aim of the study is to report the recent advances in research on this topic based on the bilateral American-Slovak project “Prenatal, pregnancy and childhood exposures to household smoking and their relations to subsequent development and health in Slovakia”.

METHODS

The studies on childhood and maternal exposure to ETS are presented. The major end-points were physical and mental health of non-smoking mothers (n=544), emotional and behavioral problems in school children (n=1,478) and the urine antioxidant capacity and oxidative lipid damage by monitoring the levels of 8-iso-

prostanes in pregnant women in the third trimester of pregnancy (n=80).

RESULTS

The results show that living with a smoker is independently associated with worse physical health in a selected sample of non-smoking women and worse mental health (SF-12) in pregnant women, and with worse emotional and behavioral problems (score CIS and BPI) in school-children only in bivariate analysis. The harmful effect of current and passive smoking on detected oxidative stress parameters in the pilot sample of pregnant women has been indicated.

CONCLUSION

These data represent an important argument for intervention in families. Further studies with a larger number of pregnant women with objectified ETS parameters are necessary to introduce our results for primary preventive interventions in clinical and preventive practice.

KEY WORDS: Environmental Tobacco Smoke (ETS), pregnant women, school-children, physical and mental health, oxidative stress parameters

I THINK WHAT I BREATHE: AIR POLLUTION AND COGNITIVE DISORDERS

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Despite being a relatively new research area, there is a mounting evidence showing also adverse effects of air pollution on cognitive function and neurological diseases, including ischemic stroke, Alzheimer's disease (AD) and Parkinson's disease (PD). As the most prevalent neurodegenerative disease AD affects more than 27 Million people worldwide and PD affects 1-2% of the population over the age of 50 years. Given these high incidences, it is important to discuss the evidence linking link air pollution to neuro inflammation, AD, PD etc. Environmental pollution has been shown to exert changes in DNA methylation, histone acetylation and micro RNA expression. Air pollution plays an important role as the pro-inflammatory stimulus to the CNS. Entry of the air pollutants to the CNS can be per-

formed through two main pathways: nasal pathway and respiratory intake. PM is mostly responsible for triggering of the release of soluble inflammatory mediators (TNF α , IL-1 β , IL-6). PM intake causes pro-inflammatory signals in peripheral tissues giving rise to systemic cytokine response that transfers inflammation to the brain. The cytokines disrupt the blood-brain-barrier or trigger signalling cascade that leads to mitogen-activated protein kinase, and nuclear factor kappa B transcription factor pathways

Data suggest very strong influence of air pollution on development and prevalence of neurodegenerative diseases. There is an urgent need for the society to include measures to contribute to better air quality.

WHO ENVIRONMENTAL NOISE GUIDELINES FOR THE EUROPEAN REGION ± WHAT IS SCIENTIFIC NOVELTY?

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ABSTRACT

WHO Environmental Noise Guidelines for the European Region (Guidelines) are developed as a scientific continuation of WHO's Community Noise Guidelines in 1999 and Night Noise Guidelines for Europe in 2009. New noise sources that are considered in the Guidelines are leisure activities and wind turbines. Lden and Lnight are used as noise indicators in the Guidelines as they are also relevant indicators in the EU Noise Directive 2002/49/EC. Guidelines Development Group (GDG) had the main task to give answers on two key questions concerning exposure-response relationship between indicators of noise and health outcomes and the effects of interventions in reducing exposure to and/or health outcomes from environmental noise. Guideline exposure levels of noise emitted from road, railway and air traffic, wind turbines and leisure activities were reached through a rigorous scientific process based on the Grading Recommendations Assessment, Development and Evaluation (GRADE) method. The relevant scientific literature was analysed and eight priority health outcomes were chosen: cardiovascular effects (hypertension and ischemic heart disease); metabolic effects (obesity and diabetes mellitus); annoyance; effects on sleep; hearing impairment and tinnitus; cognitive impairment; and quality of life, mental health and well-being and the effects of interventions. For the first time in developing WHO guidelines a Systematic Review Team of experts performed separate systematic reviews on each topic and GDG selected a benchmark measure for five priority health outcomes. Based on dose-response functions and the quality of evidence for each health outcome exposure guidelines are established together with the strength of recommendations, strong or conditional.

KEY WORDS: noise; environment; WHO; Europe; regulation

INTRODUCTION

Environmental noise is a major risk factor for numerous diseases of a high public health importance. A disabili-

ty-adjusted-life – years assessment of burden of disease related to environmental noise in western European countries showed that 903000 years are lost every year due to sleep disturbance, 654000 years due to annoyance, 61000 years due to ischemic heart disease and 45000 years due to cognitive impairment in children and 22000 due to tinnitus¹. Compared to other environmental noxious factors noise related burden of disease is ranked at the second place together with environmental tobacco smoke and after air pollution with 2,5 µm particulate matter². In a recent pan-European survey on noise from the immediate neighborhood 32% responders (individual country range from 14% to 51%) reported moderate or major problems with noise³. In EU countries about 15% of citizens rank noise among the top five environmental pollutants that affect health⁴.

Environmental noise guidelines are powerful policy tool to protect human health from adverse effects of noise. The first WHO comprehensive publication related to recommended noise levels in different environmental settings worldwide was published in 1995 and followed by night noise guidelines for Europe in 2009⁶. In the European Union the pillar of all regulations concerning noise is Environmental Noise Directive 2002/49/EC relating to the assessment and management of environmental noise⁷. It was focused on three main transportation noise sources: road, railway and air traffic. In the meantime new environmental noise sources have appeared and at the Fifth Ministerial Conference on Environment and Health in Parma, Italy, in 2010, it was recommended wind turbines, personal electronic devices and toys to be considered in new noise guidelines. In 2013 the WHO Regional Office for Europe has therefore started the work on environmental noise guidelines for the European Region. These guidelines are aimed at protecting human health from exposure to traffic noise, wind turbine noise and leisure noise and are compatible with END concerning noise indicators.

METHOD OF GUIDELINES DEVELOPMENT

These are the first WHO Guidelines in which the rigorous methodology recommended by WHO have been applied⁸. In all phases of guidelines development, the

Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was applied⁹. These phases included: defining the scope and key questions of the guidelines; review of the relevant literature; focusing on priority health outcome measures; a systematic review of the evidence; an assessment of the quality of evidence; setting the guideline exposure levels and establishing the strength of recommendations. The GDG was formed in 2013 with the main task of developing evidence based recommendations. The members of the GDG were: Stephen Stansfeld (Chair, UK), Wolfgang Babisch (Germany), Goran Belojevic (Serbia), Mark Brink (Switzerland), Sabine Janssen (The Netherlands), Peter Lercher (2013–2014) (Austria), Marco Pav-iotti (EU Commission), Göran Pershagen (Sweden), Kerstin Persson Waye (Sweden), Anna Preis (Poland), Martin van den Berg (The Netherlands) and Jos Verbeek (methodologist) (Finland). GDG defined the scope of the guidelines that encountered road, aircraft and railway traffic noise, wind turbine noise (outdoor exposure) and leisure noise (outdoor and indoor exposure at concerts, listening to loud music through mobile devices, nightclubs etc.) in all non-occupational settings except for hospital noise and neighborhood noise. The GDG had the main task to give answers on two key questions concerning exposure-response relationship between indicators of noise and health outcomes and the effects of interventions in reducing exposure to and/or health outcomes from environmental noise.

NOISE INDICATORS

Two main indicators of noise compatible with the END are used in the Guidelines: Lden and Lnight. Lden is an equivalent outdoor sound pressure level measured over a 24-hour period including day (from 6 a.m. or 7 a.m. – 6 p.m. or 7 p.m.), evening (from 6 p.m. or 7 p.m. - 10 p.m. or 11 p.m) and night (from 10 p.m. or 11 p.m - 6 a.m. or 7 a.m.) with penalties of 5 dB for evening and 10 dB for night. Lnight is an equivalent outdoor sound pressure level measured during eight hours of night time¹⁰. The measuring sites are outdoors, usually at the most exposed façade of dwellings. In the countries where different noise indicators from Lden and Lnight are used the GDG recommends conversion methods¹¹.

HEALTH OUTCOMES

The GDG identified five health outcomes that were considered as critical for assessing environmental noise issues (cardiovascular disease, annoyance, effects on sleep, cognitive impairment and hearing impairment and tinnitus) and three of them that were considered as important but not critical (adverse birth outcomes, quality of life, well-being and mental health

and metabolic outcomes like diabetes mellitus and obesity).

EVIDENCE REVIEWS

The evidence concerning the identified health outcomes was retrieved following PECCOS/PICOS approach described in the WHO handbook for guideline development⁸. PECCOS is used for exposure studies and stands for population, exposure, comparator, confounder, outcome and study design. PICOS is used for intervention studies and stands for population, intervention, comparator, outcome and study design. Concerning the inclusion criteria for studies in systematic reviews only those with noise exposure levels, either measured or calculated, were regarded as relevant. Eight systematic reviews were performed and published prior to the publication of the Guidelines covering the following health effects of noise: cardiovascular and metabolic effects¹², annoyance¹³, effects on sleep¹⁴; cognition¹⁵, adverse birth outcomes¹⁶, permanent hearing loss and tinnitus¹⁷, quality of life; mental health and well-being¹⁸, and transport noise interventions and their impact on health¹⁹.

In assessing the overall quality of evidences from systematic reviews a GRADE (Grading Recommendations Assessment, Development and Evaluation) approach was applied²⁰. The quality of evidence can be rated high, moderate, low or very low. High quality means that further research is very unlikely to change the certainty of the effect estimate. Moderate quality means that further research is likely to have an important impact on the certainty of the effect estimate and may change the estimate. Low quality means that further research is very likely to have an important impact on the certainty of the effect estimate and is likely to change the estimate. Very low quality means that any effect estimate is uncertain.

PRIORITY HEALTH OUTCOME MEASURES

The GDG chose the following priority health outcome measures in developing recommendations: cardiovascular disease - incidence of ischemic heart disease and hypertension; effects on sleep - percentage of the population highly sleep-disturbed; annoyance - percentage of the population highly annoyed assessed with standardized scales; cognitive impairment - reading and oral comprehension, assessed with tests; hearing impairment and tinnitus - permanent hearing impairment, measured by audiometry. The adopted health risk levels for setting guidelines were: 5% relative risk increase for the incidence of ischemic heart disease; 10% relative risk increase for the incidence of hypertension; 10% absolute risk for the percentage of high-

ly annoyed; 3% absolute risk for highly sleep disturbed; no risk increase due to environmental noise for permanent hearing impairment and one-month delay in terms of reading age for reading and oral comprehension.

STRENGTH OF RECOMMENDATIONS

After reaching the guideline noise levels the GRADE method was applied to set the strength of the recommendations as strong or conditional. A strong recommendation can be adopted as policy in most situations. A conditional recommendation requires a policy-making process with substantial debate and involvement of various stakeholders. The parameters that determined the decision of the GDG concerning the strength of each recommendation were: quality of evidence, balance of benefits and harms, values and preferences related to the outcomes of an intervention or exposure, resource implications, the priority of the problem, equity and human rights, acceptability and feasibility.

GUIDELINE LEVELS

Road-Traffic Noise

The strong recommendation of GDG concerning the average exposure to road traffic noise is to reduce noise level below 53 dB Lden to protect the population from adverse health effects. For night noise exposure, it is strongly recommended to reduce Lnight below 45 dB to protect the population from adverse effect on sleep. The GDG strongly recommends interventions at the source and on the route between the source and the affected population by changes in infrastructure. The rationale for Lden guideline was the existence of the absolute risk of 10% of highly annoyed people at a noise exposure level of 53.3 dB Lden. The rationale for Lnight guideline was that 3% of the participants in studies were highly sleep-disturbed at a noise level of 45.4 dB Lnight.

Railway Noise

The strong recommendation of GDG concerning the average exposure to road traffic noise is to reduce noise level below 54 dB Lden to protect the population from adverse health effects. For night noise exposure, it is strongly recommended to reduce Lnight below 44 dB to protect the population from adverse effect on sleep. The GDG strongly recommends interventions but there is insufficient evidence of the advantage of one type of intervention over another. The rationale for Lden guideline was the existence of the absolute risk of 10% of highly annoyed people at a noise exposure level of 53.7 dB Lden. The rationale for Lnight guideline was

that 3% of the participants in studies were highly sleep-disturbed at a noise level of 43.7 dB Lnight.

Aircraft Noise

The strong recommendation of GDG concerning the average exposure to road traffic noise is to reduce noise level below 45 dB Lden to protect the population from adverse health effects. For night noise exposure, it is strongly recommended to reduce Lnight below 40 dB to protect the population from adverse effect on sleep. The GDG strongly recommends interventions regarding suitable changes in infrastructure. The rationale for Lden guideline was the existence of the absolute risk of 10% of highly annoyed people at a noise exposure level of 45.4 dB Lden. The rationale for Lnight guideline was that 11% of the participants in studies were highly sleep-disturbed at a noise level of 40.0 dB Lnight.

Wind Turbine Noise

The conditional recommendation of GDG concerning the average exposure to road traffic noise is to reduce noise level below 45 dB Lden to protect the population from adverse health effects. For night noise exposure there is no guideline level due to insufficient evidences. The GDG strongly recommends interventions but there is insufficient evidence of the advantage of one type of intervention over another. The rationale for Lden guideline was the existence of the absolute risk of 10% of highly annoyed people at a noise exposure level of 45.0 dB Lden.

Leisure Noise

The conditional recommendation of GDG concerning the average exposure to road traffic noise is to reduce noise level below 70 dB LAeq,24h to protect the population from adverse health effects. For night noise exposure there is no guideline level due to insufficient evidences. The GDG strongly recommends interventions and especially concerning personal listening devices.

CONCLUSION

In the presented WHO Environmental Noise Guidelines for the European Region an evidence based approach was applied based on systematic reviews of health effects of noise. The reliability of the guidelines derives from the GRADE method in assessing the evidences and the strength of the recommendations. The scientific novelty is that each guideline is based on a specific critical health outcome that was prioritized through systematic reviews of evidences. There are also recommended interventions to mitigate the health effects of environmental noise. Although the Guidelines are not directives they will be very useful in further improvement of country specific noise regulations.

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SPECIFICS AND PERSPECTIVES OF MONITORING THE IMPACT OF INDUSTRIALLY CONTAMINATED SITES ON THE ENVIRONMENT AND HEALTH OF THE POPULATION

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INTRODUCTION

According to the evaluations, in the basin of Ibar river, in 16 industrial landfills there is more than 150 million tons of industrial refuse, which spreads from the landfills into the ecosystem. Hundreds of thousands of people are exposed to the effects of this pollution.

AIM

To show the specificities which exist in monitoring the pollution by heavy metals and to define the perspectives of monitoring of the polluted areas and their influence on the environment and the health of the inhabitants.

RESULTS

There are significant differences in distribution of heavy metals from the same source. Pollution of geogenic origin could be an important factor in defining the consequences of pollution. The largest amounts of

pollution of watercourses can be distributed to farther distances. The distribution of pollution from soil to plants is connected to their biochemical mechanisms.

CONCLUSION

When it comes to the pollution of the environment by heavy metals in industrially polluted regions and monitoring their influence on the environment and the health of the inhabitants, there is a sequence of specificities. Knowing those specificities is a necessary condition for an adequate realization of researches in this field. The current model for monitoring is inadequate, with heavy financial losses as well as loss of data. In the direction of adequate monitoring and creating the potential for further development, it is necessary to adjust and improve, both technically and legally, the model of monitoring heavy metals and their effect on the environment and the health of the inhabitants.

KEYWORDS: Industrially contaminated sites, Heavy metals, Population health.

СПЕЦИФИЧНОСТИ И ПЕРСПЕКТИВЕ ПРАЋЕЊА УТИЦАЈА ИНДУСТРИЈСКИ ЗАГАЂЕНИХ ПОДРУЧЈА НА ЖИВОТНУ СРЕДИНУ И ЗДРАВЉЕ СТАНОВНИШТВА

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Медицински факултет

УВОД

Према проценама, у сливу реке Ибар, на 16 индустријских депонија налази се више од 150 милиона тона индустријског отпада, који се са депонија шири у екосистем. Деловању овог загађења изложени је више стотина хиљада људи.

ЦИЉ

Приказати специфичности које постоје у праћењу загађења тешким металима и дефинисати перспективе мониторинга индустријски загађених подручја и њиховог утицаја на животну средину и здравље становништва.

РЕЗУЛТАТИ

Постоје значајне разлике у дистрибуцији тешких метала из истог извора. Загађење геогеног порекла може бити значајан фактор у дефинисању последица загађења. Највеће количине загађења водотокова могу се дистрибуирати на веће удаљености.

Дистрибуција загађења из земљишта у биљке је везана за њихове биохемијске механизме.

ЗАКЉУЧАК

Када је у питању загађење животне средине тешким металима на индустријски загађеним локалитетима и праћење њиховог утицаја на животну средину и здравље становништва постоји низ специфичности. Познавање тих специфичности неопходан је услов за адекватну реализацију истраживања у овој области. Постојећи модел мониторинга је неадекватан са великим губицима како финансијским тако и у подацима. У правцу адекватног праћења и стварања потенцијала за даљи развој неопходно је прилагодити и унапредити, како технички тако и законодавно, модел мониторинга тешких метала и њиховог утицаја на животну средину и здравље становништва.

КЉУЧНЕ РЕЧИ: Индустријски загађени локалитети, тешки метали, здравље становништва

DRINKING-WATER AND HEALTH – RECENT ADVANCES IN RESEARCH

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OBJECTIVE

Access to safe drinking-water is essential to health, a basic human right and a component of effective policy for health. It is important as a health and development issue at national, regional and local levels.

METHOD

For assessing the safety of drinking-water the risk analyses has to be done. From the health point of view, the risk assessment with hazard identification and characterization, exposure assessment and risk characterization, are the most important. Hazards are mostly identified and characterized by known scientific data, while for exposure assessment and risk characterization the methodology of World Health Organization (WHO) and United States Environmental Protection Agency are mostly used. The risk management is defined in Water Safety Plans (WSP) and mainly relates to drinking water suppliers, while the risk communication (RC) is activity for the whole society (professionals, drinking water suppliers, stakeholders, politicians and population).

RESULTS

In the Serbian national regulation for drinking water quality the risk characterization is not defined, so it is done only for investigation purposes. The risk assessment of drinking water supply in rural areas of Serbia, conducted by WHO, Ministry of Health and Serbian national

public health institutes, showed that main identified hazards were *Escherichia coli*, nitrates and arsenic above the proposed level, causing the intermediate risk level at about 42% of piped systems and 36% of individual supplies and the high and very high risk level at 29% of piped systems and 41% of individual supplies. Investigation in Autonomous Province of Vojvodina have shown that the risk from drinking water from 20 public wells in South Backa District analyzed for 2016, was rated as high in 2/3 of controlled public wells with an influence on morbidity of sensitive population caused by recognized hazards (thermotolerant coliforms, especially *Escherichia coli*, enterococci – genus *Streptococcus*, *Pseudomonas aeruginosa*, *Proteus* species and nitrates above the proposed level), and in 1/3 as medium, causing the changes of choice of drinking water sources. Also, the cancer risk assessment for the average and the highest concentrations of trihalomethanes from drinking water and pool water in the City of Novi Sad for 2017, was found to be acceptable. Unfortunately, WSP are not yet mandatory at national level, so there are no application examples, as there are not proposed rules for RC.

CONCLUSION

The adequate policy based on the risk analyses with defining the hazards and procedures for risk reduction, as for public or individual drinking water supply system, is necessary in Republic of Serbia.

KEYWORDS: Water, Drinking, Public Health, Environmental Medicine, Risk

MEDICAL WASTE – KNOWLEDGE AND ATTITUDES OF MEDICAL STUDENTS AND DOCTORS

JELENA ILIĆ ŽIVOJINOVIĆ

AIM

Objective of this study was to investigate the knowledge and skills in the field of medical waste management among Belgrade medical students and doctors.

METHODS

This was a cross-sectional study conducted at the Faculty of Medicine, University of Belgrade, Serbia, in the period between December 2017 and January 2018. The study comprised 430 medical students of the sixth year of studies and 46 doctors of the Faculty of Medicine working at the institutes that generate infectious waste. We used an anonymous semi-structured questionnaire specially designed for this study to determine knowledge, attitude and practice towards MW management.

RESULTS

A majority of students (74.6%) and doctors (65.3%) did not pass any training related to the management of

medical waste. Most of the respondents are not familiar with the legal regulation related to the management of medical waste. Only 38.0% of doctors gave all four correct answers to questions concerning the knowledge on color coded bins. The students' knowledge was best concerning infectious waste and used needles separation related to chemical and pathoanatomic waste, heavy metals, and cytotoxic drugs. Around 80% of students are aware of the significance of reporting injuries at work. However, medical students are not so disciplined in reporting injuries (52.4%).

CONCLUSION

This study shows that the students and employees support better training on MW management and more investigations on this topic.

KEYWORDS: medical waste, education, medical students, doctors

ORAL PRESENTATIONS

EXPOSURE TO INDOOR AIR POLLUTION AND ABSENTEEISM SCHOOLCHILDREN

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OBJECTIVES: Beside air pollution in urban outdoor settings, indoor air can also be contaminated, both from outdoor and indoor sources.

Exposure to indoor air pollution may lead to very serious health effects, especially on the respiratory system. The aim of this study was to estimate the effects of indoor air pollutants on children's health and school absenteeism.

MATERIALS AND METHODS: Anamnestic retrospective study was done on 1074 children aged between 7 and 11 in Nis.

An original questionnaire was used in an interview between trained physicians and children's parents in the period from February to June 2005. Interview data were processed using Epiinfo 6.

RESULTS: It was found that exposure to combustion by-products led to children's respiratory and nonspecific symptoms. Parental smoking was associated with wheezing, bronchitis, headache and fatigue. Children who were exposed to passive smoking and the smoke from heating materials had higher number of physician visits due to respiratory problems ($\chi^2=8.72$; $p < 0.05$) and more frequent school absenteeism due to illness ($\chi^2=10.15$; $p < 0.005$) than children not exposed to these environmental risk factors.

CONCLUSION: In conclusion indoor air pollution affects children's health and increases their school absenteeism.

KEY WORDS: indoor air pollution, schoolchildren, respiratory system, disease, absenteeism

ENVIRONMENTAL NOISE ANNOYANCE OF THE POPULATION OF NOVI SAD FOR THE PERIOD 2006–2017

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OBJECTIVE: The percentage of highly annoyed population may be determined by modeling data of measured noise levels or by interviewing the population. Both methods have limits, but provide the insight into the relationship between environmental noise and health.

METHOD: During the 2006–2017, Institute for Public Health of Vojvodina conducted 3 surveys in accor-

dance with the standardized survey ISO/TS 15666:2003. The surveys were done among the adult population, the first in 2006, the second in 2012, and the third in 2017. The surveys covered 31 questions for respondents, related to noise-induced annoyance and the individual reactions to noise. Respondents living nearby the noise measuring points in Novi Sad were randomly selected.

RESULTS: The investigated population is annoyed by traffic noise (47-59%), construction works (25%-32%), noise from the neighborhood (25%-27%), noise from the catering and other facilities (12-24%) and noise from elevators and installations in residential buildings (11-15%). Due to traffic noise, 13%-46% of respondents would change their apartments. Environmental noise annoyed people watching TV (13%-78%), resting during the day-time period (30%-60%) and mental work (36-56%). Also, based on research, 6% of respondents aged

18-25 years and 51% of respondents older than 65, wake up at night because of traffic noise.

CONCLUSION: The results of long-term environmental noise measurements and conducted surveys in Novi Sad confirm that urban noise mostly originates from road traffic and seriously disturbs people.

KEYWORDS: Environmental noise, Environmental Exposure, Population, Health

ANKETIRANJE STANOVNIŠTVA O UZNEMIRENOSTI BUKOM IZ ŽIVOTNE SREDINE U NOVOM SADU, 2006-2017

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OBJECTIVE: Buka iz životne sredine uznemirava izloženo stanovništvo. Procenat stanovništva uznemirenog bukom se odeređuje modelovanjem, korišćenjem podataka o izmerenom nivou buke, ili neposredno, stanovništvo se anketira, odnosno pojedinci odgovaraju na pitanje da li im i kakva im buka koliko smeta. I jedan i drugi način određivanja procenta stanovništva uznemirenog bukom, jasno, imaju brojnih ograničenja, ali ipak pružaju uvid u to koliko buka iz životne sredine zaista utiče na živote ljudi.

METHOD: Institut za javno zdravlje Vojvodine (IZJZV) je tokom perioda 2006 - 2017 sproveo tri anketna ispitivanja, u skladu sa standardizovanim upitnikom ISO/TS 15666:2003. Ispitivanja su obuhvatila 31 pitanje za ispitanike vezano za subjektivni doživljaj buke i subjektivnu procenu uticaja buke na zdravlje ljudi, istovremeno sa merenjem i utvrđivanjem nivoa buke u životnoj sredini, a uzorak ispitanika je izabran metodom slučajnog izbora prema adresama mernih mesta za merenje nivoa buke u životnoj sredini. Prvo anketiranje je obavljeno među odraslom populacijom 2006. godine, drugo 2012. godine, a treće 2017. godine.

RESULTS: Istraživanja su omogućila sagledavanje subjektivnog doživljaja buke kao činioca iz životne sredine

koga je nemoguće izbeći, a koji dovodi do uznemirenosti stanovništva. Izdvojeni su neki od rezultata ispitivanja, koji variraju u zavisnosti od godine istraživanja i ispitivane populacije. Procenat ispitanika koji bi zbog saobraćajne buke menjali stan kreće se u rasponu 13%-46%. Buka ljude najčešće ometa pri gledanju televizije (13%-78%), dnevnom odmoru (30%-60%) i mentalnom radu (36-56%), a najviše ih uznemirava buka poreklom od saobraćaja (47-59%) i građevinskih radova (25%-32%), buka iz komšiluka (25%-27%), buka koju stvaraju ugostiteljski objekti u okruženju (12-24%) i buka od lifova i instalacija u stambenim zgradama (11-15%). Takođe, noću se zbog saobraćajne buke budi 6% studenata, odnosno 51% ispitanika starijih od 65 godina. Sumarno, oko 50% stanovništva se izjašnjava da je veoma uznemireno bukom i tokom dana i tokom noći.

CONCLUSION: Rezultati višegodišnjih merenja buke u životnoj sredini Grada Novog Sada i anketnih ispitivanja stanovništva potvrđuju da buka iz urbane životne sredine, koja je najvećim delom poreklom od drumskog saobraćaja, uznemirava ljude i predstavlja dugotrajno prisutnu opasnost po zdravlje ljudi.

KEYWORDS: Environmental noise, Environmental Exposure, Population, Health

PHARMACOLOGICAL ACTIVE SUBSTANCES IN THE WATER SUPPLY SYSTEM OF URBAN ECOSYSTEM

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BACKGROUND: Pharmacological active substances (PAS) are complex molecules with very different functional, physical - chemical and biological properties. Numerous

researches, which have been carried out in different parts of Europe and in the USA have shown the presence of PAS in waste and surface waters, in underground water

and also in drinking water and PAS have been recognized as an important factor of risk in the environment.

AIM OF THE STUDY: To investigate the presence of PAS and residues in the water cycle of the water supply system of Maribor (surface water, groundwater, waste water and drinking water) as an example of urban ecosystems.

METHODS OF WORK: Samples of surface water, underground water, waste water and drinking water were taken at the municipality of Maribor and analyzed with LC/MS/MS for the presence of selected PAS or their residues.

RESULTS AND CONCLUSIONS: In some samples taken in different parts of the water cycle five PAS were found - caffeine, carbamazepine, paracetamol, sulfametoksazol and theophyllin.

CONCLUSION: The presence of PAS in surface and underground water represent a long term potential danger for the environment and also for humans in the urban environment.

KEY WORDS: pharmacological active substances, surface water, underground water, waste water, drinking water.

CONCENTRATION OF NITRATES IN PUBLIC WATER SYSTEMS AND GASTROINTESTINAL CANCER INCIDENCE IN THE MUNICIPALITIES OF BOGATIĆ AND LJUBOVIJA

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OBJECTIVES: To determine the concentration of nitrates in drinking water in two municipalities of the County of Mačva, Bogatić and Ljubovija, and to compare the age-standardized incidence rates (ASR) of gastrointestinal cancer (esophageal cancer, gastric cancer, colon cancer, rectal cancer) in the population aged above 25 years.

MATERIAL AND METHODS: The concentration of nitrates in water was determined by laboratories of Public Health Institute Šabac. ASRs of gastrointestinal cancer in two municipalities from 2011 to 2015 were obtained from the Šabac Public Health Institute and compared with student's t-test for independent samples.

RESULTS: The average nitrate concentrations in the central water facilities of Bogatić and Ljubovija were 42 mg/l and 10 mg/l, respectively. Nitrates concentrations

in the central water supply of Bogatić were 3.3 to 6 times higher than in Ljubovija. In Bogatić waterworks there was an evident trend of nitrates growth, while in Ljubovija the oscillations of nitrates concentrations were less prominent. Among females ASR of colon cancer was higher in Bogatić compared to Ljubovija ($p=0.02$), while ASRs of gastric and rectal cancer were similar ($p>0.05$). Among men there was no significant difference in cancer ASRs between Bogatić and Ljubovija ($p>0.05$).

CONCLUSION: There may be an association between higher concentrations of nitrates in waterworks and higher ASR of colon cancer among females in Bogatić municipality compared to Ljubovija.

KEY WORDS: nitrates, drinking water, age-standardized incidence rate, gastrointestinal cancer

PITCH POSTER PRESENTATIONS

HEALTH SAFETY OF DRINKING WATER IN THE UNA-SANA CANTON AREA DURING A FIVE-YEAR PERIOD (2014–2018)

JASMINA CEPIĆ

Public Health Institute of Una-Sana Canton

AIM: The aim of the paper is to show drinking water quality trends in the Una-Sana Canton area during the five-year period.

METHODS: The results of monitoring the health safety of drinking water in the Canton area were processed and interpreted during period of 2014-2018 (the number of microbiologically tested samples N=8515, the number of physico-chemically tested samples N=7947).

RESULTS: The results of monitoring the health safety of drinking water show that the percentage of defective microbiological samples ranged from 20,00% in 2018. to 30,91% in 2014. The percentage of physico-chemically defective samples ranged from 11,02% to 15,23%. The largest share in the total number of microbiologically defective samples is from the areas of municipalities Sanski Most, Bužim and Ključ. Concerning physico-chemical defects Bužim, Ključ and Bihać are leading. The best results of the health safety of drinking

water are in Bosanska Krupa, where the percentage of defective samples is around 8%. This is also the municipality with the relatively largest number of analyses.

CONCLUSION: The Public Health Institute Bihać performs drinking water analyses, monitors the sanitary-technical conditions in water supply systems, as well as the range of diseases that can be related to water supply. Given the unequal conditions and different approaches of the management of water supply public companies, the quality of drinking water in the Una-Sana Canton varies greatly from municipality to municipality.

The main causes of defects in drinking water are related to total number of coliform bacteria, the presence of E.coli and enterococci, water turbidity, residual chlorine concentration and KMnO₄ consumption.

KEY WORDS: health safety of drinking water, water supply, drinking water

OVERVIEW OF DRINKING WATER QUALITY ON PUBLIC TAPS AND FOUNTAINS WITH NATURAL WATER IN THE CITY OF BELGRADE IN 2018

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AIM: To evaluate the hygienic status of natural drinking water from public taps and fountains, as one of the indicators of the environment condition, and within the scope of protection of public health and monitoring the quality of groundwater sources that can be used as an alternative source of water supply.

METHODS: We included 444 samples of water, collected at 32 sites of public spring water fountains in the Belgrade area, during year 2018. Samples were analyzed in the basic "A" scale (n=415) and expanded "B" scale (n=29). Results of analysis of all samples were evaluated according to Regulation on the hygienic standards

of drinking water ("Official Gazette of the FRY", no. 42/98 and 44/99).

MAIN RESULTS: Of all laboratory samples tested, 138 (31.1%) had physico-chemical contamination and most common cause is increased level of turbidity, concentrations of nitrate, ammonia and electro conductivity values. A total of 260 (58.6%) samples had bacterial contamination with most common cause registered as presence of fecal bacteria (*E.coli*), total coliform bacteria and *Streptococcus* Group "D". Biological quality of water in most of public water fountains was satisfactory, although, in a limited number of samples the

presence of biological indicators is registered.

CONCLUSION: Drinking water from majority of controlled public fountains does not fulfill hygienic requirements. Presence of fecal bacteria in natural water from public fountains indicates poor sanitary and hygienic condition of the facilities and the neighbouring environment and represents an important sanitary and epidemiological risk to the health of users.

KEY WORDS: Environmental Monitoring, Water Pollution, Public Health

VINYL CHLORIDE – A NEW CHALLENGE FOR DRINKING WATER QUALITY IN SOME BELGRADE WATERWORKS

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Institute of Public Health of Belgrade, Department for Water

AIM: The contamination of groundwater with vinyl chloride is an emerging problem, since it has been detected in different water sources of some of public waterworks in the wider area of the City of Belgrade over the past several years.

Our aim was to investigate the presence of vinyl chloride (VCl) in raw and drinking water of one public waterworks located in the wider area of the City of Belgrade, and to evaluate the effects of measures taken to reduce its presence.

METHODS: We included a total of 193 raw and drinking water samples from a selected waterworks sampled during a 5-year period.

The presence of vinyl chloride in these samples was determined by gas chromatography, using the purge and trap technique and thermal desorption, and were evaluated according to maximum allowed concentration (MAC) level set by the Regulation on the hygienic

standards of drinking water (Official Gazette of the FRY, no. 42/98 and 44/99).

RESULTS: The registered values of VCl in raw groundwater samples ranged up to 200+ µg/l, showing the seasonal character of fluctuation, with higher values during the cold periods of the year. The concentration of VCl exceeded the MAC in 25 out of 77 drinking water samples.

CONCLUSION: In order to determine the exact cause of the presence of vinyl chloride, a detailed analysis of the state of the environment in groundwater source protection zones (SPZ) is needed, as well as finding adequate measures for SPZs protection and application of adequate water treatment techniques.

KEY WORDS: Environmental Monitoring, Fresh Water/chemistry, Vinyl Chloride/analysis, Water Pollutants

MONITORING OF LEGIONELLA IN SWIMMING POOLS WATER IN MONTENEGRO

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INTRODUCTION: Legionellosis is an acute bacterial disease caused by *Legionella* bacteria. The disease has two different clinical and epidemiological manifestations: legionary disease (pneumonia with severe clinical picture and possible death) and fever (a milder form of disease with similar flu-like symptoms).

OBJECTIVE: The aim of the paper is to investigate the presence of *Legionella* in swimming pool water samples.

METHOD: The presence of legionella was investigated in swimming pool water in Montenegro during 2018. The water was tested by standard microbiological proce-

dures (MEST EN ISO 11731 and Legiolert), in accordance with the Rule book on Sanitary-Technical and Hygienic Conditions, as well as conditions for the health of water for recreational needs and other waters of public health interest (Official Gazette of MNE no. 57/18).

The analysis included pool water samples, according to individual requirements, health and sanitary inspection requirements.

RESULTS: None of the 63 analyzed samples were positive

for *Legionella pneumophila*.

CONCLUSION: In the pools where a large number of people are held daily, the occurrence of *Legionella* can cause an epidemic. The monitoring of swimming pool waters in Montenegro shows no risk of *Legionella* infection.

KEY WORDS: pool water, inspection, microbiological safety, *Legionella pneumophila*

AIR QUALITY MONITORING SYSTEM UNDER THE AUTHORITY OF THE LOCAL SELF-GOVERNMENT UNIT OF THE CITY OF NOVI SAD

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¹ City Administration for Environmental Protection, Novi Sad, Republic of Serbia

AIM: Analysis of the air quality monitoring system within the local network of measuring stations and / or measuring points for fixed measurements under the authority of the local self-government unit of the City of Novi Sad.

METHOD: Since 2009, by adopting the Law on Air Protection, a unique functional air quality monitoring system has been established and principles for the formation of a national and local network of measuring stations and / or measuring points for fixed measurements. The air quality control program in CNS establishes a Local network of measuring points for monitoring air pollutants, determining the number and arrangement of measuring points, as well as range, type and frequency of measurement.

RESULTS: Air quality, as one of the basic *environmental quality parameters*, is monitored in the CNS since 1971. The number and arrangement of measuring points, as well as the range, type and frequency of air pollutants measurement varies over the years, depending on the needs of the City and legal regulations. It was found

that the mentioned variations make it difficult to compare the results of air quality results in the territory of the CNS, in relation to the provincial, state and European networks, as well as within the local network, in order to monitor the trend of population exposure. For the needs of the City (City Administration for Environmental Protection), an analysis of existing system in state, provincial and local monitoring network from 2012-2016 was made in order to improve the monitoring.

CONCLUSION: The existing system of local air quality monitoring in the CNS provides basic important information for the population regarding air quality. However, it is necessary to improve the monitoring from the aspect of developing the Air Quality Monitoring Program in the CNS, comparing the results with the local, national and European networks, and their harmonization for a comprehensive assessment of air quality and population exposure.

KEYWORDS: Air Quality, Environmental Monitoring, Population

CONCENTRATION OF SOOT AND GENERAL PRACTITIONER VISITS FOR RESPIRATORY DISEASE

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OBJECTIVES: To examine the association between the air concentration of soot and the daily number of visits due to respiratory diseases in a primary health facility in northern Kosovska Mitrovica.

METHODS: A time series study was performed in 2009–2013 using data on daily patient visits in the institution of primary health care at Kosovska Mitrovica. In the same period emission of soot was monitored. The

concentration of soot was determined by reflectometric method. Associations between soot concentration and daily number of first visits to general practitioner (GP) due to respiratory diseases were analyzed with nonlinear models with distributed delay DLNM by Gasparini.

RESULTS: A significant positive association was observed between the number of first visits to GP due to respiratory diseases and the concentrations of soot.

The delayed effect of soot on the increase of the number of first visits to GP was highest from the sixth to the eleventh day and was 0.7% per $10\mu\text{g}/\text{m}^3$ increase

of soot concentration (RR = 1.00655-1.00709), but only for patients up to 18 years.

There was no significant correlation between the concentration of soot, and number of GP visits among patients aged 19 to 64 years, and those older than 65 years.

CONCLUSIONS: This study shows a significant positive association between soot concentrations and GP visits due to respiratory problems in young people up to 18 years.

KEY WORDS: soot, respiratory diseases

TECHNICAL AND LEGAL LIMITATIONS OF SPECIFIC SOURCE NOISE MEASUREMENT AND CONTROL

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GOALS: This presentation's goal is to raise awareness and point out the problems with current technical and legal limitations of the system in use for both the controlling authorities and venue owners as well as provide guidance and ideas toward more effective solutions that are already in use around the world.

METHOD: Current law regulative demands that every venue that produces sound has to limit its noise output to an acceptable level in the environment, both indoors and outdoors. This is done by authorized personnel measuring noise at reference spots with high precision instruments and issuing reports that detail equipment setup at which measured levels at reference spots do not exceed noise levels set by legislation.

RESULTS: Music equipment can be immensely complex and it can be hard to control for both the authorities

and venue owners. The presentation will show how one sound recording can be mastered at different dynamic compression ratios and boost or lower the actual volume output and frequency profile without changing any setting on the music equipment in use thus making the aforementioned authorized noise measurement report music equipment settings description largely invalid. It will also impose the need for more standardized methods of noise measuring.

CONCLUSION: This state of affairs puts environment and inhabitants at risk since legal controlling authorities are not able to prove and process violations effectively but also leaves venue owners vulnerable to legal sanctions even when they abide by noise measuring report completely.

KEY WORDS: noise, environment, sound, music

VIDEO PRESENTATIONS (PPT)

DETECTION OF NITROGEN OXIDES IN VALJEVO AND THEIR IMPORTANCE FOR HUMAN HEALTH AND VEGETATION

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INTRODUCTION:

The most important nitrogen oxides (NO_x) are NO and NO₂. NO is a gas without color and odor, poorly soluble in water, and NO₂ is a gas heavier than air, of a brownish color, and characteristic sharp odor. At higher concentrations they have detrimental effect on human health and vegetation.

AIM: The aim of the study is to monitor the concentrations of NO_x in Valjevo, and to assess their effect on human health and vegetation.

MATERIALS AND METHODS: In the samples of ambient air, the presence of NO_x was monitored during winter in 2017 and throughout 2018. The NO_x concentration was determined by the method according to SRPS ISO 6768: 2001. The results were studied according to the Regulation on conditions for monitoring and air quality requirements (Official Gazette of RS, No. 11/2010, 75/2010

and 63/2013). The concentration of NO_x represents the sum of NO and NO₂ concentrations in the air.

RESULTS: Concerning the average monthly concentration, NO_x have not exceeded the threshold value and the tolerant value that are important for the protection of human health. Depending on a measuring spot, NO_x exceeded the critical level, for the protection of vegetation during winter months in 2017 and during 3–4 months in 2018.

CONCLUSION: The measured NO_x concentrations in the ambient air of Valjevo in 2017-2018 may not significantly affect human health, but can impair the numerous plant forms. It is necessary to undertake additional measures to continuously reduce NO_x emissions.

KEYWORDS: nitrogen oxides, human health, vegetation.

DETECTION OF SO₂ IN VALJEVO AND ITS IMPORTANCE FOR HUMAN HEALTH AND VEGETATION

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INTRODUCTION: Sulfur dioxide is a gas without color, but a sharp odor and sour taste, heavier than the air. Its increased presence changes the air quality. The literature describes the harmful effects of SO₂ on human health and vegetation.

AIM: The aim of the study is to monitor the concentrations of SO₂ in Valjevo, and to assess its effect on human health and vegetation.

MATERIALS AND METHODS: The presence of SO₂ in ambient air was monitored during winter in 2017 and through-

out 2018. The concentration of SO₂ was determined by the spectrophotometric method according to SRPS ISO 6767: 1997. The results were interpreted in accordance with the Regulation on conditions for monitoring and requirements for air quality (Official Gazette of the Republic of Serbia, No. 11/2010, 75/2010 and 63/2013).

RESULTS: Concerning the average monthly concentration, SO₂ has not exceeded the limit value and tolerance value for protecting human health. If the critical level is observed, it can be seen that SO₂ has exceeded the critical level, which protects the vegetation from its

harmful activity. The level of SO₂ is continuously elevated during winter. Depending on the measuring point, the concentration of SO₂ exceeded the limit during 6–9 months.

CONCLUSION: Measured concentrations of SO₂ do not significantly affect human health, but they can damage the number and variety of plant forms. It is necessary to take additional measures to reduce SO₂ emissions in Valjevo.

KEYWORDS: SO₂, human health, vegetation.

AIR QUALITY IN NIS FROM 2011–2018 THROUGH THE MONITORED FRACTIONS OF SUSPENDED PM 10 PARTICLES

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THE GOAL: The monitoring of air quality in the territory of the City of Niš from 2011 to 2018 is carried out with the basic goal of obtaining data for determining the quality of air and air pollution in the city. The data obtained are necessary for the proper selection of preventive measures in order to protect and improve the health of people and the preservation of the environment.

METHOD: Samples of suspended particles PM₁₀ and PM_{2,5} were taken with the MSV6 ambient air sampler SVEN LECKEL, Germany. PM₁₀ and PM_{2.5} air pollution test method SRPS EN 12341: 2015 (gravimetry) The upper limit for PM₁₀ for the calendar year period is 40 µg/m³, and for a 24-hour value of 50 µg/m³ and should not exceed more than 35 times in one calendar year. The deadline for reaching these values was January 1, 2016.

MAIN RESULTS: In 2018 the number of days over the GV-day was 16, for the number of measurements 47, for

2016–2017 the number of days over the GV-day was 19, for the number of measurements 51, for 2014 the number of days over GV-day was 24, for the number of measurements 48, for 2013. the number of days over the GV-day was 23, for the number of measurements 52, for 2012. the number of days over the GV-day was 15, for the number of measurements 52, for 2011. number of days via GV -day was 14, for the number of measurements 45.

CONCLUSION: Suspended particles represent a complex mixture of organic and inorganic substances of different chemical composition, made up of particles originating from diesel engines, flying ash, mineral dust. Chronic exposure to the particles contributes to the increased risk of developing respiratory and cardiovascular diseases and lung cancer.

KEY WORDS: suspended particles, PM 10, air quality, GVI

SAFETY OF RURAL WATER SUPPLY IN THE PIROT DISTRICT FOR THE PERIOD 2014–2018

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OBJECTIVE: To present the characteristics and health safety of water supply in the rural areas of the Pirot District.

MATERIAL AND METHODS: Data were collected from protocols and reports of the Institute of Public Health Pirot. Sanitary-hygienic control of water facilities was conducted.

RESULTS: Sampling and testing was carried out by the Center for Hygiene and Human Ecology-Institute of Public Health Pirot, in the accredited physico-chemical and microbiological laboratories. Evaluation of the results was performed, according to the relevant Regulations (Official Gazette FRY 42/98, 44/99). In the period 2014–2018, 1083 samples of drinking water were taken from 6 rural settlements (57 physical-chemical

and 192 microbiological analyses gave unacceptable results). Between 2014 and 2016, physical-chemical and microbiological irregularity of water samples ranged from 5.09% to 10.19%, and from 19.4% to 24.5% respectively. At that time drinking water production company, invested in the maintenance of water facilities and water supply networks. In 2017, percentages of physical-chemical and microbiological irregularities were lowered to 0.93% and 14.8%, respectively. In 2018,

percentages of physical-chemical and microbiological irregularities were 3.19% and 7.7%, respectively.

CONCLUSION: Proper maintenance and investments in rural waterworks in Pirot District resulted in the improvement of drinking water quality and lowering health risk.

KEY WORDS: rural waterworks, drinking water, health safety

SOIL CONTAMINATION TESTING WITHIN WATER SUPPLY PROTECTED AREAS ON THE TERRITORY OF BELGRADE

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PURPOSE: The purpose of the paper is to present the results of soil contamination testing within water supply protected areas on the territory of Belgrade.

METHOD: Laboratory testing results of soil quality that are shown in this paper were collected in the period 2009–2018, during the implementation of the Program of soil contamination testing on the territory of Belgrade.

RESULTS: The obtained results show higher concentration levels of one or more pollutants, mostly heavy

metals and organic pollutants, at depths of 10cm and 50cm at most of the locations.

CONCLUSION: Soil contamination with hazardous substances on the territory of Belgrade may threaten groundwater that is used for the production of safe drinking water.

KEY WORDS: soil, contamination, watersupply protected areas, heavy metals

SEASONAL DYNAMICS OF POLLEN AND NON-SPECIFIC POLLUTION IN THE AIR OF PANČEVO

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BACKGROUND: Pančevo is a capital of South Banat County in Serbia. Systematic monitoring of air quality in Pančevo includes pollen monitoring and monitoring of non-specific pollutants such as: NO₂, SO₂, soot, PM₁₀.

METHODS: The Institute of Public Health Pančevo measures the concentration of pollen of 24 allergenic plant species (continuous volumetric method, LANZONI VPPS 2000 sampler). For non-specific pollutants measurement, standard methods and procedures were used.

RESULTS show that in 2017 the highest pollen concentrations were of *Urticaceae*, *Taxaceae* and *Cupressaceae* and *Ambrosia*. The highest number of days with pol-

len concentrations higher than the limit value was recorded for pollination periods of *Urticaceae*, *Ambrosia*, *Taxaceae* and *Cupressaceae*, *Salix* and *Morus*. Analyzed periods of pollination in weeks with moderate or high risks for allergic reactions and daily concentrations of PM₁₀ above the limit values showed that: 1) there is a statistically significant correlation ($r=0.224$, $p=0.026$) for *Betula* 2) there is no statistically significant correlation ($r=0.088$, $p=0.282$) for *Poaceae* 3) there is a statistically significant correlation ($r=0.211$, $p=0.010$) for *Ambrosia* pollen.

CONCLUSION: Air quality in Pančevo (tested parameters of SO₂, NO₂, and soot) did not significantly affect the increased concentration of pollen in the air of the city of Pančevo. Tested parameter PM₁₀, showed

the correlation with the pollen concentrations with moderate and high risk for the appearance of allergic reactions. During the annual pollination, there were 12 (5.4%) days with moderate and high concentrations of

three indicators (pollen of *Betula*, *Poaceae* and *Ambrosia*) when concentrations of PM₁₀ were increased.

Keywords: pollen monitoring, PM₁₀, air pollution.

PHYSICO-CHEMICAL COMPOSITION OF BOTTLED NATURAL MINERAL WATERS IN SALES

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The sanative properties of natural mineral water have conditioned the need for their bottling. Thus, these waters became available to a wide range of consumers. They differ from ordinary drinking water in the content of mineral matter, trace elements and other ingredients that may have a certain physiological effect.

THE AIM: Physico-chemical analysis of bottled natural mineral waters in sales and assessment of their impact on human health.

RESULTS: 22 samples of natural mineral waters, 13 non-carbonated and 9 carbonated, were analyzed in laboratories of Public Health Institute Niš. The analysis included the following parameters: dry residue at 180 °C, pH, anions and cations and trace elements.

The common characteristic of non-carbonated natural mineral waters is that those with low content of dissolved mineral matter have low sodium and other

minerals content. Such quality assures their daily and unlimited use.

Carbonated natural mineral waters contain carbon dioxide, even up to a few grams per liter, which reduces the pH value of water. The chemical composition of these waters is very diverse. High mineralization waters prevail, in which Na⁺, Ca²⁺, Mg²⁺, F⁻, Cl⁻, HCO₃⁻ are characteristic ingredients. Consumption of such waters must be limited.

CONCLUSION: Uncontrolled consumption of carbonated natural mineral waters can lead to undesirable negative effects on human health. By introducing consumers with the chemical composition of bottled natural mineral waters in traffic, every person, healthy or ill, can use those waters that are most suitable for him.

KEY WORDS: natural mineral waters, mineralization, characteristic ingredients.

CONTAMINATED SITES AND POTENTIAL RISKS TO HUMAN HEALTH AND ENVIRONMENT IN THE REPUBLIC OF SERBIA

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Decades of poor waste management, the use of “dirty” technologies, absence of remediation of the resulting pollution, lack of public awareness, as well as the price of sustainability, have led to incomprehensible consequences - adverse effect to both human health and the environment. In many cases, contaminants are released from active industrial processes or are present in accumulated hazardous waste from past industrial activities. Often, multiple contaminants exist simultaneously, posing a mix of certain or suspected risks. The monitoring and proper management practices in the cases of contaminated sites are recognized as one of the most effective actions in the prevention of negative

impacts of contaminants on human health and the environment. One of the result of the UN Environment/GEF project “Enhanced Cross-sectoral Land Management through Land Use Pressure Reduction and Planning”, which is implemented in the Republic of Serbia in the period 2015-2019 is the defined possible impact (direct and indirect) of contaminated sites on the environment and human health. In the framework of the project, a preliminary risk assessment - human health hazards - have been applied according to the results on previous research (environmental impact assessment studies, expert opinions, plans, laboratory analyzes within the characterization of hazardous and

non-hazardous waste, inspection reports and other documents), as well as the results of new soil, underground and surface water and sediments quality control. From a total of 32 surveyed industrial sites with historical pollution, from the aspect of risk, 14 sites are

priorities for detailed investigation, as well as for the implementation of remediation measures.

KEY WORDS: contaminated sites, contaminants, human health, environment

IMPROVING OF AMBIENT AIR QUALITY MONITORING NETWORKS FOR ASSESSING POPULATION EXPOSURE AND POTENTIAL HEALTH IMPACT

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OBJECTIVE: Modification of existing local monitoring networks (MN) for ambient air quality in the City of Novi Sad in way that provide sufficient data which indicate population exposure to ambient air pollution.

METHOD: Throughout 2012-2016 for the area of the City of Novi Sad according to legal and sub-legal acts, as well as the US EPA Ambient air MN assessment guidance, an analysis of the MN (state, provincial and local) for ambient air quality was performed from the aspect of number of measuring points, EoI classification and pollutants (type, number, temporal coverage and data availability). Optimization of the MN within the competence of local self-government is based on the obtained results of the analysis, the data of the natural population change and on harmonization with MN under the jurisdiction of the states and the province.

RESULTS: The MN of local self-government in relation to the network under the jurisdiction of the state and the province, was most often coincidental in terms of EoI classification, limited spatial distribution, incomplete coverage of pollutants and unsustainable temporal coverage, or availability of data. The applied statistical techniques justified the displacement of the existing measuring points of the urban area in the suburban at the places of expected maximum concentrations (traffic) or in residential areas (background).

CONCLUSION: Local MN must be carefully planned and harmonized with national network to cover all critical areas in the City, thus providing a complete picture of the air quality that indicates a whole population exposure and potential health impact.

KEYWORDS: Air pollution, Environmental Monitoring, Environmental Exposure, Population, Health

HEALTHY LIFESTYLE

INVITED LECTURES

PUBLIC HEALTH: ACHIEVEMENTS AND CHALLENGES IN A GLOBALISED PERSPECTIVE

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During the last five centuries, the global life expectancy has considerably increased. This increasing trend could be linked to good public health policies, such as sewage management, vaccination, safer and more abundant food, or public water treatment. Nowadays, health is affected by globalization. The process of globalization is producing changes in three main areas, and in each one it shows health consequences: spatial change is associated with the increasing movements of people, goods, information, capitals; temporal change affects the spread of diseases and reduces adaptation times to mutations; eventually, cognitive change is influencing the way we perceive ourselves, our needs, values and knowledge, leading also the global spread of the so-called “lifestyle” diseases. This rapid health determinants movement is quickly changing the patterns of disease emergence and prevalence in populations, thus challenging the capacity of governments to effectively regulate them. Currently, some health-impacting megatrends can be identified worldwide: climate change, multimorbidity, antimicrobial resistance, rapid technological innovation. Therefore, why do nations fail in managing them? Since globalization does not have a predetermined trajectory, being able to balance between positive and negative health determinants depends on good global health governance. This means to deal with health challenges harnessing on strengths of all those who are involved: communities, governments, citizens, institutional and non-institutional organizations, health professionals groups and public health movements. The

need to engage with emerging global health issues confronts public health with the need for continuous improvement in order to achieve an ever better governance capacity. First, there is need to boost the use of data coming from the best available evidence in order to standardize the public health decision making process in the intervention context. Second, thanks to personalized public health, data can be used to stratify the population, in order to address the right public health interventions to the right targets, and in order to study and overcome the barriers that would render those interventions ineffective. Third, we need to develop effective communication skills to involve all the stakeholders: policy makers, managers, professionals, populations and individuals. In fact, the loss of public understanding is often one of the most important mistake in the health field, since health communication plays a pivotal role in promoting adoption of a healthy lifestyle. Digital technologies could help us in bridging gaps at two different levels: in promoting the utilization of data in the public health decision making, and in involving the actors of public health context in an informed proactive and participated action.

In conclusion, in this era of shared knowledge, inputs from the evidence of medical, economic and social world, from the technological progress and the unexpected directions of globalization, are potentially infinite. In a framework of sustainable development, there is a need for increasingly effective tools and increasingly skilled public health professionals that allow the signal to be separated from noise.

EDCS PREVENTIVE MEDICINE AND PUBLIC HEALTH IMPLICATIONS VS LONGEVITY

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Evangelos A Polychronopoulos et al EDCs (Endocrine Disrupting Chemicals) and potential EDCs are part of a controversial topic with scientific, regulatory, socio-economic and Public Health aspects, with particular impact on wildlife and human Health, affecting Endocrine system normal functions (i.e. neurological, immune). consequently diminishing the successful development, reproductive adulthood and decreasing survival. Beyond any doubt, in every day life occur, 'adverse effect reactions morbidity burden', due to multiple exposure to hundreds of chemicals : pesticides, insecticides, (nutrients-nutrients-EDCs) interactions, genes-nutrients-EDCs interactions, food additives, Polycyclic aromatic hydrocarbons(PAHs), Dioxins, DDTs, PCBs, brominated flame retardants(BFRs), cosmetics, parabens, chemical mixtures in unknown environmental doses . Dysfunctions and Diseases, due to early exposure include almost all the range of ' Environmental indoors and outdoors ' Human disease : atherosclerosis, CVD, learning differences, autism, thyroid dysfunction, asthma, increased infections morbidity, 'low semen quality' 'testicular *dysgenesis* syndrome', 'genital malformations' thyroid disruption associated with neuro behavioral disorders. Risk assessment Methods, Lab animal Studies and Epidemiological Studies (associations, mechanisms clarifications) should be expanded and networking with Stakeholders following UNEP, WHO, ECHA, EU, CHAFAE EU Regulations (i.e.2017/2100), are necessary, taking into account Member States Health protection actions (Example of France Ban 2015 on Bisphenol A(BPA) 'Prohibition concerning all packaging). Diethylstilbestrol (DES) withdrawn in 70's. It is essential the Expansion of Prospective Epidemiological Studies, Prevalence Studies, Computational Toxicology Tools, EDCs DATA BANK, EDCs Intergenerational Registries at National, European and Transatlantic Level. According to The Consensus Statement (Bergman A, et al Environmental Health Perspectives) concerning the Endocrine Disruption 'It is imperative to act beyond one chemical, one dose, one disease at a time usually used by animal studies, human studies models'. Public Health infrastructure and Climate Change Environment protection are basic pillars including all sensitive Population Groups (Chil-

dren, Women, Adults, Elderly, Refugees , unemployed or underpaid youngest, Awareness on 'Safe' chemicals use Literacy). Presumably Consumer life long training is the main pillar of Preventive Medicine infrastructure and actions, including EDCS adverse effects prevention (primordial, primary, secondary, tertiary, quaternary) and Specific Trainers Training in terms of knowledge, skills, attitudes, values, for better life , local tradition regions preservation (good agricultural practice) (GAP) less use of pesticides, insecticides, always towards decreasing morbidity and mortality, in regions, urban, semi urban, rural islandersvs continental towards the Longevity of the Population(Lessons from Medis Elderly Free of Disease Study). Concerning *Longevity*, EDCs endocrine function alteration , probably has been counter acted by *determinants of longevity*, including, immune response, heredity, genetic susceptibility, socio-demographic, clinical, psychological, lifestyle characteristics, which furthermore contribute to successful generations, from reduced *exposure to EDCs in remote and isolated areas*, healthy childhood, healthy adult hood, 'successful aging' and its relation to the reduction of chronic diseases risk (oxidative stress, inflammation, CVD, Cancer, Depression). It is worth mentioning the *contribution to the ideal 'free of Disease' life at all ages including also older individuals (> 65 years) living in Mediterranean areas, (Medis Study, Progress and Plans, North, South, East, West Differences. In preparation Field Study : MedisvsBeogradvsNovisad, MedisvsIstanbulConstantinople, MedisvsBaltic Sea.*

CONCLUSION

Respectively the Scientific and Regulatory agencies of the EU(CHAFAE, ECHA,EFSA) must improve risk assessment procedures, in collaboration and coordination with Stakeholders, Universities Networks, Equipped with Accredited remote QC, QA procedures established mobile Labs (Network of Reference Labs EDCs control procedures) and have not only a limited role concerning the review of the notifies always for Human and Wildlife benefit. Taking into account the information gap on chemicals less bioaccumulative, chemicals by products, further research is needed on EDCs impact on *Environment Preventive Medicine and Public Health.*

INDIVIDUAL CHOICES IN THE LIGHT OF SDGS AND GLOBAL CHALLENGES

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The global challenges of the present are so numerous, large and complex that an individual often feels helpless, unsafe and endangered. Seventeen Sustainable Development Goals (SDGs) represent a universal call to contribute comprehensively to solving global challenges, in order to eradicate poverty, ensure peace and prosperity for all, and also protect the environment. They include climate changes, economic inequalities, as well as innovation, sustainable consumption, peace and justice. The interconnection of SDGs is reflected in the fact that the key to the success of one goal is often to solve the challenges that are part of another goal. Partnership and pragmatism are an imperative within the activities of achieving goals and making appropriate choices for a sustainable improvement in the lives of future generations.

Bearing in mind the interweaving of SDGs, it is necessary that health professionals act much wider and

more comprehensively, and not only to target at goal 3 (health and well-being).

The goals should also be achieved through behavior, not exclusively through knowledge and counseling. In line with this, the role of hygiene as a basic preventive and public health branch of medicine may need to be reassessed, but to remain recognized, present both within our own space and wider.

It is necessary to insist on the individual responsibility of health professionals, ie on individual contribution through healthy lifestyles and individual choices that are presented by personal example and way of life in accordance with SDGs.

KEYWORDS: sustainable development goals, poverty, climate, health professionals, responsibility

PROMOTING HEALTHY LIFESTYLES IN THE WORKING ENVIRONMENT: HEALTHY COMPANY

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Workplace health promotion activities bring multiple benefits, from those to the individual (employees), to those to the employers and ultimately to the wider community, and thereby these activities should be one of the central public health interests. The Croatian Institute of Public Health, within the National program "Living Healthy", is implementing project: Health and Workplace. Partners on The project are Ministry of Health, Ministry of labor and other stakeholders, and providers are 21 county Institute of Mental Health. The aim of Project is to promote health and healthy lifestyles in the working environment. The project is implemented through different workshops such as: smoking and alcohol, and health, psychosocial risks of working environment. During the implementation of the

project awareness of health risks among employees is raised. Employees who are exposed to increased risks are offered mental health counseling services in the Department of mental health in 21 Institute of Public Health in all Croatian counties. The project is funded through the European Structural Funds, from 2017.-2023. In each project year, three companies apply for a project, and run through education. At the end of the project companies are awarded a "Healthy Company" certificate. So far, nine companies have been certified. The purpose of the project is to improve health literacy, to rise awareness about mental and physical health and to empower the management, employers and employees to promote health and improve health behavior.

NUTRITION THROUGH THE LIFE CYCLE: FROM CHILDHOOD TO THE ELDERLY YEARS

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INTRODUCTION

All people have a right to adequate food, nutrition and diet. Healthy diets is essential to prevent malnutrition in all its forms. When we should start? Pre-conception and pregnancy periods are very important, but it is best to start making healthy choices from a young age and maintain them as you mature. Unhealthy diets are now the number one risk factors globally for deaths and disability-adjusted life-years lost, surpassing for example tobacco smoking and high blood pressure.

AIM

Make review of the nutritional studies in the Republic of Srpska in the period 2003 to 2015.

METHOD

Retrospective analysis of data collected in the National Health Survey in RS from 2003 to 2015 year with special aspects of nutrition habits according to food frequency questionnaires.

RESULTS

Regularly first step in life, breastfeeding, of children ≤ 6 months increased for 24,4% between 2006 and 2012

year. If we look to adult population we can see that between 2003 to 2010 year adult people in RS increased intake of fruits and vegetable, but in 2015 year a very small percentage of respondents, 8,5% consumed fruit and vegetables several times a day with statistical significance between age in consumption of fruit ($F = 6,204$, $p = 0,000$) and vegetables ($F = 6,166$, $p = 0,000$). Skim fat milk in 2003 year consumed only 4,0% vs. 69,5% in 2010. Percent of individuals which add salt before tasting the food decreased for 5,3% from 2003 to 2015 year as well as percent of people which used animal fat in food preparation (47,7%, 2003 vs. 39,7%, 2010 vs. 36,5%, 2015). It is also found that cereals and whole grain products consumed very rarely. Only one third of respondents (CI 95%: 30.2-35.4), consume fish in accordance with the recommendations in 2015 year vs. 47,2% in 2010.

CONCLUSION

Our finding implicate early childhood intervention and continuous action through the Baby Friendly Hospital and Nutrition Friendly Preschool/School Initiative according to Action Plan for the Prevention and Control of Non-communicable Diseases in the Republic of Srpska for the period 2019-2026.

KEYWORDS: nutrition, life cycle, unhealthy diets

ORAL PRESENTATIONS

INFLUENCE OF FAMILY AND SCHOOL ENVIRONMENT ON CHILDREN'S HEALTHY CHOICES

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INTRODUCTION: Many behaviors, such as physical inactivity or a poor diet, that put adults at risk for chronic diseases are established in childhood. With the growing problem of childhood obesity, recent research has begun to focus on family and social influences on children's eating patterns.

THE AIM of the study is to review influence of family and school environment on children's healthy choices through results and experience from COSI survey in Montenegro, also to discuss other studies.

METHODS: The project is designed in accordance with the European COSI protocol of the World Health Organization (WHO). The target age group was children aged 7 years and 1754 children were measured. 3 types of questionnaires were used: Questionnaire for children,

schools and Parents' questionnaire, standardized by the WHO.

RESULTS: Out of the about 40 countries that participated in the survey, Montenegro is the fourth in terms of childhood obesity. Out of 100 selected schools, 20 of them have additional physical education programs. Only the capital city has organized school meal. Obtained results show that only 1% of parents think that their child is obese, and one in ten interviewed parents think that their child is overweight.

CONCLUSION: Schools have the capacity to disseminate nutrition education and promote physical activity, reaching large numbers of children. Promoting healthier eating patterns among children requires a multi-faceted approach targeting children, parents, families, and schools.

PARENTAL INFLUENCE ON THE RISK OF OBESITY AT 7 YEAR OLD CHILDREN

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AIM: To determine the level of parental influence on child's obesity risk at the age of 7.

METHODS: Randomized observational study was conducted on 251 pair children-parents during medical examination for the first grade entry. Children from the city of Osijek were included, during 2017 and 2018.

Child's state of nourishment was assessed according to the IOTF criteria.

RESULTS: In comparison to the previous period (years 2015-2016) a steep increase in underweight children was found (21.51% vs 5.38%), a slight drop in overweight children (7.97% vs 11.02%) and a slight increase

in obese children (4.78% vs 4.57%). As expected, obese children have the highest risk of cardiovascular comorbidities (observed as cardiometabolic risk, CMR and blood pressure), but children who sleep longer have lower BMI. Maternal pre-pregnancy weight correlates with child's BMI, but paternal BMI has higher influence on child's BMI. Employment and higher income correlate with lower BMI and CMR of a child. Maternal ($p=0.037$) and paternal smoking ($p=0.019$) correlate with higher BMI. Confirmed independent risks for child overweight and obesity are diastolic blood pressure (per each 1 mm Hg the risk increases by 11.9%),

maternal smoking (children who have non-smoking mothers have 68.8% lower risk), pre-pregnancy weight (the risk drops by 6.9% per each kg less), short sleep duration (44.6% higher risk) and family meals (the risk drops by 24.0% with more family meals).

CONCLUSION: The results are in line with what we know so far on the risks for child obesity but further emphasize father's role.

KEY WORDS: childhood obesity, nutritional status, parental influence, IOTF criteria

HAVING A PET AS A HEALTHY LIFESTYLE

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Nowadays, people became attached to their pets and some would even say too attached. The emotional level of connection with an animal, living in the same household, is so much higher than a century ago. Pets became actual members of the families, sharing the same space, bed, sofa or even plate! There is evidence that pets really do increase the quality of the owners life (adults or kids), but there are also some diseases or disorders that can jeopardize the health of the owner or the animal, due to this kind of relationship.

THE AIM of our work is to show the most important highlights of a pet-human relationship, good and bad, from One Health perspective. The method is a descriptive one from different studies done during the last 5 years. There are more or less dangerous diseases that can be

transferred from the pet to the owner, like rabies, scabies or even MRSA. There are disorders that can be "transferred" the other way around, from humans to animals like obesity or a habit of "not walking". But there are also zoonotic diseases that can equally threaten humans and animals at the same time and most often those are vector borne diseases like dirofilariosis, leishmaniasis, Lyme borreliosis.

TO CONCLUDE, the pets overall can increase the healthy lifestyle of humans, but humans need to be responsible for the health status and preventive measures for both – pets and humans.

KEY WORDS: One Health, vector borne diseases, pets, zoonotic diseases

PITCH POSTER PRESENTATIONS

THE ATTITUDES OF TYPICAL STUDENTS TO CHILDREN WITH DISABILITIES IN 2012 AND 2017

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AIM: The aim of the research was to identify attitudes with the onset of inclusive education and, after five years, students of typical development towards students with disabilities in regular primary school.

METHOD: The survey method was two cross-sectional studies covering 2012 and 2017. The place of research was Belgrade: Elementary School Josif Pančić, Elementary School Dragojlo Dudić, Elementary School Branko Ćopić. The first group of respondents consisted of 1,127 children of typical development, ages 7-11. The group was formed from pupils of lower school age (I to IV grade) from three elementary schools in Belgrade: Elementary School "Josif Pančić", Elementary School "Dragojlo Dudić", Elementary School "Branko Ćopić". Two different groups of children, 586 children in 2012 and 541 children in 2017 were examined.

RESULTS: By linking students of typical development

from 2012 and 2017 from three regular Elementary schools and variables of attitude towards children with disabilities in their department with appropriate statistical analyzes in our research, we came to the following results: I know the variable, I hang out, we work together and I would like to meet A child with developmental disorders has a high statistically significant association at the level ($p < 0.01$)

CONCLUSION: This result gives us good support for the continuation of inclusive policies and practices in our country in our population.

This information we receive in our research encourages us to have a very positive attitude towards our peers with disabilities and represents a good basis for continuing inclusive practice in our community.

KEY WORDS: children of typical development, children with disabilities, inclusion.

KNOWLEDGE, ATTITUDE, AND PRACTICE TOWARD ORAL HEALTH AMONG PHARMACIST IN FEDERATION BOSNIA AND HERZEGOVINA

MILKA DANČEVIĆ-GOJKOVIĆ, MD and ELMA SOKIĆ-BEGOVIĆ, DS

Customers/patients used to seek oral health and dental advice in the community pharmacies. Demanding requests give pharmacist great potential in expanding their role in oral health promotion and dental illness prevention.

THE AIM of the study was to explore the knowledge, attitude, and practice of the young pharmacist toward oral health.

METHODOLOGY: This cross-sectional study by self-administered semi opened questionnaire was carried out among pharmacist on internal-ship.

RESULTS: Majority (92%) of the participants were females, with mean age 25 years and 4 months of experience in the community pharmacy. Questioning aimed personal oral habits and professional role of pharmacist. All respondents confirmed their professional role

in the oral health promotion, 97% stated the usual customers' requests about treatment, prevention and promotion of dental health during their job experience. The most frequent reasons for contacting the pharmacy were dental problems, as pain, and oral hygiene products. Results showed pharmacist's knowledge about medication and oral health, but also commercial products. Besides the acquired knowledge satisfaction about oral health among one third, far more, even

95%, respondents were aware of need for its improvement in the future.

CONCLUSIONS: This research finding shows that pharmacist have positive attitude towards oral health, but also keen to obtain new knowledge and skills about oral hygiene practices.

KEY WORDS: Oral Health, Promotion, Practice, Pharmacists

WALKING AS A PHYSICAL ACTIVITY IN THE CITY OF ZAGREB-EHIS 2014/2015

PULJAK A., ŽIVEC M., MARIĆ BAJS M., POLIĆ -VIŽINTIN M.

AIM: Physical inactivity is one of the biggest public health problems in the 21. century. Recommended level of physical activity is at least 150 minutes of moderate intensity or at least 75 minutes of vigorous intensity per week. The aim of this research is to analyze walking as one of the most natural forms of physical activity.

METHODS: Via European Health Interview Survey 2014/2015 (EHIS) the data on the frequency and duration of physical activity in the City of Zagreb were collected. The target population was aged 15 and over. The survey included 456 inhabitants (191 men and 265 women) of the City of Zagreb.

MAIN RESULTS: According to research data, only 24,5% citizens are physically active between 150 and 300

minutes per week. 54, 3% of citizens walk seven days a week. Citizens of the age group 18-24 and 45-54 walk the most days of the week. However, 45, 0% of respondents walk 10 to 29 minutes daily, 27, 1% walk 30-59 minutes daily and 11, 0% walk between 1 hour and 1 hour and 59 minutes daily. Citizens of the age group 18-24 and 55-64 walk the most hours of the day.

CONCLUSION: Zagreb citizens do not include enough walking as physical activity in everyday life. The results support the need of more public health interventions in order to promote recommended frequency and duration of physical activity and also walking as one of the most natural forms of physical activity.

KEY WORDS: physical activity, walking, health

SMOKING PREVALENCE OF EMPLOYEES IN HEALTH CARE INSTITUTIONS IN BELGRADE

Mr sc. med. dr ANĐELIJA NEŠKOVIĆ, dr GORDANA BELAMARIĆ,
dr MLADEN BABIĆ, dr VLADIMIR MILETIĆ

ABSTRACT: Although employees in health care institutions should play an important role in smoking prevention, conducted researches show a very high prevalence of smoking in this population.

THE AIM: The aim of this paper is to explore the prevalence of smoking in health care institutions in Belgrade, and a possible difference in the proportion of smoking habits by sex, age, employee profiles, types of health care institutions and stress at work.

METHOD: A cross-section study was conducted in 54 health institutions in Belgrade, including 15.739 employees who completed an anonymous survey of employee satisfaction. Data were analyzed by methods of descriptive statistics and statistical analysis.

THE RESULTS: Out of total number of employees, 80,9% were women and 19,1% men. A majority of participants were nurses/technicians (53,3%), followed by

doctors (20,1%), technical workers (8,8%) and other employees (17,8%). Every day smokers are 25,6% of employees, another 9,4% smoke but not every day, and 17,5% are former smokers. Doctors smoke statistically highly significantly less ($p < 0.001$) than other employees, while technical workers smoke highly significantly more often in relation to other groups of employees ($p < 0.001$). Employees who are stressed at work smoke significantly more often, as well as those employees who are very unsatisfied with their work ($p < 0.05$).

CONCLUSION: There is a high percentage of smokers among employees in health institutions, despite their knowledge about smoking harmfulness. It's necessary to define activities in order to reduce the prevalence of smoking among employees in health institutions.

KEY WORDS: smoking cessation care; prevalence; health care workers

VIDEO PRESENTATIONS (PPT)

LIFE HABITS AMONG STUDENTS IN NOVI SAD

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Alcohol consumption, smoking, physical inactivity and sedentary lifestyle become a leading risk factors for chronic diseases. The aim of this study was to estimate life habits among students at two Universities in Novi Sad. Cross-sectional study was conducted in May 2018 on 4 faculties (Faculty of Medicine, Pharmacy, Faculty of Sciences and Faculty of Technology), which have at least one course on food and dietary habits and encompassed 514 participant (133 males and 381 females). The original anonymous questionnaire was used. Statistical processing was done in SPSS20. Results revealed that only 43% of students were physically active more than 1h during the day sex differences were statistically significant ($p < 0.01$). One third of stu-

dents spent 1-2h hours in front of the monitors and rest of them spent more than 2h (sex and faculty differences were statistically significant $p < 0.01$). A surprisingly positive result obtained that 70% of students did not smoke, which can be associated with greater awareness of the harmfulness of tobacco. Only 21% of students did not drink alcohol and sex and faculty differences were statistically significant $p < 0.01$. Altogether, the obtained results indicate unhealthy practices among student population and the need for healthy lifestyles promotion with emphasis on the promotion of active life without cigarettes and alcohol.

KEY WORDS: students, physical activity, smoking, alcohol.

GENDER DIFFERENCES IN RISK FACTORS FOR TYPE 2 DIABETES MELLITUS

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Diabetes mellitus is becoming a significant public health problem. World Health Organization and International Diabetes Federation estimate that the number of people diagnosed with diabetes type 2 will grow to 642 million people until the year 2040. Although the highest incidence is reported in developed countries, the biggest increase is expected in developing countries, among which is Serbia. The aim of our study was to assess risk factors for type 2 diabetes mellitus

and to investigate existence of possible gender differences.

The study was conducted as the cross-sectional study in the Community Health Center in Kragujevac. It included 600 participants without diagnose of type 2 diabetes mellitus. Questionnaire for assessment of type 2 diabetes mellitus was used according to recommendation of National guide for prevention of diabetes type 2 in primary health care, made within the

study of diabetes prevention in Finland. Chi square test performed by SPSS program version 20 was used for data analysis.

Among the respondents with high risk for type 2 diabetes mellitus, women were significantly older, had higher waist circumference, hypertension and cholesterol in comparison to men ($p=0.001$). Men with high risk had significantly higher level of glycaemia, higher triglycerides and were more often overweight in

comparison to women with high risk ($p=0.001$). High risk was observed in 10% of woman, which was twice as much as men.

Results of our study point out the necessity of paying special attention towards women in assessment of risk factors of diabetes mellitus.

KEY WORDS: risk factors, diabetes mellitus type 2, gender, primary health care

ADOLESCENTS' SUN BEHAVIOR

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OBJECTIVE: there are no sun protection educational interventions among students in high schools in Belgrade. The aim of this study was to investigate the sun behavior of adolescents – how much time they spend outside, which protection measures they use, are they visiting sun beds and how many times per year, etc, as well as to assess if there are relation of their behavior and gender, skin type, eye and hair color.

METHOD: we analyzed results from self-report questionnaire designed for this study by Pearson's chi-square test and logistic regression analyses.

RESULTS: all students, total of 149, at first year of one secondary school in Belgrade, mostly female (97 students, or 65,1%) participated in the study. 53,69% of participants spent 30-50%, and 28,86% spent more than 50% of their free time outside. The results suggest that there is not a statistically significant relationship between

gender, hair colour, eye colour, skin characteristics and percentage of time spent outside and annual number of sun bed visits. There is a statistically significant relationship between gender and wearing the hats/caps, and staying in the shade ($p<0,035$ and $p<0,003$, respectively), as well as the occurrence of sunburns and skin characteristics, $p<0,02$.

CONCLUSION: adolescents in Belgrade do not behave according to their gender and skin photo type. In order to use sun protection measures, they need more education about deleterious sun effects on the skin, and proper way to prevent them. Primary prevention programs intended for adolescents should be organized in schools, through media or social network, with health-care workers engaged.

KEY WORDS: adolescents, sun behavior, education, health promotion, primary prevention

ADVERSE CHILDHOOD EXPERIENCES AND MENTAL HEALTH SERVICES USE – retrospective analysis on the student population –

dr MILENA JAKOVLJEVIĆ, prof. dr BOJANA MATEJIĆ, dr ALEKSANDAR MEDAREVIĆ

INTRODUCTION: Adverse childhood experiences (ACE) are a risk factor for mental health disorders in adolescence and adulthood.

OBJECTIVE: To identify demographic and socioeconomic characteristics, ACE and risk behaviors associated with mental health services use and a scope of unrecognized needs for them in children who have suffered abuse/neglect.

METHOD: This is a secondary analysis of the database Research on the frequency of ACE among students in the Republic of Serbia, 2014. This research was a de-

scriptive cross-sectional study performed on a sample of 2.381 first-year students from six universities. The survey instrument was a questionnaire developed by WHO and CDC. We used a part with demographic and socio-economic characteristics, ACE, risk behaviors and mental health service use. Data were analyzed by chi-square test, univariate and multivariate logistic regression.

RESULTS: 9% of respondents have used mental health services at least once in their lives. ACE associated with mental health service use are divorce (OR=2,3), suicidal/mentally ill family member (OR=2,2), partner vio-

lence in family (OR=1,5), peer (OR=2,1) and collective violence (OR=1,5). Among risk behaviors, this association has only suicide attempt (OR=2.4). No association is found for demographic and socioeconomic characteristics. Among respondents who had experienced emotional neglect, 81% have never used professional help. For physical neglect, physical and psychological abuse this percentage was 83%.

CONCLUSION: The study highlights ACE associated with mental health service use and shows a significant presence of unrecognized needs for them among young people.

It indicates the need for effective preventive strategies and diligent application of legislation.

KEY WORDS: ACE, abuse, neglect, mental health services

THE FREQUENCY OF HYPERTENSION AMONG PATIENTS OF THE HEALTH CENTRE NOVI SAD

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INTRODUCTION: Hypertension is defined as systolic blood pressure value of ≥ 140 mmHg and/or diastolic blood pressure value of ≥ 90 mmHg. WHO lists hypertension as one of the leading health issues in the world.

AIM: To Determine the frequency of hypertension among patients of the Department of General Practice Health Centre Novi Sad and whether there are statistically significant differences regarding gender and age.

METHOD: A retrospective analysis of 3071 physical examinations at the General Medicine Department. Using data from electronic cards was approved by the Ethical comitee.

RESULTS AND DISCUSSION: 3071 people were examined. 59,62% were female and 40,38% were male. The average age of the respondents was 57.94 (SD 12.52551) years.

65,81% of people had hypertension, 65,59% were female and 66,13% were male. There is not a statistically significant difference regarding gender (Fisher's test, $p > 0,05$).

The frequency of hypertension regarding age was 15,38% among people aged between 18 and 29, and 99,04% with people over 80. Regarding age, there is a statistically significant difference ($\chi^2 = 579,264$, $p < 0,05$).

CONCLUSION: The study found a high prevalence of hypertension, which burdens the individual and the health system with direct and indirect costs. Considering this, it is necessary to adopt a healthy lifestyle in childhood, in order to postpone or prevent arterial hypertension.

KEY WORDS: Hypertension, epidemiology, prevention & control

RELATIONSHIP BETWEEN TELEVISION WATCHING AND OVERWEIGHT AND OBESITY IN ADOLESCENTS

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OBJECTIVE: Adolescents spend a lot of time on the computer, watching television, playing games and using mobile phones which as a consequence may have the increase in their body weight. Overweight and obesity in adolescents are a significant problem today. The results of the studies showed that watching television is an important risk factor for overweight and obesity in adolescents. The aim of this abstract was to investigate the relationship between television watching and overweight and obesity in adolescents.

METHODS: Data were obtained by searching the results of the studies in the Pub Med database.

RESULTS: Positive relationship between television watching and weight gain may be explained by less time for physical activity, lower energy expenditure, lack of sleep and watching advertising for food. Also, watching television is associated with eating fast food and drinking sweetened drinks which have a high energy value.

CONCLUSION: Prevention of overweight and obesity in adolescents are of great importance. Adolescents should have optimal nutrition and physical activity. The reduction of time spent watching television is necessary. Parents should talk to their children and explain to

them all the potentially harmful effects of excessive television watching.

KEY WORDS: overweight; obesity; television

DEPICTION OF AVERAGE FOOD SUPPLEMENTS USER IN SERBIA

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OBJECTIVE: we investigate the demographic feature of people who use food supplements in Serbia, on whose recommendation, are they informed about potential side effects and are they use the supplements on the way proposed by the manufacturer.

METHOD: cross-sectional study of relevant questions from the self-report questionnaires designed for different studies related to food supplements use.

RESULTS: the answers of total of 1836 examinees, who participated in 17 various studies in 14 towns in Serbia, in period 2015-2018 were analyzed. All participants signed written consent to join the study. Most of them (60,4%) are women, with secondary level of education (56,5%) and mean age of 43,8 years old. One third of participants (33,4%) follow the doctors advice

and 21,4% obey pharmacists suggestion. 27,1% of participants rely on their own, or on parents, friends, neighbors and coaches (athletes) proposals, and media and internet have only a limited attention (9,9% and 6,6%, respectively). Although 60,9% of examinees are informed about side effects, and 85,6% follow the instructions given by the manufacturer, some symptoms of side effects reported 11,7% of participants.

Since the food supplements offer and use in Serbia is growing every year, it is necessary to educate users about their positive and negative effects, proper selection and use. Health care workers should take leading role in education and counseling about food supplements. It should be an important part of public health activities designed for various population groups.

KEY WORDS: food supplements, side effects, education, health promotion, public health activities

PROGRAM „JAČANJE KOMPETENCIJA U RADU S MLADIMA“

SNJEŽANA ŠALAMON, ANDREJA RADIĆ, LUCIJA SABLJIĆ, MIRJANA ORBAN

Nastavni zavod za javno zdravstvo Dr. Andrija Štampar

Program „Jačanje kompetencija u radu s mladima“ jedan je od preventivnih programa Službe za mentalno zdravlje i prevenciju ovisnosti Nastavnog zavoda za javno zdravstvo Dr. Andrija Štampar. Cilj Programa je smanjenje pojave rizičnog ponašanja, odnosno sklonosti konzumiranja psihoaktivnih tvari i razvoja drugih oblika ovisničkog i rizičnog ponašanja među mladima. Kroz predavanja i radionice vezane uz temu rizičnog ponašanja mladih, jačaju se kompetencije profesora i stručnih suradnika u njihovom svakodnevnom radu.

Od rujna 2016. g. do siječnja 2019.g. u Program je bilo uključeno 45 srednjih i 20 osnovnih škola, odnosno 1696 profesora i stručnih suradnika.

Program se provodi četiri godine za redom, dobro je prihvaćen, a evaluacija na kraju govori i o njegovoj koristi za osobni i profesionalni razvoj. Sudionici su vrednovali provedbu Programa ocjenama od 1 do 5, a ukupna ocjena svih segmenata je 4,4.

Provođenje ovog Programa primjer je dobre prakse i suradnje zdravstvenog i odgojno obrazovnog sektora, na prevenciji štetnih obrazaca ponašanja mladih. Ocjena provedbe kao i pozitivni komentari upućuju na potrebu daljnje provedbe Programa.

KLJUČNE RIJEČI: mladi, rizično ponašanje, škola, kompetencije

PROGRAMME „COMPETENCE STRENGTHENING IN WORKING WITH YOUTH”

SNJEŽANA ŠALAMON, ANDREJA RADIĆ, LUCIJA SABLJĆ, MIRJANA ORBAN

Andrija Stampar Teaching Institute of Public Health

Programme „Competence Strengthening in Working with Youth” presents one of the preventive programmes of Department of Mental Health and Addiction Prevention at Andrija Stampar Teaching Institute of Public Health. The goal of the programme is to decrease risky behaviour, i.e. the tendency to consume psychoactive substances as well as development of other forms of addictive and risky behaviours among youth. The competences of teachers and professional associates, considering their daily work routine, are strengthened through classes and workshops related to the issue of risky behaviour in youth.

Since September 2016. by January 2019. there were 45 high schools and 20 elementary schools included in the Programme, i.e. 1696 teachers and professional as-

sociates.

The Programme has been actively carried out for four years, has been well adopted and the final evaluation suggests its benefits concerning both personal and professional growth. Participants evaluated the implementation of the Programme with 1 to 5 grading scale resulting in total grade of 4,4 for all segments.

Implementation of this Programme is an example of good practice and collaboration of health and educational sectors with respect to prevention of harmful patterns of youth behaviour. Assessment of implementation as well as positive comments indicate the need for further application of the Programme.

KEY WORDS: youth, risky behaviour, school, competences

THE INCIDENCE OF BURNOUT AMONG CRITICAL CARE NURSES: A SHORT CROSS-SECTIONAL STUDY

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INTRODUCTION: Contemporary nursing is considered one of the most stressful jobs requiring a simultaneous mental, physical and emotional engagement. As expected, the exposure of nurses to occupational stressors is most significant in critical care units. Nowadays, critical care units have been recognized as one of the most stressful working environment in global human professional activity, particularly for nurses, who are in a close contact with hospitalized patients throughout all of their working hours.

AIM: To assess the incidence of professional burnout among critical care nurses, by using the inventory based on Freudenberger Burnout Scale.

METHODS: This research was designed as a mini cross-sectional psychometric study in September 2017. The study included 71 nurses employed in critical care units of surgery, urology, internal medicine, pediatrics,

gynecology, obstetrics, and otorhinolaryngology departments in one of five university hospital centers in Belgrade, Serbia.

RESULTS: The statistical analysis of the data obtained in this study showed alarming results - burnout syndrome affected approximately one-third of the observed subjects, in form of manifested or severe job burnout. In the same time, another one-third of subjects were classified in the category of burnout candidates.

CONCLUSION: Burnout involvement in observed sample exceeds the mean frequency of job burnout among critical care nurses in other European countries that have been reported in the available literature sources.

KEY WORDS: critical care nurse, job burnout, risk factors

EATING KNOWLEDGE AND BEHAVIOUR OF FIRST GRADE PUPILS

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CILJ: Očuvanje i unapređenje zdravlja školske dece, negovanjem i usvajanjem pozitivnih navika i zdravih stilova života, te da se utvrdi znanje, stavovi i navike učenika o principima pravilne ishrane.

METOD: Podaci su prikupljeni na osnovu upitnika posebno dizajniranog za ovo istraživanje, sa pitanjima o stavovima i poznavanju principa pravilne ishrane i prehrambenih navika, prilagođenih uzrastu dece.

REZULTATI: Rezultati istraživanja su pokazala velik procenat neobaveštenosti učenika o principima pravilne ishrane, kao i o njenom značaju. Analizirajući navike u ishrani, utvrđena je nedovoljna obuhvaćenost mleka, svežeg voća i povrća u svakodnevnoj ishrani, a značajnu prisutnost grickalica, slatkiša i gaziranih napitaka.

ZAKLJUČAK: Dobijeni rezultati ukazuju na neophodnu sistemsku aktivnost radi promene znanja i navika u ishrani učenika, uključivanjem lokalne zajednice, škola i roditelja.

KLJUČNE REČI: deca, škola, ishrana, stavovi, navike

AIM: Preserving and improving the health of school children, nurturing and adopting positive habits and healthy lifestyles, and to determine the knowledge, attitudes and habits of students about the principles of proper nutrition.

METHOD: Data were collected based on a questionnaire specially designed for this study, with questions regarding attitudes and knowledge of the principles of proper nutrition and eating habits, adapted to the age of children.

RESULTS: The results of the research showed a large percentage of pupils' lack of knowledge about the principles of proper nutrition, as well as its significance. Analyzing the eating habits, the insufficient inclusion of milk, fresh fruits and vegetables in everyday nutrition was determined, and the significant presence of snacks, sweets and sweetened beverages.

CONCLUSION: The obtained results point the necessary systemic activity to change the lack of knowledge and inadequate habits in the nutrition of pupils, including the community, schools and parents.

KEY WORDS: children, school, nutrition, attitudes, habits

CORRELATION BETWEEN THE SCHOOL URBANIZATION GRADE AND OVERWEIGHT AND OBESITY IN 7 YEARS OLD CHILDREN IN MONTENEGRO

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Obesity is one of the most important public health problems in childhood. Obesogenic environment, along with genetic factors, are the main causes of childhood obesity. Many studies have shown a strong correlation between obesity and urbanization, as well as between obesity and physical activity and chronic illness.

OBJECTIVE: To determine the correlation between school urbanization grade and overweight and obesity in 7 years old children.

METHODS: The project is designed in accordance with the European COSI protocol of the World Health Organization (WHO). Out of 410 elementary schools, 100 are selected for the sample, which are divided into ur-

ban, suburban and rural. The target age group was children aged 7 years and 1754 children were measured. During the survey, 3 types of questionnaires were used: Questionnaire for children, school and Parents' questionnaire, standardized by the WHO.

RESULTS: The results show that slightly less than one-fifth of the boys were overweight (18.1%), and slightly more than one-fifth were obese (22.8%). The same percentage of girls is overweight (18.1%), while almost one in ten girls were obese (11.9%) according to the WHO growth charts. It was found that in urban areas there are twice as many children with overweight (20%) than in rural areas of Montenegro (10%). There was 18,1% obese children in urban areas and 13, 7% in rural ones.

CONCLUSION: It has been found that in urban areas there are twice as many children with overweight than in rural areas of Montenegro, and that the percentage of obese seven-year-olds is the lowest in rural areas. Inadequate

urbanization and inability to build safe zones for walking and playing, pushing children into an inactive lifestyle.

KEY WORDS: childhood obesity, schools, urbanization

OBESITY AND EATING HABITS IN SCHOOL AGE CHILDREN

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AIM: The aim of this study was to determine the anthropometric characteristics of the examined population and possible differences in nutritional status in relation to eating habits and physical activity levels.

SUBJECTS AND METHODS: The study was retrospective and the cross-sectional method was used to determine the morphologic parameters measured in a short time period on the basis of which the anthropometric status of the subjects was determined. Eating habits and degree of physical activity of the subjects were also determined. A research sample consisted of sixth grade students in the Zenica municipality. The research tool was a survey questionnaire.

RESULTS: The average BMI in the respondents was 19.05. There was a significant association between BMI and personal opinion about their diet, number of meals per

day, breakfast eating habits, eating habits, number of vegetable portions during the day, daily intake of fluid and frequency of physical activity.

CONCLUSIONS: Subjects who are rarely or ever engaged in physical activity are more often obese than those who regularly have physical activity. Those who have more meals a day and are taking snacks, who are having breakfast every day and those who take a larger number of vegetables a day are more rarely obese. Regular physical activity is associated with a lower level of obesity. A lower number of meals a day, skipping snacks, skipping breakfast, eating fewer vegetables a day, and drinking more water daily, is associated with higher levels of obesity.

KEY WORDS: children, obesity, BMI, physical activity, eating habits

QUALITY LIFE IMPROVEMENT OF PERSONS WITH INTELLECTUAL DISABILITIES THROUGHOUT HEALTH PROMOTION INTERVENTIONS

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OBJECTIVE: One of the main goals of National Strategy of Equal Opportunities for People with Disabilities from 2017 to 2020 is the encouragement of their full participation in family and community life. People with disabilities make 11, 1% of the City of Zagreb society in 2018 and 82% of them live within family. According to the damage type which causes disability, intellectual disability makes 4,8% of total disability population.

METHODS: Andrija Štampar Teaching Institute of Public Health carries out the health promotion interventions and activities such as organizing and conducting educational workshops, plays and training persons with intellectual disabilities. These are intended to raise self-confidence and creativity of social and motor skills and

are conducted through workshops of independent living, art workshops, music, sports, dance and environment care.

RESULTS: Educational workshops develops and emphasizes primarily the ability of program users, their preserved and developed potentials in the field of emotional development, creative expression, motor abilities, self confidence and self reliance as well as social competence. The results were presented in activities of daily living, self-care, on exhibitions, dance performances, sport competitions and drama workshops.

CONCLUSIONS: Interventions in health promotion needs more work in the physical and mental development

and should focus on social change to improve the health of people with intellectual disabilities. Civil society organizations contribute significantly to the creation of a positive image to the public about people

with disabilities and their needs and thereby promote their involvement in community life.

KEYWORDS: persons with intellectual disabilities, health interventions, workshops

PROGRAM IMPLEMENTATION OF PREVENTIVE EXAMINATIONS IN FAMILY MEDICINE IN ZAGREB

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AIM: The aim of this study is to assess the health condition and habits of persons included in this program.

METHODS: All persons older than 50 who did not visit their family doctor at least two years were invited for free physical examination and certain laboratory tests. 417 persons were examined and interviewed from 2015 to 2018. The paper shows analytic results expressed in percentages of the prevalence and 95% confidence interval (CI).

RESULTS: A total of 417 patients were included. The age (mean) was 60.6 years [standard deviation (SD) = 9.1], sex ratio male:female was 0.41. There were 24.3% smokers and 15.2% former smokers. Up to three alcoholic drinks per week consumed 22.6% respondents (38.6% male and 11.7% female). Overweight (BMI 25-30) were 47.5% male and 38.3% female. Obese (BMI>30) were 29.2% male and 30.7% female. Hypertension (sys-

tolic pressure above 140 mm Hg and diastolic above 90 mm Hg) was found in 13.6% male and 16.3% female. Suspicion on one or more newly diagnosed disease was placed in 56.3% (95% CI 52.7-59.8) respondents. In total there was a suspicion of 554 newly diagnosed diseases. Newly diagnosed diseases were disorders of lipoprotein metabolism (n=125, 22.4%), followed by hypertension (n=53, 9.6%), obesity (n=41, 7.4%) and independent of insulin diabetes (n=34, 6,1%). 31 persons [7,4% (95% CI 4,9-10,0)] had suspected neoplasm and they were immediately referred for further diagnostic evaluation.

CONCLUSION: Detecting malignant state as early as possible is extremely important and thereby confirms the public health significance of such programs.

KEY WORDS: preventive examinations, hypertension, overweight, obesity

IS THE ASSOCIATION BETWEEN SELF-RATED HEALTH AND OBESITY DIFFERENT FOR MEN AND WOMEN IN VOJVODINA?

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AIM: The aim of the study is to assess the association between obesity and self-rated health and how the association differs by gender.

METHOD: The study is part of the National Health Survey of Serbia, a cross-sectional study conducted in 2013 by the Ministry of Health of the Republic of Serbia. The sample included 3633 people aged 20 and more from Vojvodina (48.0% men and 52.0% women). Instruments of the study were questionnaires. Measured weight and height were used to calculate body mass index. Logistic regression was used to estimate the association between obesity and self-rated health.

RESULTS: Every sixth person rated their health as bad or very bad (16.1%), more women (19.0%) than men (12.9%)

($p < 0.001$). Bivariate statistics showed that both men and women who were obese assessed their health worse comparing to normal weight counterparts. Multivariable logistic regression showed that obese women had two times higher odds to assess their health as bad or very bad compared to normal weight women (OR=2.0 95%CI 1.39-2.90), after adjustment for age, educational level, smoking and alcohol consumption. There was no significant association between obesity and self-rated health in men, after adjustment in multivariable regression model.

CONCLUSION: Obesity is a significant predictor of self-rated health only among women. Obesity has a different effect on subjective health of men and of women.

KEY WORDS: Obesity, Health, Adult, Men, Women

THE ASSOCIATION BETWEEN DEPRESSION AND PHYSICAL ACTIVITY AMONG POPULATION IN VOJVODINA

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AIM: The aim of this study was to determine the relationship between depression and physical activity and to examine if depression reduces physical activity.

METHOD: The research was carried out as a cross-sectional study on a representative sample of the population of Vojvodina, aged 15 and over, as part of the National Health Survey of Serbia, conducted in 2013. The presence of depressive symptoms was analyzed using the PHQ-8 questionnaire (Patient Health Questionnaire-8) and the score of 10 or above indicated a depressive episode (depression). Physical activity was analyzed through two domains: walking and cycling for transportation and leisure time physical activity.

RESULTS: The study included 3550 participants with an average age of 50.2 years. Less than half of the examinees who had depression (45.8%) walked at least 10 min-

utes continuously four to seven days a week and it was statistically different compared to participants without depressive symptoms (84.8%; $p < 0.001$). There was statistically significant difference in practicing physical activity in leisure time, at least once a week, between participants without depressive symptoms and those who had a depressive episode (14.2% vs. 0.5%; $p < 0.001$). Multivariable logistic regression showed that people with depression had a greater chance not to walk (OR=6.4; $p < 0.001$) or ride a bicycle (OR=2.6; $p < 0.001$) at least 10 minutes continuously, at least once a week.

CONCLUSION: The research showed that the level of physical activity decreases with the presence of depressive symptoms and depression is recognized as a significant predictor of physical inactivity.

KEY WORDS: Depression, Mental Health, Exercise

SPORTS ACTIVITIES IN RELATION TO THE SMOKING, ALCOHOL, COFFEE AND ENERGETIC DRINKS CONSUMPTION, AMONG ADOLESCENTS IN SERBIA

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DRAGANA IGNJATOVIĆ RISTIĆ

AIM: The purpose of the study was to determine the prevalence and interconnections of positive and negative life habits among adolescents in Serbia.

METHOD: The nationally representative sample consisted of 2113 adolescents (56% females and 44% males, mean age 16.73 years). The specially designed questionnaire was used to assess socio-demographic characteristics, as well as data on participants' positive (practicing sports) and negative life habits (fast food, consumption of alcohol, energetic drinks and coffee).

RESULTS: Our participants in average played sports 4 days a week, with the average training duration of about one hour, and with males practicing sports significantly more than females ($F=141$; $p < 0.001$). Almost

half of participants consumed energetic drinks every day. Almost quarter of participants were smokers, and as many consumed alcohol, while coffee was consumed by about a third of the subjects. Comparing to those without such habits, participants who drank coffee ($F=35.03$; $p < 0.01$), alcohol ($F=1.207$; $p < 0.01$) and energetic drinks ($F=0.22$; $p < 0.05$), had significantly less hours of practicing sports.

CONCLUSION: The results point out to the considerable prevalence of negative habits in the Serbian representative sample of adolescents, with reciprocal association between negative and positive habits. These findings may have preventive implications.

KEY WORDS: adolescents, life habits, sports activities

DISEASE PREVENTION

INVITED LECTURES

DISEASE PREVENTION AMONG SCHOOL CHILDREN

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School children are extremely sensitive to health because of the many factors of physiological growth and development as well as due to exposure to a lot of number of risk factors for disease. In this age, next to developmental disorders may arise many of communicable and non-communicable diseases which can leave lifelong consequences.

The inclusion of children with special needs in the education system has imposed new directions for the development of the health system and school medicine.

The most common diseases are associated with acute infectious diseases of bacterial or viral origin (angina, influenza-flu, bronchitis, sinusitis, cystitis, varicella, scarlatina... and many others). This problem for some of the most serious diseases has been resolved using the current vaccination calendar, but a special problem are campaigns against vaccination.

Today, the incidence, prevalence and morbidity of many chronic non-communicable diseases that have not recently been characteristic for school age are on the rise, include obesity, anorexia, bulimia, hypertension, allergies, asthma, chronic bronchitis, kidney disease, migraine headaches, various forms of epilepsy, Hashimoto's thyroiditis, juvenile rheumatoid arthritis, tumors, kidney diseases, polycystic ovaries, gastritis and pancreatitis, diabetes, hyperinsulinemia, scoliosis

and other spinal column disorders, visual disturbances and many others.

A special group (with the fastest growing a number of cases) consists of addictions and behavioral diseases: alcoholism, smoking, drug addiction (PAS), behavioral dependencies (TV, internet, gambling, shopping, job...)

Because of the marked diversity of symptoms and signs of illness, this age requires a specific approach to medicine in small-school medicine.

Numerous disorders can be prevented at different prevention levels, although at this age special attention should be paid to the primordial and primary level of prevention. The legislation also includes prevention measures, and in addition to the Law on Health Care, the Law on Health and Social Insurance, the Law on Protection of Population from infectious diseases, the Law of Public Health, etc. Prevention is also carried out in national regulations (Rules for Nutrition in Children in Elementary Schools, Rules for Nutrition of Students and Students, etc.) and many of national Strategies: Strategy for Youth, Strategy for Drugs Fighting, Strategy of Public Health, HIV Prevention Strategy, and many others.

The fight for health starts at the youngest age and lasts for a lifetime.

KEY WORDS: school children, health, disease

SCREENINGS IN MONTENEGRO – NECESSITY AND CHALLENGE

B. MUGOŠA

INTRODUCTION

Screenings are measure aimed to healthy population. For those malignancies with established sufficiently reliable and specific method in their early detection, primary screening is the most adequate measure for early prevention. Considering that there are adequate and proven methods of early detection, it was decided, six years ago, to realize screenings for colorectal cancer, breast cancer and cervical cancer in Montenegro.

THE AIM

The aim of the paper is to examine the existing situation, realization of screening program for colorectal cancer, breast cancer and cervical cancer, and their success.

METHOD OF WORK

A comprehensive analysis of the completed screening programs was done based on the semi-annual and annual reports of the Institute of Public Health of Montenegro, which coordinates the implementation of the screening program in Montenegro.

RESULTS

Screening program for colorectal cancer started on June 1, 2013, including population aged 60-64 years in the first year, while in the 6th year of its implementation target population aged 50-74 years has been included (2018). Screening is performed with iFOBT (immunochemical Fecal Occult Blood Test). Testing is done in the given age group every two years, and in the case of positive test result, the colonoscopy is done. Since 2013, out of total population of mentioned age group, 169.430, screening program has included 105.423 persons or 77.31%. Colonoscopy was done in 631 persons or 19.19%, and the high-grade dysplasia was found in

151 (23.93 %) persons, polyps of the intestine was found in 61 (9.67%) persons, colitis chronic in 48 persons (7.61%) and adeno-carcinoma was found in 41 (6.50%) persons.

Breast cancer screening program was started on 23 December, 2015 for the population of women aged 50-69 years who live in Podgorica, Cetinje, Danilovgrad and Kolasin. The screening method is a digital mammogram performed in the Clinical Centre of Montenegro, and the repeated interval is two years. In the first round, the target population was 28.605, the mammography was done in 60902 women and cancer was detected in 34 women. The second round started on 26 December, 2017.

The screening program for cervical cancer started on June 2016 in Podgorica, and since 1st February 2018 it has been implemented at the national level. Screening is performed by cervical smear test on high-risk oncogenic types of HPV DNA by using PCR method in combination with LBC test and colposcopy at the interval of 5 years. The target population includes 15.706 women aged 30-34 years, except for Podgorica where age group 34-36 years is included. The number of responding women in whom sampling was done at the national level, until 1st January 2019, was 9180, out of which 1098 (11.96%) were positive for oncogenic HPV types. In the above-mentioned period, 147 women had a biopsy of the cervix and there were 36 women with CIN I, 57 women with CIN II and CIN III, in two women carcinoma in situ was detected and there were two women with invasive carcinoma.

CONCLUSION

Based on presented results it is clear that screening, as a measure aimed to healthy persons, is necessary because the treatable pathological changes are detected timely, while establishment of all three screening programs at the national level, covering total target population, presents a great challenge in the financial, technical and organizational terms for the healthcare system and the country in general.

MALIGNANT DISEASE CONTROL PREVENTION, ORGANIZED SCREENING RESULTS AND ORGANIZED CANCER SCREENING PROGRAM

JOVANOVIĆ VERICA

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Respecting the National Strategy “Serbia Against Cancer”, the National Program for the Early Breast Cancer Detection (Official Gazette No. 15/09), the recommendations of the project “Support for the introduction of the National Program for Early Detection of Cancer in Serbia”, a professional team of collaborators and a working group at the Ministry of Health, as well as the provisions of the new National Program on Early Breast Cancer Detection (Official Gazette No. 73/2013), have started organized breast cancer screenings in the Republic of Serbia in December 2012.

According to the criteria of the Ministry of Health, organized health screenings included health centers that met the criteria in terms of staff and equipment for inclusion in the Program, therefore, a total of 35 health centers and/or municipalities on the territory of the Republic of Serbia have been included in organized breast cancer screening. All women aged 50 to 69 are referred to organized breast cancer screening according to the calling plan of the community health center, so that in two years, during the organized breast cancer screening cycle, all women of the mentioned age are invited and tested. The screening test is mammography. From the beginning of breast cancer screening, 855 breast cancer cases have been detected. 165 cancer cases were discovered during 2014, 125 carcinoma during 2014, 102 carcinoma in 2015, 185 cancer cases in 2016. In 2017, 199 breast cancer cases were discovered, and in the first nine months of 2018, 79 breast cancer carcinoma.

Organized cervical cancer screening in the Republic of Serbia is conducted in a total of 17 health centers. Organized screening of cervical cancer invites all women between the ages of 25 and 64, according to

the calling plan of the community health centers, so that in two years, during the organized screening of cervical cancer cycle, all women of the mentioned age are invited and tested. The screening test is a cervical cytological swab that is read by the Papanikolau method according to the Bethesda classification. Since the beginning of the organized cervical cancer screening, 170 cervical cancers have been detected to date. In 2013, 35 carcinoma cases were discovered, 46 cases were detected in 2014, 32 in 2015, 28 in 2016, in 2017 24 cervical cancers were detected, and in the first nine months of 2018, 5 cervical cancer cases.

Organized colorectal carcinoma screenings is conducted in the Republic of Serbia in two-year cycles in 33 municipalities that meet the staff and equipment requirements. The screening test is an immunochemical Fob test for stool testing for the presence of blood, invisible to the naked eye in people who are healthy, without symptoms. The target population consists of people of both sexes aged 50 to 74.

Since the beginning of organized colorectal carcinoma screening, a total of 462 cancers have been detected to date. During the first cycle in 2013 and 2014, 129 cancer cases were discovered, during the second cycle in 2015–2016, 210 cancer cases were discovered, in 2017, 95 carcinoma cases, during the nine month period of 2018, 28 cancers cases were detected.

In the following period it is necessary to conduct continuous quality control, monitoring and evaluation of the screening performance, providing the necessary conditions for inclusion of new health institutions in the territory of the Republic of Serbia in organized cancer screening.

SURVEY ON HIV-RELATED KNOWLEDGE, ATTITUDES AND PRACTICE OF HEALTH CARE WORKERS

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INTRODUCTION

Health care workers (HCW) are key players in the prevention and control of human immunodeficiency virus (HIV) infection. A number of studies, regarding HIV/AIDS knowledge, attitudes, risk perception and safe practice among health personnel have been conducted.

THE AIM

The aim of this work was presentation of results of studies conducted worldwide and in our country aiming to assess HIV-related knowledge, attitudes and practice of HCW.

MATERIALS AND METHODS

Review of the relevant literature was performed, including a cross-sectional study of HCW from Niš.

RESULTS

Generally, the majority of HCW had insufficient knowledge about HIV infection, perceived professional risk of acquiring HIV infection, reported needlestick injuries and cuts from sharp instruments within the last year, did not use adequate protection during their daily work with patients, had not previously been tested for HIV status, expressed negative, discriminatory attitudes toward infected individuals as well as a need to be further educated about HIV infection.

CONCLUSIONS

These findings indicated a need for urgent educational and training initiatives of HIV and AIDS for all

categories of HCW. Deficiencies of knowledge with regard to HIV may contribute to negative, discriminatory attitudes toward infected individuals and reduce compliance with infection control recommendations. It is very important to note the high response rate and a HCWs need for further education regarding HIV infection.

KEY WORDS: health care workers, HIV infection, knowledge, attitudes, practice

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OUTCOMES OF THE PREVENTIVE PROGRAMS IN TUZLA CANTON

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AIM

Review of the outcomes of the programs for prevention of cervical cancer having been implemented since 2012 as well as primary screenings of childrens' eyesight having been implemented since 2013 with a special focus on available resources and the implemetation. Point the need for coordination of prevetive programs by the Ministry of Health and Public Health Institute.

METHOD

Retrospective review of the monitoring as well as financial and personnel evaluation of the preventive programs' implementation results.

CONCLUSION

The programmes for prevention of cervical cancer are being implemented in 5 community health centres as well as in University Clinical Center of Tuzla Canton. Evaluation of the implementation of the programs for

prevention of cervical cancer indicates increase of the program implementation from 48 % in 2012 to 100% in 2018. Histological diagnosis indicates an increase in the percentage of early diagnosed forms of cancer for 6%. Implementation of the programs for prevention of cervical cancer is about 25% and it is conditioned by lack of technical resources. Low percentage of implementation does not reflect on a lower BIRADS. Financial resources provided by Health Insurance Institute of Tuzla Canton are not of developmental character. The health institutions are not supported by the founder in the proces of renewal of the equipment. Obvious lack of coordination between the teams of family medicine and gynecologists in refering women to preventive medical checks.

During the first years of implementation of primary screenings of childrens' eyesight programs (2013 and 2014) 9% of the children was pointed to further diagnostics. Afterwards, the number of children rapidly decreases for even 96% due to permanent shifts of the staff educated to perform the screening of eyesight.

KEY WORDS: Prevention, implementation, resources

ORAL PRESENTATIONS

MENTALNO ZDRAVLJE I PREVENCIJA DEPRESIVNOSTI I ANKSIOZNOSTI KOD STUDENTSKE POPULACIJE

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Svetska zdravstvena organizacija definiše mentalno zdravlje kao stanje socijalnog i emotivnog blagostanja u kome osoba ostvaruje sve svoje sposobnosti, može da podnese sve životne stresove, produktivno i plodno radi i doprinosi svojoj zajednici. Studentska populacija se obično smatra zdravom grupacijom stanovništva, ali istraživanja upozoravaju na to da preko 30% studenta ima određene probleme iz oblasti mentalnog zdravlja. Treba imati u vidu i činjenicu da više od 75% slučajeva mentalnih poremećaja otpočne pre navršene 24. godine života. Najučestaliji mentalni poremećaji u studentskoj populaciji su depresija i anksioznost.

Početni stadijumi depresivnosti i anksioznosti su često neprepoznati. To se uglavnom dešava zbog prikrivenosti simptoma, dok sa druge strane, populacija mladih često pocenjuje potrebu za pomoći koju im mogu pružiti zdravstveni profesionalci trudeći se da se sami izbore sa svojim problemima. Kod ove grupacije stanovništva, problemima u oblasti mentalnog zdravlja

se olako pristupa, čak se i ozbiljni simptomi i znaci depresivnosti i anksioznosti pripisuju subjektivnoj i prolaznoj fazi studentskog načina života.

U našoj zemlji u svim univerzitetskim centrima ne postoje službe za zdravstvenu zaštitu studenata a u okviru njih posebni centri koje se aktivno bave prevencijom mentalnih poremećaja.

Vaznost detekcije depresivnosti i anksioznosti u početnoj fazi je od krucijalnog značaja u prevenciji uznapredovale faze i nastanaka hroniciteta. Organizovani skrining, edukacija, otvaranje savetovalista, predstavljaju samo neke od koraka u prevenciji depresije i anksioznosti odnosno promociji mentalnog zdravlja studentske populacije.

KLJUČNE REČI: mentalno zdravlje, studentska populacija, depresivnost i anksioznost, prevencija, promocija mentalnog zdravlja

MENTAL HEALTH AND PREVENTION OF DEPRESSIVE AND ANXIETY SYMPTOMS OF THE STUDENT POPULATION

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The World Health Organization defines mental health as a state of social and emotional well-being in which a person achieves all of his/her capabilities, can handle all the stresses of life, productively and fruitfully work and contribute to his/her community. The stu-

dent population is usually considered a healthy population group, but research indicates that over 30% of students each year experience a problem related to mental health. Furthermore, three-quarters of cases of mental disorders begin before the age of 24. The most

common mental disorders in the student population are depression and anxiety.

Mild depressive and anxiety symptoms in adolescence and young adulthood are often unrecognized due to the concealment of symptoms, on the other hand, young people often underestimate the need for professional help and try to cope alone with their problems. In a general student environment, these potential problems are easy to access, and even severe symptoms or signs of psychological problems are attributed to subjective, transient phase of student life. In our country, in all university centers, there are no health

services of students, and within these, special centers that are actively involved in the prevention of mental disorders in the student population. The importance of early identification, especially the minor signs of depression and anxiety could prevent or reduce its severity and chronicity. Systematic screening, education, opening counseling centers are some of the steps in the prevention of depressive and anxiety symptoms and promotion of mental health of the student population.

KEYWORDS: mental health, students population, depressive and anxiety symptoms, prevention, mental health promotion

TRENDS IN THE UTILIZATION OF ANTIPSYCHOTIC DRUGS IN ZAGREB-CROATIA: IMPROVEMENT IN PRIMARY HEALTH CARE PRESCRIBING PATTERNS?

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The aim was to determine the effect of antidepressant consumption on the rate of hospitalization for depression, to reinforce the role of family physician in the early recognition and treatment of mild to moderate depressive disorders.

Using the WHO Anatomical-Therapeutic-Chemical classification/Defined Daily Doses (ATC/DDD) methodology, the number of DDD was calculated from data collected from all Zagreb pharmacies on the number and size of drug packages, during the 2001-2010 period. Hospitalization data were collected for every patient hospitalized for depression.

From 2001 to 2010, the rate of hospitalization for depression has increased from 168,26/100.000 to 337,04/100.000. The mean length of hospital stay was reduced from 35 to 34.5 days.

Outpatient utilization of antidepressants increased by 90% (11,4 DDD/TID vs 20,59 DDD/TID). The highest rise was recorded in the consumption of SSRI by 148%,

with an increased proportion of sertraline and fluvoxamine. Outpatient consumption of nonselective inhibitors of monoamine reuptake decreased by 68%.

In the subgroup of other antidepressants, a rise was recorded in the consumption of mirtazapine and venlafaxine in particular.

Although the overall outpatient utilization of antidepressants increased during the study period, the rate of hospitalization for depression increased as well. Ratio indicator anxiolytics/ antidepressants was found to have improved. There still was an excessive use of anxiolytics and inadequate use of antidepressants. Continuous education of primary care physicians in early detection and treatment of mental disorders is required. Introduction of a questionnaire for early recognition of depression symptoms at the primary healthcare level would be highly useful.

KEY WORDS: depression, primary care, antidepressants, hospitalization, anxiolytics

THE POSITIVE INFLUENCE OF THE NON-INSTITUTIONAL FORM OF ORGANIZING OF OLD PEOPLE ON THEIR PHYSICAL AND MENTAL HEALTH

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OBJECTIVE: To demonstrate the positive influence of the non-institutional form of organizing of old people on their physical and mental health through a self-perception questionnaire.

METHODS: The survey of respondents aged 60 and over has been carried out through a dedicated survey questionnaire, in centres for healthy aging and in primary

health care centres in the three municipalities of Tuzla Canton. The sample 300 respondents in centres for healthy aging and 300 respondents in primary health care centres.

RESULTS: Answers to the Survey of beneficiaries of centres for healthy aging indicate a positive attitude towards life, and thus a low level of depression in com-

parison to respondents who did not use services of centres for healthy aging. There is a significant difference in the answers between these two groups of respondents, ranging from 06%, which is the lowest recorded difference among the given answers, and it refers to the question related to talks relating to own death, up to the difference ranging from 15% to 31 % in answers related to appetite, dyslexia, physical and psychic activity, lack of energy and feeling of loneliness and abandonment.

CONCLUSION: Inclusion of the elderly people in the social life of the local community, through different kinds of the non-institutional forms of organizing and through different offered activities is of a great importance for their mental and physical health. These activities meet the needs of elderly people in the local community and implement the basic principles of a mixed social service system.

KEY WORDS: old people, local community, preservation of health

PITCH POSTER PRESENTATIONS

ADDRESSING REFUGEE HEALTH THROUGH EVIDENCE-BASED PRACTICE: A CASE STUDY FROM TURKEY – THE CHALLENGES IN PROVIDING HEALTH CARE TO SYRIAN REFUGEES

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Since 2011 Turkey received large number of Syrian refugees (3,5 million Syrians and over 300.000 other). They passed legislation to provide status of Syrians under Temporary Protection (SUTPs) to all those registered and the right on free health care at the same level as for Turkish citizens (supported by the EU Facility for Refugees in Turkey (FRIT)).

The aim is to show solutions for health care for refugees in the country that received unprecedented number of SuTPs.

METHODOLOGY: Cross sectional observational study of health services programme for refugees in Turkey, based on focus groups and in-depth interviews and results of published studies.

RESULTS: The case-study (late 2018 - beginning 2019), is an example of adapting policies to address actual epi-

demiological situation and address the health needs of large number of refugees from different social, cultural and language background. Examples of good practices and important gaps as well as lessons learned in overcoming language and socio-cultural differences are highlighted.

CONCLUSION: Complexity and uniqueness of refugees' health problems; significant challenges for the host country to provide access to health services through modifying policies and adapting services to specific needs; allowing health professionals among refugees to get access to labour market and get engaged in supporting health wellbeing of SuTPs in the hosting country.

KEYWORDS: Syrian refugee, health disparities, health services, public health policy, Turkey

100 YEARS SINCE SPANISH FLU – WHAT DO WE LEARN? THE ROLE OF FAMILY DOCTORS IN INFECTION DISEASE'S PREVENTION

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BACKGROUND: Since 1918's influenza pandemic, the vaccination against influenza have been one of the most successful medical interventions. Immunization is proved to reduce the morbidity and mortality from influenza, as well as many other infectious diseases which are no longer or rarely seen in nowadays.

AIM: In 2018-2019 influenza season Romania experienced an Influenza outbreak. High virulence, vaccine hesitancy, insufficient stockpiles were among the motives. We are open to present you the way family physicians reacted during October 2018-march 2019 fighting the flu.

MATERIAL AND METHOD: In Romania the main vaccinators are family doctors. They are vaccine providers, taking care of new born to seniors., as well as reporting to Local Health Department the needed number of vaccines included in National Immunization Programme (NIP) for their patients . We interviewed by mail or telephone our colleague about number of patients injected with influenza vaccine (from NIP or bought from pharmacy) in their cabinet.

CONCLUSION: Living in neighbor countries, like Romania and Serbia, especially Danube – Criş –Mureş – Tisa/ Dunav–Karaš–Moriš–Tisa (DKMT) Euroregion, is important to share information about how to protect our patients against vaccine preventable disease by promoting vaccination, and the most appropriate response to limit an epidemic situation.

KEY WORDS: vaccine, influenza, Family physician, epidemic

PREDICTORS OF MUSCULOSKELETAL PAIN IN SCHOOL CHILDREN IN BOSNIA AND HERZEGOVINA: GENDER DIFFERENCES

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AIM: The aim of this study is to determine the gender differences in prevalence of musculoskeletal pain, as well as the predictors of pain, especially school activity related factors.

METHODS: The study covered 1500 children of both genders (total sample was n = 1315, 663 girls, 652 boys), between age of 8 and 12, during year 2016 in Tuzla canton in B&H. The methods were: weight and height measurements (BMI); measurement of school bags, screening of musculoskeletal pains by using Nordic questionnaire of musculoskeletal pain and screening of depression and anxiety of participants by Back scales.

RESULTS: Girls more often have suffered acute neck pain (P=0.001), acute pain in the right shoulder (P=0.004), acute pain in both shoulders (P=0.013), and chronic

pain in both shoulders than boys (P=0.009). The predictors of the MSP are: higher school class, BMI, time of carrying school bags in school and on the way from school, weight of empty and full school bags, frequency of pain when carrying a bag, and going to school and back from school by foot. Anxiety is the predictor of acute pain in both shoulders, chronic pain in both shoulders, and acute back pain.

CONCLUSION: Musculoskeletal pain in schoolchildren is associated with unfavorable conditions in relation to school, female gender, increased BMI, and anxiety perception, which are preventable.

KEY WORDS: musculoskeletal pain, schoolchildren, gender differences, musculoskeletal pain predictors

LET'S TALK ABOUT THE MENTAL HEALTH OF IMMIGRANTS IN THE CITY OF ZAGREB

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INTRODUCTION: The problem of immigrants is a growing problem in the European Union. Croatia is participating of immigrants acceptance who are coming from different cultures. In cooperation with non-governmental organizations we have developed a specific mental health care program for the persons under international protection in the city of Zagreb.

OBJECTIVE: To raise the awareness of the immigrant's mental health problems by showing the occurrence of mental disorders and substance abuse among immigrants in the city of Zagreb, as well as the occurrence of blood transmitted viral disease appearance.

METHODS: We analyzed the medical data of the persons in the treatment up to December 2018. All of the immigrants have been tested for HIV and HCV also urine toxicological analyzes of the psychoactive substances were made.

RESULTS: Altogether we carried out 76 medical treatments. All of immigrants who have asked psychiatric help were males and none females. Most of them are between the age of 20 and 29, originally from the Middle East and North Africa, half of them have completed elementary school, and the rest of them have mostly secondary education. Almost all of them

were deported from Austria and Germany. Majority have suffered from mental disorders in the context of adaptation, while minority of them have substance abuse (thc, alchochol) or medicines abuse (pregabalin, klonazepam, tramadol) problem. All of immigrants are HIV and HCV negative.

CONCLUSION: We have presented our experience of providing psychiatric care to immigrants in the city of

Zagreb who asked for help. The results indicates that it is necessary to raise awareness of immigrants mental health problems and develop antistigmatic programs aimed at sensitizing the wider community about the obstacles and problems faced by people under international protection.

KEY WORDS: immigrants, mental health, addiction prevention

VIDEO PRESENTATIONS (PPT)

PREVENTION AND RATIONAL TREATMENT OF PATIENTS WITH A BACK PAIN

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INTRODUCTION: Prevalence of lower back pain is about 5%, and most often occurs at the age of 30 to 60 years. It is ranked as the first cause of disability and incapacity for work, and is expected to affect 90% of the world's population at some point in their lives.

OBJECTIVE: To determine whether the daily use of the celiatic belt was reduced by the use of parenteral and oral therapy in subjects with lower back pain.

Determine the number of patients sent to the physician or to spa treatment, because of pain in the lower part of the back, after using the celiatic belt.

METHODOLOGY: The research is a prospective retrospective study conducted at the Primary Health Care Center Doboj from November 25, 2016 to November 30, 2017. The study involved 106 patients, both sexes, with lower back pain recommended for the use of a celiatic belt, by a family doctor. By examining electronic health records, the recommended parenteral and / or oral therapy was documented by a family doctor, with lower back pain subjects using the celiatic belt during the

examined period, as well as the number of patients sent to the physician or to spa treatments.

RESULTS: Out of the 106 respondents, 58 were female and 48 males. The highest number of women in the female sex who used the celiatic belt was 50 to 65 years old, and the male half was also 50 to 65 years old. During the one-year use of the celiatic belt from 106 subjects 4 used parenteral therapy, 4 to the physicist, and 2 nd spa treatment, it was not written that some of them came by oral th. From parenteral therapy in 4 cases, flosterone ampoules, 1 OHB12, and 1 combined parenteral therapy (diclofenac and dexonone) were used.

CONCLUSION: Celiatic belt use has resulted in a significant reduction in lower back pain and the use of parental / oral pain therapy in subjects, as well as reduced referral to physiotherapy consultations or spa treatment.

KEYWORDS: lower back pain, parenteral / oral pain therapy, celiatic belt.

ETIOLOGY OF BALKAN ENDEMIC NEPHROPATHY: HISTORICAL REVIEW

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AIM: Objective of this article is to review studies on etiology of Balkan endemic nephropathy (BEN) from 1960s, when it was recognized, until today.

METHODS: We reviewed articles from 1964 to 2019 using MEDLINE, EBSCO and Scopus. Search terms includ-

ed Balkan nephropathy, endemic nephropathy, ochratoxin A, aristolochic acid.

RESULTS: In the early 1960s, when interest in BEN began, many hypotheses of its etiology were considered, but none could be fully accepted. One of the first theories

was infection, but it was soon rejected due to absence of inflammation. Toxic substances, such as insecticides, pesticides and polycyclic aromatic hydrocarbons were considered and rejected, as well as socio-environmental factors such as household and occupational hygiene. Among the more investigated hypotheses were the toxic effects of metals. Lead, cadmium, copper and uranium were thoroughly researched but none could be associated with BEN. Due to familial occurrence, genetic factors were particularly interesting but solid evidence was never found.

Among the strongest hypotheses was the role of ochratoxin A, a toxin produced by *Aspergillus spp.* In 1994, while ochratoxin A theory was in focus, aris-

tolochic acid, an alkaloid from the plant Aristolochia clematitis, was first mentioned as a possible cause. It took almost 20 years to make this theory the most credible.

CONCLUSION: Until recently, etiology of BEN was unknown, even though it was first noticed more than half a century ago. Considering the number of factors researched and rejected, Balkan nephropathy could be one of the biggest etiology mysteries and we are finally close to getting it solved.

KEYWORDS: Balkan nephropathy, endemic nephropathy, etiology, aristolochic acid

RELATIONSHIPS OF THE BODY MASS INDEX AND THE RELAXATION MODEL OF YOUNG PEOPLE

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INTRODUCTION: The way of spending free time influences the lifestyle of young people and is reflected in the efficiency and satisfaction in the workplace and in everyday life. The following patterns of behavior have been determined: academic, sports-oriented, fun and music-oriented. Many studies have confirmed that physical passivity is associated with a higher body mass index (BMI).

GOAL: The degree of correlation between types of relaxation of young people, especially academic, with their nutrition was investigated.

METHOD: Within the survey "Factors that determine lifestyles of young" conducted in the High Vocational School in Subotica in 2016 on a sample of 150 students, a special set of questions related to: relaxes with a TV, a computer with friends, working menial jobs, in cin-

ema and theater, sports, reading. Body mass index is calculated from their arbitrary data on height and weight.

RESULTS AND DISCUSSION: A third of young people spend their free time with friends, 47% sometimes in front of your computer or reading, 49% sometimes deal with physical affairs, 59% sometimes go to the cinema and theater. 85% of them reading and dealing with sports are acceptable weight, 70% of them most often hang out with friends, go to the theater and the cinema, 50% sit in front of the computer. Statistically significant difference is only between reading and ITM. It would be interesting to explore the relationship between these patterns of youth behavior and their nutrition, their life goals and social saturation.

KEY WORDS: relaxation, young, body mass index

PROPER NUTRITION WITH PHYSICAL ACTIVITY- THE ROAD TO HEALTH PRESERVATION

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INTRODUCTION: Proper and balanced nutrition includes selecting various food, which maintain an optimal intake of energy. A balanced nutrition maintains energy, strengthens immunity and defers fatigue after physical activity.

OBJECTIVE: Show the importance of physical activity supported by proper nutrition program.

METHOD: Questionnaire used for patients who practice physical activity, both recreationally and professionally.

RESULTS: The patients agree that the three main principles of proper nutrition are: respect diversity i.e. enjoying all food. The balance and moderation include a proper ratio of essential nutrients, carbs, proteins, fat, vitamins and minerals. Diets rich with proteins are not sufficient to replace carbs (the fuel of our organism).

Replacements for meals cannot be the energy bars and drinks. The patients know that irregular meals, skipping meals, big portions, fast intake of food and food too much thermally treated, are not good for health preservation. Every person has its own specificities in nutrition. Nutrition needs of every person are genetically different. The majority of patients is familiar that with fresh food they intake pure energy, because the minerals, vitamins, indispensable amino acids, hormones remain in natural form. The majority of surveyed patients feel the pleasure of dividing

a meal, as beneficial, anti-inflammatory, psychosocial effect.

Athletes have their own specificities, more energy needs, bigger loss of water and salt (sodium chloride and vitamins) and a higher muscular work. They stick to known food and intake sufficient fluid. How to achieve excellent results, and remain healthy?

CONCLUSION: Physical activity without nutrition program, limits itself. If the improved nutrition is activated, to express the beneficial effect, time is necessary. (physiological dynamics) . various food express interdependent interaction (synergism). There's no integrity if some of the nutrition factors is missing. Proper nutrition does not create a healthy person, but, with physical activities opens the road to health.

KEY WORDS: nutrition, activity, health.

IMPROVING THE COOPERATION BETWEEN THE FAMILY DOCTOR AND THE PATRONAGE NURSE

DRAGICA A. SHULEVA

DZ Bar

The term "Team of the family doctor" is often used in everyday communication. The team's task is determined and all members are defined. They are a physician, general practitioner of family medicine, family doctor (ID); nurse - technician (secondary education) (MS); patronage nurse (PS), who should possess the Higher Medical School and a laborant (LT), which can belong to two or more teams.

The aim of this paper is to show that the family doctor does not necessarily have to do all the procedures and procedures for preventive and curative purposes, but much of it can be done by the patronage nurse independently. Her expertise and autonomy can be of great help. Benefit comes in, not only in team work, but directly in the health and social environment of each patient. By showing the cooperation between PS and ID within the Bar health center, I will try to bring the positive effects of this model closer. Moreover, I feel invited to speak about this, because the ID team in which

I was hired myself, in Virpazar, worked on this model. Improving cooperation between PS and ID leads to the establishment of a wider knowledge of the population of patients, their families, and conditions of social status, as well as the implementation of therapeutic procedures and interventions in each of them, recorded as patients of the ID.

The ability, and training, of patronage nurses to perform most of the activities, such as preventive visits, is of great help and importance. Keeping parallel documentation also reduces the risk of omission and incompatibility with all indicators of the health status of a particular population, such as infants, elderly people and immobile people. The model currently being implemented is taken from the Netherlands and is closest to the European integration of patient visits to their households.

KEY WORDS: patronage, home visits

VIOLENCE AS A FORM OF INDIVIDUAL AND GROUP BEHAVIOR

DRAGICA ŠULEVA

DZ Bar

ABSTRACT: Violence, whether a group or individual behavior, is considered a deviation. It's one of the leading

health – work problems, and its growing. The definition of violence depends on the point of view, so it could be

a legal or a social problem. Violence comes in many shapes and sizes. There are some known types of violent behavior: domestic violence, bullying etc. This research is based on workplace violence. As a form of violent behavior, it can be noticed in different professions involving communication. The main topic of this research is violent behavior in the healthcare system. By the nature of it violence can be physical, psychological, sexual etc. The definition of violence by the World Healthcare Organization goes: Attentional use of physical power, by threatening someone, and end with certain consequences.

GOALS: to determine the existence of violence over healthcare workers – doctors. Determination of causes for violent behavior. Determine a profile of a violent person. Determine a strategy or programs to prevent violence in the healthcare system.

METHODS: The research conducted a survey for doctors, for 6 hospitals.

RESULTS: The research shows that in a period of one year, doctors were exposed to verbal violence more often than physical, and almost never sexual violence. Majority of those who were exposed to violence were women.

Persons who act violently are 25 – 50 yrs old, and the cause for them acting so was their discontent with the healthcare system.

CONCLUSION: Doctors deal with the problem of violence on their own, the need for a strategy to prevent violence is still present.

KEY WORDS: violence, healthcare workers, doctor

MULTIDISCIPLINARY TEAMWORK – NURSE IN PUBLIC HEALTH

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The World Health Organization (WHO) and other leading healthcare and nursing associations in Europe at all levels of health care, point out the importance of working with nurses and mutual cooperation with other professions.

Nurses in the Croatian health care system possess a high level of knowledge, expertise, high moral factors, a significant degree of motivation and creativity for work in the process of providing health care.

Traditionally, the work of nursing in the community is mainly limited to providing health care and / or nurturing a sick or healthy individual in their families or in health care homes.

Contrary to the traditional nursing, public health care, more and more nurses focus on working in the community as a whole and working with groups of people.

This does not mean that the importance of working with individuals and their families is diminished, but that nurses are increasingly involved in assessing individual health needs and providing support to family members and close persons in developing skills and knowledge to protect their health and help others. In the process of providing health care nurses in public health must be part of the team.

Interprofessional teamwork in public health is a form of communication and work aimed at improving the co-operation between healthcare professionals, as well as between healthcare professionals and other professionals with whom they are closely involved in the process of providing health care, treatment and rehabilitation to the patient.

Providing health care through teamwork involves a system of state, group and individual measures, services and activities aimed at preserving and improving health, preventing disease, early detection of disease, timely treatment, health care and rehabilitation. Every intervention and work of a nurse is based on the principles of comprehensiveness, continuity, availability and full access to primary health care, and a specialized approach to specialist, consular and hospital health care.

During the provision of health care in the work organization and the team itself, there is the possibility of combating the most diverse character traits, thinking, attitudes and the possibility of judging and perceiving common work. That is why teamwork and the process of work itself should be based on thorough communication, which ultimately affects the overall success of the organization.

PREVALENCE OF CHRONIC NON-COMMUNICABLE DISEASES AND ASSOCIATED FACTORS AMONG OLDER ADULTS

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THE AIM: The aim of this paper is to examine the prevalence of chronic non-communicable diseases, as well as its association with demographic and socioeconomic characteristics of the respondents in the population aged 65 and over, on the territory of the Republic of Serbia.

METHOD: We used data from the Health Survey of the population in Serbia, conducted in 2013 by the type of cross-sectional study, on the representative sample of 3540 respondents aged 65 years and over. As an instrument of research, we used data of the 2011 census, as well as a specially designed questionnaires. Results were analyzed using univariate and multivariate logistic regression.

THE RESULTS: From the total number of respondents, 88.9% indicated that they had some of chronic diseases, 19% of these subjects reported one, and as many as 69.9% of two or more than two chronic diseases (multimor-

bidity). The most common diseases are hypertension (65.8%), followed by deformation of the lower spine, or other chronic problem with the back (35.2%) and coronary heart disease or angina pectoris (28.8%). Number of chronic diseases and conditions significantly differed according to gender, age, marital status, education, the index of well being and geographical areas.

CONCLUSION: Chronic non-communicable diseases are of great public health importance, because of the fact that they leave significant consequences for the individual and his health, as well as for the family, and the socio-economic consequences for the community and society, leading to working disability, invalidity and premature death, and the creation and implementation of prevention programs are of great importance.

KEY WORDS: chronic non-communicable diseases, aged 65 and over, National health survey, Serbia

SOCIOECONOMIC INEQUALITIES IN THE USE HEALTH CARE FOR WOMEN RELATED TO REPRODUCTIVE HEALTH

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THE AIM: The study of the socio-economic factors associated with the barriers of accessibility, availability and acceptability emphasizes the importance of female gender as a significant predictor of disparities in the use of health care, which are arising from the dual role of women and their responsibilities both in the workplace and at home.

The aim of this paper is to assess the socio-economic factors associated with inequalities in the usage health care for women related to reproductive health.

MATERIALS AND METHODS: The paper is based on data from a National health survey of the population of Serbia in

2013. The sample entered 7864 women age 15 and over. Logistic regression analysis was applied to examine socio-economic factors associated with inequalities in the usage health care for women related to reproductive health.

RESULTS: Total of 62.8% of women in Serbia have their gynecologist: 53.3% of women have their gynecologists in public health institution, while 9.5% of women have their gynecologists in private practice. Univariate binary logistic regression showed that age, type of settlement, financial status, education level, marital status and region affect the usage of health care related to reproductive health.

CONCLUSIONS: Among the population of women in Serbia there are significant socio-economic disparities in the usage of health care related to reproductive health, the challenge for the creators of public health interventions that would contribute to reducing inequali-

ties in access, usage and realization of the need for health care in this population group.

KEY WORDS: Socioeconomic inequalities, usage health care, Women, reproductive health, National health survey

GENDER DIFFERENCES IN RISK FACTORS FOR TYPE 2 DIABETES MELLITUS

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Diabetes mellitus is becoming a significant public health problem. World Health Organization and International Diabetes Federation estimate that the number of people diagnosed with diabetes type 2 will grow to 642 million people until the year 2040. Although the highest incidence is reported in developed countries, the biggest increase is expected in developing countries, among which is Serbia. The aim of our study was to assess risk factors for type 2 diabetes mellitus and to investigate existence of possible gender differences.

The study was conducted as the cross-sectional study in the Community Health Center in Kragujevac. It included 600 participants without diagnose of type 2 diabetes mellitus. Questionnaire for assessment of type 2 diabetes mellitus was used according to recommendation of National guide for prevention of diabetes type 2 in primary health care, made within the study of diabetes prevention in Finland. Chi square test

performed by SPSS program version 20 was used for data analysis.

Among the respondents with high risk for type 2 diabetes mellitus, women were significantly older, had higher waist circumference, hypertension and cholesterol in comparison to men ($p=0.001$). Men with high risk had significantly higher level of glycaemia, higher triglycerides and were more often overweight in comparison to women with high risk ($p=0.001$). High risk was observed in 10% of woman, which was twice as much as men.

Results of our study point out the necessity of paying special attention towards women in assessment of risk factors of diabetes mellitus.

KEY WORDS: risk factors, diabetes mellitus type 2, gender, primary health care

EARLY TREATMENT OF DEPRESSION AS PREVENTION FOR DEMENTIA

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INTRODUCTION: Investigators report that people can reduce their risk to develop Alzheimer disease by making key life changes and even reduce the risk for dementia for almost 30%. The smoking, obesity, hypertension, head trauma, hyperlipidaemia, depression and lower level of education are risk factors for dementia. Depression has been both proposed to be a risk factor for dementia as well as a prodrome of dementia. Approximately, half of the patients with late-onset depression have cognitive impairment. The prevalence of depression in dementias has been reported to be up to 68%.

OBJECTIVES AND METHODS: We would like to present the results of our work for senior clients with depression (N=26) in preventive manner for preserving cognitive

reserve by behavioural measures during 12 months. Also we compare this group of patients with people with dementia (N=25) according the antidepressive psychopharmacological treatment.

RESULTS AND CONCLUSION: In our Center for mental health, we provide care for people with Alzheimer's disease and the members of their families but we are strongly oriented to recognize symptoms of depression in seniors and other risk factors in term to prevent cognitive deterioration and preserve their cognitive reserves. The early recognition of depression and treatment by antidepressive as well as supportive psychotherapy and behavioural recommendations that include promotion of healthy eating habits, physical activity and promoting social networking are shown to

be beneficial for senior clients with depression. The most acceptable preventing measure is regular physi-

cal activity – daily walking 30-45 minutes accepted by 2/3 of seniors with depression in our treatment.

HAND HYGIENE PRACTICES OF FOOD HANDLERS IN MONTENEGRO

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INTRODUCTION: Hand hygiene is vital in preventing contamination of food by food handlers. GOAL: Assessment of hand hygiene practices of food handlers in Montenegro

METHODOLOGY: A cross sectional study was conducted. A specially structured questionnaire, for assessment of knowledge about hand hygiene were used. In order to determine the hygiene of hand of food handlers were used swabs-hand samples.

RESULTS: The survey included 385 respondents, 203 male and 182 females employed in 110 food facilities. Proper hand washing 55% of participants, 44.2% do not use a towel to wipe hands after washing, and 45.2% regularly disinfect their hands after washing them. Slightly less than three quarters of the respondents (71.7%) regularly wash their hands before contact with raw foods.

The difference has statistical significance in relation to hand washing ($p=0.023$) and wash hands before contact with raw foods ($p=0.004$) compared to the type of facility in which the employees work (restaurant, bakery, pastry shop). In the restaurants in the examined group, half had the correct results of hand-swab samples, 36.6% in bakeries and 40.0% in pastry shops. Microbial species found in hand-swab samples in examined group were aerobic mesophilic bacteria (42.2%) and enterobacterias (44.3%) while in the control group were aerobic mesophilic bacteria in 58.1% of the swabs and in 57.7% of the swabs were found enterobacterias.

CONCLUSION: The results indicate that the hand hygiene of food workers present a significant factor of risk for contamination of food.

KEY WORDS: hand hygiene, food handlers, food handlers

RELATIONS OF BODY COMPOSITION AND MAXIMAL EXPLOSIVE MUSCLE FORCE OBTAINED BY HAND GRIP MEASUREMENT IN FEMALE STUDENTS OF THE UNIVERSITY OF BELGRADE

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The aim of this research was to determine the state and interconnection of functional parameters of muscle force and explosivity with body composition in young females and to contribute thus to the establishment of reference values, which would enable monitoring the changes in these parameters with aging. Method: The research included a randomized sample of 140 female students of the University of Belgrade aged 23.4 ± 2.2 yrs. Body composition measuring was done by multi-segmental bioelectrical impedance analysis (BIA), using a professional measurement equipment – In Body 720. In addition to the standard body structure indexes such as body height (BH), body weight (BW) and BMI, the presence of following components indexed ac-

cording to longitudinally were measured: indices of fat-free body mass (FFMI), fat masses (FMI) and muscle mass (SMMI). The parameters of muscle strength that is isometric maximal force (HG_Fmax) and maximal rate of force development (HG_RFDmax) were obtained based on the standardized isometric hand grip (HG) test protocol Results: High correlation level was noted between FFMI and functional indices of HG_Fmax i.e. HG_RFDmax ($r=0.294$ $p=0.000$ and $r=0.318$, $p=0.000$, respectively) and index of muscle mass and HG_Fmax that is HG_RFDmax ($r=0.292$, $p=0.000$ and $r=0.314$, $p=0.000$, respectively). Statistically significant correlation of lower level was noted between BW and BMI with regard to HG_Fmax i.e. HG_RFDmax. Conclu-

sion: The application of reliable and simple tests for measuring muscle strength and body composition such as parameters of body structure longitudinally, together with determination of reference values for all age categories in girls would enable better understanding, monitoring and controlling of diseases caused by

aging and bad health habits in Serbian female population.

KEYWORDS: hand grip strength/ body composition/young women/muscle mass

EPILEPSY IN THE PRIMARY HEALTH CARE ORDINATION

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INTRODUCTION: Epilepsy is chronic neurological disease characterized by spontaneous repetition of epileptic seizures. Seizure attack is periodical, stereotype episode of disorder of consciousness, behavior, emotional reactions, motoring or sensory functions, which are result of cortical neuronal discharges. Episodes are reversible, have limited duration and followed by abnormalities in electroencephalogram - EEG.

OBJECTIVE: A case of epileptic seizure in ordination in Primary health care center.

METHODS: Retrospective analysis of patients from ordination in Primary health care center Bijelo Polje, in period of 6 months (14.01 – 14.07.2012).

RESULTS: The patient Z.V. 24 years old, came in ordination on February 14. 02. 2012. for prescribing therapy. During his entry in ordination, he had grand mal epileptic attack. He had lost of consciousness that lasts 30 seconds, with tonic clonal cramps, cyanosis, mouth

foaming and incontinence. After cramping, patient was in state of deep and audible breathing, after which he woke up with a sense of malathion and general weakness. Patient stated that he slept less past several nights and that last attack was year ago. His therapy was: Diazepam amp. of 10 mg im and Phenobarbiton tbl. 100 mg. On neurologist suggestion his therapy was changed: Topamax 5 mg tbl, Eftil tbl. and Diazepam 2 mg tbl.

CONCLUSION: In most cases, cause of epilepsy is unknown. It is very important to educate a patient about illness, therapy and way of life. The most important thing is to educate patient about taking therapy regularly, to go to medical controls and to learn what are the side effects of illness. It is important to include members of patient's family in education process. At the same time, it is important for the patient to be independent.

KEYWORDS: epilepsy, seizure, definition, classification, symptomatology, diagnostics

FOOD, NUTRITION AND HEALTH

INVITED LECTURES

NUTRITION POLICY OF BULGARIA

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Bulgaria had a total population of approximately 7.15 million in 2015 y, the share of population aged 65 years and over is 19.8%. Risk factors such as unhealthy diet, low levels of physical activity, smoking and harmful alcohol consumption contribute to premature mortality from cardiovascular diseases, cancers and other chronic diseases in Bulgaria and affect quality of life in general.

Negative characteristics of nutrition and adverse trends in eating patterns of population in Bulgaria lead to increasing the incidence of overweight and obesity, including children, high morbidity and mortality from chronic diseases related to nutrition.

Public Health in Bulgaria is coordinated by the MoH, which is responsible for overall planning and su-

pervision. By 2014, Bulgaria adopted a National Health Strategy, 2014–2020 that envisages interventions to reduce risk factors, health promotion and disease prevention, promotion of healthy nutrition, improving the quality of health education and training, coordination and synchronization of sectorial policies and the active involvement of different stakeholders.

The National Programme for Prevention of Chronic Noncommunicable Diseases, 2014-2020 has implemented a wide range of activities to encourage healthy attitudes and behavior. One of the goals of the programme is strengthening positive changes in the national dietary pattern and achieving new ones for reducing the risk from nutritional deficiencies and chronic diseases associated with nutrition.

DIETARY INFLAMMATORY INDEX: A NEW TOOL FOR ASSESSMENT DIET QUALITY BASED ON INFLAMMATORY POTENTIAL

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ABSTRACT

Mild inflammation is related to increased risk for chronic diseases such as cardiovascular diseases and certain malignant diseases. It is reported that factors from foods influence the inflammation both via proinflammatory and anti-inflammatory mechanisms. "Western style" diet, rich in sugar, fried food, full-fat dairy products and refined grains is related to high levels of inflammatory biomarkers such as C-reactive protein (CRP) and interleukin-6 (IL-6). On the other hand, mediterranean diet, rich in whole grains, green leafy vegetables and fish, and poor in red meat and butter, with moderate intake of alcohol and moderate to high intake of unrefined olive oil is related to lower level of inflammation. Investigation of dietary patterns is one of the most valuable approaches in understanding the relationship between nutrition and diseases. Investigations of diet types are used in estimation of general nutrition quality taking in consideration the potential synergy between various foods. Construction of dietary indexes may be useful in further recommendations for specific nutrition intervention. Considering the relation between diet and microinflammation, there was an attempt to construct the original index which would be useful in categorization of individual diet in range from maximally anti-inflammatory to maximally proinflammatory potential. Dietary Inflammatory Index (DII) is a novel tool for estimation of proinflammatory potential of diet, which is confirmed in established relation between higher DII scores and high CRP levels, also with higher concentrations of various inflammation markers: TNF- α , IL-1 and -2, IFN- γ and VCAM, and with obesity, cardiovascular diseases, as well as specific mortality.

INTRODUCTION

Obesity is chronic disorder with growing incidence worldwide regardless of age. According to BMI, 68% of adult Americans are overweight, and 33,8% are obese. Changes in lifestyle, ample of energy-rich foods and lack of physical activity are responsible for increasing

obesity. Numerous hormonal and neurotransmission factors involved in body mass regulation (regulation of satiety, hunger, food intake) are genetically determined. Even minor disorders in their expression might substantially contribute to increase in body mass. Number and size of adipocytes, their regional distribution and basal metabolism rate are also genetically determined. Inheritance increases the predisposition and susceptibility to obese, while other non-inherited environmental factors, such as nutrition, lack of physical activity, psychological, cultural and sociological factors also play important role.

Besides being chronic disease itself, obesity is also a risk factor for various complications and premature death, which increases health care expenses worldwide. So far, the attention is put on the most frequent and potentially most dangerous disorders such as heart stroke, brain stroke, type 2 diabetes, hypertension, malignant diseases, gall bladder diseases, psychosomatic disorders, sleep apnea... Visceral obesity is particularly important for development of metabolic syndrome. Metabolic syndrome represents the combination of impairments related to obesity and includes visceral obesity, hypertension, insulin resistance and dyslipidemia. Foundation of this syndrome is infiltration of visceral adipose tissue with macrophages, and presence of numerous adipokines responsible for inflammation development. Accumulation of adipose tissue in organs and tissues involved in metabolism of glucose and insulin (liver and muscles) and lipid metabolism (liver) directly contributes to systemic manifestations of metabolic impairments within this syndrome. In individuals genetically susceptible to visceral obesity, excess energy intake leads to accumulation of fat in liver, heart, muscles, i.e. visceral adipose tissue. In addition to genetics, this process is also influenced by individual neuroendocrine profile related to maladaptive response to stress. This leads to changes in circulating insulin levels, and bioavailability of insulin-like growth hormone-1 (IGF-1), adipokines (particularly leptine and adiponektine), inflammatory factors (cytokines) and vascular factors (VCAM and PAI-1). About 60% of obese persons fulfil the criteria for metabolic syndrome – insulin intolerance, hypergly-

caemia, dyslipidemia (particularly hypertiglyceridemia), and hypertension.

INFLAMMATION AND NUTRITION

Inflammation considers normal biological process engaged in immune response. Normal inflammatory response is generally self-limited process necessary for wound healing and response to infection. However, chronic low-level inflammation (microinflammation) might result from various impairments in milieu interne which is often present in obese individuals. Inflammation includes activation and targeted migration of leukocytes (neutrophils, monocytes and eosinophils), from vascular bed towards the inflammation site. Leukocyte migration is stimulated by haemotactic cytokines called haemokines. Once activated, macrophages become major source of growth factor and cytokines. Fat cells also contribute to production of inflammatory mediators such as histamine, cytokines and proteases, as well as lipid messengers.

Mild inflammation is related to increased risk for chronic diseases such as cardiovascular diseases and certain malignant diseases. It is reported that factors from foods influence the inflammation both via proinflammatory and anti-inflammatory mechanisms. "Western style" diet, rich in sugar, fried food, full-fat dairy products and refined grains is related to high levels of inflammatory biomarkers such as C-reactive protein (CRP) and interleukin-6 (IL-6). On the other hand, mediterranean diet, rich in whole grains, green leafy vegetables and fish, and poor in red meat and butter, with moderate intake of alcohol and moderate to high intake of unrefined olive oil is related to lower level of inflammation. In addition, high intake of Ω -3 polyunsaturated fat acids, dietary fibers, vitamins E, C, β -carotene and magnesium are also related to lower inflammation. Characterization of diet type according to its inflammatory potential may be useful in establishing the relation between nutrition and cardiovascular diseases (1) Investigations reported inverse correlation between fruits and vegetables intake and inflammatory markers such as CRP, IL-6, and TNF- α (2). These foods and nutriments are not consumed separately, but in various combinations, hence the Dietary Inflammatory Index (DII) is constructed, in order to estimate the total quality of nutrition according to its inflammatory potential (3).

CRP is common feature of inflammation which is produced in response to interleukine stimulation (IL-6). It is used for decades as marker of inflammation in diseases like rheumatoid arthritis, but development of high-sensitive CRP enables the detection of microinflammation on the vascular level. In addition to findings that CRP is related to numerous cardiovascular diseases and their outcomes, CRP along with proin-

flammatory cytokines such as IL-6 and TNF- α is increased in obese persons, particularly with visceral fat distribution. Higher IL-6 in obese is related to insulin resistance and other features of metabolic syndrome.

DIETARY INFLAMMATORY INDEX

In order to estimate total quality of diet, nutritive indicators were developed, and they are often directed to intake of fats, fruits and vegetables, or dietary fibres (4). Investigation of dietary patterns is one of the most valuable approaches in understanding the relationship between nutrition and diseases. Investigations of diet types are used in estimation of general nutrition quality taking in consideration the potential synergy between various foods. Construction of dietary indexes may be useful in further recommendations for specific nutrition intervention. For example, *Healthy Eating Indexes (HEI, AHEI)* are made according to American guidances for nutrition in 2005. Some indexes are directed towards specific health benefits such as *Dietary Approach to Stop Hypertension (DASH)*, while others try to estimate the level of adherence to traditional eating patterns such as mediterranean diet, or vegan type of nutrition. All these types of adequate or "healthy" diets have protective effects against the most frequent contemporary diseases. Studies report that HEI, AHEI and DASH scores correlate to decrease of risk of death, cardiovascular diseases, malignant diseases and type 2 diabetes (1).

Considering the relation between diet and microinflammation, there was an attempt to construct the original index which would be useful in categorization of individual diet in range from maximally anti-inflammatory to maximally proinflammatory potential. *Dietary Inflammatory Index - DII* is constructed from 927 studies of dietary intake, and is validated in longitudinal study SEASONS, with CRP as inflammatory marker (2). The study showed that DII is able to predict with statistical significance the interval changes in CRP levels. In further studies DII is additionally improved in score algorithm. First, the improved score system is applied to 45 food parameters, including food articles, nutriments and some bioactive food components. Second, referent diet list is expanded. Third, percentile score system is introduced. New DII from 2014 incorporated the results of studies in which the inflammation was defined according to specific inflammatory markers such as IL-1 β , IL-4, IL-6, IL-10, TNF- α and CRP. In total, the results from 1943 published papers were reviewed and scored. Scoring was performed as follows: score +1 was attributed in case of proinflammatory effects (significantly increase the levels of IL-1 β , IL-6, TNF- α or CRP, or decrease the levels of IL-4 or IL-10); score -1 was attributed in case of anti-inflammatory effects (significantly decrease of IL-1 β , IL-6,

TNF- α or CRP or increase of IL-4 or IL-10); score 0 was attributed when food parameter does not produce any significant change in inflammatory markers. DII was then standardized according to representative food intake, which was achieved by constructing of complex data base which represents the wide range of diet types worldwide. For American region, the authors used the data base from *Nutritional Health and Nutrition Examination Survey (NHANES)* (2007-2008), for Australia – *National Nutrition Survey report* (1999), for Bahrain – *National Nutrition Survey for Adult Bahrainis* (2002), for Denmark – *Danish National Survey of Diet and Physical Activity* (2011), for India – *Indian Health Study & Mumbai Cohort Study* (2005), for Japan – *National Nutrition Survey Report* (2002), for New Zealand – *National Nutrition Survey Report* (1997), for Taiwan – *Nutrition and Health Survey in Taiwan* (1993-1996), for South Korea – *Korean National Health and Nutrition Examination Survey* (2007), for Mexico – *Mexico National Health and Nutrition Survey* (2006), for Great Britain – *The National Diet and Nutrition Survey* (2004).

45 food parameters are listed, with calculated inflammatory potential scores per weight unit (g, mg, μ g), or kCal for each item. DII score is inversely correlated to other health diet scores. The higher DII score – the lower are the DASH, AHEI and HEI-2010 scores, i.e. the diet is less adequate (5).

The possible relationship between proinflammatory potential of diet, measured by DII, and cardiovascular diseases is investigated in several populations worldwide. In meta-analysis of 14 studies, the positive correlation is reported between higher DII, which indicated higher proinflammatory potential of diet, and cardiovascular diseases (6).

Other studies, such as PONS (conducted simultaneously in Sweden and Poland) were designed to investigate if higher DII scores, i.e. higher proinflammatory potential of diet, correlated with increased incidence of metabolic syndrome compared to lower DII score (lower proinflammatory /higher anti-inflammatory potential) (7). The results indicate that parameters of metabolic syndrome, measured by waist-to-hip ratio and diastolic pressure are considerably higher in subjects with highest DII scores (4th quartile) compared to 1st quartile.

The validity of DII as tool for estimation of proinflammatory potential of diet is confirmed in study conducted in almost 500 subjects, which established the relation between higher DII scores and CRP levels above 3 mg/L c, also with higher concentrations of various inflammation markers: TNF- α , IL-1 and -2, IFN- γ and VCAM (8,9), and with obesity (10). Meta-analysis published in 2018, reviewed 14 studies of relationship of DII scores and cardiovascular diseases, as well as specific mortality (6). Obtained data showed direct correlation between high DII scores (4th quartile) and incidence of cardiovascular diseases, which indicates the

importance of proinflammatory characteristics of diet in this population. Individuals in highest DII category had higher risk by 36% for cardiovascular disease and mortality. Further analysis established the increase in risk of CVD and mortality by 8% with every point in DII score. Another confirmation of these findings was obtained in large study SEASONS (*Seasonal Variation of Blood Cholesterol Study*), published in 2014. It reported that higher DII scores were significantly related to CRP levels above 3 mg/L (odd ratio 1,1), with possible use of DII score as predictor for increased CRP (11). Interesting study was conducted in 2014, in which the authors investigated models of 3 diet types, regarding their inflammatory potential: fast food diet, mediterranean diet, and macrobiotic diet, with calculated daily intake of 2000 kCal (3). Daily intake for fast food diet showed high proinflammatory potential with DII score +4,07. Other two diets showed high anti-inflammatory potential with DII scores -3,96 for mediterranean diet, and -4,07 for macrobiotic diet. Further categorization of these DII scores put mediterranean and macrobiotic diets below 10th percentile of estimated proinflammatory scores, while fast food diet is over 90th percentile, due to its high intake of saturated and trans-fatty acids and low intake of fibres, vitamins and flavonoids. On the other hand, anti-inflammatory potential of mediterranean and macrobiotic diets is mostly related to high intake of vegetables, fruits and whole grains.

Antiinflammatory potential of mediterranean diet is also shown in PREDIMED cross-sectional study (*PREvencion con Dieta MEDiterranea*), conducted in Spain among 7000 people of middle and older age (12). In addition to previous findings of low DII scores in this diet type, the authors showed correlation between DII scores and total energy intake, as well as with obesity parameters: BMI, waist circumference and waist-to-hip ratio. These findings support the hypothesis that nutrition may play important role in obesity development via inflammation modulation.

Potential limitations of DII may result from literature-based data used for algorithm construction. This bias is somewhat diminished by taking in consideration of all available literature, which is estimated regarding study design. Second bias is attributed to standardization of individual intake according average global intake, which may be variable. Nevertheless, DII standards encompass diet types all around the world, and diet trends are not very changeable.

Calculation of the DII is very complex. Data are usually collected from 24-hours intake questionnaire of food frequency. Dietary intake data are then linked to the regionally representative world database (Table 1) and multiply to express an individual's exposure relative to "standard global mean" as a Z-score by subtracting the "standard mean" from the amount reported in questionnaire and dividing this value by its SD. To min-

imize the effect of “right skewing” this value is converted to a percentile score. To achieve a symmetrical distribution with value centered on 0 and bounded between -1 (maximally anti-inflammatory) and +1 (maximally proinflammatory), each percentile score is doubled and then value 1 is subtracted. The centred percentile value for each food parameter is then multiplied by its respective “overall food parameter-specific inflammatory effect score” to obtain the “food parameter-specific DII score”. Finally, all of the “food parameter-specific DII scores” are summed to create the “overall DII score” for given individual. Score is then categorized according to the percentile distribution in 7 categories. Maximal value may be +7,98 indicating the diet with maximally proinflammatory effect. The value of the 50th percentile (median) is +0,23, while minimally possible value is +8,87 which indicates diet with maximally anti-inflammatory potential, i.e. the healthiest possible diet.

In Serbia, there is ongoing study investigating inflammatory potential of diet using DII scoring method. Considering the wide database with record of intake 45 items from 11 different world regions, it is expected that this survey would give first valid results about inflammatory potential of diet in Serbian population.

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SECONDARY PREVENTION OF RHEUMATOID ARTHRITIS BY APPLYING DIFFERENT DIETS

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INTRODUCTION

Rheumatoid arthritis is defined as a chronic autoimmune disease of the connective tissue. A secondary prevention possibilities are small, because of the course of the disease itself and because of the typical treatment. The diet of these patients should be programmed and individual. Supplementation of omega-3 and omega-6 fatty acids has proven successful for a variety of chronic diseases and conditions.

OBJECTIVE

Demonstration of the effect of omega-3 and omega-6 fatty acids on the activity and on the symptoms of rheumatoid arthritis.

MATERIAL AND METHODS

The study included 60 female patients with rheumatoid arthritis who meet current diagnostic criteria of the American Rheumatology Association of year 1988. Patients were selected at the Department of rheumatology and Rheumatological ambulance in the Clinical Center Kragujevac. Rheumatological examination included evaluation of disease activity using the scores for disease activity 28 (Disease Activity Score - DAS 28). The patients were divided into three groups. The first group consisted of 20 patients with rheumatoid arthritis who received 5 gelcapsules Omega 3 Cardio that contains 1000 mg of concentrated fish oil with 300 mg of docosahexaenoic acid (DHA) in the composition of one gelatin capsule, 200 mg of eicosapentaenoic acid (EPA), 100 mg of other omega-3 fatty acids during 3 months, in addition to their regular rheumatologic therapy. The second group consisted of 20 patients with

rheumatoid arthritis who received 3 gel capsules Omega 3 Cardio and two gelatin capsules of evening primrose oil (containing 1300 mg of evening primrose oil with 949 mg of linoleic acid and 117 mg of γ -linolenic acid), with a meal. In the third, control group, there were 20 patients with rheumatoid arthritis who received only their usual rheumatologic therapy. In the blood of all subjects, oxidative stress parameters were measured spectrophotometrically (superoxide anion radical (O₂⁻), hydrogen peroxide (H₂O₂), nitric oxide (NO), the index of lipid peroxidation (TBARS), superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH)), levels of cytokines determined using ELISA kits specific for the human cytokines, while the concentration of polyunsaturated fatty acids was determined by gas chromatographic method.

RESULTS

In patients with rheumatoid arthritis who took supplements of concentrated fish oil with omega-3 fatty acids as a dietary supplement, as well as in patients with rheumatoid arthritis who took supplements with concentrated evening primrose oil with omega-6 fatty acids as a dietary supplement, there was a reduction in disease activity.

CONCLUSION

Supplementation with omega-3 and omega-6 fatty acids is justified for use in the secondary prevention of rheumatoid arthritis.

KEYWORDS: rheumatoid arthritis, supplementation, omega-3 fatty acids, omega-6 fatty acids

ORAL PRESENTATIONS

FOOD FRAUD – RISK TO ASSESS

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Food fraud or economically motivated adulteration of foods, which is known for centuries, is not a rare occurrence even in modern times. Ordinary eggs sold as organic, salmon from controlled farmlands sold as wild salmon, olive oil mixed with vegetable oils, horse meat offered as a thigh are some examples. In this context, health risks are much larger than traditional food safety risks, because contaminants are unconventional and their sources may be boundless. Therefore, detection of food fraud is analytical, public health, legal and economic challenge. Its prevention requires enforcement of many key elements, which include regulatory system, sampling and monitoring, training of food producers and handlers, and development of precise, rapid, and cost-effective methods of fraud detection. In the

EU, DG SANTE has strengthened its cooperation with the Joint Research Centre, other Directorates-General in the Commission such as DG AGRI, MARE, TAXUD and OLAF with EFSA for the purpose of risk assessment of emerging risks regarding food fraud. Although comprehensive compilation of information on known problematic ingredients and detection methods is still lacking, the use of rapid alert and the AAC system to request information on or the assistance from, to launch investigations or enforce actions, is of great importance in food fraud matters.

KEY WORDS: Food, ingredient, adulteration, health, challenge

PESTICIDES IN PLANT FOOD FOR INFANTS IN SERBIA – WHERE ARE WE?

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OBJECTIVE: Pesticide residues, with maximum residue levels (MRL) in infant food (IF) set on the basis of precautionary principle for all pesticides as serious health concerns, were analyzed in IF considering principle sets in Scientific opinion on pesticides in foods for infants and young children (EFSA 2018) to assess health risk to infants and needness of regular monitoring.

METHOD: 417 results of plant IF from four years of Ministry of Agriculture annual official pesticide monitoring programs, collected with sanitary inspection from Serbian market, were analysed.

The Hazard Index (HI) method was used to assess consumer risk.

RESULTS: 33 samples were non-compliant (found in range 0,011-0,561 mg/kg); 31 of domestic origin; 11 with multiple residues. 31 different pesticides were found, 16 over the MRL. Acetamiprid was dominant (found in 26 samples in range 0.003-0.561 mg/kg, 19 over MRL).

There is statistically significant difference between first years/last years in distribution of non-compliant and compliant products. Acute and chronic exposure

were below the respective ARfD's and ADI's. Recorded aHIs and cHIs were lower than 1 and 100%.

CONCLUSION: Based on the results of this study and current scientific attitude, pesticide residues in plant IF in Serbia don't represent public health problem. But, there

is need for continual collecting data from regular monitoring of IF and studies of the contribution of conventional food to exposure of infants to pesticide.

KEY WORDS: infants, pesticides, monitoring, exposure, risk

PITCH POSTER PRESENTATIONS

DETERMINATION OF CANNABINOIDS IN HEMP-BASED FOOD PRODUCTS

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Cannabinoids are terpenophenolic compounds which occur in hemp (*Cannabis sativa*, Cannabaceae). The most important representatives of this class of compounds are Δ^9 -tetrahydrocannabinol (THC), cannabidiol (CBD) and cannabinal (CBN). Cannabinoids occur in all parts of *C. sativa* except seeds. However, it was noticed that they can be present in almost all types of hemp-based products. The aim of this study was to quantify the amounts of THC, CBD and CBN in different samples of hemp oil, seeds, protein, tea, confectionary products and alcoholic beverages. Total of 31 samples were collected in local stores at territory of Serbia, Bosnia and Herzegovina, Croatia, Slovenia and Austria during 2018. A highly sensitive GC-MS method for determination of THC, CBD and CBN with ketamine-hydrochloride as internal standard was developed and validated in a term of linearity, matrix effect, selectivity, recovery, precision, accuracy, limits of detection and quantification. The results showed a high variability

of cannabinoids amounts in the examined products. Cannabidiol was present in high amounts in products labeled as CBD oils (250.63-43207.5mg/kg) and hemp teas (450.54-25606.27mg/kg), while in other examined products it ranged from <LOD to 72.01mg/kg. The same trend of presence was also noticed in case of THC, where in some tea samples its content reached more than 0.8%. In most of the examined samples, levels of CBN were relatively low. The results of this study stress out the importance of hemp-based products quality control in relation to their safety, when bearing in mind their increased presence on the market.

KEYWORDS: cannabinoids; food products; GC-MS;

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RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND SEVERITY OF CORONARY DISEASE

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AIM: The aim of the study was to examine whether there is a correlation between the severity of coronary

disease and the state of nutrition of patients assessed by the Body mass index (BMI).

METHODS: This cross sectional study included 300 patients with diagnosed coronary artery disease who were treated in the General Hospital Pančevo. According to the clinical picture, patients were divided into patients with stable angina pectoris and patients with acute coronary syndrome. The diagnosis of stable angina pectoris was based on anamnestic data of the presence of angina pain in the effort and / or on the basis of a positive ergometric test. The diagnosis of acute coronary syndrome was based on typical angina pain and / or typical electrocardiographic changes.

RESULTS: There were 300 patient in the study with coronary heart disease, of which 68 patients (22.7%) in the normal weight group, 133 (44.3%) were overweight

and 99 patients (33.0%) were obese, with an average BMI of 28.7kg/m².

In the overweight group, there was the highest number of patients with stable angina pectoris (43.0%) and acute coronary syndrome (45.3%), but this difference did not show a statistically significant difference with the other two investigated groups.

CONCLUSION: The study showed that the incidence of coronary heart disease is more common in people who are overweight, pointing to the need for health education and introduction healthy lifestyle to patients in order to prevent both overweight and obesity.

KEY WORDS: coronary disease, nutritional status, obesity

MEDITERRANEAN DIET AND ACUTE CORONARY SYNDROME

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INTRODUCTION AND AIM: Mediterranean diet (MD) is associated with primary and secondary prevention of cardiovascular diseases (CVD). We sought to determine the degree of MD compliance in subjects with acute coronary syndrome (ACS) and subjects with established risk for developing CVD.

METHOD: The study was a prospective, cross-sectional, with enrollment of 294 participants (146 women and 148 men), 30 to 82 years of age. The first group was comprised of ACS patients, and the second group of subjects with established at least one major risk factor for the development of CVD but without clinical manifestations. All participants underwent the following protocol: anthropometric and blood pressure measurements, biochemical analyses. For all subjects we assessed the degree of compliance with MD pattern, by using validated *MedDiet* score.

RESULTS: The average value of the *MedDiet* score varied significantly between two groups (ACS 27.48±6.59,

non-ACS 20.53±4.01, p=0.029). *MedDiet* score and fasting blood sugar were excellent markers for ACS (AUROC=0.815, p<0.0005; AUROC=0.829, p<0.0005, respectively). *MedDiet* score ≤22.5 indicated greater risk for the ACS development.

Multivariate regression analysis showed that ACS is affected by the following risk factors: age 1,063 (1,270-1,819), male gender 4,071 (1,901-8,719), smoking 3,067 (1,322-7,114), body mass index 0,902 (0.839-0.970), systolic blood pressure 1.020 (1.003-1.037), fasting blood sugar 1.520 (1.025-1.101) and *MedDiet* score 0.783 (0.722-0.849).

CONCLUSION: MD is related to significant health benefits. ACS patients showed lesser adherence to the MD. We determined cut-off value for *MedDiet* score of 22.5 that is able to classify patients into high and low risks category.

KEY WORDS: Mediterranean; Cardiovascular Diseases; Acute Coronary Syndrome; Risk Factors; Nutrition Assessment

VIDEO PRESENTATIONS (PPT)

TOXICITY RISK ASSESSMENT OF ELEMENTS IN SYRUPS INTENDED FOR PEDIATRIC POPULATION

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AIM: Frequent usage of syrups claiming support for respiratory system, especially in the pediatric population, imposed a need for the assessment of risk due to toxic elements.

METHOD: The elements having reasonable probability of occurrence (V, Co, Ni, As, Cd, Hg, Pb) were analysed by ICP-MS after microwave digestion of 29 syrups taken from the pharmacies in Novi Sad. Oral intake of the elements was calculated on the bases of conditions of use given by the producers and compared with oral permitted daily exposures (PDEs) established by the United States Pharmacopoeia Advisory panel and International Conference on Harmonization guidelines.

RESULTS: Obtained results showed that a daily dose of any of the tested syrups would not cause exposure to the selected elements higher than the corresponding PDEs. Maximally reached exposure for the specific age

groups of pediatric population indicated no risk concern: 46.1% of PDE for lead (infants), 16.0% for mercury (adolescents), 6.8% for arsenic (children 3-6 y.), 3.0% for vanadium (children up to 4 y.), 2.1% for nickel (children 4-12 y.), 0.5% for cobalt (adolescents). Related to the elements occurrence rate, nickel was the most dominant (76%), followed by cobalt (62%) and vanadium (45%). Arsenic, lead and mercury were present in lower number of syrups (34%, 17% and 14%, respectively), however, these elements are the most toxic ones, together with cadmium which was not detected in any of the samples.

CONCLUSION: Attention should be paid to the concurrent use of multiple pharmaceutical products, potentially leading to the increase of the exposure to toxic elements.

KEYWORDS: toxic elements, syrup, exposure, ICP-MS

CHEMICAL HAZARDS IN FOOD – “COUNTRY OF ORIGIN” SERBIA ON THE RAPID ALERT SYSTEM FOR FOOD AND FEED (RASFF)

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With the aim to get insight into chemical food safety challenges in Serbia, relevant notifications from Rapid Alert System for Food and Feed, an instrument to communicate risks, were reviewed.

Within 10 years period (2009-2018), 34 notifications were registered due to the presence of chemical con-

taminants: mycotoxins took the lead with 41.2%, followed by industrial contaminants (32.6%), pesticide residues (20.6%), heavy metals and residues of veterinary medicine (2.9% each). Eight food categories were involved: most often cereals and bakery products (55.9%), then fruits and vegetables (17.6%), confection-

ery / fats and oils / nuts, nut products and seeds (5.9% each group), and cocoa and cocoa preparations, coffee and tea / dietetic foods, food supplements, fortified foods / honey and royal jelly (5.9% each group). Most frequent combinations were cereals and bakery products with mycotoxins or industrial contaminants (35.3% and 20.6%, respectively), and fruits and vegetables with pesticide residues (17.6%). Overall occurrence of main chemical hazards was ranked in the following order: acrylamide (26.5%) > aflatoxins (20.6%) = various pesticide residues (20.6%) > deoxynivalenol (11.8%) > ochratoxin A (8.8%). Risk was characterized

as serious in 52.9% of the cases, undecided 20.6% and not serious 26.5%. Border control was recorded as notification basis in even 67.6% of the cases. Dominant notification type was information (44.1%), followed by border rejection and alert (32.4% and 17.6%, respectively). Return to consignor was the most frequently taken action (20.6%), followed by destruction and withdrawal from market (14.7% per each). Food safety management system in Serbia needs refitting!

KEY WORDS: food safety, chemical hazards, RASFF, Serbia

BIOGENIC AMINES IN ARTISANAL DRY FERMENTED SAUSAGES AND ASSOCIATED HEALTH RISK FOR CONSUMERS

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The study aim was to investigate biogenic amine profile of dry fermented sausages from artisanal production marketed in Novi Sad.

The study was conducted on 19 samples collected on green markets, applying modified ISO 19343 method for the analysis.

The profile showed presence of histamine, tyramine, putrescine and cadaverine in all analysed sausages, as well as natural polyamines spermine and spermidine; occurrence of phenylethylamine and tryptamine was 95% and 26%, respectively. The levels of biogenic amines showed wide variations, ranging from 26.3 to 1186 mg/kg in total. Tyramine and phenylethylamine were the most abundant, followed by putrescine. Tyramine amount was in the range 0.5-412 mg/kg, putrescine 1.0-243 mg/kg and cadaverine 0.5-409 mg/kg. Histamine content was 2.6-90.9 mg/kg, not exceeding proposed level of 100 mg/kg. The sum of four vasoactive amines (tryptamine, phenylethylamine,

histamine and tyramine), suggested as an indicator of hygiene and good manufacturing practice, ranged from 19.0 to 533 mg/kg, exceeding the limit of 200 mg/kg in 10% of the samples. Consumption of dry fermented sausages could cause histamine / tyramine intake up to 9.1% / 3.4% of threshold dose for healthy population (50 / 600 mg/meal). Tyramine intake for patients taking third generation MAOI drugs could reach 41% of threshold dose (50 mg/day), whereas for patients on classical MAOI drugs the threshold (6 mg/day) would be exceeded by 21% of the samples.

In conclusion, adverse health effects would be rather unlikely for healthy population, whereas sensitive individuals and MAOI patients should be advised to avoid dry fermented sausages.

KEY WORDS: fermented sausages, biogenic amines, histamine, risk assessment

PHYTOCHEMICAL SCREENING OF BARK AND LEAF EXTRACTS OF SALIX FRAGILIS L.

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Antioxidant phytochemicals present in medicinal plants play an important role in prevention of chronic diseases caused by oxidative stress. Bark of various species of the genus *Salix* has been reported to exhibit strong anti-inflammatory and antioxidant activity

due to the presence of phenolic compounds. Willow leaves are usually treated as waste and are mainly not studied. The aim of this study was to characterize the phytochemical constituents of bark and leaf extracts of *Salix fragilis* L. (Salicaceae) and evaluate their antiox-

idant potential. Willow bark and leaf extracts were obtained by microwave assisted extraction. Chemical composition of extracts was determined by High Performance Liquid Chromatography (HPLC), while the antioxidant activity was assessed by the ability of extracts to scavenge 2,2-diphenyl-1-picrylhydrazyl (DPPH) and hydroxyl radicals (OH). The presence of 13 out of 16 analyzed phenolics was confirmed. Dominant compounds in bark and leaf extracts were salicin, chlorogenic acid, epicatechin and rutin. The amounts of the majority of identified compounds were higher in leaf

than in bark. DPPH radical scavenging capacities were 6.83 µg/ml and 8.82 µg/ml, while those of OH radical 19.52 µg/ml and 24.48 µg/ml for bark and leaf, respectively. Results indicate that not only bark but willow leaves as well contain health beneficial phenolic compounds and could be used as sources of antioxidant compounds.

KEY WORDS: Salix; Chromatography, High Pressure Liquid; Antioxidants

HEALTH RISK ASSESSMENT FOR PEDIATRIC POPULATION ASSOCIATED WITH ETHANOL AND SELECTED RESIDUAL SOLVENTS IN HERBAL BASED PRODUCTS

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In this study, 48 herbal based products (41 for pediatric population) were analyzed for the presence of ethanol and residual solvents. A rapid, sensitive and reliable HS-GC-MS method for quality control of herbal based products in a term of acetone, methanol, ethanol, isopropanol, 1-propanol and 1-butanol presence was developed and validated. Ethanol was not detected in only 12% of the products designed for infants or toddlers less than 2 years old, although it is contraindicated, and not quantified in only 36% of 'alcohol free' products. Actual content was higher than labeled in six out of 11 samples with specified ethanol quantity. WHO proposed requirement for ethanol content in products intended for use in children under the age of 6 (<0.5%) was not met by as many as 26 samples. Furthermore, calculated blood alcohol levels in children exceeded the relevant toxicological levels for nine samples fol-

lowing a single dose, and for one sample in case of accidental poisoning with the entire package. Regarding the residual solvents, acetone, 1-propanol and 1-butanol were not quantified, 2-propanol was found in two samples in low concentrations, whereas methanol intake via one of the samples exceeded the permitted level for children. Obtained results revealed a significant health concern for pediatric population due to ethanol intake via herbal based products, calling for the establishment of strict guidelines for ethanol content and labeling.

KEY WORDS: ethanol; residual solvents; herbal products

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ANTIOXIDANT ACTIVITY AND PRELIMINARY CHEMICAL ANALYSIS OF COMMERCIAL TEA SAMPLES (*CAMELLIA SINENSIS* L.)

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Dietary intake of antioxidant-rich food and medicinal plants is associated with lower incidence of human disease. Tea (*Camellia sinensis* L., Theaceae) is a popular and widely consumed beverage, owing to its antioxidant activity. The aim of this study was to determine and com-

pare the antioxidant activity, as well as the total phenolic and flavonoid content of different samples of green, black and white tea present in the Serbian market. Infusions of commercial green, black and white tea samples obtained from different manufacturers present in

domestic market were prepared. Antioxidant activity was evaluated by the ability of extracts to scavenge 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical. The amounts of total phenolic and flavonoid compounds were determined spectrophotometrically. Concentrations of extracts that neutralized 50% of DPPH radical (IC₅₀) were in interval from 1,35 to 4,07 µg/ml. Total phenolic content in different tea samples ranged from 0,04 to 8,17 mg gallic acid equivalents (GAE)/g of dried extract (de) and flavonoids from 5,94 to 9,08 mg quercetin equivalents

(QE)/g of de. Green tea had the highest content of total phenolic compounds and antioxidant activity among tea samples in filter bags. Green tea in bulk possessed the highest amount of total flavonoid compounds and antioxidant activity among the samples of tea in bulk. The sample of green tea in bulk showed the highest antioxidant activity when compared to all the other samples.

KEY WORDS: *Camellia sinensis*; Antioxidants; Phenols; Flavonoids

HERBAL FOOD SAFETY IN NIŠAVA AND TOPLICA DISTRICT

JELENA ĆIRIĆ

Public Health Institute Niš

Public Health Institut Niš has an accredited laboratory for testing food safety. Out of the total number of samples analyzed per year, 829 of them are herbal food. Although the Institute has a contract with the Ministry of Agriculture, the number of samples sent by Inspectors is evidently decreasing,

THE AIM of this paper was assessment of herbal food safety in Nišava and Toplica District.

MATERIALS AND METHOD: herbal food samples were analyzed by accredited methods, and database was formed according to results. This database is updated annually. The results of microbiological and physical and chemical testing of herbal food during the period 2015-2018 year are showed.

RESULTS: During the period 2015-2018 year, an average of 375 samples per year was microbiologically tested. Physical and chemical testing of samples included con-

taminants content (heavy metals, pesticides, nitrates, nitrites and mycotoxin presence), ingredients, declaration and organoleptic features. An average of 829 samples were tested for these parameters. The results of food safety shown are collected from PHI database that is updated annually.

CONCLUSION: Given the marked decrease in the number of samples sent by the inspectors to the Institute, as well as the maintenance of the number of samples entrusted by the users to the Institute for analysis, the Institute would certainly have a better insight into the health safety of food by amending the laws on food safety as an authorized healthcare institution for the territory of the Nišava and Toplica District which is announced every year. The changes in Law on Food Safety in the field of food safety control are expected to be returned to sanitary inspectors.

KEY WORDS: Food, Herbal food, Food safety, Public Health Institute Niš

PARTICIPATION OF ALTERNATIVE MODES OF NUTRITION AMONG YOUNG SOCCER PLAYERS IN SUBOTICA

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INTRODUCTION: Along with the quality of training and genetic limitations, nutrition plays an important role in a successful sport's career. A lot of athletes, all over the world, are choosing a diet that partially or completely omits ingredients of animal origin, rejecting such prej-

udices that vegetarian, vegan or other alternative diets aren't suitable for nutrition of professional athletes. Information about the principles of vegetarianism, macrobiotics, raw food nutrition, Ayurveda, and other various types of diets can be found today across the

different types of media, especially on the Internet. Guided by the desire to achieve the best possible sport's results, young athletes unadvisedly accept diet that's not inherent to our region, most often without basic knowledge about the potential benefits or health risks of such nutrition' modes.

AIM: To assess knowledge of young soccer players about alternative modes of nutrition.

METHODS: In 2017, 33 soccer players aged 18 to 33 were interviewed in the Soccer Sports Club in Subotica.

RESULTS: Only one respondent in the observed group was a vegetarian. About one-third of them didn't know what

is macrobiotics, but more than three-quarters knew what is Ayurveda. Just a few respondents were informed about the blood type-based mode of nutrition. Respondents were insufficiently informed about Chrono diet and other dietary modes of nutrition.

CONCLUSION: Alternative modes of nutrition aren't widely represented among young soccer players in Subotica. At the same time, this study pointed out the necessity of education about alternative modes of nutrition in the population of young athletes.

KEYWORDS: alternative mode of nutrition, young athletes, education.

HEALTH CONCERNS RELATED TO TATTOO INKS ON THE RAPID ALERT SYSTEM FOR NON-FOOD CONSUMER PRODUCTS (RAPEX)

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Over the past 20 years, tattooing has become a fashion trend extending to large parts of the population. With respect to the possible health risks of the tattoo practice due to the microbiological contamination or presence of dangerous chemical substances, a review of relevant notifications on the Rapid Alert System for Non-Food Consumer Products (RAPEX) was prepared, covering three years period (2016-2018). There were 71 notifications related to tattoo inks, which were categorized as chemical products. The risk was reported as dangerous in all cases, except for one product with second degree risk. Regarding the notification basis, border control was leading in 2017, with 97% of the notifications, whereas market control was equal in 2018 (50%), or slightly more prominent in 2016 (60%). When the type of the hazard was considered, chemicals showed dominance, with 93% *versus* 7% for microbiological

hazards. Among chemicals, primary aromatic amines and polycyclic aromatic hydrocarbons were equally represented (39% each), while the toxic metals were on the third position. Through the years (2016-2017-2018), the distribution of the chemical hazards varied substantially: primary aromatic amines 56%, 15% and 55%, polycyclic aromatic hydrocarbons 33%, 65% and 19%, toxic metals 11%, 19% and 26%, respectively.

Categorisation of tattoo inks and permanent make up as chemical products, and not as cosmetics, potentiate the risk of being in grey zone, not covered with official control relevant for consumers' health safety. Tattooing practice is widely adopted and represents a socio-cultural phenomenon in Serbia also.

KEY WORDS: tattoo, chemicals, PAHs, heavy metals, official control

HEALTH RISKS ASSOCIATED WITH TATTOO AND PMU PRODUCTS

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BACKGROUND: Tattoos may pose a risk to human health due to microbiological contamination and/or the presence of harmful substances in the products used for tattoos and/or the possibility of being tattooed under questionable hygienic conditions.

AIM OF THE STUDY: The aim of the study was to establish the chemical composition and eventual microbiologi-

cal contamination of colorants used in tattoos and permanent make - up.

METHODS OF WORK: Samples of colorants used in tattoos and permanent make - up have been taken in tattoo and beauty shops and analyzed for the presence of carcinogenic, mutagenic, reprotoxic and senzitisising aromatic amines and contaminants, such as polycyclic ar-

omatic hydrocarbons, benzene-a-pyrene and metals. In addition, the samples were examined on the total bacterial count at 30 °C, the presence of moulds, yeasts and pathogenic agents at 37 °C.

RESULTS: The results of the study shown that some samples were microbiologically contaminated. The total bacterial count was > LOD, in addition yeasts and moulds were detected.

Several samples contained heavy metals above maximum allowed concentrations. Metals above maximum allowed concentrations were barium, copper, cadmium and lead. In addition almost all samples con-

tained nickel for which maximum allowed concentration is not clear. Also polycyclic aromatic hydrocarbons and benzene-a-pyrene above maximum allowed concentrations were identified. Aromatic amines, which should neither be present in tattoos and permanent make – up products nor released from azo – colorants, were identified too.

CONCLUSION: From the results of the study it is obvious that tatoos involve a certain health risk.

KEY WORDS: tatoo colorants, microbiology, heavy metals, polycyclic aromatic hydrocarbons, aromatic amines.

THE CONTENT OF PHTHALATES IN TOYS IN THE REPUBLIC OF SRPSKA FROM 2016 TO 2018

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OBJECTIVE: To determine the percentage of samples of toys that do not correspond to the requirements of the regulation regarding the content of phthalates in the period from 2016 to 2018 and point out the public health significance of controlling the content of phthalate in toys.

METHOD: Samples were collected in accordance with the official control of toys imported for the market of Republika Srpska. In 2016, 74 samples, in 2017, 79 samples, and in 2018 159 samples were taken for analysis of phthalate content. The phthalate analysis was carried out by the method of gas chromatography in the Department of Sanitary Chemistry of the Institute of Public Health of the Republic of Srpska.

MAIN RESULTS: The results showed that in 28% of samples in 2016, that is, in 2017, 24% of samples, and in

2018, 12,6% samples were found a higher quantity of phthalates than allowed. The largest number of samples deviated in terms of the content diethylhexyl phthalate, and diisononyl phthalate.

CONCLUSION: Due to the toxic effects of phthalates on the liver as well as mimicking estrogen effects, may be considered a risk to the health of children.

We concluded that phthalates are still used in toys production at a higher concentration than those permitted by the Directive.

Given that global production of toys is high and that toxicity to the organism of phthalate has been proven, special attention should be paid to public health standards.

KEY WORDS: kids, toys, phthalates, public health

PERSONAL HYGIENE PRODUCTS SAFETY AND FACE AND BODY PRODUCTS SAFETY IN NIŠ DISTRICT

JELENA ĆIRIĆ

Public Health Institute Niš

Public Health Institut Niš has an accredited laboratory for testing every day usage products safety since 2005, and among those, personal hygiene products and cosmetic products for face and body care. Although the Institute has a contract with the Ministry of Health, the

number of samples sent by Inspectors is evidently decreasing,

The aim of this paper was assessment of personal hygiene products and face and body care products safety in Nišava District.

MATERIALS AND METHODS: personal hygiene products and face and body care products samples were analyzed by accredited methods, and database was formed according to results. This database is updated annually. The results of microbiological and physical and chemical testing of herbal food during the period 2015-2018 year are showed.

RESULTS: During the period 2015-2018 year, an average of 640 samples per year was tested. Physical and chemical testing of samples included contaminants content (heavy metals presence), declaration and organoleptic features. An average of 763 samples was tested for these parameters. The results of cosmetic products

safety, microbiological and physical and chemical testing in past five years is shown, for imported and domestic made products both.

CONCLUSION: Although the number of samples sent by inspectors at the import for the analysis is noticeably reduced, the number of those voluntarily entrusted by the users to the Institute is constant. It is important to note that among the tested samples there were a small number of those who were defective, whether they came from imports or were of domestic origin

KEY WORDS: Personal hygiene products, Face and body care products, Products safety, Public Health Institute Niš

SUGAR AND CARBOHYDRATES INTAKE AND CARDIOVASCULAR DISEASE RISK IN PRESCHOOL CHILDREN

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In order to promote cardiovascular health of children, the American Heart Association (AHA) established dietary recommendations for carbohydrate intake. For children 2-5 years old, these recommendations include daily intake of 19-25g dietary fibres (min. 14 g/per1000 cal) from variety of fruits, vegetables and grain products and limited consumption of sugar and food with added sugar (no more of 25 g per day or maximum 10% of total energy intake).

The aim of the study was to examine the values of carbohydrates, especially dietary fibres and added sugar in kindergarten meals that could affect the development of cardiovascular disease.

Daily amount of foods used for preparation of 100 meals and carbohydrate contents of meals in period 2014-2018 were calculated based on the warehouse supply list and Serbian food composition tables.

The mean value of the carbohydrate content in meals was – 130.3 g (rang: 109.8-152.7g) or 53.6% (48.8-57.8) of the total energy value of meals (mean: 997.3cal). Most of carbohydrates in meals where in the form of polysaccharides – 81.4g with distribution of dietary fibres of 14.3g. The mean percentage of energy contributed by added sugars was 9.7% (5.5-13.6) or 23.5g.

According to AHA dietary recommendation, kindergarten diet in Niš doesn't present a risk factor for cardiovascular disease development. Planning of meals, with higher content of fruits and vegetables as a source of dietary fibres and lowering the content of added sugar (below 5% of total energy intake) is necessary in order to gain additional health benefits.

KEY WORDS: diet; cardiovascular disease; children; kindergarten.

RELATIONSHIP BETWEEN MAGNESIUM DEFICIENCY AND ADVERSE CONDITIONS IN PREGNANCY

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OBJECTIVE: Magnesium is a cation of a great importance for many enzymatic reactions. Low magnesium intake may contribute to some diseases such as diabetes, cardiovascular diseases and osteoporosis. Deficit of magnesium may have a significant role in pregnancy. The national guide of good clinical practice for the diagno-

sis and treatment of arterial hypertension suggest magnesium-sulfate for the treatment of preeclampsia and eclampsia.

The aim of this abstract was to investigate the relationship between magnesium deficiency and adverse conditions in pregnancy.

METHODS: Data were obtained by searching the results of the studies in the Pub Med database.

RESULTS: Magnesium deficit may lead to some adverse conditions in pregnancy such as gestational diabetes, preeclampsia and migraine.

Furthermore, leg cramps in pregnant women and preterm labor are also connected with magnesium deficiency.

Also, there is relationship between magnesium deficit and small for gestational age.

CONCLUSION: Magnesium deficit may lead to some adverse conditions in pregnancy, therefore appropriate dietary magnesium intake and supplementation are of great importance.

KEY WORDS: magnesium deficiency; pregnancy

IDENTIFICATION AND ANTIMICROBIAL RESISTANCE OF ENTEROBACTERIACEAE IN FOOD

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INTRODUCTION: The presence of enterobacteria in foods is an indicator of insufficient hygiene during production, storage and handling of food.

THE AIM: To determine the presence of enterobacteria in food: ready meals (cooked and baked), semi-ready meals, sandwiches and to examine an antimicrobial sensitivity in isolated strains.

MATERIAL AND METHODS: All samples were inoculated according to standard SRPS EN ISO 21528: 2017. Characteristic colonies to the level of the species were identified by the biochemical series and test oxide. The final identification was performed using matrix-assisted desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS, Bruker, USA). Resistance to antibiotics was tested by disc diffusion method using 14 antibiotics according to EUCAST 2018.

RESULTS: A total of 187 samples were plated, of which 40 samples were positive or 21.3%. 97 samples were ready meals (cooked and baked), of which 5 samples were positive or 5.1%. 75 samples were semi-ready meals, out of which 27 samples were positive or 36%. 15 sam-

ples were sandwiches, of which 8 were positive or 53.3%. All positive samples were tested for antimicrobial sensitivity.

Various types of Enterobacteriaceae were identified: *Escherichia coli*, *Enterobacter cloacae*, *Klebsiella pneumoniae*, *Klebsiella variicola*, *Cronobacter sp*, *Cronobacter sakazakii*, *Kosakonia cowanii*, *Erwinia sp*, *Siccibacter colletis*, *Franconibacter pulveris*. All isolated strains were susceptible to Cefepime, Amikacin, Gentamycin, Ciprofloxacin, Levofloxacin, Meropenem, Imipenem, Piperacillin + Tazobactam, Trimethoprim + Sulfamethoxazole. Partial sensitivity was indicated on Ampicillin (40% resistant), Amoxicillin + clavulanic acid (22.5% resistant), Ceftriaxone (2.5% resistant), Tobramycin (5% resistant), Ertapenem (2.5% was resistant).

CONCLUSION: The majority of positive samples were sandwiches, where the greatest manual manipulation was during food preparation, and the least in ready cooked and baked meals. These results have important hygienic-epidemiological importance.

KEYWORDS: Enterobacteriaceae, resistance, food

MICROBIOLOGICAL HAZARDS IN FOOD – “COUNTRY OF ORIGIN” SERBIA ON THE RAPID ALERT SYSTEM FOR FOOD AND FEED (RASFF)

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In order to obtain information related to microbiological food safety challenges in Serbia, relevant notifications from Rapid Alert System for Food and Feed, public portal of the European Commission, were analysed.

In the last decade, 48 notifications were registered due to the presence of pathogenic and non pathogenic microorganisms in food from Serbia: pathogens took the lead with 91.7%. Seven food categories were involved:

most often fruits and vegetables (79.2%), then confectionery (8.3%), herbs and spices (4.2%), and fish and fish products / ices and desserts / milk and milk products / other food products/mixed (2.1%). Overall occurrence of pathogens was ranked in the following order: norovirus (61.4%) > *Salmonella* (18.2%) > hepatitis A (13.6%) > *Listeria monocitogenes* (4.5%) > coagulase-positive *Staphylococcus* (2.3%). Most frequent combinations were fruits and vegetables with pathogens (norovirus 77.1%, hepatitis A 17.1%, *Listeria monocitogenes* and *Salmonella* 2.9% each) and confectionery with pathogens (*Salmonella* 100%). Non pathogenic microorganism were found in fruit and vegetables (75.0%) and herbs and spices (25.0%). Risk was

characterized as serious in 56.3% of the cases, undecided 37.5% and not serious 6.3%. Food poisoning was recorded as notification basis in even 39.6% of the cases, whereas border control took the second lead with 29.2%. Dominant notification type was alert (58.3%), followed by information and border rejection (27.1% and 14.6%, respectively). Recall from the consumers and withdrawal from the market were the most frequently taken actions (29.2% and 20.8%, respectively), followed by redispach (12.5%) and destruction (8.3%). Presented results indicate need for action!

KEY WORDS: food safety, microorganisms, RASFF, Serbia

DETECTION OF *SALMONELLA* SPP. IN FOOD SAMPLES USING MSR/V AGAR

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The introduction Presence of *Salmonella* is still on the rise in food samples, especially in chicken meat.

The objective of the study was to test the performance for the detection of *Salmonella* at different contamination levels, both high (60 cfu) and low (6 cfu), in a food samples.

MATERIAL AND METHODS: Food samples of 25 grams each were analysed in the presence of reference materials containing *Salmonella* (at various contamination levels). The prescribed method was Annex D of ISO 6579 with selective enrichment on Modified semi-solid Rapaport Vassiliadis (MSRV) agar.

RESULTS: Out of 60 examined food portion *Salmonella* is found in 98% of the (contaminated) samples, 30 positive samples out of 30 for high contamination and 29 positive samples out of total 30 samples for low contamination level.

48 hours of incubation of MSR/V gave overall 10% more positive results compared to 24 hours of incubation.

CONCLUSION: The sensitivity rates and the specificity rates of the majority of the samples (control samples as well as artificially contaminated samples) were close to 100%, showing that the MSR/V was well able to detect *Salmonella* at different levels. Only the sensitivity rate of low level contaminated samples was lower (96%), indicating that the level of this type of sample became close to the detection limit of the method.

It is found comparable results of the prescribed method with MSR/V and method with MKTT.

As a final result the prescribed method (MSRV) fulfilled the criteria of good performance.

KEY WORDS: *Salmonella*, food, Modified semi-solid Rapaport Vassiliadis agar (MSRV)

MICROBIOLOGICAL PROFILE OF DRY FERMENTED SAUSAGES FROM ARTISANAL PRODUCTION

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The study aim was to investigate microbiological profile of dry fermented sausages from artisanal production marketed in Novi Sad.

The study was conducted on 19 samples collected on green markets, applying standard method for mi-

crobiological analyses: ISO 11290-1, ISO 22964, ISO 6579. Isolates were identified by Matrix Assisted Laser Desorption/Ionization Mass Spectrometry.

The food pathogens *Listeria monocytogenes*, *Salmonella* spp., *Staphylococcus aureus* and *Bacillus cereus*

were not detected, but four samples were contaminated with pathogenic bacteria, three with *Cronobacter sakazakii* and one with *Listeria innocua*.

The highest detection rate was recorded for *Bacillus* species (95%), followed with *Enterobacteriaceae* (58%), *Enterococcus* (32%) and *Staphylococcus* (21%). Dominant species were *B. pumilus* and *B. licheniformis*, but more important were findings of *Escherichia coli* and *Klebsiella pneumonia* (37% and 32%, respectively).

Furthermore, in one third of the samples simultaneous presence of multiple bacterial species, four, or even five, was observed. Bacterial counts revealed the heaviest presence of *E. faecium*, up to 7.86 log cfu/g, *E.*

coli with 7.64 log cfu/g and *B. licheniformis* and *B. pumilus* with 6.82 and 6.74 log cfu/g, respectively.

In conclusion, microbiological profile of artisanal dry fermented sausages indicates not adequate control of raw material and hygienic conditions in production and hence does not provide enough confidence for the consumers. Serbian market of artisanal meat products is very dynamic and fragmented, thus questioning availability of information and application of risk mitigation options. One of the consequences of bacterial contamination is production of biogenic amines, chemical hazards endangering food safety.

KEY WORDS: fermented sausages, microorganisms

PREVENTIVE MICROBIOLOGICAL CONTROL IN SOUP KITCHEN PREMISES

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OBJECTIVE: Overview of effects of the program of preventive control of sanitary-hygiene conditions in soup kitchen premises conducted through analysis of environmental swabs including hand/nose swabs of employees working at the point of food distribution and preparation.

METHOD: Overall analysis of 2913 swabs, sampled between 10.02.2015 and 31.12.2018. Laboratory analysis was conducted in the Institute of Public Health Belgrade and the results were further processed using SPSS version 22.0. Acceptable level of microorganisms was set in accordance to domestic legislation.

RESULTS: Over selected period level of unsatisfactory results was less than 5% (4,77%), and in comparison to 2015. decreased by more than 50% in 2018.(3,35%). Within individual swab categories a general drop in unsatisfactory results was also observed. The most

unsatisfactory results were detected in hand swabs 46,04% (64/139), followed by surface and utensils swabs 34,53% (48/139) and nose swab samples 19,42% (27/139). The chief microbiological indicator, present in almost 70% of all samples with detected microorganisms was total aerobic colony count (TACC), present individually 52,51% (73/139) or with *Enterobacteriaceae* 17,26% (24/139), followed by *Staphylococcus aureus* Co+ detected in 23,57% (31/139) of all positive samples.

CONCLUSION: Microbiological results showed trend of overall improvement which can be attributed to continuous surveillance, work on improving sanitary – hygiene conditions in soup kitchen premises and raising awareness among workers engaged in food preparation and distribution of importance of acting according to good hygiene practices.

KEY WORDS: soup kitchen, swabs, preventive control

IMPORTANCE OF DEHYDRATION IN MODERN SPORT

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AIM: Aim of this article is to study the effect of dehydration on mental and physical performances of athletes as well as the latest knowledge about adequate rehydration.

METHODS: In order to review articles and find clinical trials we used MEDLINE, EBSCO, Scopus databases. The search included full-length articles of these databases published since 2000 until 2019. Search keywords were: „dehydration“, “exercise“, “sports performances“, “endurance“, “rehydration“.

RESULTS: Many studies revealed that dehydration $\geq 2\%$ body mass leads to a reduction of VO_{2max} . There is an overall consensus in literature that dehydration $\geq 2\%$ body mass represents a threshold at which endurance, as aerobic performance, becomes impaired. Study of dehydration effect on muscle strength and power is difficult due to their multi-factorial nature.

Nevertheless, in some studies, the reduction of these performances was observed in athletes who were $\geq 2\%$ dehydrated, while the results of others indicated that dehydration had no effect on them.

It has been demonstrated that the symptoms of dehydration such as thirst, headache and fatigue, have a negative effect on mood and can consequently impair sports performances, but the exact mechanism is still unclear.

CONCLUSION: Adequate rehydration is crucial in maintaining fluid balance. Endurance could be maximized

if hydration status before exercise is well and fluid intake is dictated by thirst. Future research should provide necessary recommendations for optimal fluid intake in the aim of faster recovery and prevention of reduction in sports performances caused by dehydration.

KEYWORDS: dehydration, exercise, sports performance, endurance, rehydration.

CONSUMPTION PATTERNS OF FLUID INTAKE AMONG ADOLESCENTS AND YOUNG ADULTS IN SUBOTICA

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AIM: Healthy drinking pattern during life cycle is of great importance. Young adulthood is a period prone to developing unhealthy behaviors. The aim of the study was assessing amounts and sources of fluid intake in the adolescent and student population, and the linkage of fluid intake with nutritional status.

METHODS: A total of 148 individuals (75% females), aged between 15-30 years were recruited. Information about fluid intake was collected using a beverage intake questionnaire, designed for this study. Fluid intake was compared with EFSA dietary reference values for water. Statistical analysis was performed by IBM SPSS Statistics 19, and the correlations between the selected variables were determined by Spearman's correlation coefficient of rank.

RESULTS: In the total sample, 77.5% of females and 67.6% of males comply with the EFSA AI for water from fluids ($p=0.008$). Those who have lower total fluid intake

more often consume sweetened carbonated beverages ($p=0.001$).

Nutritional status showed significant connection with beverage choices, those with BMI>25 more often drink diet varieties and 2%vol. beer than those with adequate nutritional status.

The most consistent gender differences observed were that females more often consume fruit yogurt ($p=0.012$), while males consume higher quantities of whole milk ($p=0.045$).

Energy drinks are more often consumed by student population 19-23 years old.

CONCLUSION: Those who drink enough overall fluid are more likely to use drinking water, both bottled and tap water and yogurt, while the group that do not meet EFSA AI for fluid intake drink more often sugar sweetened beverages.

KEY WORDS: water, adolescents, students, sugar sweetened beverages

DIETARY HABITS AMONG STUDENTS IN NOVI SAD

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Studying represents an important period of an individual as well as the transition from adolescence to adulthood. During this time, students can develop improper dietary habits. The aim of this study was to estimate dietary habits among students at two Universities in Novi Sad. The research was conducted in May 2018 and included 514 students aged from 19 to 24 (133 males and 381 females) from 4 faculties (Faculty of Medicine, Pharmacy, Faculty of Sciences and Faculty of Technology) whose study programs contain nutri-

tional items. The original anonymous questionnaire was used. Statistical processing was done in SPSS20. Results revealed that only 11% of participants practiced 5 meals daily and just 56% of them consumed breakfast every day and sex differences were statistically significant ($p < 0.01$). Regarding the food types, only 5% of the participants consumed vegetables and only 6% of them consumed fruits more than once a day with statistical significance between faculties ($p < 0.01$). At the same time, 92% of participants consumed meat

a few times a week and 77% of participants consumed fish at least once a week. Water consumption higher than 2 L daily was reported by only 29% of the students (sex differences were statistically significant $p < 0.01$, and faculty differences were statistically significant $p < 0.05$) although 85% of participants reported water as

their first choice of drinks. Results indicate unbalanced nutrition and unhealthy lifestyle among students and therefore imply the necessity of education aimed to increase public health.

KEY WORDS: students, dietary habits, Novi Sad

NUTRITION IN THE CONTROL OF TYPE 2 DIABETES

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Diabetes mellitus is a chronic metabolic disease characterized by chronic hyperglycemia caused by a defect in insulin secretion or its effect and is associated with long-term unbalanced diet.

The number of people with diabetes in the world in 2014 was 422 million, and in our country 710,000, 12.4% of the adult population. Optimal glucose-regulation, usually, can be achieved by proper diet and physical activity, with adequate therapy. The diet represents the basis of treatment. The standard guidelines recommend that carbohydrates make 50 - 55% of the daily intake while avoiding free sugars and sweetened drinks.

Proteins make up 10-15% of the daily intake, with the consumption of non-fat meat and dairy products. Fats make 30% of the daily intake, yet the quality of fat is more important than quantity. Salt intake is recommended at < 3 g/day in hypertensive people. Since 80% of patients with diabetes die from cardiovascular disease, the diet also focuses on the improvement of the

cardiovascular risk profile. There are several proven effective ways of controlling glycemic control, including a modified diet pyramid, and a carbohydrate calculation method, but there is evidence of the effectiveness of other diets. In the category of the best diabetes, the first place was won by the Mediterranean diet, then DASH. Both diets emphasize fruits, vegetables, and whole grains.

This diet involves an increased intake of unsaturated fatty acids via fish. Fish oil, especially EPA, is associated with reduced ischemic stroke, atherosclerotic disorder, and peripheral arterial disease by as much as 26%. Therefore, consideration should be given to the introduction of a recommendation for a Mediterranean diet and DASH within the diabetes counseling center, with an assessment of the effectiveness of these diets among type 2 diabetes sufferers.

KEY WORDS: Diabetes, Nutrition, Mediterranean Diet, DASH Diet

SUGAR PROFILE OF HONEYS FROM SERBIA

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Honey is a natural product that enjoys strong demand, which is due to a range of substances that are responsible for its unique nutritional and medicinal value. The major components of honey are sugars, mostly fructose and glucose. It is the only sweet natural product that can be used for human nutrition without any processing. Fifty two honey samples of different floral origin from Serbia were examined. The sugar composition (fructose, glucose, sucrose) was determined by an HPLC system equipped with a refractive index detector.

Our study confirmed that in the examined honey types the average percentage of fructose and glucose ranged from 36.57 to 41.64 i.e. from 30.00 to 34.53%, respectively. Acacia honey had the average fructose

concentration (41.77 g/100 g), while multiflower honey had the highest content of glucose (34.53 g/100 g). The lowest mean value of glucose was found in the samples of acacia honey (30.00 g/100 g). In 41 of the total of 52 investigated samples (79%), sucrose content was below the detection limit of the applied method. The sum value of glucose and fructose, as well as sucrose content in all investigated honey samples was found to meet European Legislation and local regulations. As a dietary product honey can be applied simultaneously with medicines and with the implementation of treatment measures.

Unfortunately, despite the apparent benefits of other food products (sugar, sweet, jam, etc.) honey is still

not sufficiently applied in the modern clinic and in the treatment and prophylaxis facilities.

KEY WORDS: fructose, glucose, sucrose, Serbian honey

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LABELING OF HONEY AND HONEYBEE MIXTURES, RESTRICTIONS AND DANGERS OF ADDITION OF SOME INGREDIENTS

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There is an increasing demand for enriched food, often attributed to traditional beliefs about effectiveness in the prevention and treatment of various diseases. On the other hand, given the complex requirements of the EU and EU legislation, it is necessary to label mandatory quotations on honey, and in particular honeybee blends with some particular ingredients. The market of the Republic of Croatia and the EU is flooded with numerous food supplements (FSs), and an increasing number of consumers prefer the natural origin of bee products, especially honey, propolis, bee pollen and royal jelly.

Also, fruits, vegetables, spice herbs, medicinal herbs and seeds are often used for addition in honey, and such products are often referred to FSs. Composition, labeling and placing a of FSs on the market in Croatia are regulated by special regulations, and one of the most important principles is that marking, advertising and presentation of FSs must be such that the product

is not attributed to the properties of prevention, therapy or treatment of the diseases.

The aim of the paper is to present examples of good and bad labeling of bee products, where special focus will be placed on substances that can be added to food and substances whose use in food is prohibited or restricted.

The fact is that many small and medium enterprises (SMEs), food business operators (FBOs) are adding ingredients into the food that are prohibited or at least limited to the final product according to applicable regulations. It is necessary to raise the awareness of small manufacturers and control bodies on the application of legal guidelines governing the selection of ingredients added to honey, especially when developing new products.

KEYWORDS: honey, food supplements, labeling, restricted ingredients.

NUTRITION RISK SCREENING AMONG PRESCHOOLERS

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AIM: Study aim is to identify proportion of preschool children at nutrition risk and to assess connection with nutritional status.

METHODS: The study involved 164 children (range 3-5 years, mean age 4.8 years, 54.9% males), and their parents.

Parents completed the nutrition screening tool for preschoolers - NutriStep® questionnaire.

The coding for each answer was provided within a spreadsheet, where overall score ≤ 20 is classified as low risk, scores 21-25 were classified as medium risk and scores 26 or above were classified as high risk. Body composition was assessed with InBody230 (Bio-

space, Corea). Height was measured using a mobile stadiometer (202, Seca,UK).

RESULTS: Almost 19% of the children screened were in high nutrition risk, 28.7% were in medium risk and 52.4% in low risk. About 83.5% of children in low risk were well nourished according to obesity degree. Among children in medium and high risk there were 73% well nourished. According to questionnaire, 17.7% preschoolers eat at "fast food" once a week or more often, 36% eat 2 or more portions of vegetables daily. Only 39% parents let their children decide how much to eat, but it shows no statistical significant difference to BF% or nutrition risk rank.

CONCLUSION: The high percentage of preschoolers in medium and high nutrition risk shows the need for healthy nutrition and lifestyle habits education in the preschool period. NutriStep® screening tool provides a simple and effective way to assess the eating

habits of preschoolers and identify children at nutrition risk.

KEY WORDS: preschool children, eating habits, nutrition, risk

OBESITY AND EATING DISORDER COUNSELLING AT ZAGREB YOUTH HEALTH CENTER

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Introduction: Childhood and adolescent obesity is serious and challenging public health concern. School doctors regularly assess body weight and track BMI percentiles during well visits at the School Health Centres. They are encouraged to refer children and their parents for further evaluation and management, but obesity treatment programs are not available in many areas. Zagreb City Office for Health has recognized this issue and has funded Youth Health Centre in Zagreb which offers free counselling and treatment for obesity and eating disorders outside of the primary care setting. It is a multidisciplinary team run by two school doctors with psychotherapy background, and dietitians, kinesiology teacher, psychologist and psychiatrist available for consultation.

AIM: To review the outcomes of obesity counselling within community youth health centre.

METHODS: we evaluated obesity interventions at Youth Health Centre, carried out once a week, during two school years.

RESULTS: 43 children (Mean age = 16.3; 34 girls) participated in obesity individual or family counselling during 119 counselling sessions: 10 children from elementary school, 17 from high school, and 16 university students. Mean BMI for 14 older children were 31.99 (24.44 – 41.1).

Among 29 younger children, 25 were children with a BMI above the 97th percentile. The intensity and frequency of the visits varied greatly from 1 to 17 visits. After two visits (N = 25) 20 children lost their weight (mean = -1.7 kg), and after 3 visits (N = 17) 10 children lost weight (mean = -4.2 kg).

CONCLUSION: It is imperative for primary care providers to screen for obesity and disordered eating symptoms and for local community to provide affordable, acceptable and appropriate effective treatments.

KEYWORDS: Obesity, local community Youth Health Centre, Obesity treatment, children and adolescents

NUTRITION AND SUPPLEMENTATION OF YOUNG ATHLETE

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AIM: Proper nutrition and supplementation for young athlete provide the energy and nutrients needed for proper growth and development, training, competition and rapid recovery.

METHODS: Assessment of the nutritional status of athlete was performed on the basis of clinical examination of the patient, biochemical tests and anthropometric measurements.

Athlete gave information about dietary habits, schedule and level of physical activity. Energy requirements were calculated on the basis of recommendations for the assessment of total energy intake for children and adults provided by the World Health Organization and the European Union. The menu was created based on tables of chemical composition of food products.

RESULTS AND DISCUSSION: Nutrition and supplementation are adapted to the energy needs of the athlete. Energy intake was increased to 3400kcal per day. The recommended daily supplements: Whey protein and sports drink Hydrostar. After a period of four months in male athletes, aged 18 years, body height 190.0cm, body weight 69.4kg and value BMI 19.2kg/m² and body fat mass of 8.5% was increased body weight 10.0kg. Body weight was 79.0kg while the value of body fat mass of 9.3% was registered in the values for gender, age and type of sport.

CONCLUSION: Adequate nutrition and supplementation can provide all the necessary macro and micronutrients necessary for the growth and development of athletes.

KEY WORDS: Athletes, nutrition, supplementation

DIETARY PROTEIN AND PHOSPHORUS INTAKE IN HEMODIALYSIS PATIENTS

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Adequate nutrition of patients on hemodialysis can improve or prevent deterioration of physical and mental function, improve malnutrition, quality of life, reduce the number and severity of complications caused by disease or treatment. Nutrition recommendations for these patients include adequate intake of energy and proteins that have high biological value and limited phosphorus intake.

The aim of this study was to evaluate the dietary intake of energy, protein and phosphorus and to examine their association in hemodialysis patients.

The study was designed as a cross-sectional study. We used 24-hour dietary recall as assessment method for daily nutrition intake in 37 hemodialysis patients.

Average daily intake of energy was 27.61 ± 11.39 kcal/kg body weight/day. The average daily intake of

total proteins was 1.06 ± 0.49 g/kg body weight/day, of which the plant proteins were 0.36 ± 0.20 g/kg body weight/day, and the animal proteins were 0.70 ± 0.43 g/kg body weight/day. The average daily intake of phosphorus was 1102 ± 628 mg/day. Patients consumed the highest amount of protein and phosphorus from meat and grains. We found a positive correlation between the energy intake, and protein and phosphorus intake, as well as between protein and phosphorus intake.

Although the majority of patients consumed a sufficient percentage of protein of high biological value, the total daily intake of protein and energy is below the recommended. The average daily intake of phosphorus is above recommended limit.

KEY WORDS: hemodialysis, nutrition, protein, phosphorus

HYGIENIC-DIETARY REGIME DURING HOMEOPATHY TREATMENT

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Homeopathy as a complementary branch of medicine was legally acknowledged in Serbia in 2007. From that moment till now, the number of patients treated by this method either as a supplementary therapy or as the only therapy has been increased. In order to have the optimum effect of homeopathic medicaments, it is necessary that the patients comply with certain dietary rules, as well as with other pieces of advice related to the way of living which should be applied not only during the period of use of homeopathic therapy, but in the period following it as well so as to secure the persistence of the positive effect of medicaments on patients' organisms.

Some of the most basic rules imply quitting coffee as well as quitting nutrients which include caffeine and menthol. The given substances can be a direct antidote to a homeopathic medicament. In addition, patients

are advised to avoid industrially-processed food which includes food additives, avoid alcohol and start drinking regularly herbal teas which are based on the plants which are used for the production of some of homeopathic medicaments. Along with these recommendations, it is advised to take up a moderate way of living, avoid psycho-physical stress and take up regular day-night regimen with a sufficient level of rest and sleep.

With a homeopathic medicament that was properly selected by a homeopath, such dietary and life regimen provides for the optimum effect of a medicament. The same goes for conventional medicaments therapy but, however, with homeopathy treatments, non-compliance with these principles and with these pieces of advice prevents the effect of the medicament directly.

KEY WORDS: treatment, homeopathy, nutrition

ARSENIC LEVELS IN RICE-BASED INFANT FOOD – CONCERN, YES OR NO?

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OBJECTIVE: The most common first solid foods for infants are rice-based products, and often food of choice for

children with celiac disease. Rice bioaccumulate iAs at higher rate than other grains. Scientific Report of EFSA

“Dietary exposure to inorganic arsenic in the European population” concluded that the highest dietary exposure to iAs was estimated in the younger population (infants and toddlers) and consumption of three portions of rice-based infant food could represent an important source of iAs.

The aim was to assess needness for regular monitoring of As in rice-based products based on the analyzed data.

METHOD: Testing of tAs in IF with rice were performed in the Institute of Public Health, Belgrade at request of the border inspection, importers and producers during 2016 to 2018.

RESULTS: In total 146 samples were tested. The tAs levels in rice-based baby foods ranged from 0.002 - 0.15 mg/kg. 12 samples (3 organic and 9 non-organic) had tAs level greater than 0.08 mg/kg. Products which had rice as the main ingredient had the highest tAs content detected.

CONCLUSION: The question still remains if rice consumption is suitable for infant foods or no. Changing dietary recommendations regarding infant rice products consumption might be the most effective measure to reduce risks. The arsenic content in rice should be monitored and rice with the lowest content should be used for the preparation of IF.

KEYWORDS: arsenic, infant, monitoring

SALT CONTENT IN DEHYDRATED SOUPS RETAILED IN NOVI SAD, SERBIA

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AIM: Emerging evidence suggests that processed food is the major contributor to high-salt intake, one of the leading factors causing hypertension and its complications.

People increasingly chose processed food because of its acceptability, low price, longer shelf life, and heavy marketing. Dehydrated soups (DS) are products with a high level of salt added, ensuring preservation, microbial safety, as well as flavor potentiation, besides salt taste.

The aim of the paper was to determine salt content in DS retailed in Novi Sad.

METHODS: In total, 81 samples of DS were purchased from the supermarkets. Potentiometric titration was performed for determination of chloride ions and calculation for NaCl content. Results were expressed as a %NaCl in DS, NaCl content per liter and the portion (250ml) of prepared soup.

British Food Standard Agency (FSA) salt content profile is used for the classification of the samples and

WHO recommendation for daily dietary intake of salt (5g). Descriptive statistical analyses were performed using Microsoft Excel 2003.

RESULTS: The average salt content of controlled DS was 13.13±3.83%, ranging from min 3.5 to maximal 23.74%; 9.3±0.50g/l (6.17-16.92g/l) in prepared soup; and 2.30±1.95 g, ranging from 1.54-4.23g, in one declared portion (250 ml), respectively, highly contributing (46%) to recommended daily salt intake. Established salt content in all controlled samples is considered as high applying British FSA criterion.

CONCLUSION: It is of great importance to gradually reduce salt content in all food products, even in those recognized as processed products with high salt content. A simple sodium reduction does not necessarily have a negative effect on safety and shelf life of products.

KEY WORDS: sodium chloride; high blood pressure; processed food; dehydrated soups

CLAIMS ON FOOD SUPPLEMENTS – CHALLENGES IN MONTENEGRO

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In the Montenegro accession to the European Union process, main Directives and Regulations which regulate the attribution of health properties to foods and food supplements were officially adopted. Numerous

claims used so far in Montenegro, cannot be used anymore. In light of the new regulations, it has become more complex and challenging to point out the health claims on the labels correctly and to check its compliance by

official authorities. In addition to the correct usage of the claims, it is essential to carry out monitoring of the quality and health safety for these products.

OBJECTIVES: To analyze results for supplements tested in Institute of Public Health in the frame of Monitoring for food supplements in 2018.

RESULTS: IPH in checking compliance on food and food supplements, as well as raising awareness of the population producers and importers regarding food safety and requirements of the new legislation. Out of 109

samples, 17 (18,5%) were inadequate due to inappropriate statements.

CONCLUSION: In addition to correct usage of the claims, it is essential to carry out monitoring programs directed on the quality and health safety in the production and distribution of food and dietary supplements, to avoid any negative impact on the health of consumers.

KEYWORDS: consumer protection, EU regulations, food supplements, human diseases, labeling, health claims

ESCHERICHIA COLI IN TRADITIONALLY MADE DAIRY PRODUCTS IN MONTENEGRO

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Traditionally, cheese is made from fresh, raw, unpasteurized milk at temperatures lower than the pasteurization levels. E. coli carried in the intestines of ruminants are excreted in their feces, and can spoil the teats of cows, increasing the likelihood of contamination during the milking process

OBJECTIVES: To analyze the concentration of E.coli according to regulatory limits in samples analyzed in Institute of Public Health sampled in the frame of Monitoring of dairy products on milk processing farms in Montenegro.

RESULTS: Out of 2209 samples of dairy products cheese and cream, 603 (29,3%) were unsatisfactory due to high concentrations of E.coli above limits (100 cfu/g) stipulated in legislation.

There were no data in official documents that these products have been involved in outbreaks in the last 3 years.

CONCLUSION: Dairy products are produced in a similar way by small enterprises in various parts of the country. Many microorganisms such as lactic acid bacteria, yeasts, molds, and other non-pathogenic bacteria are adapted to survive and grow in such environments and have a key role in the biochemical and sensory characteristics of each kind of cheese. Whatever the reason is for E. coli being present, only a root cause analysis will help to identify where and when the contamination occurred in the cheese making process. E.coli is a valuable indicator to verify the safety of the finished dairy product, as well as to verify general hygiene. Raising awareness and education in good manufacturing practices is necessary in order to modify processing protocols to manufacture products from raw milk and to create an unfavorable environment for pathogen microbes to progress at a level that represents a health risk for the consumers.

KEYWORDS: E.coli, dairy products, hygiene practice, good manufacturing practice

AN OCCURRENCE OF LISTERIA MONOCYTOGENES IN READY-TO-EAT MEAT PRODUCTS AND MEAT PROCESSING PLANTS IN MONTENEGRO

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INTRODUCTION: L. monocytogenes has been isolated from a wide variety of ready-to-eat (RTE) foods and is responsible for several outbreaks in the world, described in scientific literature. Routine official examination of the presence of L. monocytogenes in food in Montenegro began in 2012.

OBJECTIVE: The aim of this work was to study the occurrence of Listeria monocytogenes in several types of ready-to-eat (RTE) meat products and in the environment of meat processing plants in Montenegro and to analyze potential health risks.

METHODOLOGY: The study evaluated available reports, interviews with producers on *L. monocytogenes* presence in ready to eat meat products in 2016 and 2017.

RESULTS: From the total of 1026 samples taken for the analysis, the *Listeria monocytogenes* was identified in 44 samples. Serotypization of the tested pathogens was not performed. In this period, there were no reported cases of listeriosis in population. All manufacturers of meat products where listeria is detected imported raw meat from the countries of the European Union.

CONCLUSION: Given its ubiquitous nature, there are many challenges for controlling *L. monocytogenes*. Food

business operators manufacturing food susceptible to *L. monocytogenes* must strengthen environmental monitoring. It is necessary to align the production process and the type of final product to the quality of the raw meat in cooperation with inspection services. Inspection services and authorized laboratories must be strengthened in order to monitor parameters (pH, aw) in susceptible RTE food, as well as to perform serotypization in isolates. Continuous medical education in health care is a prerequisite to adequately reporting cases of listeriosis.

KEYWORDS: *L. monocytogenes*, RTE products, Listeriosis

IODINE INTAKE OF PREGNANT WOMEN IN THE FRAMEWORK OF THE REDUCTION OF SALT INTAKE IN MONTENEGRO

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INTRODUCTION: The general recommendations for reducing salt intake in the population emphasize the importance of monitoring iodine intake, especially for pregnant and breastfeeding women as well as children up to two years old.

OBJECTIVE: Evaluate the intake of iodine by using a questionnaire on the frequency of consumption of selected food types and iodine supplements.

METHODOLOGY: The study compared the iodine status of pregnant women living northern region with central and coastal region, in total 300 subjects. The iodine content was analyzed in in the salt samples from the household and urine samples for each pregnant woman.

A questionnaire for assessing iodine intake from food and supplements is designed to investigate the frequency of consumption of certain types of food (fish and seafood, milk and dairy products, eggs, multivitamins and mineral supplements)

RESULTS: Median iodine concentration in table salt per region was 13.76 in former endemic, 15.03 in central and 13,97 mgI/kg for coastal region. The estimated iodine intake in pregnant women was less than 138 µg per day which is less than recommended value 250µg. The most important source of iodine in nutrition where iodized salt and dietary supplements with iodine. Pregnant women using iodine supplementation had almost double the iodine intake compared to those who did not use supplements (245.7 µgI versus 124.5 µgI). Dairy products are a significant source of iodine while fish and eggs are not consumed enough to have significant impact in iodine intake.

CONCLUSION: Harmonization of activities in the framework of Program for reduction of salt intake in the population and Strategy for improving iodine intake need to be performed.

KEYWORDS: pregnant women, iodine intake, table salt, nutrition,

DETERMINATION OF FUMONISINS IN MEDICINAL PLANTS BY LIQUID CHROMATOGRAPHY

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Medicinal plants have a long tradition in the medicine, and in Serbia they are widely used for preparing hot drinks. Data on the mycotoxins contaminations of me-

dicinal plants are different and depend on both, the plants tested, as well as the climate. Although fumonisins B₁, B₂ and B₃ (FB₁, FB₂ and FB₃) mainly contaminate

corn, they were also detected on other substrates. The aim of this paper is development of analytical method and the determination of fumonisins in medicinal plants from Serbia.

A total of 17 samples of medicinal plants (yarrow, chamomile, and thyme) were collected from three locations in Serbia: western Serbia (Zlatibor), eastern Serbia (Stara and Suva mountain), and from organic production from the north of Serbia (Orom) over three years. A method that has been developed involves the extraction of fumonisins from medicinal herbs by phosphate buffer, purification on immunoaffinity columns, and determination by liquid chromatography with fluorescence detection.

By spiked samples testing, there was confirmed a good separation of the peaks, and the method showed good recovery for FB₁ and FB₂ (60–91%), according to EU

regulation 401/2006. For FB₃ there are not defined requirements for recovery, which amounted 49–66%. The detection limits were 0.54–1.28 µg/kg for FB₁, 0.22–2.45 µg/kg for FB₂ and 0.50–2.17 µg/kg for FB₃ depending on the substrate. Fumonisins were not detected in any of the examined samples. According to the results, *Fusarium* molds are not producers of fumonisins on yarrow, chamomile and thyme in conditions of cultivation, storage and transport in Serbia.

KEY WORDS: fumonisins, liquid chromatography, yarrow, chamomile, thyme

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