118 YEARS OF PASTEUR INSTITUTE NIŠ
118 ГОДИНА ПАСТЕРОВОГ ЗАВОДА У НИШУ

52 Days of Preventive Medicine

International Congress

52. Дани превентивне медицине
међународни конгрес

25-28. September 2018.
Niš, Serbia

BOOK OF ABSTRACTS
ЗБОРНИК РЕЗИМЕА

Endorsed by:
У организацији:

Public Health Institute Niš
Институт за јавно здравље Ниш

Faculty of Medicine,
University of Niš
Медицински факултет
Универзитета у Нишу

Serbian Medical Society, Niš
Градска подружница Српског
лекарског друштва Ниш

dpm.izjz-nis.org.rs

PUBLIC HEALTH INSTITUTE NIŠ
ИНСТИТУТ ЗА ЈАВНО ЗДРАВЉЕ НИШ

FACULTY OF MEDICINE NIŠ
МЕДИЦИНСКИ ФАКУЛТЕТ НИШ

SERBIAN MEDICAL SOCIETY OF NIŠ
СРПСКО ЛЕКАРСКО ДРУШТВО ПОДРУЖНИЦА НИШ

52nd DAYS OF PREVENTIVE MEDICINE
52. ДАНИ ПРЕВЕНТИВНЕ МЕДИЦИНЕ

INTERNATIONAL CONGRESS
МЕЂУНАРОДНИ КОНГРЕС

BOOK OF ABSTRACTS
ЗБОРНИК РЕЗИМЕА

НИШ, 2018.

Editor in Chief
Уредник
Prof. dr Biljana Kocić

Technical Editor
Техничкиуредник
dipl. ing. Stefan Bogdanović

Publisher
Издавач
Public Health Institute Niš – Институт за јавно здравље Ниш
Faculty of Medicine Niš, University of Niš – Медицински факултет у Нишу, Универзитет у Нишу
Serbian Medical Society of Niš – Српско лекарско друштво подружница Ниш

For publisher
За издавача
Prof. dr Miodrag Stojanović

Printed in
Штампарија и место штампања
Галаксија, Ниш, Србија

Number of copies
Тираж
350

Under the patronage of
Под покровитељством

Ministry of Education, Science and Technological Development of the Republic of Serbia
Министарства просвете, науке и технолошког развоја Републике Србије

Ministry of Health of the Republic of Serbia
Министарства здравља Републике Србије

The content of this publication is available online at dpm.izjz-nis.org.rs
Садржај ове публикације је доступан на Интернет адреси dpm.izjz-nis.org.rs

Dr Stanko Marjanović is participating in realisation of the Museum of Health Culture exposition.
У реализацији изложбе у Музеју здравствене културе учествује др Станко Марјановић.

The continuing education program number A-1-1253/18 was accredited by the decision of the Health Council of the Republic of Serbia No. 153-02-1550/2018-01from 21. 05. 2018.
Програм континуиране едукације је под бројем А-1-1253/18 акредитован одлуком Здравственог савета Републике Србије број: 153-02-1550/2018-01 од 21. 05. 2018. године.

ISBN 978-86-915991-9-5

SCIENTIFIC COMMITTEE – НАУЧНИ ОДБОР

Chairlady/Председница
Prof. dr Biljana Kocić, Serbia

Members/Чланови
Prof. dr Dobrila Stanković-Đorđević, Serbia
Prof. dr Miodrag Stojanović, Serbia
Prof. dr Dragan Bogdanović, Serbia
Prof. dr Eleni Jelastopulu, Greece
Prof. dr Gianfranco Damiani, Italy
Prof. dr Angel Galabov, Bulgaria
Prof. dr Tomaz Langerholc, Slovenia
Prof. dr Gordana Mijović, Montenegro
Prof. dr Olgica Đurković-Đaković, Serbia
Prof. dr Lazar Ranin, Serbia
Prof. dr Milena Kataranovski, Serbia
Prof. dr Branislava Kocić, Serbia
Prof. dr Suzana Otašević, Serbia
Prof. dr Marina Dinić, Serbia
Prof. dr Biljana Miljković-Selimović, Serbia
Prof. dr Gordana Ranđelović, Serbia
Prof. dr Nataša Miladinović-Tasić, Serbia
Doc. dr Predrag Stojanović, Serbia
Prof. dr Zoran Milošević, Serbia
Prof. dr Vesna Mijatović-Jovanović, Serbia
Doc. dr Aleksandar Višnjić, Serbia
Prof. dr Maja Nikolić, Serbia
Prof. dr Dušica Stojanović, Serbia
Prof. dr Aleksandra Stanković, Serbia
Doc. dr Konstansa Lazarević, Serbia
Doc. dr Olivera Radulović, Serbia
Doc. dr Nataša Rančić, Serbia
Doc. dr Roberta Marković, Serbia
Doc. dr Ljiljana Stošić, Serbia

ORGANISING COMMITTEE - ОРГАНИЗАЦИОНИ ОДБОР

Chairlady - Председница
Doc. dr Nataša Rančić

Secretary - Секретар
Prim. dr Mirko Ilić, mr sc. med.

Technical secretary - Технички секретар
Stefan Bogdanović, dipl. ing.

Members - Чланови

Doc. dr Predrag Stojanović
dr Jovana Kostić
dr Marina Ranđelović
dr Ana Stefanović, mr sc. med.
dr Mihajlo Spasić
dr Marko Stojanović
Asst. dr Marija Anđelković Apostolović
dr Katarina Bulatović
dr sci. Nemanja Stanković, dipl. biolog
Ivana Kamenović, dipl. hem. spec.

MAIN TOPICS

- **Theoretical and practical problems of communicable and non-communicable disease epidemiology**
- **Microbiology today**
- **Environment and health**
- **Nutrition and health**
- **Current parasitosis and fungal infections**
- **Public health today**
- **Application of informatics in the health system**
- **Promoting the health of children and young people**

52nd DAYS OF PREVENTIVE MEDICINE
BOOK OF ABSTRACTS

25-28. SEPTEMBER 2018.

NIŠ, SERBIA

KEYNOTE LECTURES

1. PUBLIC HEALTH – QUO VADIS?

Jelastopulu Eleni
Department of Public Health, School of Medicine, University of Patras, Greece

Health is one of the basic human rights and it should be ensured for all people in order to enjoy the highest achievable level of physical and mental health. The access to health care for all citizens should be the major priority of a country, including access to diagnostic and therapeutic procedures. On the other hand, the same high priority should be given to disease prevention, health protection and health promotion. Modern health policies should – even in times of economic and social crisis situation - provide health care and take all measures to protect its citizens' health.

Over the last century, many revolutionary discoveries, such as vaccines, antimicrobial and antiretroviral therapies, screening tests, and so much more, have undoubtedly contributed to the increase of life expectancy, to the prevention and eradication of fatal diseases, to the therapy of diseases with high mortality and to other medical achievements.

In the modern age, the range and burden of morbidity and mortality has undergone a transition from communicable diseases to chronic and degenerative diseases such as cardiovascular disease, cancer, diabetes, and dementia. And here we are called upon to prevent and promote health, manage health risks, improve the quality of services and of living and environmental conditions, and set the priorities for health.

Globally, population health is being challenged in different ways, from climate change and growing air pollution and toxic environmental exposure to food insecurity, massive population migration and refugee crises, to emerging and re-emerging diseases. Each of these trends reinforce each other and concentrate their harms on the most vulnerable populations. Multi-level governance, together with novel regulatory strategies and socially oriented investments, are key to successful action against many of the new challenges.

Thus we are urged to undertake actions in order to raise awareness in the public and among stakeholders of the health risks posed by the new challenges, and to protect the public health.

2. REAL AND FICTITIOUS CAUSES OF CANCER

Zoran Radovanović
University of Belgrade, Faculty of Medicine Belgrade, Serbia

SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF NON-COMMUNICABLE DISEASES EPIDEMIOLOGY

INVITED LECTURES

1. MYTHS AND MISCONCEPTIONS ABOUT HYPERTENSION

Šipetić-Grujičić Sandra[1], Miljuš D.[2], Nikolić A[1].
[1]University of Belgrade, Serbia, Faculty of Medicine Belgrade, Institute of Epidemiology
[2]Institute of Public Health of Serbia "Dr Milan Jovanovic Batut" Belgrade, Serbia

One of the global non-communicable disease (NCD) targets adopted by the World Health Assembly in 2013 is to lower the prevalence of raised blood pressure, defined as systolic blood pressure of 140 mmHg or higher and/or diastolic blood pressure of 90 mmHg or higher, by 25% compared with its 2010 level by 2025 (1). Because of that, the aim of this study was to analyze epidemiological situation of hypertension globally and in Serbia and to recommend some preventive measures to avoid myths and misconceptions about hypertension.

Prehypertension (PreHTN) and hypertension (HTN) are important public health problems worldwide and although they can be modified, they are often a risk for cardiovascular disease (CVD), cerebrovascular disease (stroke) and kidney disease in the terminal phase (2,3). HTN is responsible for approximately half of the deaths from CVD and stroke. PreHTN elevates the risks of CVD (RR = 1.55), coronary heart disease (RR = 1.50) and stroke (RR = 1.71) (4).

A recent report from the Global Burden of Disease Study ranked high BP as the most important risk factor among 67 risk factors studied for worldwide mortality (9.4 million deaths) and disability-adjusted life years (7%) during 2010 (5). The number of adults with raised blood pressure increased from 594 million in 1975 to 1.13 billion in 2015, with the increase largely in low-income and middle-income countries (6). It is estimated that approximately 40% of adult population of the world have diagnosed HTN (2). In the adult population aged 25 and over, the estimated age standardized prevalence of HTN is the highest in underdeveloped countries and developing countries (Africa - 46%), while the lowest is in developed countries of the world (North America - 35%) (2). In a meta-analysis of 1479 population-based measurement studies with 19.1 million participants, global standardized mean systolic blood pressure in 2015 was 127.0 mmHg in men and 122.3 mm Hg in women; standardized mean diastolic blood pressure was 78.7 mmHg for men and 76.7 mmHg for women (6). In 2015, central and eastern Europe, sub-Saharan Africa, and South Asia had the highest blood pressure levels. Prevalence of raised blood pressure decreased in high-income and some middle-income countries, but it remained unchanged elsewhere (6).

The majority of people with undiagnosed, untreated and uncontrolled HTN live in low- and middle-income countries with insufficiently developed health systems (2). The awareness, treatment, and control of hypertension in urban areas are better compared with those in rural areas, probably because people living in urban areas had a higher level of education, higher income, and better medical conditions (7,8). In another study (7), the awareness, treatment, and control of hypertension in females were higher than those in males. The treatment and control of hypertension in individuals aged 25–34 and 35–44 years were low, which might be because of their busy schedule and bad habits including smoking, drinking, and staying up late (9).

PreHTN prevalence and HTN prevalence is attributed to the growth and aging of the population and risk behaviors such as malnutrition, overweight, harmful use of alcohol, smoking tobacco, insufficient physical activity, high cholesterol, diabetes and long-term stress exposure (10-12).

Scientific studies have consistently shown the health benefits of lowering blood pressure through population-wide and individual (behavioral and pharmacological) interventions (13). For instance, every 10 mmHg systolic blood pressure reduction significantly reduced the risk of major cardiovascular disease events (RR =0.80: 95%CI 0.77–0.83), coronary heart disease (0,83; 0.78–0.88), stroke (0.73; 0.68–0.77), heart failure (0.72; 0,67–0.78), and all-cause mortality (0.87; 0.84–0.91).

According to data of our cross-sectional study, in 2013, 17.7% of the Serbian population, aged 15 and over, was normotensive, every third person had prehypertension (33.1%), and every second had hypertension (49.3%)(14). Hypertension was defined as systolic blood pressure (SBP) values ≥140

mmHg or diastolic blood pressure (DBP) values ≥90 mmHg or current treatment with antihypertensive drugs (15). The standardized prevalence of prehypertension was 40.6% and 34.5% for hypertension. Only 57.8% of the hypertensive population were receiving medical treatment. Among those receiving medical treatment, only 35.2% (36.4% males and 33.2% females) had a blood pressure within the normal range. According to the results of multivariate logistic regression analysis, independently significant risk factors for hypertension compared to persons with normotension were older age (50 and more) ($p<0.001$), overweight ($p<0.001$) and obesity ($p<0.001$), moderate ($p<0.001$) and large ($p<0.001$) waist circumference in both sexes, and nonurban place of residence in females ($p=0.006$). In females, independently significant risk factors for prehypertension compared to persons with normotension were older age (50 and more) ($p<0.001$), overweight ($p<0.001$) and obesity ($p<0.001$), moderate ($p<0.001$) and large ($p<0.001$) waist circumference, but high level of physical activity was significantly protective ($p=0.014$). In males, overweight ($p<0.001$) and obesity ($p<0.001$) were independently significant risk factors for prehypertension.

Therefore, Serbia belongs to countries with a high prevalence of prehypertension and hypertension. Our results emphasize the need for a new public health strategy for the prevention, detection and treatment of prehypertension and hypertension. Moreover, weight loss in overweight or obese patients, dietary salt reduction, regular aerobic exercise, high consumption of vegetables and fruits and low-fat intake, regular and moderate alcohol consumption (up to 2 drinks/day for men, 1 drink/day for women), cigarette smoking cessation contribute not only a furthermost treatment of hypertension, but are beneficial in managing most of the other cardiovascular risk factors (16,17).

For an epidemiological and clinical point of view, it is mandatory to constantly monitor how the prevalence of hypertension is worldwide changing, to identify new groups at risk, to verify the effectiveness of current health education especially for particular targeted population (low middle income and high middle income countries). Inadequate BP control is a global problem that concerns all the societies worldwide and cannot be exclusively ascribed to a lack of access to medical care, low adherence to Guidelines or poor compliance to therapy. Today, the global scenario of hypertension highlights people's diffuse limited awareness and inappropriate management and the urgent need, in different regions, for an intensive programme of effective preventive strategies for the control of CVD.

References

1. WHO. Global action plan for the prevention and control of noncommunicable diseases 2013–2020, 2013.
2. WHO. A global brief on hypertension: silent killer, global public health crisis: World Health Day 2013. WHO/DCO/WHD/2013.2
3. U.S. department of health and human services. National institutes of health. National heart, lung, and blood institute. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. 2004.
4. Huang Y, Wang S, Cai X, et al. Prehypertension and incidence of cardiovascular disease: a meta-analysis. BMC Med 2013; 11:177.
5. Lim SS, Vos T, Flaxman AD, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012; 380:2224–60.
6. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19,1 million participants. Lancet 2017; 389: 37–55.
7.Yang L, Yan J, Tang X, t al. Prevalence, Awareness, Treatment, Control and Risk Factors Associated with Hypertension among Adults in Southern China, 2013. PLoS One 2016;11:e146181.
8. Wang J, Zhang L, Wang F, Liu L, Wang H. Prevalence, awareness, treatment, and control of hypertension in China: results from a national survey 2014.
9. Hu L, Huang X, You C, et al. Prevalence and Risk Factors of Prehypertension and hypertension in Southern China. PLoS ONE 2017; 12(1): e0170238.
10. Awosan KJ, Ibrahim MTO, Essien E, Yusuf AA, Okolo AC. Dietary pattern, lifestyle, nutrition status and prevalence of hypertension among traders in Sokoto Central market, Sokoto, Nigeria. Int J Nutr Metab 2014; 6(1):9-17.

11. Stults-Kolehmainen MA, Keri Tuit K, Sinha R. Lower cumulative stress is associated with better health for physically active adults in the community. Stress 2014;17(2):157–68.
12. European Commission, Eurostat, Methodologies and working papers. European Health Interview Survey (EHIS wave 2) - Methodological manual. Luxembourg: Publications Office of the European Union, 2013.
13. Ettehad D, Emdin CA, Kiran A, et al. Blood pressure lowering for prevention of cardiovascular disease and death: a systematic review and meta-analysis. Lancet 2016; 387(10022): 957-967.
14. Šipetić Grujičić S, Miljuš D, Soldatović I, Nikolić A, Vujčić I. Prehypertension and hypertension prevalence and risk factors among adult population in Republic of Serbia: A cross-sectional study. Vojnosanit Preg 2017; https://doi.org/10.2298/VSP180330114S
15. Chobanian AV, Bakris AV, Black GL, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA 2003; 289:2560–2572.
16. Weber MA, Schiffrin EL, White WB, et al. Clinical practice guidelines for the management of hypertension in the community: a statement by the American Society of Hypertension and the International Society of Hypertension. J Clin Hypertens (Greenwich) 2014;16:14-26.
17. Mancia G, Fagard R, Narkiewicz K, et al. 2013 ESH/ESC guidelines for the management of arterial hypertension: the Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). Eur Heart J 2013; 34:2159-219.

2. RISK FACTORS FOR OCCURANCE OF MALIGNANT NEOPLASMS OF LYMPHOID TISSUE

Krstić Miljan[1,2], Stojnev S[2].
[1]University of Niš, Serbia, Faculty of Medicine Niš, Department of Pathology
[2]Pathology and Pathological Anatomy Center, Clinical Center Niš, Serbia

Lymphoid neoplasms represent a very heterogeneous and polymorphic group of entities. These tumors represent neoplastic proliferation of lymphoid cells where phenotype of neoplastic cell closely resembles that of a particular stage in normal differentiation and maturation stage (1, 2). The confusing aspect of lymphoid neoplasms is the use of terms "leukemia and lymphoma". Leukemia refers to the presence of tumor cells in peripheral blood caused by widespread involvement of the bone marrow, while lymphoma describes a tumor presenting as a tissue mass. However, the line between leukemia and lymphoma in clinical practice is often blurred, since many lymphomas that start as a lymph node enlargement may give rise to leukemia in blood.
The updated WHO classification of lymphoid neoplasms from 2016. divides lymphomas in following groups: 1. Precursor lymphoid neoplasms (mostly pediatric disease); 2. Mature B-cell neoplasms; 3. Mature T- and NK-cell neoplasms; 4. Hodgkin lymphoma; 5. Immunodeficiency-associated lymphoproliferative disorders; 5. Histiocyts and dendritic cell neoplasms (3).
The largest and clinically most significant group of lymphoid neoplasms are those of mature B-cell origin that traditionally comprise Hodgkin lymphoma (which is now a separate category), and non Hodgkin lymphomas. Hodgkin lymphoma is morphologically unique disease that arises in a single lymph node or a group of nodes, and spreads to anatomically contiguous nodes. On the other hand, non Hodgkin lymphomas comprise numerous entities that vary significantly in terms of etiology, morphology, and prognosis, and occur in a lymph node or in extranodal sites (Waldeyer's ring, gastrointestinal system, skin, spleen, lung, brain), and spreads in unpredictable fashion (3, 4).
The etiopathogenesis of lymphoid neoplasms is complex interplay of chromosomal alterations, and genetic, environmental, infectious, and iatrogenic factors (5, 6). The occurrence of chromosomal translocations and genetic mutations that drive the neoplastic growth, as well as small, but firmly established genetic susceptibility that increase the risk for certain leukaemias-lymphomas cannot be influenced neither modified. However, the importance of numerous risk factors that may cause, initiate, and promote lymphoid neoplastic transformation have now been increasingly recognized. Certain types of lymphoma are clearly associated with well known risk factors: age, gender, race, ethnicity, geographical factors, diet, exposure to chemicals and drugs, radiation exposure, infections, autoimmune diseases and immunodeficiency (5 – 7).
Viral carcinogenesis is found to be critical in development of certain epithelial cancers. During the past decades, it has been found that viruses are also implicated in neoplastic lymphomagenesis (5, 8, 9).
Epstein-Barr virus (EBV) genome has been found in several types of B cell neoplasms. EBV infects B-cells via CD21 molecule and establishes latent infection leading to their immortalization. Viral genes dysregulate cell cycle: LMP-1 (latent membrane protein 1) mimics signaling cascade normally triggered by the CD40 receptor activation and causes activation of NFkB and JAK/STAT signaling pathways. This imitates B-cell proliferation induced by helper T-cells. In addition, EBV gene *EBNA-2* activates CyclinD and several other cell cycle regulators, promoting the transition of resting B-cells to proliferativelly active population. EBV has been implicated as a causative agent in a subset of Burkitt lymphoma (BL), 30-40% classic Hodgkin lymphoma (cHL), certain types of diffuse large B cell lymphoma (DLBCL), especially those occurring in the setting of immunodeficiency, as well as rare NK cell neoplasms (8).
BL is highly aggressive but curable lymphoma that often presents in extranodal sites. There are three epidemiological variants that differ in geographical distribution, clinical presentation and biological features. Endemic BL occurs in equatorial Africa as the most common childhood malignancy and presents as large jaw tumor or as abdominal mass, often involving kidneys, ovaries, adrenal glands. Sporadic BL is seen throughout the world mainly in children and young adults, and presents as abdominal mass involving ileocecum and peritoneum. Immunodeficiency associated BL is found in the setting of HIV infection and other forms of immunosuppression. Although all forms of BL are

associated with translocations of *c-MYC* gene, latent infection with EBV is found in essentially all endemic tumors, but only in about 25% of HIV associated tumors, and 20% of sporadic cases (2, 9). The presence of EBV episomes is found in Reed-Sternberg cells of many cases of cHL, especially in mixed cellularity. NFkB signaling is found to be upregulated in most cHL, not only in those associated with EBV (1, 2).

EBV positive DLBCL, NOS was formerly designated as DLBCL of the elderly, but the restriction has now been removed (3). This lymphoma can present over a wide age range, but usually occurs in people over 50 years. It has a distinctive histological appearance, poor prognosis, and routine EBV testing is required for diagnosis. EBV infection is also linked to a rare EBV positive mucocutaneous ulcer that occurs in patients with iatrogenic immunosuppression in a form of ulcerated lesion in the oral mucosa, skin and gastrointestinal tract. It has a typically indolent course with spontaneous regression in some cases. Moreover, EBV is associated with DLBCL arising in the setting of chronic inflammation, which is now recognized as a special entity, formerly known as pyothorax associated lymphoma. Lymphomatoid granulomatosis is lymphoproliferative disease found usually in lungs, brain, and rarely skin, composed of EBV positive neoplastic B-cells that grow in angicentric and angidestructive fashion (2, 8, 10).

Human T cell leukaemia virus 1 (HTLV-1) is oncogenic RNA virus that has been associated with development of adult T-cell leukemia/lymphoma. HTLV-1 has tropism for CD4+ T-cells and causes their monoclonal proliferation in 3-5% of infected individuals after a very long latent period (over 40 years). HTLV-1 contains no oncogene but its transforming activity is attributed to *TAX* gene, whose protein product is capable to activate proliferation and differentiation of T-cells, as well as to inactivate cell cycle inhibitor p16, thus enhancing the cell cycle. In addition, HTLV-1 infection promotes genomic instability of T-cells (1, 11).

Kaposi sarcoma herpesvirus/human herpesvirus-8 (KSHV/HHV-8) has a major role in pathogenesis of vascular neoplasm Kaposi sarcoma associated with HIV/AIDS, however recently it has been found that KSHV is uniquely linked to a group of B-cell disorders that predominantly arise in young immunodefficient patients, usually HIV infected. This causative relation is so strong, that the newest lymphoma classification contains a special group of HHV-8 associated lymphoproliferative disorders. It comprises multicentric Castleman disease, HHV-8 positive DLBCL, NOS, and HHV-8 positive germinotropic lymphoproliferative disorder. Common morphological feature of HHV-8 transformed B-cells is plasmablastic phenotype. Moreover, outside this group HHV-8 is strongly associated to a very rare type of B-cell lymphoma that does not form a detectable mass, but presents clinically with serous effusions, usually in pleural cavity – primary effusion lymphoma (3, 5).

It has been found that chronic inflammation is a predisposing factor for certain lymphomas. Some long-term infections may increase a risk of lymphoma genesis by forcing immune system to be constantly active. *Helicobacter pylori* (*H. pylori*) infection is undoubtedly associated with gastric B-cell lymphoma. Chronic *H. pylori* infection causes formation of lymphoid infiltrates in which B-cells actively proliferate and may acquire various genetic abnormalities. Treatment of *H. pylori* infection with antibiotics results in regression of lymphoma in most cases in early course of the disease, however after a prolonged period of time *H. pylori* induced genetic anomalies become sufficient to allow the neoplastic cells to autonomously proliferate. Infection is associated with marginal zone lymphoma (MZL) which usually develops in mucosal sites and is referred to as MALT (mucosa associated lymphoid tissue) lymphoma. This lymphoma arise in the setting of chronic inflammation not only of infectious etiology, like in stomach where it's linked to *H. pylori*, but also in tissues involved with chronic inflammation caused by autoimmune disorders. Therefore, MALT lymphoma is the most common type of lymphoma seen in salivary gland in Sjögren disease, and thyroid gland in Hashimoto thyroiditis. *Chlamydia psittaci*, common cause of lung infection, has been linked to MALT lymphoma in the tissue around the eye (called ocular adnexal marginal zone lymphoma). Infection with bacterium *Campilobacter jejuni* has been linked to a type of MALT lymphoma called immunoproliferative small intestinal disease. This type of lymphoma, which is also sometimes called Mediterranean abdominal lymphoma, typically occurs in young adults in eastern Mediterranean countries. *Borrelia burgdorferi* is a rare cause of cutaneous MALT lymphoma that resolves after antibiotic use. Long-term infection with the hepatitis C virus seems to be a risk factor for certain types of lymphoma, such as splenic marginal zone lymphoma (4 – 6).

Contemporary way of living raised several risk factors associated with peculiar lymphoid diseases. Very recently, a novel type of T cell lymphoma has been recognized: Breast implant associated anaplastic large cell lymphoma. It develops in one per half to three million women with breast implants in a seroma cavity and capsule surrounding silicone implants. It is highly treatable only with surgery (2, 3).

In spite of the accumulated vast knowledge and intense research in recent years, the etiology of many lymphoid neoplasms remains poorly understood. Established risk factors for certain types of lymphoma currently include hereditary immunodeficiency disorders, acquired states of strong immunosuppression (HIV/AIDS, organ transplantation), some infectious agents and autoimmune disorders. Early recognition of modifiable risk factors for development of lymphoid neoplasms could play a key role in prevention and management of this often devastating disease.

References

1. Jaffe, Elaine Sarkin; Arber, Daniel A; Campo, Elias; Harris, Nancy L; Quintanilla-Martinez, Leticia (editors). Hematopathology. Second edition. Philadelphia, PA (USA): Elsevier, 2017.
2. Swerdlow, Steven H (editor); World Health Organization; International Agency for Research on Cancer. WHO classification of tumours of haematopoietic and lymphoid tissues. Revised 4th edition. Lyon, France: International Agency for Research on Cancer, 2017.
3. Swerdlow SH, Campo E, Pileri SA, et al. The 2016 revision of the World Health Organization classification of lymphoid neoplasms. Blood 2016; 127(20):2375-90.
4. Teras LR, DeSantis CE, Cerhan JR, Morton LM, Jemal A, Flowers CR. 2016 US lymphoid malignancy statistics by World Health Organization subtypes. CA CANCER J CLIN 2016; 66:443–459.
5. Ekström-Smedby K. Epidemiology and etiology of non-Hodgkin lymphoma--a review. Acta Oncol 2006; 45(3):258-71.
6. Cerhan JR, Slager SL. Familial predisposition and genetic risk factors for lymphoma. Blood 2015; 126(20):2265-73.
7. Hidayat K, Li HJ, Shi BM. Anthropometric factors and non-Hodgkin's lymphoma risk: systematic review and meta-analysis of prospective studies. Crit Rev Oncol Hematol 2018; 129:113-123.
8. Healy JA, Dave SS. The Role of EBV in the Pathogenesis of Diffuse Large B Cell Lymphoma. Curr Top Microbiol Immunol 2015; 390(Pt 1):315-37.
9. Rochford R, Moormann AM. Burkitt's Lymphoma. Curr Top Microbiol Immunol 2015; 390(Pt 1):267-85.
10. Horn H, Ziepert M, Wartenberg M, et al. Different biological risk factors in young poor-prognosis and elderly patients with diffuse large B-cell lymphoma. Leukemia 2015; 29(7):1564-70.
11. Martin F, Taylor GP, Jacobson S. Inflammatory manifestations of HTLV-1 and their therapeutic options. Expert Rev Clin Immunol 2014; 10(11):1531-46.

3. PREVALENCE OF DEPRESSIVE SYMTOMS AMONG MEDICAL STUDENTS

Kocić Biljana, Rančić N.
University of Niš, Serbia, Faculty of Medicine Niš
Public Health Institute Niš, Serbia

Depresion, anxiety and stress symptoms are common in medical students [1,2]. The stress and depression during the medical school may predict later mental health problems in physicians [2,3,4] and the stress that began in medical school tends to continue throughout the years of practicing medicine.
According to the results of the study from 2016, medical students in the United States of America (the USA) have two to five times more higher prevalence of depression than the general population; the depression prevalence ranged from 9% to 56% [5].
The percentage of medical students with depression or depressive symptoms ranged from 20% in Europe to 31.8% in the Middle East. Medical students in the North America had the second highest prevalence in the world and it is 30.3% [6].
Depression of medical students is associated with poorer quality of life, impaired academic productivity and an increased usage of some medicines like benzodiazepines, the use of alcohol, tobacco, illicit substances, and self-harming behavior to help cope with negative affects [7,8].
In the study of Mackenzie (2011) depression was associated with a number of health issues such as unwanted sexual experiences, and other forms of victimization or violence [8]. Furthermore, increased severity of depression is associated with suicidal ideation and suicide attempts [9,10]. Cross-country, cross-ethnic and cross-cultural differences may contribute to depression prevalence [11].
In general, depression is one of the most prevalent mental disorders [12], but it is hard to document real prevalence of depression among medical students. The global prevalence of depression among medical students was estimated to be 28.0 % according to a meta-analysis of 77 studies [1]. A high prevalence of anxiety and depression among medical students has been reported worldwide [2–19]. An increased prevalence compared with age-matched peers in general population [20, 21] and with non-medical students has been reported in the literature [22]. Recent research discussed that medical schools provide a toxic psychological environment [23–25] where academic pressure, workload, financial hardships sleep deprivation are stressors factors [2, 26].

References

1. Ediz B, Ozcakir A, Bilgel N. Depression and anxiety among medical students: Examining scores of the beck depression and anxiety inventory and the depression anxiety and stress scale with student characteristics. Cognet Phyholog. 2017; 4(1): 2017, Published online: 09 Feb 2017
2. Fawzy M, Hamed SA. Prevalence of psychological stress, depression and anxiety among medical students in Egypt.Psychiatry Res. 2017 May 17;255:186-94.
3. Puthran R, Zhang MW, Tam WW, Ho RC. Prevalence of depression amongst medical students: a meta-analysis. Med Educ. 2016; 50(4):456-68.
4. Aboalshamat K, Hou XY, Strodl E. Psychological well-being status among medical and dental students in Makkah, Saudi Arabia: a cross-sectional study.Med Teach. 2015; 37 Suppl 1:S75-81.
5. Rotenstein SL, Ramos AM, Torre MJ, Segal MJ, Peluso JM, Guille C et al. Prevalence of Depression, Depressive Symptoms, and Suicidal Ideation Among Medical Students A Systematic Review and Meta-Analysis. JAMA. 2016; 316(21):2214-236.
6. Hope V, Henderson M. Medical student depression, anxiety and distress outside North America: a systematic review. Med Educ. 2014;48(10):963-79.
7. Yusoff MS, Abdul Rahim AF, Baba AA, Ismail SB, Mat Pa MN, EsaAR.The impact of medical education on psychological health of students: a cohort study. Psychol Health Med. 2013;18(4):420-30.
8. Mackenzie S, Wiegel RJ, Mundt MM, Brown D, Saewyc E, Heiligenstein E et al. Depression and Suicide Ideation Among Students Accessing Campus. Am J Orthopsychiatry. 2011; 81(1):101–07.
9. Eisenberg D, Gollust SE, Golberstein SE, Hefner JL. Prevalence and correlates of depression, anxiety and suicidality among university students. American Journal of Orthopsychiatry 2007;77:534–42.

10. Schwenk LT, Davis L, Wimsatt AL. Depression, Stigma, and Suicidal Ideation in Medical Students. JAMA. 2010;304(11):1181-190.
11. Juhasz G, Szlari N, Pap D, Gonda X. Cultural differences in the development and characteristics of depression. Neuropsychopharmacol Hung. 2012; 14(4): 259-65.
12. World Health Organization. Depression: A Global public health concern. Department of Mental Health and Substance Abuse, 2012,WHO.
13. Mayer BF, Santos SI, Silveira PSP, Lopes IHM, de Souza DRA,Campos PE et al. Factors associated to depression and anxiety in medical students: a multicenter study BMC Medical Education 2016: 16:282 Available from: https://doi.org/10.1186/s12909-016-0791-1
14. Alvi T, Assad F, Ramzan M, Khan FA.Depression anxiety and their associated factors among medical students. Journal of the College of Physicians and Surgeons Pakistan,2010;20:122–26.
Kunwar D, Risal A, Koirala S. Study of Depression, Anxiety and Stress among the Medical Students in two Medical Colleges of Nepal. Kathmandu Univ Med J 2016;53(1):22-6.
15. Sidik SM, Rampal L, Kaneson N. Prevalence of emotional disorders among medical students in a Malaysian University. Asia Pacific Family Medicine 2003;2:213–17.
16. Bunevicius A, Katkute A, Bunevicius, R. Symptoms of anxiety and depression in medical students and humanities students: Relationship with big-five personality dimensions and vulnerability to stress. International Journal of Social Psychiatry,2008; 54;494–501.
17. Roh MS, Jeon HJ Kim H, Han SK, Hahm BJ. The prevalence and impact of depression among medical students: A nationwide cross-sectional study in South Korea. Academic Medicine 2010; 85, 1384–390.
18. Sidana S, Kishore J, GhoshV, Gulati D, Jiloha RC, Anand T.Prevalence of depression in students of a medical college in New Delhi: A cross-sectional study. Australasian Medical Journal 2011; 5, 247–50.
19. Quince AT, Wood FD, Parker AR, Benson J. Prevalence and persistence of depression among undergraduate medical students: a longitudinal study at one UK medical school. http://creativecommons.org/licenses/by-nc/3.0/ and http://creativecommons.org/licenses/by-nc/3.0/legalcode
Available from: http://dx.doi.org/10.1136/bmjopen-2012-001519
20. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression,anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. Acad Med. 2006;81:354– 73.
21. Wege N, Muth T, Li J, Angerer P. Mental health among currently enrolled medical students in Germany. Pub Health. 2016;132:92– 100.
22. Abdel Wahed WY, Hassan SK. Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. Alex J Med. 2016.
http://dx.doi.org/10.1016/j.ajme.2016.01.005.
23. Venrooij LT, Barnhoorn P, Giltay E, Noorden MS. Burnout, depression and anxiety in preclinical medical students: a cross-sectional survey. Int J Adolesc Med Health. 2015;aop.
24. Shi M, Liu L, Wang YZ, Wang L. The mediating role of resilience in the relationship between big five personality and anxiety among Chinese medical Students: A Cross-Sectional Study. PLoS One. 2015;10(3):e0119916.
25. Seweryn M, Tyrala K, Kolarezy-Haczyk A, Bonk M, Bulska W. Krysta K. Evaluation of the level of depression among medical students from Poland, Portugal and Germany. Psych Dan. 2015;27(1):216– 22.
26. Stewart SM, Lam TH, Betson CL, Wong CM, Wong AM. A prospective analysis of stress and academic performance in the first two years of medical school. Med Educ. 1999;33:243–50.

4. PSORIASIS VULGARIS: COMORBIDITIES AND ASSOCIATIONS

Binić Ivana
University of Niš, Serbia, Faculty of Medicine Niš, Department of Dermatovenerology
Clinic of Dermatovenerology, Clinical Center Niš, Serbia

Psoriasis is a multi-system inflammatory disease where the skin and the joints are the primary targets. It is characterized by widespread scaly erythematous patches that cause significant physical and psychological burdens for the affected individuals. The accelerated inflammation driven by the TNF-α/IL-23/IL-17A axis is now known to be the major mechanism in the development of psoriasis. The chronic skin inflammation extends the systemic inflammation beyond the skin. There are many reports that psoriatic patients tend to have concurrent illnesses that are termed as comorbidities. The consistency of association and the diversity of comorbidities reported in psoriasis warrants it to be labelled as a complex syndrome. The pathogenesis of psoriasis and its comorbidities is complex but several studies have revealed certain mechanisms and factors which are common to both. These shared pathogenic mechanisms solve the mystery to this comorbid association especially with metabolic syndrome and cardiovascular disease, which were first described. A rapidly expanding body of literature in various populations and settings supports additional associations between psoriasis and gastrointestinal disease, kidney disease, cancer, infections, anxiety and depression.The presence of co-morbid diseases is associated with an increase in concomitant medication, some of which may worsen psoriasis; conversely, systemic treatment of psoriasis with certain drugs may impact the co-morbid conditions. Comorbidities are likely to contribute to the 3- to 4-year reduction in life expectancy, in patients with severe psoriasis. Psoriasis patients with comorbidities also have more health care costs, than those without comorbidities. Dermatologists should be aware of these associations as they may be in a position to detect them early. Detection of cardiovascular and other comorbid conditions in psoriasis can possibly reduce the morbidity, mortality, and economic burden associated with the disease and also may improve the overall quality of life of the patient.

5. ATHOPIC DERMATITIS-WHAT WE KNOW ABOUT CAUSES AND RISK FACTORS TODAY?

Jovanović Dragan
University of Niš, Serbia, Faculty of Medicine Niš, Department of Dermatovenerology
Clinic of Dermatovenerology, Clinical Center Niš, Serbia

Atopic dermatitis (AD) is disease of early childhood. It affects about 20% of children, with onset in first year of life in about 60% and 90% before fifth year. Usually, disease regress before adult age. Etiopathogenesis of AD is multifactorial: disturbances in skin barrier function, immune reaction with key role of T-cells, dendritic cells, lymphocytes, mast cells, eosinophils, and environmental factors. Tree main causes of disturbances in skin barrier function: reduced filaggrin gene expression, decreased level of ceramides in the skin, increased activity of epidermal proteases.
Known risk factors for onset of AD acting as triggers: Family history for AD or other atopic diseases, Urban/Rural place of living, Sex, Age of mother in the moment of children's birth, Socioeconomic status.
Positive family history for atopic diseases - 70% AD patients. Living in urban areas (cities) appears to increase the risk of AD. Living in a developed country also seems to increase the risk of AD. Low colder climates ambient humidity also increase a person's risk of developing the condition. Some research has found that being female puts a person at a slightly higher risk for developing AD, however, other research has failed to confirm those data. Mother's age at child's birth – older mother - higher risk.

6. RISK FACTORS FOR DELAYED IN VENOUS LEG ULCERS

Karanikolić Vesna, Golubović M.
University of Niš, Serbia, Faculty of Medicine Niš, Department of Dermatovenerology
Clinic of Dermatovenerology, Clinical Center Niš, Serbia

7. ACCURACY OF MEDICAL DEATH CERTIFICATE AND IMACT ON MORTALITY STATISTICS

Rančić Nataša[1,2], Stević S[2].
[1]University of Niš, Serbia, Faculty of Medicine Niš
[2]Public Health Institute Niš, Serbia

Data of mortality statistics are widely used althought their accuracy is often questioned (1). Mortality data are cheap, comprehensive, available from many countries, collected on an ongoing basis and cover long periods of time (2). Concerns about the accuracy of mortality statistics, and consequently about their usefulness in research and for prevention, are as old as the statistics themselves (3).
Data of health statistics, national mortality statistics particularly, and data on disease prevalence, are derived largely from death certificates (4). Diagnostic difficulties, inaccurate medical certification of the underlying cause of death, and errors in coding and classification contributing to the unreliability of mortality data (5). Some difficulties are blamed on the physician, or of the statistics office responsible for preparing the mortality statistics, such as insufficient data checks and inconsistent coding and classification (6).
However, it is recognized that many of the difficulties in both certification and classification practices are caused by the International Disease Recommendations. These instructions have developed over a long time and are very detailed, but still far from complete and sometimes open to very different interpretations (7,8). The International Classification of Disease (ICD) system is currently on it′s 'tenth revision, introduced in 1993. It is assumed that each revision brings with it new and more specific causes of death, expanding from under 200 to nearly 15,000 codes (9-11).
The death certificates (DCs) are important source of mortality data (12) and basic public health surveillance tool because morbidity and mortality statistics often come from death-certification data (13-15). Death certificate should be as accurate and complete as it possible. The inaccuracy of DCs is a well-recognized problem at both the national and international levels (16).
The term 'death certificate' is not statutorily defined and can mean the certificate from the physician or coroner, and the copy of the death register entry for the 'qualified informant' (17). DCs have to be completed by registered medical practitioners or by coroner's. The World Health Organization (WHO) has designed a standardized procedure. According to the WHO regulations, member countries are to use death certificate forms based on the International Form of the Medical Certificate of Cause of Death.
The international form, which is included in the ICD (7) has two parts. In Part I, the certifier describes the main stages of the train of events that lead to death. The events are reported in causal order with the final complication on line (a). If the certifier uses more than one line in Part I, the emergence of a condition should be fully explained by the condition entered on the line below. This means that Part I will contain a point-by-point description of the train of events leading to death, with the originating cause stated on the lowest used line and the final complication stated on line (a).I n Part II, the certifier enters conditions that might have accelerated the process but do not belong to the train of events reported in Part I.
If carried out correctly, the procedure allows the registry staff to identify the most important condition of the case, which the WHO calls the “underlying cause of death” (18,19).
In mortality statistics according to the WHO rules and guidelines, each death is attributed to one single underlying cause. Defined since ICD-6 (1948) as “(a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury (20).
The physician should certify death "to the best of his knowledge and belief" (21). Accuracy of cause of death is influenced by diagnostic and 'semantic' considerations, themselves influenced by various characteristics of the certifier, the certificate, the deceased and the 'true' cause of death. In completing the certificate, the certifier should report any disease, abnormality, injury or external cause that is believed to have contributed to the death.
Modes of death (respiratory failure, heart failure) should not be considered as causes of death. The higher the proportion of DCs with only one cause listed, or with a mode of death reported, the poorer the quality of death data will usually be (22).

A medically certified cause of death, in which a physician has completed the death certificate and given a judgement on the cause of death, is the gold standard for generating cause-of-death information (23).
The quality of cause-of-death data will depend on the certifier's ability to diagnose diseases, knowledge of the patient's medical history, and ability to enter this information correctly on the death certificate. Certifying the correct cause of death takes experience; interns and junior doctors should only certify deaths when supervised by more experienced physicians (24).
Death certificates are generally accurate for the date and place of death.
The civil registration system focuses on death event itself. For public health purposes, information on the circumstances of the cause of death is crucial. Cause-of-death information is important as the certification of mortality (25).
Computerization of civil registration and vital statistics records cannot by itself improve the quality of the data contained in civil registration records, but it does have a number of advantages.
Computerization helps to promote timeliness of different processes, including data production and management; it also facilitates the verification, validation and sharing of vital statistics data (26).
An electronic and interactive certificates are seen as a way of improving certification. For example, it would be possible to check that physicians enter plausible sequences and that they do not only report general symptoms (27). Electronic certification might not solve all difficulties related to poor certification, and certainly not at once.
Some Nordic countries have or have had data collection systems involving peer review, but with varying outcomes. For example, in Norway all death certificates are reviewed by a medical officer before they are forwarded to Statistics Norway. According to the assessment of Statistics Norway, which produces the Norwegian mortality statistics, the impact is not overwhelming (28). In Finland, however, where all death certificates are also reviewed by a medical officer, the experiences are far more encouraging (29).
In conclusion training physicians in how to certify deaths properly is very much a recurrent theme in the discussion on how best to improve mortality statistics.

References

1. Makiko Naka Mieno, Noriko Tanaka, Tomio Arai, Takuya Kawahara, Aya Kuchiba, Shizukiyo Ishikawa et al. Accuracy of Death Certificates and Assessment of Factors for Misclassification of Underlying Cause of Death. J Epidemiol 2016;26(4):191-8.
2. Filippatos G, Andriopoulos P, Panoutsopoulos G, Zyga S, Souliotis K, Gennimata V et al. The quality of death certification practice in Greece. Hippokratia. 2016; 20(1): 19-25.
3. Johansson AL. Targeting Non-obvious Errors in Death Certificates [dissertation]. Upssala University, Sweden; 2008.
4. G. P. Nielsen, J. Björnsson, J. G. Jonasson.The accuracy of death certificates.1991; 419(2): 143-6.
5. Department of Health Statistics and Information Systems WHO, Global Health Estimates Technical 2013. WHO methods and data sources for global causes of death 2000-2011. June. Paper WHO/HIS/HSI/GHE/2013.3
6. Murray CJL, Lopez AD. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Cambridge, MA: Harvard School of Public Health/World Health Organization/World Bank; 1996
7. Jemal A, Ward E, Anderson RN, Thun MJ. Influence of Rules From the Tenth Revision of the International Classification of Diseases on U.S. Cancer Mortality Trends. J Natl Cancer Inst. 2003;95(22):1727–8.
8. World Health Organization: International Statistical Classification of Diseases and Related Health Problems. Tenth Revision. Volume 2. Second edition. Geneva, http://www.who.int/classifications/icd/en
9. World Health Organization, 2010. Improving the quality and use of birth, death and cause-of-death information: guidance for a standards-based review of country practices.
10. Cheng TJ, Lin CY, Lu TH, Kawachi I. Reporting of incorrect cause-of-death causal sequence on death certificates in the USA: using hypertension and diabetes as an educational illustration. Postgrad Med J. 2012;88:690–3.

11. Burger EH, van der Merwe L, Volmink J. Errors in the completion of the death notification form. S Afr Med J. 2009;99(9):643-4.
12. JB Hoff JB C, Ratard R. Louisiana Death Certificate Accuracy: A Concern for the Public's Health. Journal of the Louisiana State Medical Society. 2010;162:30-3.
14. Mathers DC, Ma Fat D, Inoue M, Rao C, Lopey DA. Counting the dead and what they died from: Bullten of the World Health Organization. 2005;83:171-7.
15. Naghavi M, Makela S, Foreman K, O'Brien J, Pourmalek F, Lozano R. Algorithms for enhancing public health utility of national causes-of-death data Population Health Metrics. 2010; 8: 9.
16. Maudsley G, Williams EM. 'Inaccuracy' in death certification-where are we now? J Public Health Med. 1996;18(1):59-66.
17. Crowcroft N, Majeed A. Improving the certification of death and the usefulness of routine mortality statistics. Clin Med. 2001;1(2):122-5.
18. Danilova I, Shkolnikov MV, Jdanov AD, Meslé F, Vallin J. Identifying potential differences in causeof-death coding practices across Russian regions. Population Health Metrics. 2016; 14:8
19. Foreman JK, Naghavi M, Ezzati M. Improving the usefulness of US mortality data: new methods for reclassification of underlying cause of death. Population Health Metrics. 2016: 14:14
20. Myers KA, Farquhar DR. Improving the accuracy of death certification. CMAJ.1998;158(10):1317-23.
21. Ravakhah K. Death certificates are not reliable: revivification of the autopsy. South Med J. 2006;99(7):728-33.
22. Swift B, West K. Death certification: an audit of practice entering the 21st century. J ClinPathol.2002;55(4):275-9.
23. McKenzie K, Walker S, Casey R. Some issues to consider when assessing concordance of death certificates with registry reports. Aust N Z J Public Health. 2004;28(1):87.
24. Minino AM, Rosenberg HM (ed). Proceedings of the International Collaborative Effort on Automating Mortality Statistics, Volume II.U.S. Department of Health and Human Services.Centres for Disease Control and Prevention, National Center for Health Statistics. Hyattsville, Maryland, September 2001.DHHS Publication No. 2002-1252.
25. Lopez DA, Setel WP. Better health intelligence: a new era for civil registration and vital statistics? BMC Medicine (2015) 13:73 [doi 10.1186/s12916-015-0333-4]
26. Minino AM, Rosenberg HM (ed). Proceedings of the International Collaborative Effort on Automating Mortality Statistics, Volume III.U.S. Department of Health and Human Services. Centres for Disease Control and Prevention, National Center for Health Statistics. Hyattsville, Maryland, November 2006.DHHS Publication No. 2006-1252.
27. Pavillon G, Jougla E, Cherie-Challine L, Hatton F. Assessment of two alternative methods (guidelines or examples) in completing death certificates. Meeting of WHO Collaborating Centres for the Classification of Diseases, Tokyo 1996. WHO/ESS/ICD/C/96.29.
28. Johansson LA, Bille H, Ahonen H, et al. Cause-of- Death Statistics. In Health Statistics in the Nordic Countries 1997, pp 175-208. Copenhagen: Nordisk Medicinalstatistisk Komité 56:1999.
29. Lahti RA, Penttila A. Cause-of-death query in validation of death certification by expert panel; effects on mortality statistics in Finland, 1995. Forensic Sci Int. 003;131(2-3):113-24.

8. PREVENTION OF LOWER EXTREMITAS DEFORMITES AND GAIT DISTURBANCE IN CHILDREN WITH SPASTIC CEREBRAL PALSY

Čolović Hristina, Dimitrijević L.
University of Niš, Serbia, Faculty of Medicine Niš
Clinic of Physical Medicine and Rehabilitation, Clinical Center Niš, Serbia

CEREBRAL PALSY (CP)

CP is a movement disorder produced by an injury to the immature brain. It is, by definition, a static encephalopathy, but the manifestations of that injury are by no means static. A broad spectrum of etiologies mediate neonatal brain injury in preterm and term infants. The most common cause can be cerebrovascular injury. Other etiologies includes: trauma, infections, metabolic dysfunction, etc.Cerebral palsy is the most common movement disorder in children. It occurs in about 1-3 per 1,000 live births (1).

Signs and symptoms appear during infancy or preschool years. In general, cerebral palsy causes impaired movement associated with abnormal reflexes, floppiness or rigidity of the limbs and trunk, abnormal posture, involuntary movements, unsteady walking, or some combination of these. Children with cerebral palsy may have problems swallowing and commonly have eye muscle imbalance, in which the eyes don't focus on the same object. Children with cerebral palsy also may suffer reduced range of motion at various joints of their bodies due to muscle stiffness.

Signs and symptoms can vary greatly. Movement and coordination problems associated with cerebral palsy may include: Variations in muscle tone, such as being either too stiff or too floppy, stiff muscles and exaggerated reflexes (spasticity), stiff muscles with normal reflexes (rigidity), lack of muscle coordination (ataxia), tremors or involuntary movements, slow, writhing movements (athetosis), delays in reaching motor skills milestones, such as pushing up on arms, sitting up alone or crawling, favoring one side of the body, such as reaching with only one hand or dragging a leg while crawling, difficulty walking, such as walking on toes, a crouched gait, a scissors-like gait with knees crossing, a wide gait or an asymmetrical gait, excessive drooling or problems with swallowing, difficulty with sucking or eating, delays in speech development or difficulty speaking, difficulty with precise motions, seizures (2).

THE NEURAL CONTROL OF MOVEMENT

The only action a human can bring about is muscular contraction. This muscular contraction will cause movement that may in turn produce walking, writing or speech. However, any action must start as a thought. Thoughts arise in certain areas of the brain, which through their connections stimulate cortical motor centers. This initiation of motor actions has been recorded as an electrical potential known as the „readiness potential“, and it is located in the supplementary motor area, just anterior to the motor strip. This readiness potential occurs up to one second before the onset of movement, whether the movement occurs in the hand, toe, mouth, tongue or eye, and irrespective of whether the movements are complex and programmed, or simple (3).

Large, fast-firing neurons in the cortex, which are known as Betz cells, contribute axons to motor tracts which descend from the cortex to the brainstem (corticobulbar fibres) and spinal cord (corticospinal tracts) to connect with motor nerves that innervate muscles. The muscles, when stimulated by these motor tracts, then contract to bring about the desired purposeful movement and action.

SPASICITY AND MUSCULOSKELETAL PROBLEMS

Spasticity is one of the major problems in patients who have an upper motor lesion in the brain or spinal cord. The clinical feature of spasticity is an elevation in muscle tone evidenced by a velocity-dependent increase in resistance to passive movement.

Due to spasticity, the muscle growth in a child with CP will be abnormal for the following reasons: A spastic muscle will not allow stretch to the same degree as one with norml tone, As a result a muscle that initially has dynamic contracture, will develop static contracture.

Bone growth in CP child is likely to be abnormal. The best example is femoral anteversion. A child with CP typically stands and walks with hips and knees in some flexion.

Deformities of the feet are the most common musculoskeletal problem in children with cerebral palsy. The most common deformity is equinus, which is present in the large majority of children with CP at the beginning of standing and walking. Children with spastic CP and equinus gait have longer than normal Achilles tendons and shorter than normal muscle bellies (4).

THE GAIT

Gait is a complex activity. It requires: a control system, an energy source, levers providing movement, and forces to move the levers.The Gait cycle: A complete gait cycle or stride begins when one foot strikes the ground and ends when the same foot strikes the ground again. The gait cycle can be described according to phases, tasks and periods. The cycle is divided into two major phases: stance and swing. Within these phases it is possible to further subdivide stance into the instant of initial contact, loading response, mid-stance, terminal-stance, pre-swing and instant of foot-off. During swing phase, the limb behaves like a compound pendulum (5).

A child who is trying to walk with impaired motor control as well as dynamic and structural musculoskeletal deformities does not have an easy task, and he or she must learn to cope with the resultant problems. Pathological gait is a mixture of many abnormalities.

BOTULINUM TOXIN TREATMENT

Botulinum toxin is a neurotoxic protein produced by the bacterium *Clostridium botulinum* and related species. It prevents the release of the neurotransmitter acetylcholine from axon endings at the neuromuscular junction and thus causes flaccid paralysis. Infection with the bacterium causes the disease botulism. The toxin is also used commercially in medicine, cosmetics and research.

Botulinum is the most acutely lethal toxin known, with an estimated human median lethal dose (LD_{50}) of 1.3–2.1 ng/kg intravenously or intramuscularly and 10–13 ng/kg when inhaled.

There are eight types of botulinum toxin, named type A–H. Types A and B are capable of causing disease in humans, and are also used commercially and medically. Types C–G are less common; types E and F can cause disease in humans, while the other types cause disease in other animals. Type H is considered the deadliest substance in the world – an injection of only 2 ng can cause death to an adult. Botulinum toxin types A and B are used in medicine to treat various muscle spasms and diseases characterized by overactive muscle.

Botulinum toxin exerts its effect by cleaving key proteins required for nerve activation. First, the toxin binds specifically to nerves which use the neurotransmitter acetylcholine. Once bound to the nerve terminal, the neuron takes up the toxin into a vesicle. As the vesicle moves farther into the cell, it acidifies, activating a portion of the toxin which triggers it to push across the vesicle membrane and into the cell cytoplasm. Once inside the cytoplasm, the toxin cleaves SNARE proteins preventing the cell from releasing vesicles of neurotransmitter. This stops nerve signaling, leading to paralysis.

The toxin itself is released from the bacterium as a single chain, then becomes activated when cleaved by its own proteases. The active form consists of a two-chain protein composed of a 100-kDa heavy chain polypeptide joined via disulfide bond to a 50-kDa light chain polypeptide. The heavy chain contains domains with several functions: it has the domain responsible for binding specifically to presynaptic nerve terminals, as well as the domain responsible for mediating translocation of the light chain into the cell cytoplasm as the vacuole acidifies.[1][35] The light chain is a zinc metalloprotease and is the active part of the toxin. It is translocated into the host cell cytoplasm where it cleaves the host protein SNAP-25, a member of the SNARE protein family which is responsible for fusion. The cleaved SNAP-25 is unable to mediate fusion of vesicles with the host cell membrane, thus preventing the release of the neurotransmitter acetylcholine from axon endings. This blockage is slowly reversed as the toxin loses activity and the SNARE proteins are slowly regenerated by the affected cell (6).

Botulinum toxin type A increasingly being used for the treatment of childhood spasticity, particularly cerebral palsy. Physical therapy and occupational therapy regimens of assisted stretching, strengthening, functional tasks, and/or targeted physical activity and exercise are usually the chief ways to keep spastic CP well-managed.

REFERENCES

1. Rosenbaum P, Rosenbloom L. Cerebral palsy. Dorchester: Mac Keith Press.2012.
2. Surveillance of Cerebral Palsy in Europe (SCPE). Prevalence and characteristics of children with cerebral palsy in Europe. Dev Med Child Neurol 2002;44:633-40.
3. Rossman AR, Neary D. Neuroanatomy. London: Elsevier. 2005.
4. Bar-On L, Molenaers G, Aertbelien E, Van Campenhout A, Feys H, Nuttin B, Desloovere K.Spasticity and its contribution to hypertonia in cerebral palsy. Biomed Res Int.2015;2015:301-11.
5. Gage JR, Schwartz MH, Koop SE, Novacheck TF. The identification and treatment of gait problems in cerebral palsy. London: Mac Keith press. 2012.
6. Strobl W, Theologis T, Brunner R, Kocer S, Viehweger E. et all. Best clinical practice in botulinum toxin treatment for children with cerebral palsy. Toxins 2015;7:1629-48.

9. THE IMPORTANCE OF PROPER NUTRITION AND USE OF SUPPLEMENTS IN PREGNANCY

Janošević-Radović Dragana
University of Niš, Serbia, Faculty of Medicine Niš
Clinic of Gynecology and Obstetrics, Clinical Center Niš, Serbia

The balance of essential nutrients is of most importance in the three main periods which form the gestational continuum; the pre-conception period, the period of pregnancy and the postnatal period – lactation. It is needless to say that care about one`s healthy offspring begins long before birth itself. The nutritive needs of the mother go through numerous changes. Partly due to the nutritive needs of the foetus, partly to the physiological variations which affect the absorption and the metabolism of nutritive matter. The nutritive needs, also depend on the physiological changes in the mother`s organism and form an adequate adaptation including lowering of electrolytes, proteins, glucose levels, vitamin B12, folic acid, vitamin B6, and on the other hand increasing of lipids, triglycerides and cholesterol levels in the mother`s blood.

The basic characteristics of pregnancy are imbedded in the complex interactions between the three separate biological entities, the mother, the foetus and the placentae. All of them function in synergy during pregnancy making a unique unity and they define the factors which will determine the nutritive needs at that particular time.

The mother factors - age, number of previous pregnancies and births, nutritive habits, diet regime, factors which occur as a consequence of the acute condition.

The foetus factors – number of foetuses, period of pregnancy, the physiological state of the foetus, speed of advancement.

The placentae factors - functional conditions, age of the placentae, other factors which refer to modulation and transfer factors between the mother and the foetus or the creation of its own products.

Nutrition in pregnancy has a direct influence on, first of all, the outcome of pregnancy, duration of gestation, foetal growth, inborn anomalies, PIH; and secondly, the post natal development of the child, its cognitive development, atopic diseases, hyper TA.

Good nutrition should provide sufficient caloric input for adequate development in the TT of the mother with sufficient input of vitamins and minerals which would prevent their deficiency during pregnancy and lactation period with obligatory consummation of iodine salts.

An adequate nutritive status of the mother should provide her with a good general well-being, a good chemo gram, function of the placentae, low oxidative stress with low levels of homocysteine, lasting gestation, regular development of all foetal structures, normal growth and TT at birth.

Depending on the activity, the caloric input varies between 1600 and 2600 calories per day, and the optimal gain of weight is between 12 and 16 kg.

The daily input of carbohydrates would be between 175g/day or 35% of the daily caloric input. This amount should provide enough energy, avoid ketoacidosis and sustain the adequate concentration of glucose in the blood.

Proteins - have a primary building role and the need for them is increased in pregnancy as to satisfy the needs of the fast growing foetus, the uterus, the increase of the entire body of blood volume up to 40-50%, the forming of the amniotic fluid, forming of reserves to get the pregnancy to full term, go through delivery and begin lactation.

The need for proteins increases as the pregnancy progresses, and they reach their maximum during the third trimester when their level should be 71g per day.

Fats – there are no official recommendations for the input of fats and their levels depend on the energetic needs of the mother herself.

There are, though, recommendations for the input of unsaturated acids; lanoline – 13g/day, linoleic – 1,4g/day.

Taking into consideration the influence of good nutrition and the use of vitamin supplements has become highlighted only after a few new researches which speak of the epigenetic importance, especially specific nutrients – epinutrients.

The study TehAL et al from 2014, points out the importance of the epigenetic influence on the health of the neonates and later on. Apparently, only 25% of our health is determined by genetics and up to 75% by epigenetic factors, that is those genes that interact with the mother’s way of life.

The creator of the term, epigenetics, is Conrad Hal Waddington (1905-1975), who defined it as a concept of canalling genotypes and phenotypes. His term 'epigenetic landscape' metaphorically describes the way developments is modelled by regulation of the genetic activities.
Genes, as the carriers of inheritance, act orchestrated and by interacting with their environment shape a certain phenotype, a visible characteristic and in the final outcome, the entire organism in its fullest.
The modern grasp of epigenetics implies all hereditary changes on the genome including the changes of the basic information level of the DNA sequence itself.
The epigenetic changes of the genome are all the functional changing activities, that is the exposed specific parts of the genome which consequently change the cell's phenotype.
The effects of these changes on the level of the genome's functions, the cells' metabolism and the cell itself are extremely complex, specific and of vital importance for the cells and the entire organism.
By selective silencing or, to say, opening certain parts of the genome for reading, we get a unique space and time profile of the cell – her differentiation in a specific type of cell placed in a suitable cellular frame.
The destiny of the cell created in this manner is a result of interaction of the cellular molecular structures and the influence of the cellular environment. Thus, the unique genetic code has a minor importance than we give it, as the epigenetic mechanisms influence the conversion of information in the genetic code – nutrition, TT, life style, supplements.
The epigenome is flexible, especially in the prenatal and the early development period, and it is under the influence of environment; Replicated by mitosis, it can give long-term phenotype effects which stay stable through adulthood.
Undesirable influences on the epigenetic development can lead to maladaptive phenotypic characteristics that potentially increases the risk of diseases with a possible influence on the offspring.
The most important epigenetic factor is the nutritive status, that is the input of essential epigenetic nutrients.
Nutritive components, such as folate, vitamin B12, B6, B2, biotin, choline, and specific minerals, such as Zink, Magnesium, affect the epigenetic mechanisms and a lack of these, especially during the foetal development, can precipitate dysfunctional DNA molecules which are in link with a higher risk of severe defects of the neuronal tube, insulin and lepton resistance, hyper TA, hepatic steatosis, cardiovascular diseases, disturbances like types of autism, maladaptive social and language skills.
Foetal adaptation to limited or insufficient provision of nutrients leads to a programmed change of the physiology and the metabolism thus making way to adult diseases such as coronary disease, stroke, diabetes, and hypertension.

Pregnancy supplements

Recommended for those in nutrient risk:

-Multiple pregnancies
-Alcoholism, drug addiction, smokers
-Strictly vegetarian diet
-Economically unprivileged mothers
-Limited diet out of fear of obesity
-Vomiting, loss of appetite
-Use of antiepileptics
-Chemoglobinopathy (chronic chemolisis)

A nutritive compromised pregnancy is hard to detect. According to UNICEF data, women often lack essential nutrients, and many effects of the various defects are irreversible.
UNICEF also recommends multisupplementation as the fastest way to uplift the nutritive status of mothers.

10. THE CURRENT APPROACH TO THE PREVENTION OF PRIMARY AND SECUNDARY OSTEOPOROSIS

Živković Valentina
University of Niš, Serbia, Faculty of Medicine Niš
Institute for Treatment and Rehabilitation,,Niška Banja“ Niš, Serbia

Osteoporosis is a disease of the skeletal system characterized by disturbed bone firmness, leading to an increased risk of bone fractures (9). It is divided into primary osteoporosis, including postmenopausal (type I) and senile osteoporosis (type II), and secondary osteoporosis, with clearly defined etiological mechanisms (malabsorption, use of glucocorticoids, hyperparathyroidism). Osteoporosis and increased risk of fractures are among the most common consequences of aging in women. This disease has reached pandemic proportions worldwide, and in order to alleviate the burden to public health systems it is necessary to develop the strategies that would help us in early identification of women at higher fracture risk and to make provisions that safe and effective prevention measures are available and implemented. The risk factors for osteoporosis, in addition to age and female gender, are genetics, postmenopausal status, hypogonadism or premature ovarian failure, low body mass index, ethnicity, rheumatoid arthritis, low bone mineral density (BMD), vitamin D deficiency, low calcium intake, smoking, excessive alcohol intake, immobilization, and long-term use of certain drugs, such as glucocorticoids, anticoagulants, anticonvulsants, aromatase inhibitors, chemotherapeutic agents to treat cancer, and gonadotropin-releasing hormone agonists. Prevention of osteoporosis by the removal of the mentioned modifiable risk factors, identification of individuals at high fracture risk, and early diagnosis, are essential in combating osteoporotic fractures. The strategies for the prevention and treatment of osteoporosis and osteoporotic fractures involve the following measures: prevention of falls by correcting visual acuity, reduction of use of consciousness- and balance-altering drugs, reduction of the risks of falling at home (removal of slippery floors, obstacles, insufficient lighting), physical exercises to improve muscle strength, exercises that can improve balance and bone mass maintenance, giving up smoking and alcohol consumption, adequate intake of proteins, calcium and vitamin D.

Systemic osteoporosis and increased rates of osteoporotic fractures are characteristic for chronic inflammatory diseases, such as rheumatoid arthritis, spondyloathritides, systemic lupus erythematosus, chronic inflammatory bowel diseases and chronic obstructive pulmonary disease. In most of these patients, in addition to other drugs glucocotricoids are administered, which, independent of other factors, adversely affect bone metabolism. It is well known that inflammation is an important predictor of increased bone fragility due to the action of inflammatory mediators, factors of the disturbed immune system and bone remodeling. The activity of a chronic inflammatory disease could well be one of the main, leading factors in the onset and course of osteoporosis, on the account of which the reduction of inflammation and disease remissions are significant in the prevention of osteoporosis. It is thought that not only the use of drugs to treat osteoporosis (oral bisphosphonates, teriparatide, denosumab), but also the use of potent antiinflammatory agents have a beneficial effect on bone fragility markers.

In 2017, the latest recommendations of the American College of Rheumatology were published, dealing with the prevention and treatment of glucocorticoid-induced osteoporosis. These recommendations involve bone fracture risk assessment in patients starting or continuing long-term glucocorticoid therapy based on the history of osteoporotic fractures, BMD values, and 10-year risk of hip fracture and a major fracture using the FRAX score in adults over 40 years of age, and bone fracture risk assessment in children and adults below 40 years of age based on the history of osteoporotic fractures and BMD. The recommendations suggest the use of calcium and vitamin D only in adult individuals with low bone fracture risk, while in those with moderate and high risk values calcium and vitamin D should be also administered with supplemental treatment of osteoporosis, where oral bisphosphonates constitute the first line of treatment of glucocorticoid-induced osteoporosis.

Keywords:Osteoporosis; Fracture prevention; Glucocorticoids

REFERENCES

1. Komm BS, Morgenstern D, A Yamamoto L, Jenkins SN. The safety and tolerability profile of therapies for the prevention and treatment of osteoporosis in postmenopausal women. Expert Rev Clin Pharmacol. 2015;8(6):769-784.
2. Akkawi I, Zmerly H. Osteoporosis: Current Concepts. Joints. 2018;6(2):122-127.
3. Kuo T R, Chen C H. Bone biomarker for the clinical assessment of osteoporosis: recent developments and future perspectives. Biomark Res. 2017;5:18.
4. Lorentzon M, Cummings S R. Osteoporosis: the evolution of a diagnosis. J Intern Med. 2015;277(06):650–661.
5. Cosman F, de Beur S J, LeBoff M S et al. Clinician's guide to prevention and treatment of osteoporosis. Osteoporos Int. 2014;25(10):2359–2381.
6. Rossini M, Adami S, Bertoldo F et al. Guidelines for the diagnosis, prevention and management of osteoporosis. Reumatismo. 2016;68(01):1–39.
7. Kanis J A, McCloskey E V, Johansson H, Cooper C, Rizzoli R, Reginster J Y; Scientific Advisory Board of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO) and the Committee of Scientific Advisors of the International Osteoporosis Foundation (IOF). European guidance for the diagnosis and management of osteoporosis in postmenopausal women Osteoporos Int 2013;24(1):23–57.
8. Ensrud K E, Crandall C J. Osteoporosis. Ann Intern Med. 2017;167(03):ITC17–ITC32.
9. Tawaratsumida H, Setoguchi T, Arishima Y et al. Risk factors for bone loss in patients with rheumatoid arthritis treated with biologic disease-modifying anti-rheumatic drugs. BMC Res Notes. 2017;10(01):765.
10. Minisola S, Cipriani C, Occhiuto M, Pepe J. New anabolic therapies for osteoporosis. Intern Emerg Med. 2017;12(07):915–921
11. Qaseem A, Forciea M A, McLean R M, Denberg T D; Clinical Guidelines Committee of the American College of Physicians.Treatment of low bone density or osteoporosis to prevent fractures in men and women: a clinical practice guideline update from the American College of Physicians Ann Intern Med.2017;166(11):818–839.
12. Güler-Yüksel M, Hoes JN, Bultink IEM, Lems WF. Glucocorticoids, Inflammation and Bone. Calcif Tissue Int. 2018;102(5):592-606.
13. Briot K, Geusens P, Em Bultink I, Lems WF, Roux C. Inflammatory diseases and bone fragility. Osteoporos Int. 2017;28(12):3301-3314.
14. Lems WF, Saag K, Lems WF, Saag K. Bisphosphonates and glucocorticoid-induced osteoporosis: cons. Endocrine. 2015;49(3):628-634.
15. Whittier X, Saag KG. Glucocorticoid-induced Osteoporosis. Rheum Dis Clin North Am. 2016;42(1):177-189.
16. Canalis E, Mazziotti G, Giustina A, Bilezikian JP.Glucocorticoid-induced osteoporosis: pathophysiology and therapy. Osteoporos Int. 2007;18(10):1319-1328.
17. Cherian KE, Kapoor N, Paul TV. Glucocorticoid-induced Osteoporosis. Indian J Endocrinol Metab. 2017;21(5):652-654.
18. Buckley L, Guyatt G, Fink HA, et al. 2017 American College of Rheumatology Guideline for the Prevention and Treatment of Glucocorticoid-Induced Osteoporosis. Arthritis Rheumatol. 2017;69(8):1521-1537.

POSTER PRESENTATIONS

Wednesday, 26.09.2018.12:15-13:15
Faculty of Medicine Niš

1. SCREENING OF CERVICAL CANCER IN MONTENEGRO:HUMAN PAPILLOMA VIRUS TEST RESULTS FOR THE PERIOD 01.02-01.07.2018.

Vuković-Leković Jovana, Nikčević-Kovačević I., Samardžić I.
Public Health Institute of Montenegro, Podgorica

Objective: Screening program for early detection of cervical cancerimplemented at the national level in Montenegro beginning from 01.02.2018. The Abbott RealTimehrHPV test enables the isolation of the HPV16 and HPV18 genotypes and the detection of a high-risk hrHPV (31,33,35,39,45,51,52,56,58,59,66,68).
Method: The data are collected from the electronic information system of the National Screening of Cervical Cancer.Age groups are 30-34 years, except in Podgorica, where the age group is 30-36 years old.
Results: In observed periodof the 3.456 returned results, 628 (18.17%) were HPV positive while 2.741 samples (79.31%) were negative. Out of a total of 628 positive samples in 406 (64.65%) hrHPV genotypes were detected, 115(18,31%) HPV16positive, 30 (4,78%)HPV18 positive samples. The presence of HPV16 and HPV18 virus genotypes was detected in one sample (0.16%), 55 (8.76%) were positive for hrHPV and HPV16,16 samples (2.55%) were positive for hrHPV and HPV18, and 5 samples (0.80%) were positivefor all detectable genotypes.
Conclusion: HPV infection is linkedto the 99.7% of cervical cancer. Importance of this program is in the fact that is based on detection of HPV virus, which is the latest approach of the prevention of cervical cancer.

Key words:HPV genotypes, screening cervical cancer

2. CERVICAL CANCER SCREENING:THE CONNECTION OF VARIOUS GENOTYPES OF HUMAN PAPILLOMA VIRUS (HPV) WITH PATHOHISTOLOGICALBIOPSY FINDINGS

Nikčević-Kovačević Ivana, Vuković-Leković J., Stanišić M., Ostojić Đ.
Public Health Institute of Montenegro, Podgorica

Objective: The aim of national program for early detection of cervical cancer is to reduce incidence and prevalence of cervical cancer and the mortality of this disease; to investigate the correlation and prognostic significance of HPV status and pathohistological findings in the screening participants in whom a biopsy was performed after a colposcopy examination.
Method: 50 pathohistological findings were collected. Women were from the age group of 30-36 years who were HPV positive and in whom colposcopy and biopsy were performed.
Results: Of the 50 pathohistological findings of HPV positive women, in 13(26%) the diagnosis was cervicitis, 11(22%) CIN I, 5(10%) CIN II, 19(38%) CIN III and 2(4%) was found carcinoma, one in situ and the other invasive. The most prevalent was the HPV16 genotype. HPV16 was isolated in 89.47% of CIN III and in 100% of cancers.
Conclusion: In the pathohistological findings of women of the age group 30-36 years with a biopsy after HPV testing and colposcopy, the most common finding was CIN III. The most common HPV virus genotype isolated from women in whom cervical biopsy was perfomed was HPV16. These results can contribute to optimizing the monitoring and treatment of patients with the HPV16 positive result.

Key words:HPV, CIN, screening cervical cancer

3. TRENDS IN INCIDENCE AND MORTALITY RATES OF THYROID CANCER IN CENTRAL SERBIA IN THE PERIOD FROM 1999 TO 2014

Nikolić Aleksandra [1], Milin-Lazović J.[2], Živaljević V.[3], Šipetić-Grujičić S[1].
[1]Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Serbia
[2]Institute of Medical Statistics and Informatics, Faculty of Medicine, University of Belgrade
[3]Department of Endocrine Surgery, Clinical Center Serbia

Objectives: To analyze trends in incidence (IR) and mortality rates (MR) of thyroid cancer (TC) in Central Serbia (CS), during the period 1999-2014. **Methods**: Data for the period 1999-2014 were taken from The Public Health Institute of Serbia. Jointpoint regression analysis was used to estimate annual percent changes (APCs) and average annual percent changes (AAPCs) in IR and MR. **Results**: In CS, in the period between 1999 and 2014, there was a significant increase in standardized IR (AAPC 5.6%), as well as a decrease in MR (AAPC -3.5%) for TC in females. For males, there was a significant increase in IR (AAPC 6.2%), while MR were stable. The increase in IR was significant in all age groups in both sexes, except for males in the age group 50-59 years, where the IR were stable. The increase in age-specific IR was highest in the age group 0-39 years, where for males it was 12.1% annually and for females 11.0% annually. Age-specific MR were stable in both sexes. **Conclusion**: Growing trend in incidence of TC demands analytical studies in order to identify potential risk factors for this malignant cancer and to implement preventive measures.

Keywords: thyroid cancer, trend, incidence, mortality, joinpoint regression

4. THE IMPACT OF SMOKING ON PRESENTATION AND CLINICAL OUTCOME OF CHRONIC MYELOID LEUKEMIA

Čojbašić Irena
University of Niš, Serbia, Faculty of Medicine Niš Clinic of hematology and clinical immunology, Clinical Center Niš

Objectives: The aim of the current study was to investigate the impact of smoking on baseline characteristics and on the course of chronic myeloid leukemia(CML).
Materials and methods: The study included a non-selected group of 110 patients with CML, but the division into smokers and non-smokers was available for 95 patients, out of which 23 (24%) were smokers. The average follow-up was 7,6 years.
Results: Smoking was more frequent in males (31%) than in females (18%). There was a significant difference in the baseline characteristics of the disease between smokers and non-smokers in relation to spleen size, hemoglobin levels, the number of peripheral basophils and age at diagnosis, $p<0.001$. No significant difference regarding cytogenetic and molecular responses to tyrosine kinase inhibitors therapy were observed. The estimated 8-year overall survival and progression-free-survival in the non-smoker group was significantly higher than in the smoker group, $p<0.001$.
Conclusion: The results of this study indicate the negative impact of smoking on survival. No direct influence of smoking on the level of therapeutic response during the administration of tyrosine kinase inhibitors has been demonstrated. It is suggested that patients with CML should be encouraged to stop smoking in order to have a better long-term outcome.
Key words: chronic myeloid leukemia, smoking, survival.

5. PROPHYLACTIC CRANIAL IRRADIATION (PCI) FOR PATIENTS WITH SMALL CELL LUNG CANCER (SCLC)

Krasić Katarina[1], Jović J.[2], Stojadinović J.[1], Živković-Radojević M.[1], Grujić M.[1], Milosavljević N[1].
[1]Department of radiology, Clinical Center Kragujevac
[2]University of Priština, Faculty of Medicine Priština-Kosovka Mitrovica

Objectives: Profilactic whole brain (or cranial) irradiation (PCI) reduce incidence of brain metastasis and benefits patients with SCLC.
Materials and methods: Based on literature review.
Results: Approximately 10% of patients with SCLC present with brain metastases at initial diagnosis, and an additional 40% to 50% will develop brain metastases during the course of disease**.** Early trials comparing PCI *vs* follow-up showed reduced brain metastases, but inconclusive effects on overall survival (OS). Aupérin and colleagues conducted a meta-analysis of 7 randomized trials comparing PCI *vs* follow-up for patients in complete response, after initial treatment. PCI reduced the incidence of brain metastases in 2 years from 58.6% to 33.3% and improved 3-year OS from 15.3% to 20.7%. Meert and colleagues confirmed an OS benefit for those with a complete response. No dose-effect relationship for PCI was showed in LD SCLC patients so that the recommended dose is 25 Gy in 10 fractions. It is recomended after curative chemoradiotherapy, if complete response is achived.
Conclusion: PCI is recomended to patients with complete response to treatment, excluding patients with preexisting contraindications or patient at high risk for neurocognitive deterioration.Modern radiotherapy techniques contribute reducing the risk of side effects from PCI.

Key words: profilactic cranial irradiation, SCLC, overall survival.

6. SEASONAL VARIATION OF MORTALITY IN BELGRADE IN THE PERIOD 1995-2016

Kokić Zoran[1], Mihailović-Kokić B[2].
[1]Primary Health Care Center „Voždovac“, Belgrade
[2]Clinical Hospital Center „Zvezdara“, Belgrade

It is known that mortality is higher during the winter months than during the rest of the year. In the northern hemisphere, this difference ranges from 5% to 25%. The highest participation in the increase in general mortality in most countries during the winter period is contributed by the mortality of chronic cardio-vascular and respiratory diseases patients.

Many epidemiological studies have examined risk factors that can contribute to the seasonal increase in mortality.

The aim of this analysis was to examine the basic characteristics of the seasonal variation of mortality in the population of Belgrade, from 1995 to 2016

Materials and methods: This study used a descriptive epidemiological method. The area covered by the survey is the city of Belgrade. The period from 1995 to 2016 was observed. Data on the number of deaths by months were collected from the published material of the City Bureau of Statistics.

Results:

The percentage increase in the mortality rate in the December-February interval compared to the mortality rate in the March-November interval, in the same year for the observed period, ranged from 1.64% (2015) to 34.23% (2000) with an average value of 8.8%.

The percentage increase in the mortality rate in January, compared to the Mortality Rate in August of the same year for the observed period, ranged from 5.75% (2012) to 77.03% (
2000) with an average value of 23.19%.

Conclusion:.

In 2000, in Belgrade, the highest percentage increase in the mortality rate in the December-February period was recorded in Belgrade, compared to mortality rates in the March-November interval (34.23%), as well as the highest percentage increase in the mortality rate in January, in relation at the mortality rate in August (77.03%).

In 2000, the highest age-specific mortality rates were found for the 5-14 year age range (22.76 / 100000) and age 65-74 (3907.67 / 100000). Further, the highest percentage share in the group of the deceased aged 65-74 (33.17%) and ages 75+ (44.78%), were found in the total number of deaths of the same year.

During the observed period, in 2000 the highest specific mortality rate from cardiovascular disease (677.54 / 100000) and respiratory diseases (44.56 / 100000) was recorded.

The results obtained for 2000 indicate the need for further research regarding the causes of extreme mortality rates.

Keywords: Seasonal variation in mortality

7. VIOLENCE AGAINST TEACHERS BY PUPILS IN PRIMARY SCHOOLS IN THE CITY OF KRAGUJEVAC

Miljanović Ana[1], Rančić N.[2,3], Vukomanović-Simić I.[1,4] Ilić M.[4], Uskoković N[1].
[1]Public Health Institute Kragujevac
[2]University of Niš, Serbia, Faculty of Medicine Niš
[3]Public Health Institute Niš, Serbia
[4]University of Kragujevac, Faculty of Medical Science Kragujevac

Introduction. Violence against teachers is a common problem in primary schools and it is present in many countries of different cultures around the world.
The objective of this study was to examine the frequency and type of violence that teachers experienced from pupils of primary schools. **Methods.** The cross-sectional study was conducted. The study involved teachers from the five primary schools in the city in Kragujevac. The study took place in March in 2018. The standardized Olweus questionnire was used. All the calculations were done into the SPSS software package version 20.0. Statistical significance was accepted when the corresponding p-value< 0.05. **Results.** The total number of participans was 127 (23 males and 104 females). The average age was 43.1±8.4 (rangrd 25 to 64). 52.8% of teachers have experienced violence: 17.3% of teachers have experienced multiple violence, 15.7% physical and 15.0% verbal violence. Male teachers were more often victims of verbal and physical violence than their female colleagues. Female teachers have experienced multiple violence more often than male teachers. In the last three months teachers have experienced mainly verbal violence. **Conclusion.** More than a half of teachers have experienced violence from their pupils and the most frequent were multiple violence, physical and verbal. Male teachers were more often victims of verbal and physical violence than female teachers who have experienced more often multiple violence.

Key words: violence, teachers, primary school, Olweus questionnaire

8. THE INFLUENCE OF SOME RISK FACTORS ON THE APPEARANCE OF THE LOWER BACK PAIN AND DEGENERATIVE CHANGES OF THE INTERVERTEBRAL DISKS

Pavlovska Irina[1], Taushanova B.[1], Zafirova B.[1], Stojanoska-Matjanoska K[2].
[1]Institute of Epidemiology and Biostatistics with Medical Informatics, Medical Faculty Skopje
[2]Institute of Physical Medicine and Rehabilitation, Medical Faculty Skopje

Objective: To make an evaluation of some risk-factors on the appearance of the lower back pain (LBP).**Methods:**This is a case-control study, the incidence type.The study population aged 19-64, was divided, and two groups were identified as cases and controls, each consisted of 142 participants.Determination of the association i.e. the relationship of the analyzed risk-factors and the appearance of the LBP and quantification of that relationship were made by means of non-parametric methods (Chi-square test of homogeneity with C-coefficient of contingence) and parametric methods.The value of $p<0.05$ was considered for significant level. **Results:**Positive anamnesis for LBP in the family had 55(39.4%) examinees of the investigation group (IG) and 36(25.3%) of the control group (CG). The difference in distribution of the examinees with positive and negative familiar anamnesis for LBP, has been statistically significant (p=0,01).Profession related to continuous standing had 68.3% examinees with LBP, i.e. 49.3% in CG.The difference between IG and CG depending on having a profession related to continuous standing is highly significant (p=0.001).Smoking cigarettes was registered more frequently in IG, i.e. 48.6%, contrary to 32.4% in CG. IG examinees and CG had significantly different smoking status (p=0.005).**Conclusion:**Some of the risk-factors have statistically significant influence for the LBP. Many of them are preventable. By using primary prevention measures starting from the early childhood or during the period of the healthy young adulthood we can reduce the incidence of the LBP.

Keywords:low back pain, risk factors, hereditary factor, profession, smoking

9. THE ROLE OF AGE ON EARLY POSTOPERATIVE MORTALITY IN PATIENTS WITH RUPTURED ABDOMINAL AORTIC ANEURYSM

Damnjanović Zoran[1], Jovanović M.[1,2], Živić S.[3], Đorđević P.[1], Grozdanović D.[1], Stepanović N.[1], Smiljković I.[1], Živković V.[1], Golubović M.[3], Lazarević M.[2], Milić D[3].
[1]Vascular Surgery Clinic, Clinical Center Niš, Serbia
[2] University of Niš, Serbia, Faculty of Medicine Niš
[3]Cardiac Surgery Clinic, Clinical Center Niš, Serbia

Objectives: The aim of this study was to find the correlation of etiopathogenetic and clinical factors with early postoperative mortality of patients with abdominal aortic rupture.
Materials and methods:A total of 60 patients with abdominal aortic rupture were included in this retrospective clinical study. Patients were hospitalized in the period from 1 November 2014 to 31 November 2016. Patients were divided into two groups: group I - patients who died after the surgical treatment of rupture of the abdominal aorta and group II - patients who survived the surgical treatment of abdominal aortic rupture.
Results: Among the groups of survivors and groups who died after RAAA surgery, there was no statistically significant difference in sex, age, and localization of aneurysmal changes, but a significant predictive effect has been demonstrated by the age of patients on the occurrence of fatal outcome, where for each year of life risk increases by 10%.
Conclusion: The age of patients with RAAA has a significant impact on early postoperative mortality.

Key words:ruptured abdominal aortic aneurysm, age, mortality

10. REFRACTIVE ERRORS IN CHILDREN WITH DEFORMITIES OF THE SPINAL COLUMN

Stanković-Babić Gordana
University of Niš, Serbia, Faculty of Medicine Niš, Department of Ophthalmology
Clinic of Ophthalmology, Clinical Center Niš, Serbia

Objectives. The aim of the paper was to analyze the presence of refractive errors in children with clinically diagnosed deformities of the spinal column, who exercised corrective gymnastics.
Methods. Thirty children (22F:8M) aged between 5 and 16 years were referred to ophthalmologic examination with scoliosis, kyphosis, kyphoscoliosis and scoliotic posture. Children were evaluated according to refraction, visual function, ortoptic values.
Results. Scoliotic posture and scoliosis were prevalent and three times more frequent in girls (n= 16, 12 F: 4M), followed by kyphoscoliosis (n= 8, 4F:4M) and kyphosis (n=6, 2F:4M). The results of ophthalmological examinations: emmetropia was found in 60 %, myopia in 33.3 %, and hypermetropia in 6.6% cases.
Conclusion. Preventive measures against deformities of the spinal column and refractive errors (particularly myopia) are necessary for an adequate therapeutic treatment.

Key words: refractive error, deformities of the spinal column

11. REFRACTIVE ERRORS IN PRETERM CHILDREN WITH AND WITHOUT ROP

Stanković-Babić Gordana[1,2], Vujanović M.[1], Cekić S[1,2].
[1]University of Niš, Serbia, Faculty of Medicine Niš, Department of Ophthalmology
[2]Clinic of Ophthalmology, Clinical Center Niš, Serbia

Introduce. Approximately 20% of all premature babies can develop some form of strabismus or refractive error over time.The aim of the paper is to provide an analysis of refractive errors in premature infants, with and without ROP.
Material and methods. After the approval of the local ethical committee, an ophthalmic examination of 500 infants (1000 eyes) aged nine months (250 premature and 250 full-term infants) was conducted at the Ophthalmology Clinic, Clinical Centre Niš.
Results. ROP was bilaterally present in 133 children (53.20%), accounting for mROP (26.80%) and sROP (26.40%).The most common refractive error in both groups of patients was moderate hypermetropia. Myopia is statistically significantly in the study group with ROP (13.20%). The prevalence of astigmatism was greater in the study group, especially high ($p < 0.001$). Anisometromy was prevalent in preterm infants (23.20% vs. 13.20%), especially in preterm infants with ROP (29.32% vs. 16.24%).
Conclusion. The screening of refractive errors in the group of premature babies with some of severe forms of ROP should be done earlier in the preverbal period, at the age of nine months, as well as follow up ROP patients even later as they grow up.

Key words: retinopathy of prematurity, preterm infants, refractive errors, myopia

12. THE SIGNIFICANCE OF EARLY ARTERIAL HYPERTENSION DISCOVERY WITH PROFESSIONAL MEMBERS OF THE GENDARMERIE

Veljković Dejan[1], Deljanin Z.[2], Bogdanović K[3].
[1]Department of Medical Care of the Gendarmerie in Kraljevo
[2]Public Health Institute Niš, Serbia
[3]Department of Medical and Psychological Prevention and Coordination in the Sector for Emergency Situations in Kragujevac

Objectives: Arterial hypertension is defined as a state in which one or both blood pressure components are outside the reference range. The normal values are <140 mmHG for systolic, and <90 mmHG for diastolic blood pressure.
Materials and methods: During 2018, 120 professional members of the Gendarmerie, ages 30 to 35, who not receiving treatment for arterial hypertension, were examinated with the aim of discovering arterial hypertension, "white coat" hypertension, and "masked" hypertension. The examination itself was divided into two phases. The first stage included ambulatory control of blood pressure with a sphygmomanometer. As for the second stage, the examinees with observed elevated blood pressure values were put under 24-hour ambulatory blood pressure monitoring (ABPM) – blood pressure holter monitoring. Hypertension on the sphygmomanometer was further specified with parameters of ≥ 140/90 mmHG, which corresponds with the ≥ 130/80 mmHG reference range of the 24-hour ABPM.
Results: During the first phase of the examination, 16,67% examinees were diagnosed with elevated blood pressure, with the blood pressure of the rest of the examinees within the reference range. During the second phase, 25% examinees were diagnosed with elevated average values in the 24-hour period, which led to the discovery of "masked" hypertension. There were also 75% cases of average values for the 24-hour period remaining within the reference range, which led to the discovery of "white coat" hypertension.
Conclusion: The introduction of the 24-hour ABPM to the members of the Gendarmerie illustrates significant progress. The data received with this method carry greater prognostic value for assessing cardiovascular risks that the classic methods of ambulatory blood pressure measuring, and represent an indication for the discovery of arterial hypertension, "white coat" hypertension, and "masked" hypertension.

Key words: "masked" hypertension, "white coat" hypertension, 24-hour ambulatory blood pressure monitoring

13. MARITAL STATUS AS IMPORTANT SOCIOECONOMIC FACTOR FOR ACUTE MYOCARDIAL INFARCTION

Deljanin Zorana[1], Kostić M.[1], Kocić B.[1,2], Veljković D[3].
[1]Public Health Institute Niš, Serbia
[2]University of Niš, Serbia, Faculty of Medicine Niš
[3]Department of Medical care of the Gendarmerie in Kraljevo

Introduction. Numerous epidemiological studies have demonstrated the importance of prevention of risk factors for acute myocardial infarction (AMI).
Aim. Examine the relationship between marital status in patients from AMI and healthy subjects (controls) from the city of Nis.
Materials and methods. Descriptive and analytical epidemiological methods were used. The study was conducted as case-control study and included 310 participants, aged 30-65 years, matched with respect to sex and age (± 2 years).
Results. The groups were similiar by gender (p=1.000) (each group included 110 male and 45 female subjects) and by age (t=1.208, p=0.228) (cases 56,10±7,82 vs. controls 55,04±7,60).
Married are significantly more common in the patient group (p=0.001) and unmarried living together in the control group (p=0.001).
Conclusion. The results of the study have shown that married couple are at risk in AMI development and unmarried living together are protective factor, which is important for future epidemiological studies and in the improvement of preventive strategies regarding AMI.

Key words: acute myocardial infarction, risk factors, marital status

SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF COMMUNICABLE DISEASES EPIDEMIOLOGY

INVITED LECTURES

1. CHALANGES AND LIMITATIONS IN THE SURVEILLANCE OF HEALTHCARE ASSOCIATED INFECTIONS-EXPERIENCE IN SERBIA

Denić-Marković Ljiljana
University of Belgrade, Serbia, Faculty of Medicine Belgrade

ABSTRACT
The term health care associated infections (HAI) has been used since 2005 when the World Health Organization (WHO) establish the Alliance for Patient Safety. The consequences of HAIs are additional morbidity, prolonged hospitalization, long-term physical, developmental and neurological sequelae, increased cost of hospitalization and sometimes even death. Surveillance for HAIs is a systematic way to gather information (data) to describe the occurrence and distribution of HAIs. HAI surveillance data can be used to estimate the scope, spread and location of infections, monitor trends, evaluate preventive efforts, and improve practices, policy and facility planning. The current legislation framework for HAIs is defined by the Law on Protection of Population from Infectious Diseases and the Rulebook on Prevention, Early Detection and Control of HAI. This rulebook defines the number and specialities of HAI Commission members, the structure, responsibility and duties of the infection control (IC) team, and the types of the HAI surveillance at the national, regional and local levels. The health care system in Serbia faces many new challenges in HAI surveillance. The synchronization of Serbian national surveillance system with EU regulations is underway. According to the Action plan for HAI, surveillance of *Clostridium difficile* should be carried out during the year 2018, and the surveillance of surgical site infections and the surveillance in the intensive care units in the next following years. Regardless of all problems and challenges in the organization of the national HAI surveillance, it can be expected that due to the efforts of all healthcare workers and the understanding and support of the Ministry of Health, HAI surveillance will be successfully implemented in the years to come. This could lead to a reduction in HAI rates and an increase in patient safety.

INTRODUCTION

Definitions and importance of health care associated infections

The term health care associated infections (HAI) has been used since 2005 when the World Health Organization (WHO) establish the Alliance for Patient Safety [1]. The synonyms for this term are nosocomial and hospital infections. A HAI is an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. A HAI arises as a result of an unwanted reaction of the organism to the presence of an infectious agent or its toxins which was not present before, and the patient was not in incubation on admission. An infection is considered a hospital infection if it has become evident 48 hours or more after hospital admission. These definitions of HAIs were prepared by the Centers for Disease Prevention and Control in Atlanta, USA [2], and were used in our country up to this year [3]. Since recently, the European Center for Disease Prevention and Control (ECDC), has introduced new definitions [4], which are now used in our country [5].

According to the WHO, for every 100 hospitalized patients at any given time, 7 in developed and 10 in developing countries can acquire one of the HAI. The prevalence of HAIs in developed countries varies between 3.5% and 12% whereas in developing countries it is around 5.7% to 19.1%. [6,7]. In Europe, it was estimated that more than 4 million patients have about 4.5 million HAIs each year. About 37,000 patients die due to the HAIs [8].

The consequences of HAIs are additional morbidity, prolonged hospitalization, long-term physical, developmental and neurological sequelae, increased cost of hospitalization and sometimes even death.

SURVEILLANCE OF HAI

Surveillance is defined as “the ongoing, systematic collection, analysis, interpretation and evaluation of health data closely integrated with the timely dissemination of this data to those who need it” [9].

Surveillance for HAIs is a systematic way to gather information (data) to describe the occurrence and distribution of HAIs. HAI surveillance includes the collection, compilation, analysis, interpretation, and distribution of information about HAIs. The information allows health care institutions to direct their efforts toward the most serious HAI problems and risk, to obtain support of personnel, and to provide feedback on the results of preventive changes. A surveillance system in hospitals and long-term care homes forms an integral part of an infection prevention and control program aimed at reducing HAIs. HAI surveillance data can be used to estimate the scope, spread and location of infections, monitor trends, evaluate preventive efforts, and improve practices, policy and facility planning.
Several studies indicated that the reductions in rates of HAIs were the result of changes to infection prevention and control practices informed by the feedback provided by the surveillance system [10,11]. These studies compared the risk of HAIs at the beginning of a surveillance program (before any impacts associated with the program could be expected) to the risk of infection after the surveillance program was established and operational. There was a clear connection between implementation of a surveillance program and subsequent decline in the rates of HAIs. Reductions in the rates of HAIs generally ranged from 7% to 60% following the implementation of surveillance programs [11,12].

Characteristics of Effective Surveillance
In order for surveillance to be effective, it is critical that:
a) Surveillance is based upon sound epidemiological and statistical principles.
b) Data are properly collected and analyzed.
c) Information is shared in a timely manner with those who can act to improve IPC practices and the quality of care. Efforts to improve practices and decrease HAI are a critical part of the surveillance
Surveillance systems for HAIs in acute care and long-term care homes serve several related purposes towards the end goal of reducing the risk of acquiring health care-associated infection: to detect and monitor; to indentify risk factors for HAIs; to evaluate preventive interventions: to provide information in order to inform, educate and reinforce practice [13].
A well-functioning surveillance system provides the means to establish the endemic, or baseline, rate of HAI in a health care setting [14]. Although surveillance can assist in the detection of outbreaks of HAIs, a more central purpose of ongoing surveillance is to monitor changes in the endemic rate of infection that indicate areas to focus improvements. The data collected as part of a surveillance system in a health care setting can be used to identify patients or residents at high risk for HAIs or practices associated with a high risk of infection [15,16]. Data from the surveillance system can be used to investigate whether the measures were effective in achieving their intended outcome of improved infection control. The continued presence of a surveillance system can increase awareness of staff through discussions initiated by infection control practitioners when they gather information from wards. Evidence of the effectiveness of preventive interventions in one's own health care setting also serves to reinforce practice in another [15].
The general steps required in setting up a surveillance program are the following [16]:
- assess the population to be surveyed
- select the outcome(s) for surveillance
- use standardized, validated case definitions for infection
- use case definitions consistently over time
- collect the surveillance data
- calculate and analyze surveillance rates
- apply risk stratification methodology where applicable
- interpret HAI rates
- communicate surveillance information to stakeholders
- use surveillance information to improve practice
- evaluate the surveillance system

Figure 1 illustrates these recommended steps of surveillance [13].

There are several different partitions of surveillance: outcome- or process-oriented surveillance; continuous or periodic and active or passive [13]. Outcome surveillance is monitoring of specific HAIs (e.g., SSIs, catheter-associated urinary tract infections, diarrhea). Process surveillance is monitoring of patient care practices, including infection control practices (e.g., compliance with hand hygiene, timing of prophylactic antibiotics during surgery, use of aseptic technique for central line insertion). In continuous surveillance, data are collected continuously on a routine basis, while in periodic surveillance, data are collected at intervals, such as one month each quarter or during whole year. Active surveillance is the identification of HAIs by trained personnel who proactively look for HAIs using multiple data sources. Active surveillance is conducted by trained staff using standardized case definitions and is more accurate than passive surveillance. Passive surveillance of HAIs refers to the identification of HAIs by patient care providers, such as physicians or nurses, who may not be formally trained in surveillance and may not consistently use standardized surveillance case definitions to identify HAIs [17,18].

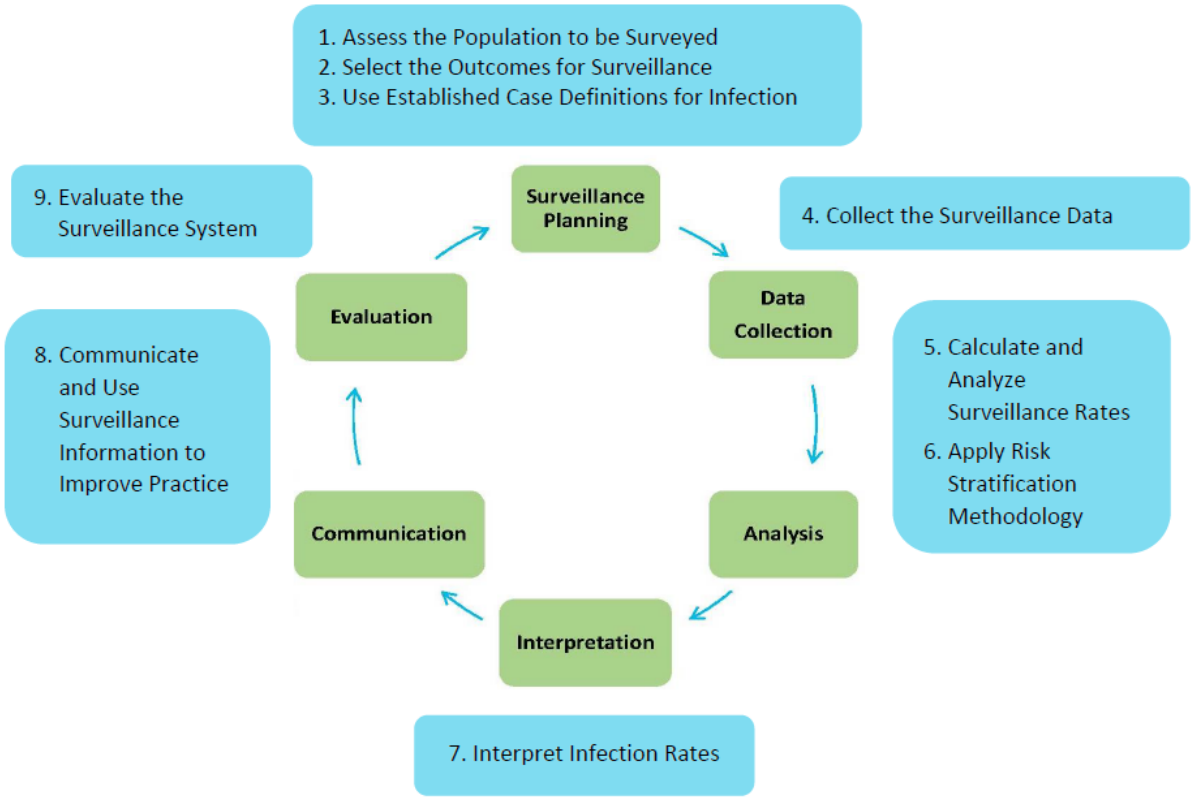


Figure 1: Steps to planning a surveillance system (Source: ref. 13)

HAI surveillance was introduced during the 1960s in many hospitals in the USA. During the 1970s, Centers for Disease Prevention and Control in Atlanta, USA, established a unique national surveillance system (*National Nosocomial Infections Surveillance system* - NNIS) based on the voluntary participation principle, the so-called comprehensive surveillance type. Since 1986, three additional components have been added that enabled the calculation of the adapted (standardized) infection rates for certain groups of patients (in the ICU, Intensive Care Unit, neonatology and surgery) [19]. In Europe, the organization of the national surveillance systems for the HAIs started significantly later. In 1994, in order to synchronize the surveillance in the EU countries, the European Commission endorsed the formation of HELICS (*Hospitals in Europe Link for Infection Control through Surveillance*), only to form a new project on patient security in 2005, the IPSE (*Improving Patient Safety in Europe*) which incorporated HELICS, and which includes a comprehensive HAI surveillance [20].

SURVEILLANCE OF HAIs IN SERBIA

Legal basis of HAIs in Serbia

The current legislation framework for HAIs is defined by the Law on Protection of Population from Infectious Diseases [21]. The paragraph 55 of that law regulates the obligation for all healthcare institutions to take measures for the prevention and control of the HAIs including mandatory public reporting of HAI, and defines the role of the HAI Commission. All of this is described in more detail in the Rulebook on Prevention, Early Detection and Control of HAI [22]. This rulebook defines the number and specialities of HAI Commission members, the structure, responsibility and duties of the infection control (IC) team, and the types of the HAI surveillance at the national, regional and local levels. The Rulebook on Indicators of Quality of Healthcare describes the HAI in the intensive care units (ICU), surgical site infections, sepsis and control of sterilization quality as the indicators of patient safety [23].According to the Rulebook [22], there is at least one IC nurse in the healthcare institutions at the primary level, whereas, hospitals have an IC team at the secondary and tertiary level. This team consists of at least one full time or part time specialist of epidemiology and at least one IC nurse, depending on the size of the hospital. The role of IC team is to ensure that the risk of HAI is minimised through a set of measures. The IC team monitors HAI rates, practices and standards of care and formally and informally educates the health care personnel. Unfortunately, no rulebook has yet stipulated the number of IC doctors and IC nurses per number of patient beds. A rulebook is being drafted that will prescribe 1 IC doctor (an epidemiology specialist) per 500 beds and at least 1 IC nurse per 200 beds in secondary and tertiary care hospitals. Besides, there is an Infection Control Committee in each health care institutions. A director of a healthcare institution is responsible for IC, patient safety, and the implementation of all HAI prevention and control measures. Usually, he is a president of the Infection Control Committee (ICC). The ICC, with at least one epidemiologist from the Regional Institute of public health (RIPH), as a member, was first introduced in hospitals as a legal obligation in 1997. Nowadays, in all hospitals, the members of the hospital ICC are epidemiologists, infectious disease doctors, microbiologists, the director of the hospital, nurses, etc. ICC sets general IC policy, IC program and IC plan for every calendar year.

Organization of HAI surveillance in Serbia

Two types of active surveillance are currently in use in Serbia: incidence and prevalence studies. Incidence studies are obligatory, conducted throughout the year at the high risk departments (ICU, surgical, neonatal and obstetrical units). The current law requires hospitals to report all HAI to the RIPHs. Besides, hospitals prepare an annual report on HAI which they send to the RIPHs who in turn send it to the Institute of Public Health of Serbia, where the summed up results of HAI surveillance are printed in the annual reports on communicable diseases. However, that effort is time-consumingand many hospitals have faced the greatest challenges in reporting and preparing the HAI annual report. Therefore, there is an urgent need to define a priority in the mandatory reporting of HAI. The synchronization of Serbian national surveillance system with EU regulations is underway. Up until now, the four national point prevalence studies (PPS) have been conducted in Serbia. The last of them was conducted along with studies in the EU countries, in November 2017 in 65 acute care hospitals and 6 long-term care facilities.

Along with the preparation for this PPS, the EU definition of the HAIs has been translated. Until then, US HAIs definitions were in use. However, since the beginning of 2018, the EU HAI definitions are officially in use in Serbia.

The health care system in Serbia faces many new challenges in HAI surveillance. According to the Action plan for improvement of communicable diseases surveillance and response system in Serbia, 2017-2020, prepared under Chapter 28 of the ***Treaty*** of ***Accession*** of the Republic of ***Serbia to the European Union,*** it is envisaged to start with at least 3-month surveillance of *Clostridium difficile* during the year 2018. All preparations for carrying out this type of surveillance are ongoing and it will take place in the period October-December, in line with the method prepared by the European Center for disease prevention and control. During 2019, surveillance should be carried out in two three-month cycles. In addition, the surveillance of surgical site infections should be organized in this year. It is planned that surveillance in the intensive care units starts with 2020 year.

However, there are some important problems in the organization of further national HAI surveillance system such as insufficient human resources, increased nursing workload, inadequate oversight, inappropriately designed information technology, and deficiencies in training.

CONCLUSION

Regardless of all problems and challenges in the organization of the national HAI surveillance, it can be expected that due to the efforts of all healthcare workers and the understanding and support of the Ministry of Health, HAI surveillance will be successfully implemented in the years to come. This could lead to a reduction in HAI rates and an increase in patient safety.

REFERENCES

1. World Health Organization. Report on the Burden of Endemic Health Care-Associated Infection Worldwide. WGO, Geneva, 2011.
2. Garner JS, Jarvis WR, Emori GT, Horan TC, Hughes JM. CDC definitions for nososcomial infections. Am J Infect Control 1988; 16(3):128-40.
3. Institut za javno zdravlje Srbije. Bolničke infekcije. Definicije. Priručnik 1. Institut za javno zdravlje Srbije, Beograd, 1998.
4. Centers for Disease Control and Prevention/National Healthcare Safety Network. Identifying Healthcare-associated Infections (HAI) for NHSN Surveillance. January 2017. Dostupno na: https://www.cdc.gov/nhsn/pdfs/pscmanual/2psc_identifyinghais _nhsncurrent.pdf
5. Ministarstvo zdravlja Srbije i Institut za javno zdravlje Srbije. Bolničke infekcije. Definicije. Ministarstvo zdravlja Srbije, Beograd, 2017.
6. World Health Organization. Healthcare-associated infections: fact sheet, 2014. Dostupno na: http://www.who.int/gpsc/country_work/gpsc_ccisc_fact_sheet_en.pdf
7. Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L, Pittet D.Burden of endemichealth-care associated infectioninfection in developingcountries: systematicreviewand meta-analysis. Lancet 2011;377(9761):228-41.
8. World Health Organization. Guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level. WHO, Geneva, 2016.
9. Centers for Disease Control and Prevention. *CDC surveillance update*. Atlanta: Centers for Disease Control and Prevention, 1988.
10. Mintjes-de Groot AJ, van Hassel CA, Kaan JA, Verkooyen RP, Verbrugh HA. Impact of hospital-wide surveillance on hospital-acquired infections in an acute-care hospital in the Netherlands. J Hosp Infect 2000;46(1):36-42.
11. Gastmeier P, Sohr D, Schwab F, Behnke M, Zuschneid I, Brandt C, et al. Ten years of KISS: the most important requirements for success. J Hosp Infect 2008;70 Suppl 1:11-6
12. Ellingson K, Haas JP, Aiello AE, et al. 2014. Strategies to prevent healthcare-associated infections through hand hygiene. Infect Control Hosp Epidemiol. 35(8):937–960.
13. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for surveillance of health care-associated infections in patient and resident populations. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2014.
14. Forrest J, Tucker A, Brnabic AJM. A 9-year infection-control surveillance program in Sydney-based residential aged-care facilities. Healthc Infect 2011;16(3):108-14.
15. Agodi A, Auxilia F, Barchitta M, Brusaferro S, D'Alessandro D, Montagna MT, et al. Building a benchmark through active surveillance of intensive care unit-acquired infections: the Italian network SPIN-UTI. J Hosp Infect 2010;74(3):258-65.
16. Daneman N, Simor AE, Redelmeier DA. Validation of a modified version of the national nosocomial infections surveillance system risk index for health services research. Infect Control Hosp Epidemiol 2009;30(6):563-9.
17. Lee TB, Montgomery OG, Marx J, Olmsted RN, Scheckler WE. Recommended practices for surveillance: Association for Professionals in Infection Control and Epidemiology, Inc. Am J Infect Control 2007;35(7):427-40.
18. Curless M, Ruparelia C, Thompson E, Trexler P. Infection prevention and control. Surveillance of health care-associated infections. Jhpiego Corporation. Baltimore, USA, 2018.

19. Sartor C, Edwards JR, Gaynes RP, Culver DHEvolution of hospital participation in the National Nosocomial Infections Surveillance System, 1986 to 1993. Am J Infect Control. 1995;23(6):364-8.
20. Fabrya J, Moralesb I, Metzgera MH, Russellc I, Gastmeier P. Quality of information: a European challenge. J Hosp Infect 2007;65(S2):155-158.
21. Ministry of Health of Republic of Serbia. Law on Protection of Population from Infectious Diseases. Official Gazette of Republic of Serbia, 15/2016.
22. Ministry of Health of Republic of Serbia. Rulebook on Prevention, Early Detection and Control of HAI. Official Gazette of Republic of Serbia, 77/2015.
23. Ministry of Health of Republic of Serbia. Rulebook on Indicators of Quality of Healthcare. Official Gazette of Republic of Serbia, 49/2010.

2. SURGICAL SITE INFECTION AND OTHER HEALTHCARE-ASSOCIATED INFECTIONS IN POPULATION OF SURGICAL PATIENTS

Šuljagić Vesna
Department of Prevention and Control of Healthcare Associated Infection, Military Medical Academy, Faculty of Medicine of Military Medical Academy, University of Defence, Belgrade, Serbia

Surgical care has been an essential component of health care worldwide over the past two centuries. Every year, many millions of people undergo surgical treatment, and surgical interventions account for an estimated 13% of the world's total disability-adjusted life years. Complications after inpatient operations occur in up to 25% of patients; at least half of the cases in which surgery led to harm are considered preventable. One of the most common complication of surgical procedures is infection. Infections after surgical procedures can cause longer hospital stays, and increased health care costs. Postoperative infections may cause severe problems, including failure of the surgical procedure, other surgical complications, sepsis, organ failure, and even death.
Identified healthcare-associated infections (HAIs) as an important patient safety challenge in surgery.HAIs were defined as infections that occurred during a hospitalization and that were not present prior to hospital admission. Infections had to meet body site–specific criteria. HAIs are preventable with adoption of recognized preventive measures. The first step is to identify patients at higher risk of HAI.
Several risk factors (RF) are associated with the development of HAI following surgical procedures: older age, obesity, diabetes, other comorbidities, smoking, emergency operations, microbial contamination (with debris, stool, pus, urine or other substance) of the injury or the surgical area, etc. Preoperative identification of these RF and patient risk stratification are critical to effectively assess individualized risks, postoperative expectations, and whether surgery is appropriate.
Surgical site infections (SSIs) are the most common infections in population of surgical patients. SSIs are infections of the incision or organ or space that occur after surgery. RF for SSIs can be divided into host and perioperative factors, which can be further divided into preoperative, intraoperative, and postoperative factors. Surgical patients initially seen with more complex comorbidities and the emergence of antimicrobial-resistant pathogens increase the cost and challenge of treating SSIs.It has been estimated that approximately half of SSIs are preventable by application of evidence-based strategies.
Healthcare associated pneumonia (HAP) is a complication that sometimes occurs after major surgery. It is a very serious problem because some of affected patients die after surgery. HAP is more common after certain types of operations, and older and weaker patients are more likely to get it. Surveillance of HAP in surgical patients provides useful data in identifying RF that contribute to the development and outcome of HAP.
Catheter-associated urinary tract infections (CAUTI) are also common in surgical patients. Prolonged catheter duration and appropriate catheter use are major RFs for CAUTI. CAUTI pathogenesis and treatment are complicated by the presence of biofilms. Prevention strategies include accurate identification and tracking of CAUTIs, and the development of institutional guidelines for the appropriate use, duration, and removal of indwelling urinary catheters.
In the last two decades there have been dramatic changes in the epidemiology of ***Clostridium difficile*** infection (CDI), with increases in incidence and severity of disease internationally. The incidence of CDI has also increased in surgical patients. Surgical patients, although usually younger and healthier than their medical counterparts, frequently receive prophylactic antibiotics and have long inpatient hospital exposure. Wise use of antibiotics, and other infection control strategies decrease incidence and in-hospital mortality rate of CDI in surgical patients.
The prevention and control of HAIs in population of surgical patients is a top priority for the healthcare workers in surgery. It is not something that begins and ends in the inpatient health care environment. It is a collective process.

Key words: surgery, surgical site infections, healthcare associated pneumonia, catheter-associated urinary tract infections, ***Clostridium difficile*** infection, prevention and control
REFRENCE

1. WHO Patient Safety & World Health Organization. (2009). WHO guidelines for safe surgery: 2009: safe surgery saves lives. Geneva: World Health Organization. http://www.who.int/iris/handle/10665/44185
2. Berríos-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. ***JAMA Surg.*** 2017; 152(8):784–791. doi:10.1001/jamasurg.2017.0904
3. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infect Control Hosp Epidemiol*. 2011;32(2):101-114.
4. Šuljagić V, Jevtic M, Djordjevic B, Jovelic A. Surgical site infections in a tertiary health care center: prospective cohort study. Surgery today. 2010 Aug 1;40(8):763-71.
5. Sotirović J, Šuljagić V, Baletić N, Pavićević L, Bijelić D, Erdoglija M, Perić A, Soldatović I. Risk factors for surgical site infection in laryngeal cancer surgery. Acta clinica Croatica. 2015 Mar 1;54(1.):57-63.
6. Starčević S, Munitlak S, Mijović B, Mikić D, Šuljagić V. Surgical site infection surveillance in orthopedic patients in the Military Medical Academy, Belgrade. Vojnosanitetski pregled. 2015;72(6):499-504.
7. Šuljagić V, Milović N, Kočević B, Bančević V, Šegrt Z, Rajić-Dimitrijević R, Miolјević V. Surgical site infections and other healthcare related infections in cohort of urological patients, 2010-2013. Acta chirurgica Iugoslavica. 2014;61(3):25-32.
8. Ramanathan R, Duane TM. Urinary tract infections in surgical patients. Surgical Clinics. 2014 Dec 1;94(6):1351-68.
9. Mladenović J, Veljović M, Udovičić I, Lazić S, Jadranin Ž, Šegrt Z, Ristić P, Šuljagić V. Catheter-associated urinary tract infection in a surgical intensive care unit. Vojnosanitetski pregled. 2015;72(10):883-8.
10. Smetana GW, Lawrence VA, Cornell JE. Preoperative pulmonary risk stratification for noncardiothoracic surgery: systematic review for the American College of Physicians. Annals of internal medicine. 2006 Apr 18;144(8):581-95.
11. Taušan Đ, Kostić Z, Slavković D, Nešković B, Bokonjić D, Grujičić-Šipetić, Ratković N, Šuljagić V.Incidence, in-hospital mortality and risk factors for hospital-acquired pneumonia in patients with intra-abdominal surgical procedures hospitalized in a tertiary hospital in Belgrade, Serbia: A matched case- control study. Vojnosanitetski pregled 2018 OnLine-First Issue 00, Pages: 125-125 https://doi.org/10.2298/VSP180521125T
12. Bernatz JT, Safdar N, Hetzel S, Anderson PA. Antibiotic overuse is a major risk factor for Clostridium difficile infection in surgical patients. Infection Control & Hospital Epidemiology. 2017 Oct;38(10):1254-7.
13. Šuljagić V, Miljković I, Starčević S, Stepić N, Kostić Z, Jovanović D, Brusić-Renaud J, Mijović B, Šipetić-Grujičić S. Risk factors for Clostridium difficile infection in surgical patients hospitalized in a tertiary hospital in Belgrade, Serbia: a case–control study. Antimicrobial Resistance & Infection Control. 2017 Dec;6(1):31.

3. NEONATAL CANDIDOSIS:THE MODE OF *CANDIDA*-TRANSMISSION, RISK FACTORS, POSSIBLE STRATEGIES OF PREVENTION

Otašević Suzana[1,2], Momčilović S.[1], Ranđelović M.[1,2], Arsić-Arsenijević V[3].
[1]University of Niš, Serbia, Faculty of Medicine Niš
[2]Public Health Institute Niš, Serbia
[3]University of Belgrade, Serbia, Faculty of Medicine Belgrade

Yeasts of the genus *Candida* represent a leading cause of sepsis in very and extremely low birth weight infants. The prevalence of late-onset sepsis ranges from 2.6 to 16.7% in very low birth weight (VLBW≤ 1.500 g) preterm infants and from 5.5% to 20% in extremely low birth weight (ELBW≤ 1.000 g) ones (1). Recently, *Candida* species have been reported as emerging nosocomial pathogens and *Candida*-attributable mortality in preterm infants can reach up to even 43% in spate significant improvement in neonatal care (2).
The first link in the pathogenesis chain of fungal infections in neonates is adherence followed by colonization and dissemination (1). Adherence factors of fungi, the number of microorganisms and multiple site colonization are the most important virulence properties and risk factors which could influence infection (3). Also, many patient risk factors (such asmoist skin, mucosal or skin demage, imature immune defense associated with possible coinfection) along with various surgical diseases (necrotising enterokolitis, intestinal perforation), interventions (abdominal surgery) and other invasive medical procedures (parentenal nutrition**,** necessity of catheters, tubesapplication) as well as administration of some medications (antibacterial drugs, steroides, H2 antagonists) represent very important predisposing conditions that could affect the occurrence of yeast dissemination and the onset of infection (4-7).

The dominant species, causative agents of invasive fungal infections (IFI) in preterm neonates are ***Candida (C.) albicans*** and *C.**parapsilosis.* **These** commensal organisms colonize the skin and mucosal surfaces and cause approximately 80-90% of infections in infants (1,2). Recently, invasive candidosis due to *C. glabrata* and *C. krusei* are another increasingly recovered IFI (8,9). In Serbia, after the first, prospective, national, multicenter study, it can be highlighted that *C. albicans* is the most common isolate with prevalence of 77.8%. As for non-*albicansCandida* species, *C. tropicalis*,*C. lipolytica* and *C. parapsilosis* fungaemia in VLBW infants were established (10).
Generally, accepted theory is that colonization by*Candida* spp. in neonates emerges by vertical transmission from the mother (11). Moreover, molecular studies have shown that *Candida* vaginal infection is strongly associated with congenital candidosis, has the great impact on outcomes of pregnancy with a history of cerclage and can be the large problem in attempts of *in vitro* fertilization. On the other hand, horizontal acquisition of ***Candida*** has been also proved and is consider as probably the most common mode of transmission for ***C. parapsilosis*** **strain (3,12,13).**
Preventive measures are of great importance given the fact that treatments for IFI are not always successful, morbidity remains high, and the management is fraught with numerous complications. So far, the efforts are focused on prevention of invasive fungal diseases which includes chemoprophylaxis in order to reduce colonization index and establishing the preemptive diagnostic procedures followed by preemptive appropriate therapy. Chemoprophylaxis, which includes the application of fluconazole or local nystatin, as well as the use of probiotics were introduced as preventive measures to face this pathology (1). However, fluconazole administration significantly decrease the prevalence of fungaemia in VLBW and ELBW neonates, but in some studies it has been determined that this measures did not decrease the incidence of non-*albicans* species caused fungemia (1). On the other hand, prophylaxis with live probiotic bacteria and yeasts could carry the risk of transmission of these microorganisms into the blood of infants.
Consequently, further attempts to prevent the occurrence of these infections in prematures will be directed towards the prevention of colonization. A new preventive strategy has to start with the identification of risk and protective factors for vertical and horizontal transmission of yeasts followed by the development of an appropriate test strategy and finally, the assurance of widespread adoption. Test prevention strategy for interrupting the vertical transmission requires the control and treatment of genital candidosis of child-bearing woman. However, this is a very big chalange for gynecologists given that i) genital candidosis is the most common infection in women; ii) the prevalence of vaginal

colonization in pregnant women is very high (30-40%); iii) yeasts of the genus *Candida*, especially species *C. albicans*, are considered as commensal organisms which presence in a small number is allowed by immune system; iv) molecular studies have proved that vulvovaginal *Candida*-colonization is present in 64% of women (14) and using molecular typing techniques, vertical transmission of ***C. albicans*** was documented in 33% of premature infants (15). Results of our research showed that prevalence of genital candidosis in women is 22%, that 8% of women had chronic/recurrent form of this infection, and that approximately 15% of asymptomatic women and 23% of expectant mothers are colonized by yeasts of the genus *Candida* (16)**.** What makes these data more alarming is the fact that these strains are less susceptible to usually used antifungal drugs in the treatment of this genital infection.

On the other hand, transmission of *Candida* species to premature neonates can be due to the horizontal(patient to patient) transmission and through medical procedures. In a multicenter study, *Candida* spp. were isolated from the hands of 29% of health workers with a predominance of *Candida parapsilosis* (19%) (1). Moreover, medical equipments and procedures are very often responsible for infections due to the contaminated instruments, needles, or dressings, or contaminated gloves that are not changed between patients. In addition, it was established that stethoscopes and mobile phones could be also colonized by fungi (17).

In prevention, it is very important to develope test prevention strategy for vertical and horizontal transmission. As for the vertical transmission, the cotrol of pregnant women has to include personalisation of each case, consideration of recurrent form of genital candidosis, and obligatory mycological analyses with antimycogram test. Also, during the control examination, it is necessary to exclude intestinal overgrowth and possibility of sexual transmissin. Finally, it is very important to perform laboratory control and to carry out adequate treatment in the last trimester or month of pregnancy (18). It is possible that futher research will give us some new solution for solving the problem such as a vaccine (15) and possibility of alternative treatment with some natural compounds (16). As for the horizontal transmision, the best results were obtained by integrating preventive measures in neonatal intensive care units. These preventive measures are similiar with rutine meassures for prevention of nosocomial infections and include desinfection, sterilization, isolation of patient and chemoprophylaxis. However, hand hygiene should be performed using the combination of running wather and sanitizer instead of waterless hand sanitizer (19). Besides, these measures are also followed by a decision that applies to all employees in clinics - everybody must be supervisor to anybody.

In conclusion, the first step in prevention strategy for neonatal candidosis has to be establishment of the official national approach and monitoring with real support from authorities for this infection, which must be followed by ensuring widespread adoption into clinical practice.

References

1. Leibovitz E. Strategies for the prevention of neonatal candidiasis. Pediatr Neonatol. 2012; 53(2):83-9.

2. Lovero G, De Giglio O, Montagna O, Diella G, Divenuto F, Lopuzzo M, et al. Epidemiology of candidemia in neonatal intensive care units: a persistent public health problem. Ann Ig. 2016; 28(4):282-7.

3. Bendel CM. Colonization and epithelial adhesion in the pathogenesis of neonatal candidiasis. Semin Perinatol. 2003; 27(5):357-64.

4. Benjamin DK Jr1, Stoll BJ, Fanaroff AA, McDonald SA, Oh W, Higgins RD, Duara S, et al. Neonatal candidiasis among extremely low birth weight infants: risk factors, mortality rates, and neurodevelopmental outcomes at 18 to 22 months. Pediatrics. 2006; 117(1):84-92.

5. Saiman L, Ludington E, Pfaller M, Rangel-Frausto S, Wiblin RT, Dawson J, et al. Risk factors for candidemia in Neonatal Intensive Care Unit patients. The National Epidemiology of Mycosis Survey study group. Pediatr Infect Dis J. 2000; 19(4):319-24.

6. Saiman L, Ludington E, Dawson JD, Patterson JE, Rangel-Frausto S, Wiblin RT, et al. Risk factors for Candida species colonization of neonatal intensive care unit patients. Pediatr Infect Dis J. 2001; 20(12):1119-24.

7. Manzoni P, Farina D, Leonessa M, d'Oulx EA, Galletto P, Mostert M, et al. Risk factors for progression to invasive fungal infection in preterm neonates with fungal colonization. Pediatrics. 2006; 118(6):2359-64.
8. Verweij P, Lyon S. Optimizing antifungal strategies to improve patient survival. Future Microbiol. 2016. [Epub ahead of print]
9. Karabıçak N, Alem N. Antifungal susceptibility profiles of Candida species to triazole: application of new CLSI species-specific clinical breakpoints and epidemiological cutoff values for characterization of antifungal resistance. Mikrobiyol Bul. 2016; 50(1):122-32.
10. Arsić Arsenijević V, Otašević S, Janić D, Minić P, Matijašević J, Medić D, et al. Candida bloodstream infections in Serbia: first multi-center report of a national prospective observational survey in intensive care units. Mycoses. 2018; 61(2):70-78.
11. Zisova LG, Chokoeva AA, Amaliev GI, Petleshkova PV, Miteva-Katrandzhieva TM, Krasteva MB, et al. Vulvovaginal Candidiasis in Pregnant Women and its Importance for Candida Colonization of Newborns. Folia Med (Plovdiv). 2016; 58(2):108-14.
12. Pfaller MA, Diekema DJ. Epidemiology of invasive candidiasis: a persistent public health problem. Clin Microbiol Rev 2007; 20(1):133-63.
13. Waggoner-Fountain LA, Walker MW, Hollis RJ, Pfaller MA, Ferguson JE 2nd, Wenzel RP, et al. Vertical and horizontal transmission of unique ***Candida*** species to premature newborns. Clin Infect Dis. 1996; 22(5):803–8.
14. van de Wijgert JHHM, Jespers V. The global health impact of vaginal dysbiosis. Res Microbiol. 2017; 168(9-10):859-64.
15. Cauchie M, Desmet S, Lagrou K. Candida and its dual lifestyle as a commensal and a pathogen. Res Microbiol. 2017; 168(9-10):802-10.
16. Otasevic S, Momčilović S, Trajkovic A, Arsic-Arsenijevic V. Modelling of antifungal treatment with azoles and essential oils for non-albicans Candida spp. causing vulvo-vaginal infections. 27th European Congress of Clinical Microbiology and Infectious Diseases; 2017 April 22-25; Vienna, Austria.
17. Otasevic SA, Ignjatovic AM, Rancic NK, Momcilovic SD, Krivokapic LJ, Nikolic JD, Arsic-Arsenijevic VS. Laboratory investigation of moulds and yeasts contamination of mobile phones. Mycoses. 2017; 60(Suppl. 2):145-145.
18. Mendling W, Brasch J, Cornely OA, Effendy I, Friese K, Ginter-Hanselmayer G, et al. Guideline: vulvovaginal candidosis (AWMF 015/072), S2k (excluding chronic mucocutaneous candidosis). Mycoses. 2015; 58 Suppl 1:1-15.
19. Chen J, Yu X, Zhou Y, Zhang Y, Zhu J, Xie L, et al. Integrated measures for prevention of invasive Candida infections in preterm infants in a Chinese neonatal intensive care unit. Am J Infect Control. 2015; 43(12):1321-5.

4. CLINICAL CHARACTERISTICS OF PATIENTS IN THE MEASLES OUTBREAK, 2017 TO 2018

Popović-Dragonjić Lidija
University of Niš, Serbia, Faculty of Medicine Niš
Clinic of infectious diseases Niš, Clinical Center Niš, Serbia

Introduction

Measles could be a serious disease in all age groups. Children younger than 5 years and adults older than 20 years are more prone to measles complications. More frequents complications include diarrhoea, otitis media, conjunctivitis, laryngitis, pneumonia, bronchitis, croup, febrile convulsions. Less frequent complications include hepatitis, meningitis and encephalitis and acute respiratory distress syndrome (ARDS). Very rare complications are optic neuritis and vision loss, myocarditis and subacute sclerosing panencephalitis. The majority of patients recover in 7-10 days, but certain number develops complications. 1 in 5,000 patients affected with measles will die (1,2).
According to the data obtained from the Wold Health Organization and the Center for Disease Control and Prevention, 53 European countries were covered by analysis of the 2017/2018 outbreak and Ukraine was the hardest hit country with more than 23 000 cases so far in 2018.Six other countries in the region: Italy, Greece, Georgia, Russia, Serbia, France - have recorded more than 1000 infections in adults and children in 2018. 37 people have died across Europe. Serbia reported 15 deaths, the highest number of any country included. There were total 5715 cases in Serbia out of which 2875 were laboratory confirmed (since October 2017 through August 2018) (3,4).
Aim

The aim of this study is to analyze clinical characteristics of patient hospitalized in Clinic for infectious disease, Clinical Center in Nis, Serbia (CID, CC Nis).

Patients and methods

Out of 224 patients hospitalized in CID, CC Nis between November 20, 2017 and May 5, 2018 during the measles outbreak in Nishava and Toplica district, 208 patients' charts are statistically analyzed (clinical characteristics and routine blood analyzes) through SPSS for Windows 10. Criteria for hospitalization were complication of measles.

Results

1240 people from the Nishava and Toplica district were affected with measles. In 974 patients (79%), measles were serologically confirmed. Only 3% of patients were completely vaccinated (two doses of MMR vaccine). 4% got one dose of MMR vaccine, 26% have not been immunized at all. 67% of patients had uncertain immunization status. 1473 patients suspected for measles were examined by infectologists in CID,CC Niš. 224 patients were hospitalized. Only cases in which period from rash appearance until the moment of obtaining serum for analysis was exactly established were taken in consideration for interpretation of measles analyses results, because of possible false negative results despite obvious ongoing measles (those were 92 patients, 77 (84%) positive and 15 (16%) negative for measles). Out of 208 patients included in further analysis in this manuscript, 121 were females an 86 were males. The average year of birth was 1981 (the range of 1947 to 2003). All the patients were adults except one child with chronic human immunodeficiency virus infection. The laboratory characteristics of the patients are given in Table 1.
Clinical characteristics are given in Table 2 (respiratory complications) and Table 3 (gastrointestinal complications). Numbers of patients with hepatitis and pancreatitis are shown in table 4. There were 2 patients with measles encephalitis. The most usual manfestations of measles, such as fever, maculopapular rash, conjunctivitis, and Koplik's spots were not included in analysis since being almost always present in measles.

	N available results	$\bar{x}$ **± SD**	**Min**	**Max**
Le G/l	201	6.1 ± 2.3	1.6	14.9
Ne %	201	75.5 ± 15.8	23	94.6
Tr G/l	199	166.6 ± 77.6	23	537
CRP mg/l	202	63.4 ± 59.1	0.2	347.5
AST u/l	186	104.1 ± 107.9	5	771
ALT u/l	200	119.6 ± 142.5	8	723
LDH u/l	131	985.1 ± 563.9	77	4309
GGT u/l	133	191.1 ± 250.7	10	1572
BILIRUBIN total µmol/l	28	14.3 ± 10.3	0.9	44.8
BILIRUBIN direct µmol/l	27	7.4 ± 9.3	0.8	39.4
AMYLASE serum u/l	148	109 ± 145.7	19	1601.3
AMYLASE urine u/l	131	1311.1 ± 1227.9	44.8	6520
LYPASE u/l	29	80.4 ± 121.6	6	606

Table 2. Respiratory complications of measles

Symptoms & established dg	**N / % patients with symptoms**	**N available data**
Pneumonia, radiogically	85/ 43	198
Pneumonia with lethal outcome	1 / 0.5	198
Dry cough	170 / 90	189
Breathing difficulty, dispnoea	81 / 43	188
ARDS	3 / 1	208
ARDS with lethal outcome	1 / 0.5	208

Table 3. Gastrointestinal complications of measles

Symptoms	**N / % patients with symptoms**	**N available data**
Nausea	129 / 67	192
Vomiting	99 / 53	184
Diarrhoea	53 / 28	191
Abdominal pain	50 / 26	194

Table 4. Patient with hepatitis and pancreatitis

Findings	**N / % patients with the finding**	**N available data**
Acute pancreatitis	46 / 34	131
Pancreatitis	31 / 23	131
Acute hepatitis	4 /2	200
Hepatitis	83/ 41.5	200

Discussion

Complications from measles have been reported in every organ system. Many of them are are caused by disruption of epithelial surface and immunosuppression. Respiratory and gastrointestinal complications in measles are not rare, unfortunately. Neurological complications are rare, but leave patients with long term sequelae most often (5).

In measles infection, 55 % patients has radiographic changes of pneumonia, out of which 77% with severe disease. It is estimated that 49-57% adults and 9% children with measles will have pneumonia (6). Almost half of our inpatients (43%) had pneumonia, which does not differ significantly from the literature data. One lethal outcome due to pneumonia occurred in postpartal period in a 21 year old woman, which could be explained through decline of immunity in pregnancy and postpartal period. Deaths from measles are due largely to an increased susceptibility to secondary bacterial infections, attributed to a prolonged state of immune suppression (7). ARDS in measles occur even in developed countries, its occurrence represent the most severe clinical presentation with high fatality rate. Data about ARDS rate are scarce, percentages between 0% and 5% could be found in literature. Up to 21% children among children with pneumonia could develop ARDS (8). Although our patients with ARDS were administered appropriated antibiotics, immunoglobulines and mechanically ventilated, there was one lethal outcome.

Measles affect gastrointestinal tract of the majority of the patients. ‘’Giant cells’’ which are typical for measles especially in respiratory complications can also be found in tissue of stomach (gastritis) and appendix (appendicitis). Digestive and urogenital complications of measles are: diarhhoea, hepatitis, appendicitis with perforation and peritonitis, mesenterial lymphadenitis, hepatitis, ileocolitis, cervicitis, acute glomerulonephritis (5, 9). Diarrhoea is the most frequent digestive complication. It is present in approximately 8-63% of patients, especially if they are younger than 5 years and older than 30 years. Bacterial flora from the stool in measles related diarrhea and diarrhea not related to measles does not differ. It usually appears 1 day before the rash (5). Hepatitis is seenin younger adults with measles (more severe and more frequent compared to children). Almost 80% patients with measles have hepatitis. Up to 3% patients have icterus. The maximum of the liver test alteration occurs between the 5th and the 10th days of the illness. It is a reversible impairment with complete resolution of liver damage. There is a correlation between severity of damage and secondary bacterial infections (10,11). Interestingly, some gastrointestinal complications, such as acute pancreatitis, have occurred in unexpectedly high rate. The ‘’common’’ hepatitis (ALT increased up to 10 times) and ‘’common’’ pancreatitis (urin amylase increased up to 1200 U/l) are usual in measles, percentage of our patients is not greater than data in literature. However, acute pancreatitis (urine amylase greater than 1200 U/l) is rarely seen in literature in such a percentage (23%). By searching the Medline database until 1996, only 4 cases of acute pancreatitis caused by measles. The clinical features of acute measles pancreatitis (AMP) do not differ from pancreatitis of other etiologies (12, 13, 14, 15, 16). It seems like pancreas is Measles virus’ new target organ.

Conclusion

A significant percentage of adults with measles presented with complication for which they were hospitalized. The rate of measles-related deaths is not to be underestimated. ‘’Better to prevent than to treat’’, a well known Serbian saying, should be our motto when it comes to measles.

References

1. https://www.nhs.uk/conditions/measles/complications/
2. https://www.cdc.gov/measles/about/complications.html
3. https://ecdc.europa.eu/en/publications-data
4. http://www.who.int/immunization/monitoring_surveillace/burden/vpd/surveillance_type/active/measles_monthlydata/en/
5. Orenstein WA, Perry RT, Halsey NA. The clinical significance of measles: a review. J Infect Dis 2004; 189(1): S4-S16.
6. Henneman PL, Birnbaumer DM, Cairns CB. Measles pneumonitis. Ann Emerg Med 1995; 26(3):278-82.

7. Moss WJ, Ota MO, Griffin DE. Measles: immune suppression and responses. Int J Biochem Cell Biol 2004; 36(8): 1380-5.
8. Li J, Zhao Y, Liu Z, Zhang T, Liu C, Liu X. Clinical report of serious complications associated with measles pneumonia in children hospitalized at Shengjing hospital, China.J Infect Dev Ctries 2015; 9(10): 1139-46.
9. Rasul KI, Al-Kaabi S. Acute pancreatitis associated with the Measles virus. Ann Saudi Med 2000; 20(2): 176-7.
10. Gavish D, Kleinman Y, Morag A, Chajek -Shaul T. Hepatitis and jaundice associated with measles in young adults. An analysis of 65 cases. Arch Intern Med 1983 Apr;143(4):674-7.
11. Shalev-Zimels H, Weizman Z, Lotan C, Gavish D, Ackerman Z, Morag A. Extent of measles hepatitis in various ages. Hepatology 1988; 8(5):1138-9.
12. www.Cochrane.org/CD12010/UPPERGI_blood-and-urine-test-diagnosis-acute-pancreatitis-sudden-inflammation-pancreas
13. Miralbés M, Garreta J, Manonelles A, Gonzalez T, Martinez-Cerezo FJ. Acute pancreatitis induced by the measles virus: a case report. Pancreas. 1995 ;11(1):101-2.
14. N. C. Morcos, H. McHugh. Pancreatitis associated with measles in a young adult.J Natl Med Assoc. 1997; 89(7): 435–7.
15. KI Rasul, S Al-Kaabi, Acute Pancreatitis Associated with the Measles Virus. Ann Saudi Med 2000; 20(2): 176-7.
16. Fusilli G, De Mitri B. Acute pancreatitis associated with the measles virus: case report and review of literature data. Pancreas. 2009;38(4):478-80.

5. MEASLES OTBREAK IN THE TERRITORY OF CENTRAL KOSOVO

Ničković Vanja
Clinical Hospital Center Priština, Gračanica, Serbia

Introduction: Measles (Morbilli) is a highly contagious rash fever spread via droplets. It is caused by Paramyxovirus RNA. The virus is transmitted via the respiratory route, followed by elevated body temperature, cough, runny nose and conjunctivitis ("*facies morbillosa*"), associated with characteristic maculopapular rash. Due to inadequate immunization and immunosuppression, measles-related complications may include laryngitis, angina, ear infection, interstitial pneumonia (and the development of bacterial superinfection), gastroenteritis, encephalitis and subacute sclerosing panencephalitis. The most severe cases may cause even death.
Aim: The aim of the study was to analyze clinical and laboratory findings of children and adults in Serbian enclaves in Kosovo.
Material and methods:
This is a retrospective study including 193 patients, 89 (46.4%) children and 109 (53.7%) adults in the period from October 11th 2017 to April 7th 2018; obtained clinical and laboratory data and complications occurrence were compared among children aged ≤ 18 years and adults from 18 to 52 years of age. They were treated at Infectious Diseases Department, University Clinical Center Priština. Distribution of age, sex, ethnicity, frequency of symptoms and complications of the disease, as well as routine hematological and biochemical parameters, were compared and analyzed.
Results: The greatest number of patients in both experimental groups was recorded in December 2017 (37.5 % and 32.6%). Male gender dominated regardless the age in 57.1% children and 62.1% adults. As for ethnicity, regardless the age, Roma ethnicity (41.8% and 49.5%) and Serbian ethnicity (42.5% and 39.9%) were almost equally distributed, and other ethnicities (Albanian, the Gorani, Turkish) were distributed 16.7%, 10.7%, 2.2% respectfully. The incidence of high fever, cough and rash was similar among the children of all ethnicities (94.6%, 89.1 %, 91.8 %; 54.34%, 65.21%; 100%,100%100%;). Both in children and adults, laboratory analyses most commonly revealed: leukopenia (34.78% and 2926%), lymphocytosis (69.56 % and 71.73%), thrombocytopenia (30.43% vs. 39.13%) and aspartate aminotransferase activities increase (31.73% and 49.73%). The most common complications in 63.04% of older children aged between 10 and 14 included laryngitis, bronchopneumonia and tracheitis. They were distributed as follows: laryngitis (43.7 %), bronchopneumonia (50.3%) and tracheitis (52.1 %). Interstitial pneumonia was registered in 15.64 % of children of the same age. The most common complication in younger children between 2 and 4 years of age (38.7%) was otitis media. In 70.1% of adults between 28 and 48 years of age the most common complication was bronchopneumonia. There were two cases of encephalitis.
Vaccination status of children: there were 72.3% unvaccinated and 14.3% incompletely vaccinated children. Regardless the age, unvaccinated patients or those of uncertain vaccination status were 100% associated with the Roma ethnicity. Unvaccinated children comprised 41.2 % of cases, and incompletely vaccinated children comprised 12.1% of cases in children of Serbian ethnicity. Other ethnicities included 9.9% unvaccinated and 1.1 % incompletely vaccinated children. Vaccination status of adults: there were 62.3% unvaccinated and 39.3% incompletely vaccinated patients or with uncertain vaccination status. Roma people dominated among adult unvaccinated patients (87.2 %), while incompletely vaccinated patients were predominantly of Serbian nationality (57.6 %).
Conclusion. A decrease in incidence of measles, reaching global and regional eradication, can be achieved by measles vaccination as a preventive measure.
Key words: measles, children, adults, epidemic, laboratory, clinical characteristics, vaccination status

6. MEASLES IMMUNIZATION IN SERBIAN AREAS IN KOSOVO AND METOHIA:CHALANGES FOR THE FUTURE

Stevanović Jasmina
University of Priština, Serbia, Faculty of Medicine in Kosovska Mitrovica, Department of Epidemiology

Introduction : Vaccination is an individual right and a collective responsibility.-Sunday immunization in the WHO European Region 2018
Immunization is one of the most successful public health initiatives. Immunization prevents diseases, complications, and deaths from vaccine-preventable diseases. It is estimated that 18.7 million children in the world remain unvaccinated every year, with basic vaccines according to an extended immunization program.
The WHO begins the Extended Immunization Program (EPI) in 1974 with the goal of all children in the world being vaccinated against frequent and deadly diseases. The main and basic success of the EPI program is that over 3 million children's lives are saved annually.
The WHO EPI program began to apply in the territory of Serbia in 1978. If we look at a little bit in the past, in the 19th century, Serbia accepted the vaccination among the first in Europe and the world and regulated this area of health in the legislation. Vaccination against variola was mandatory by law back in 1839. Long before the EPI program appeared, vaccines against variola, tuberculosis, rabies, diphtheria, tetanus, childhood paralysis and smallpox were mandatory in Serbia.
The basic goal of the EPI program is to reach 95% and higher coverage of immunized individuals at the level of the entire population.
The goal of the EPI program in Serbia is that every child is immunized with all the predicted vaccines in order to achieve a high degree of collective immunity and prevent the disease and the epidemic of diseases that can be prevented by vaccines.
The aim of the paper : The aim of the paper is to demonstrate the success of immunization with MMR vaccine in the Serbian communities of Kosovo and Metohija, as well as to highlight the challenges in implementing mandatory immunizations in this area in the future.
Material and Methods : We have analyzed the annual reports of the Public Health Institute Kosovska Mitrovica on completed mandatory immunizations.
Descriptive epidemiological method is used in this paper.
Results : Vaccines and vaccinations have been present in our territory since the 19th century, and there has always been a discussion of their justification and success, so the percentage of immunized people varied over time. If we look at data from Kosovo and Metohija, we will see that data is similar to in other parts of Serbia, but we have to take into account the specificity of this territory. So, the percentage of successfully immunized in 2011 was 96.5%, and for years this number has declined in 2015.84.0%, 2016 82, 14%, which caused the onset of an epidemic of morbile in 2017. and in 2017, the percentage of immunized persons increased to 96.7%. In the future, as little as possible and as little morbidity epidemics as possible, we need to continue with continuous vaccination in places where it is possible, and where there are no conditions, try to make campaigning immunization regular, to provide every child with the opportunity to be protected from all vaccine-preventable diseases. Health workers need to educate the population, and through health education to explain the importance and benefits of a vaccine for every child.
Conclusion : The future with as few patients as possible, and the higher percentage of successful and timely vaccinated people is our main goal. In order to achieve this despite the specificities of the Serb communities of Kosovo and Metohija, we must ensure unhindered procurement and timely availability of vaccines. Continual implementation of immunization, as well as constant work on education of the population. As well as the continuous education of health professionals in the goal of approaching and explaining the importance and benefits of the vaccine.
Key words : Immunization, MMR vaccine, Kosovo and Metohija

ORAL PRESENTATIONS

Wednesday, 26.09.2018.15:45-16:15
Faculty of Medicine Niš annex building, main hall

1. TRENDS IN ROUTINE IMMUNIZATION IN CITY OF BIJELJINA, 2001-2016
Dakić Marjena, Novaković M., Dakić Z.
Health Center Bijenljina, Republic of Srpska, Bosnia-Herzegovina

Objectives: immunization has greatly reduced the burden of mankind with infectious diseases. More recently, the focus of public interest has been shifted to adverse effects or prejudices related to vaccination much more than on their effectiveness and benefit to society. This paper overviewsvaccination coverage of children aged 6-18 years, the users of health services of the Family Medicine Service of Bijeljina in the period 2001-2016, as well as the consequences of the failure in the process of immunization.
Materials and methods: Retrospective analysis. Data in this paper were obtained through the revision of the immunization records of the Vaccine Center Bijeljina and the analysis of medical records of children aged 6-18 in the Family Medicine Service.
Results: The vaccination coverage of children in the past decade has been decreasing successively. The highest drop in vaccination was recorded for MMR vaccine (from 93% in the beginning of the observed period to 58% in 2016), followed by DiTe pediatric (98% to 64%), DiTe (93% to 55%) and ultimately tetanus vaccine at the age of 18 (from 97% to 65%). In the observed period, three outbreaks of vaccine-preventable diseases (mumps, rubella, measles) were reported in Bijeljina.
Conclusion: Change in the paradigm of evaluating the effectiveness of vaccination in assessing and monitoring its side effects has consequently led to a lower interest in the immunization population. Not only the antivacial sector is responsible for this phenomenon, but also the problems in the procurement and distribution of vaccines and inadequately clear and resolute attitude of health professionals.
Key words:immunization coverage, vaccine-preventable diseases, Bijeljina

2. VACCINATION OF EMPLOYEES OF HEALTHCARE INSTITUTIONS-ACTUAL PROBLEM

Branislav Tiodorović
University of Niš, Serbia

Introduction

Vaccines have given a strong contribution to national health both individually and socially and certainly economically and therefore represent one of the greatest achievements in medicine. Vaccines for the economy are of great importance, because good organization and quality vaccines reduce hospitalization as well as the need for expensive therapy, and in doing so reduce lasting consequences and limit the long-term effects of the disease. In addition to reducing the epidemic, productivity reductions are also reduced.

Objective, material and methods

The aim of this paper is to identify, on the basis of relevant data and information, the underlying causes of partial understanding of the importance of immunization of health workers.

Work and discussion

The resistance to vaccines constituted in the last decade, in particular, was based on knowledge of Th1 - Th2 paradigms, on the use of vaccines such as cellular pertussis vaccine, contagious diseases associated with the Gulf War. Thereafter, the views on better immunity following natural infections as well as some ambiguities in the scientific settings on vaccines and the immune system. Also, the application of the vaccine according to the strict recipe and the application of a strict protocol, as well as the fight against any remark on the vaccine, was noticed, whereby the individuality of the organism and the diseases from which someone is ill, as well as the current state of the organism.

According to the RULES ON IMMUNIZATION AND THE PROTECTION OF MEDICATIONS (Official Gazette of the Republic of Serbia, No. 88/2017, 11/2018, 14/2018, 45/2018, 48/2018 and 58/2018) Article 14 provides also for the 4) obligatory active and passive immunization of employees in health institutions, while an active and passive immunization of persons employed in health institutions is subject to a certain Article 18. It is carried out against certain infectious diseases in accordance with the program referred to in Article 13, paragraph 1 of this Rulebook.

Obligatory active and passive immunization of persons employed in health institutions of vulnerable persons (without previously acquired immunity) of employees in health institutions are:1) hepatitis B; 2) influence; 3) measles; 4) rubella; 5) mumps; 6) diphtheria; 7) pertussis; 8) meningococcal disease; 9) varicella; 10) other infectious diseases according to epidemiological indications.

Health care workers and private practice subject to mandatory active and passive immunization are those who provide health care services in departments with increased risk of communicable diseases, such as diagnostics, treatment, nursing, nutrition, and hygiene maintenance. Immunization is carried out after checking the immunization status of an employee in accordance with the Law. Article 24 stipulates the obligation to establish immunization status both in employment and before practicing in health institutions.

The question arises why people do not want to be vaccinated? Diseases are forgotten, or are not considered serious. There is an increase in skepticism towards the pharmaceutical industry and government bodies. Individual risk and social benefit are often perceived as opposing factors. It is also evident that the risk of infection is very low in those countries where they have been properly vaccinated.

Stories or narratives are easily accessible thanks to social networks. The output is in the need for more research into the settings that assess the actual impact of the information received - instead of collecting self-report on "importance" on the Internet. As a result of information from the internet search, a need for long-term surveys for development evaluation change in vaccine risk perception.

The advantage of narrative information is obvious and irreplaceable. The only question is: How can we use the natural propensity to social media narratives to help in decision-making about vaccinations? Much greater activity in this field of experts and professionals is the only way to achieve the goal - to arrive at the argument of the truth about immunizations rather than arguments of force or repression.

Conclusion

Recommend as a stance arising from the doctrine of medical science to all doctors - learn about preventable infectious diseases.

To develop awareness of additional risk factors for certain diseases, to understand the pathophysiology of the disease and mechanism of action of the vaccines, not to apply blind protocols, and to incorporate into their knowledge a decision on the vaccination of a healthy person or patient.

It is necessary to integrate one's own experience with the experience of colleagues. "The safety signal" is not a proof that the vaccine is the cause, the facts are to be examined, the evidence is collected and sent to the experts. Notice that there is no absolute safety (risk equal to 0), because there is no such thing in nature and the "sit and wait" approach increases the theoretical risk, beyond the real risk, do nothing, it means taking the risk.

And at the very end we should remind ourselves that medicine rests on trust between medical staff and citizens. Only strong and flexible vaccination programs are able to respond to the challenges of future epidemics or pandemics.

In accordance with the Rulebook on Immunization and the Method of Drugs Protection, it is mandatory to vaccinate all those employed in health institutions.

POSTER PRESENTATAIONS

Wednesday, 26.09.2018.17:00-18:00
Faculty of Medicine Niš

1. OUTBREAKS OF VACCINE-PREVENTABLE DISEASE IN THE CITY OF BIJELJINA, 2009-2016

Dakić Zoran, Dakić M., Novaković M.
Health Center Bijenljina, Republic of Srpska, Bosnia-Herzegovina

Objectives: omissions in mandatory immunization of the population are sooner or later manifesting in a forms of outbreaks, which often are an indicators of the quality of the overall immunization process. Aim of this paper is to describean outbreaks of vaccine-preventable diseases in the city of Bijeljina in the period 2009-2015, as well to evaluate of the quality of the vaccination process and the impact of various factors on its success.
Materials and methods: Descriptive analysis of data collected by field investigation of outbreaks, laboratory findings from reference institutions and data from the records of the Hygienic-Epidemiological Service and the Family Medicine Service in Bijeljina.
Results: During the observation, there were 4 outbreaks: mumpsin seasons 2009/10 and 2011/12 in Bijeljina, rubella in 2010 in the municipalities of Pelagićevo and Donji Žabar and measles 2014/15 in Bijeljina. Total number of notified persons was 1381 of which 842 (61%) were aged up to 18 years. In average, the percentage of MMR vaccinated persons in these outbreaks was 8%, incomplete vaccinated 9%, no vaccination data 21% and 62% unvaccinated. Causative agents was confirmed by the European Reference Laboratory in Luxembourg - rubella genotype 2B and morbili D8. Measles outbreak in season 2014/15 was quickly brought to an end after emergency immunization of children under the age of 19.
Conclusion: One of the most important causes of the mentioned outbreakswas represented as a percentage of unvaccinated children, although the vaccination in Republika Srpska is mandatory by the law. Additional difficulties include the occasional inaccessibility of immunobiological preparations in the vaccine center due to a discontinuation in procurement by the Public health institute, as well as an aggressive anti-vaccine movement. It is necessary to intensify activities to raise parental awareness, not by repression and punishments, but rather by precise arguments about the real benefits of the vaccine.

Key words:MMR vaccine, outbreak, vaccine-preventable diseases, Bijeljina

2. EPIDEMIOLOGY OF MEASLES AND MUMPS OUTBREAKS IN THE LAST 25 YEARS

Kostić Marina[1], Deljanin Z.[1], Kocić B[1,2].
[1]Public Health Institute Niš, Serbia
[2]University of Niš, Serbia, Faculty of Medicine Niš

Measles and mumps are diseases that can be successfully prevented by MMR vaccine. The aim of this paper was to present the measles and mumps outbreaks in the territory of the Nišava and Toplica Districts in the last 25 years.The material used were illness-death records of infectious diseases, epidemic out-report and annual reports of the Center for disease control and prevention IPH Nis. The period from 1994 to 2018 was observed. The method of descriptive statistics was used. In the observed period 14 of measles and 5 of mumps outbreaks were registered with 2068 diseased persons, of which 561 were hospitalized. In 2018, 5 patiens have died, during all five outbreaks of measles (the highest number of epidemics during observed period of 25 years). From 1994 to 2018, mumps appeared in epidemic form in 1999, 2000, 2008 and 2009 with 58 diseased persons. For the first time, in 1998, measles has been reported in the epidemic form; cyclyng form of the disease was observed from 2008. The reference laboratory has confirmed the virus in all epidemics of measles, and in one epidemic of mumps. In the family measles epidemic of 2008, the morbile virus was imported from Thailand. Sixty six percent of patients with mumps were unvaccinated, with the most number of patients aged 10-14 years (n=28). Tventy seven percent of patients (n=540) with measles were unvaccinated while in sixty seven percent (n=1356) patients vaccination status was not known. The largest number of measles patients was registered in the age of 30-39 years (n=739). Conclusion: From 2012 to 2018, the vaccination coverage under than 80% led to the emergence of outbreaks of measles in the last 10 years.

Key words:measles, mumps, vaccination, outbreaks

3. MOVEMENT OF INFECTIOUS DISEASE OF COMPULSORY APPLICATIONS IN THE FIELD OF CANTON SARAJEVO IN THE PERIOD 2013-2017

Bursać-Aranđelović Snežana, Ibrahimi M., Operta-Maestro N.
Institute of Public Health of Canton Sarajevo

Introducion: 84 infectious diseases are subject to compulsory reporting in accordance with the Law on the protection of population from infectious diseases ("Official Gazette of the Federation BiH No. 29/05).
Methods: This paper uses data from P.I. Institute for public health of Canton Sarajevo database for the period 2013-2017. The methodology is analytical.
Results: In 2014, the number of reported cases of Varicellae in relation to the 2013 report has been recorded. The reason is the inexplicable reporting of newly detected cases of illness, since since 2013, this disease reports on a collective application.
Conclusion: Following the ten leading contagious diseases in the Canton Sarajevo in the period 2013-2017. year. Varicellae is the leading disease.

Key words: registration, Varicellae, infectious diseases

4. EIGHTEEN-YEAR RETROSPECTIVE TREND ANALYSIS OF SURVEILLANCE DATA OF HEPATITIS C IN THE REPUBLIC OF SERBIA 2000-2017

Rakić Violeta, Simić D., Stošić M.
Institute of Public Health of the Republic of Serbia, Department of HIV/AIDS, Viral Hepatitis, PPI and Tuberculosis

Introduction: According to the WHO, about 328 million people with some form of chronic hepatitis lived in 2015, while 257 million people with chronic HBV infection and 71 million people with chronic HCV infection. In 2016, 29 EU/EEA member states reported 33,860 cases of hepatitis C virus infection (HCV), with a notification rate of 7.4 cases per 100,000 inhabitants.

Objective: The aim of the paper is to describe the epidemiological characteristics of notified cases of viral hepatitis C in Serbia in order to improve epidemiological examination of each reported case at the district leveland obtain supplementary data.

Method: We retrospectively analysedsurveillance data of viral hepatitis in Serbiain the period 2000-2017. Epidemiological surveillance is based on the passive data collection and data analysis from paper based notification forms of all registered cases of illness and death from viral hepatitis A, B and C. Notification forms are collected by the competent institutions in line with the relevant legislation related to infectious diseases.

Results: There is a downward trend in number of cases of acute hepatitis C in Serbia in the period 2000-2017. From 2008 to 2017, the incidence rates ranged from 1.3 to 0.2 per 100,000 inhabitants. The highest number of patients was registered in 2005 (202 persons, incidence rate 2.7/100.000) and in 2006 (169 persons, incidence rate 2.3/100.000), but in 2017 there was a four-fold reduction in the rate most likely due to better classification of reported cases by clinicians compared to the previous year. In addition, cyclical variations in the notification rates of chronic hepatitis C during the analysed period have been reported. Rates ranged from 0.7/100.000 in 2000 to 7.7/100.000 inhabitants in 2007 and 2013. The highest age-specific rates of illness in acute and chronic forms of the disease are registered in age group 30-39 years, while the male sex is twice as high represented compared to women.

Conclusion: Epidemiological surveillance of viral hepatitis C needs to be improved in order to provide better evidence for strategic planing of the diseaase prevention and control program.

Key words: hepatitis C, surveillance, incidence rate, age-specific rate, Serbia

5. OUTBREAK OF STAPHYLOCOCCAL FOOD POISONING AMONG SCHOOL CHILDREN,BELGRADE, OCTOBER 2017

Maris Slavica[1], Durlević D.[1], Risimović V.[1], Vidaković Z[2].
[1]Institute of Public Health of Belgrade
[2]Primary Health Care Center „Dr Milutin Ivković“ Palilula

Background: Staphylococcal food poisoning is one of the most common food-borne disease worldwide. The incidence of food poisoning is understimated, in Belgrade several individual cases are registered each month.
On October 3, 2017, the Institute of Public Health of Belgrade received the information of potential outbreak-20 cases of gastroenteritidis in one school in Belgrade.
Objective: To investigate the potential outbreak and to identify the etiologic agent and the source of the infection with intention to recommend the control measures.
Methods: Retrospective cohort study were used: study population 2,276 children from 21 schools in Belgrade. The standardized epidemiological questionnaire for data collection were used.
Case definition: The consumer of macaroni with bolognese sauce prepared in one catering company and served at lunch time (11:30-14h) at 2nd Octobar 2017 in 21 schools in Belgrade-within 8 hours developed: nausea AND vomiting.
Results: In total 176 cases in 21 schools in Belgrade, median age was 7.8 years (range:6-12). The onset of illness in all cases was the 2nd October 2017. Macaroni with bolognese sauce associated with illnes (RR=110.0, 95% CI:15.4 to 784.0). First and second graders in schools were at greatest risk of food poisoning comparing with older students (RR=76.2, 95% CI:10.7 to 543.3; RR=33.2, 95% CI:4.6 to 242.2). In two samples of food (macaroni with bolognese sauce from 2nd October, cabbage salad from 3rd October) collected in two schools, staphylococcal enterotoxins were detected. In the throat/nose swabs of five kitchen workers Staphylococcus aureus were detected.
Conclusion: As transmission patch in the outbreak were macaroni with bolognese sauce contaminated with staphylococcal enterotoxins. The potential source of infection can be kitchen workers in whose throat/nose swabs Staphylococcus aureus were detected. A similar staphylococcal food poisoning among students from 20 schools was registered in Octobar 2013 (263 cases). It is necessary to improve knowledge and sanitary-epidemiological habits for kitchen workers.

6. ANTROPOZOONOZIS IN THE REPUBLIC OF SRPSKA IN 2017

Bratić Radovan, Tešanović M.
Public Health Institute of the Republic of Srpska, Banja Luka

Aim: To depict the movement of anthropozoonoses in the Republic of Srpska in 2017 with a referenceto the five-year period from 2013 to 2017.
Material and work methodology: We analyzed all cases reported both in 2017 and in the five-year period from 2013 to 2017. The analyzed data come from reports of infectious diseases of health centres, hospitals and laboratory findings. A descriptive method was used.
Results and discussion: The total number of reported cases in 2017 was 435 with an incidence rate of $37,6^{0}/_{0000}$and percentage of participation of 3,24 % intotal number of infectious diseases. During 2017, 1 patientdiedofleptospirosis. Outofallregisteredanthropozoonosesin 2017, therewere 142 casesofsalmonellosisfollowedbyHFRS-94, M. Lyme - 68, Lyssa contact-34, leptospirosis-30,Q fever-26, trichinosis-22,1 brucellosis-12, acutetoxoplasmosis-4, echinococosis - 2and1 caseoftetanus.From 2013 to 2017, the incidence rate of anthropozoonoses ranged from $22,1^{0}/_{0000}$ in 2016 to $37,6^{0}/_{0000}$in 2017.
Conclusion: In the observed period, the epidemiological situation was insecure and unfavorable due to the epidemiological onset of several types of zoonoses with a special focus on HFRS outbreak. Epidemic occurrence of trichinosis and a high morbidity of salmonellosis
indicate certain failures in production, traffic, storage and distributionof food and food products and misses in performing their surveillance.
Already present climatic changes create conditions for sanitary and hygienic deterioration and vector and transmissible diseases that have rarely or never occurred in our region.Certain zoonoses control is insufficient and thus leads to a wrong impression that these diseases do not represent a huge problem. Policy makers are insufficiently aware of meaning of certain zoonoses so there is no budget allocation for control and surveillance programmes.
Proposed measures: To strengthen zoonoses control and surveillance.To act on raising awareness of the significance of zoonoses. Relevant applications in this field. Multidisciplinary approach of all experts. Encouraging epidemiological and epizootiological studies.Continuous scientific research and education.

Key words: anthropozoonoses, incidence rate, outbreak, surveillance, control**.**

7. COMPARISON OF GENERAL AND CLINICAL CHARACTERISTICS AMONG CHILDREN OF DIFFERENT ETHNIC BACKGROUND SUFFERING FROM SCARLET FEVER IN THE REGION OF CENTRAL KOSOVO

Ničković Vanja[1], Trajković R.[2], Šulović Lj.[2], Marković-Jovanović S.[2], Živković Z.[2], Mitić J.[2], Kocić I[3].
[1]Clinical Hospital Center Priština, Gračanica, Serbia
[2]University of Priština, Faculty of Medicine, Kosovska Mitrovica, Serbia
[3]University of Niš, Serbia, Faculty of Medicine, Niš

Introduction: Scarlet fever is a contagious disease characterized by sore throat and tiny bumpy skin rash. The causative agent is a group A hemolytic streptococci, which causes inflammation of nasopharynx and toxemia. Scarlet fever is related to different ethnicities, their culture and health-care education in the region of Kosovo.The aim of our study was to analyze general and clinical features in children suffering from scarlet fever in the Kosovo region.
Methods: This study enrolled 82 children treated at the Department of Pediatrics, Clinical Hospital Center Priština. It was conducted from November 2017 to February 2018. Data were obtained from medical histories of patients with scarlet fever. Diagnosis was established according to epidemiological and clinical data, blood count, and determination of serum ASOT.
Results: Average age of patients was 7.97 ± 2.03 years, (MIN- 4, MAX- 17 years). The majority of children were between 7 and 16 years of age (55.7%) Roma children, (27.6 %) Albanian children and children of other nationalities, between 4 and 11 years of age – Serbian children (21.1%). There were 46.5 % undernourished and 28.6 % obese Roma children. Clinical manifestations in Roma children (58.2%) included: temperature >38.5 C, pharyngitis (19.7%), angina (34.7%), 'raspberry' tongue (27.5%), peeling of the palms and soles (77.6%); Serbian children (33.7%): temperature (about 38.5 C), angina (24,7%), sore throat (29.7%), small red bumpy skin rash (49.8 %), sporadic outbreaks (33.7%), rash resembling rubella (13.1)%; 'raspberry' tongue (39.5 %), flaking of the skin (21.7%), and peeling of the skin (14.5%); nephritis in 11.1% and glomerulonephritis in 3.4% of Roma children.
Conclusion. Most cases of scarlet fever in Kosovo enclaves occurred in Roma children. Special efforts should be made regarding education about scarlet fever and identification of the carriers and affected individuals.

Key words:scarlet fever, general and clinical characteristics, prevention, eradication

8. EPIDEMIOLOGICAL AND CLINICAL CHARCTERISTICS OF ADULT PATIENTS SUFFERING FROM MORBILLI IN SERBIAN ENCLAVES IN KOSOVO

Ničković Vanja[1], Odalović D.[2], Šulović Lj.[2], Jovanović M.[3], Marković-Jovanović S.[2], Živković Z.[2], Mitić J.[2], Kocić I[3].
[1]Clinical Hospital Center Priština, Gračanica, Serbia
[2]University of Priština, Faculty of Medicine, Kosovska Mitrovica, Serbia
[3] University of Niš, Serbia, Faculty of Medicine, Niš

Introduction: Morbilli isa contagious conditionmanifested by catarrhal changes of the conjunctiva and mucous membrane of the upper respiratory tract, as well as by maculopapular rash. Morbilli poses a significant health problem in the regions of Kosovo that have not reached adequate levels of vaccination. The aim of the study was to investigate epidemiological and clinical characteristics, as well as vaccination status of persons affected by morbilli in Serbian enclaves in Kosovo.
Methods: This was a prospective studyincluding 97 adult patients (69 males and 28 females) in the period from October 2017 to March 2018. The patients were treated at the Infectious Diseases Clinic, Clinical Hospital Center Priština. The diagnosis was established according to epidemiological and clinical characteristics, blood count, and findings of specific IgM antibodies in serum.
Results: Average age of patients was 33.25 ± 12.83 years, (MIN 20, MAX 47 years). They were divided into 3 age groups: 20 – 29 years (32.7%), 30 - 39 years (48.7%), and > 40 god (21.6 %). As for nationality, there were 43.7% of the Roma population, 42.2% Serbian population, and 21.7% Albanian and other nationalities. There were unvaccinated (58.7%) and incompletely vaccinated (22.3%) patients, Clinical signs and symptoms included: temperature: > 39°C (57.8 %); about 38.5 °C – 44.5 %, about 37.5 °C-9.4 % ; facies morbillosa – 53.5%, dry cough – 63.7 % ; Koplik's spots – 13.4 %; nausea and vomiting –34.7 %, diarrhea – 61.2 %, fatigue 81%. Rash: on face – 65.2 %, on the trunk - 78.2 %. Complications: pneumonia – 61.2 %.
Conclusion. Morbilli should be eradicated by mandatory vaccination and by conducting epidemiological and therapeutic measures.

Key words: measles, epidemiological characteristics, clinical characteristics, eradication

9. EPIDEMIOLOGICAL CHARACTERISTICS OF VIRAL HEPATITIS C IN NIŠAVA AND TOPLICA DISTRICT FROM 2013 TO 2017

Milenković Nikola[1], Rančić N.[1,2], Ilić M.[2], Kostić M.[2], Stošić V.[2], Stanojević B.[1], Jovanović M.[1], Stojanović M[1,2].
[1]University of Niš, Serbia, Faculty of Medicine Niš
[2]Public Health Institute Niš, Serbia

Objectives. Hepatitis C is an infectious disease caused by Hepatitis C virus (HCV), which is manifested by inflammation of the liver. The Hepatistis C virus (HCV) belongs to the genus Flaviviridae. The HCV gene shows a great heterogeneity, which is interpreted by a large number of errors in the transcription process and the lack of reparation mechanisms. The source of infection is always a person with acute or chronic HCV infection. The virus is isolated from almost all body fluids, but from epidemiological point of view presence in the blood is the most significant. The diagnosis of HCV infection is based on the clinical picture, the value of biochemical analyzes and microbiological findings. The aim of this paper is to examine the epidemiological situation of viral hepatitis C in the area of Nisava and Toplica district in the period from 201 to 2017. and significant epidemiological characteristics.
Material and methods. A descriptive method is applied. The data were used from the documentation of the Public Health Institute of Nis, Center for Control and Prevention of Diseases, as follows: 1. Diagnosis and death of infectious diseases; 2. Reports on the movement of infectious diseases in the territory of Nisava and Toplica districts in the period from 2013 to 2017; In the processing of data on the epidemiological characteristics of viral hepatitis C, a descriptive and partially analytical method was used to determine the epidemiological structure of diseased and dead of this disease (territorial distribution, age, sex...) in this period. All data is statistically processed, using Microsoft Office (Word and Excel). During the statistical data processing, the official population census of Serbia was used in 2011, and the disease rate is estimated at 1/100 000 inhabitants of the study area.
Results. In the period from 2013 to 2017. 18 persons infected with hepatitis Viralis acute C have been reported and recorded in the territory of Nisava and Toplica districts. Most of the patients were registered in 2014 (6) and at least 2016 and 2017 (2). There is a significant difference in the number of patients on the territory of the city of Niš compared to the territories of other municipalities of these two districts. The majority of patients (6) are in the age group of 60 and over, and the smallest number of patients are in the group between 40-49 years (2). There are more males (14 or 78%) compared to the number of female patients (4 or 22%). In the same period, 137 persons with Hepatitis viralis Chronic C were reported and recorded. Most of the patients were registered in 2014 (49) and at least 2017 (9). In the observed period from 2013 to 2017, four deaths from hepatitis viralis chronica C have been recorded. Most of the patients were registered in the city of Nis (80). The least of them were in the municipalities of Gadzin Han and Ražanj, where one person was registered in the observed period. Out of a total of 137 people, 90 or 66% of them are male and 47 or 34% are female. In the period from 2013 to 2017, 198 carriers of anti-HCV antibodies were reported and recorded in the territory of Nisava and Toplica districts. The largest number was recorded in 2013 (75), and the smallest in 2015 (15). In the observed period, carriers of anti HCV antibodies were registered in all municipalities, except in the municipalities of Merošina and Žitorađa. The largest number of holders was recorded in the city of Nis (176), while in other municipalities this number is significantly lower. The largest number of anti-HCV antibodies in the area is in the age group of 20 to 29 years, 75% or 38% of the total, indicating that young people with the most risky behavior are more susceptible to narcotic use and often change partners. There are more anti-HCV anti-malignant carriers (126 or 64%) than the number of females (72 or 36%).
Conclusion. In the observed period, the incidence of hepatitis C virus infection shows a small number of patients suffering from an acute and an increased number of patients with a chronic disease, which can be associated with increased screening and improved disease prevention methods, as well as with new therapeutic procedures.

Keywords: Hepatitis C virus, infectious, disease, epidemiology

10. EPIDEMIOLOGICAL CHARACTERISTICS OF *STAPHILOCCUS AUREUS* CARRIERS IN THE TERITORY OF NIŠAVA AND TOPLICA DISTRICT

Stojanović Marko[1,2], Spasić M.[1], Mitić S.[1], Jovanović M.[1], Milenković N.[2], Stanojević B[2].
[1]Public Health Institute Niš, Serbia
[2]University of Niš, Serbia, Faculty of Medicine Niš

Objectives: The aim of the study was to determine epidemiological impact of *Staphylococcus aureus* on the territory of Nišava and Toplica district from January to June 2017 and 2018.
Materials and methods: Source of the data was the data base of medical exams conducted in Public Health Institute Niš, in the period from 01.01. to 30.06.2017. and 01.01. to 30.06.2018. for the Nišava and Toplica district. For data analysis were used the following statistical parameters: average value, standard deviation and Students t-test.
Results: In the first six months of 2017 we examined 18246 people at Public Health Institute Niš, out of which 1128 were positive on *Staphylococcus aureus* in nose and/or throat. In 2018, within the same period, we examined 18798 people in Public Health Institute Niš, out of which 1091 were positive on *Staphylococcus aureus* in nose and/or throat. The number of newly discovered cases of *Staphylococcus aureus* varies every month, but there is no statistically significant difference in terms of number of newly discovered cases.
Conclusion: These results are very good, since they show the efficiency of restrain of *Staphylococcus aureus* on the territory of Nišava and Toplica districts.

Key words:*Staphilococcus aureus*, medical exam, epidemiological impact

11. ANALYSIS OF ANTIRABIC IMMUNIZATION IN THE TERITORY OF NIŠAVA AND TOPLICA DISTRICT

Jovanović Marko[1], Kostić M.[2], Ilić M.[2], Janićijević I.[2], Stanojević B.[1], Milenković N.[1], Stojanović M[1,2].
[1]University of Niš, Serbia, Faculty of Medicine Niš
[2]Public Health Institute Niš, Serbia

Objectives. Rabies (lyssaviruses, hydrophobia) is an acute viral disease of the CNS (encephalitis) of warm-blooded animals and humans. Primarily, it is a disease of wild and domestic animals, and is transmitted to humans by contact with the diseased animal. The illness that has been diagnosed is always ending fatal. It is one of most dangerous zoonosis (common to humans and animals) because it is deadly. The virus is from Rhabdoviridae, which is always found in the nervous tissue and sputum-infected animals, and under a light microscope is in the form of a bullet. It is neurotropic. The aim of this paper was to look at and compare the number of people attacked by animals and the applied Antirabic immunization for the period from January to June 2017 and 2018 at the Antirabic station Niš at the Institute of Public Health Nis.

Material and methods.

A descriptive method was applied. The data were used from the documentation from Antirabic station Niš, Public Health Institute of Niš. The material used were the protocol for rabies for the period January - June 2017 and the protocol for rabies for the period January - June 2018. The observation period is the first six months of 2017 and the first six months of 2018. All data were statistically analyzed, using (Microsoft Office Word and Excel).

Results. For the first 6 months in 2017 and 2018, a total of 816 of injured people by animals. The surveillance was carried out in 801 cases (98.16%) and in 15 cases (1,84%) Antirabic immunization was applied. Most of the injuries were dog bites 780 (94,61%), cat attacks 289 (4,41%) and 8 attacks by other animals (4 rats, 3 mice, 1 crow) (0,98%). The highest number of injuries was reported for men 369 (45,23%), 245 women were injured or (30,02%) and children 202 (24,75%). The average age of children up to the age of 18 is 9,6 years. The average age of adults is 45,75 years. The highest number of injured were from the territory of the city of Niš, 605 (74,97%), the municipality Aleksinac 87 (10,78%) and the municipality Svrljig 36 (4,46%). Considering local of injuries, the highest number were in the left foot of 195 (23,69%), right foots 169 (20,53%), right hand 91 (11,06%) and 101 (12, 27%) with multiple injuries.

Conclusion. The analysis showed that the trend of injured persons is approximately similar for the same period of time in both years. The number of injured men is slightly higher in relation to women and children, and the reason is higher exposure. If we compare the number of injured by cities, the number corresponds according to the number of inhabitants. Most injuries were by dogs. Since, according to the instructions of the Pasteur Institute in Novi Sad, when a dog's wandering in urban environments bites people, there is no antirabic protection because there is no rabies in Serbia, and hence there is a great difference in the attitude of the monitor and the applied antirabic protection. The highest number of injuries is on the legs and it corresponds to dog bites.

Keywords: rabies, lyssavirus, neurotropic virus, post exposure vaccine, Pasteur

12. EPIDEMIOLOGY OF THE INTRAVASCULAR CATHETER RELATED INFECTIONS AND MEASURES OF PREVENTION

Mioljević Vesna
Clinical Center of Serbia, Department of Hospital Epidemiology and Food Hygiene

INTRODUCTION: Intravascular Catheter-Related Infections (CRI) account for 10% of all registered blood infections (BIs). Placement of intravascular line is associated with a high risk for the development of CRI. CRI increases the number of hospitalization days and the cost of hospital treatment. About 16,000 IKs are registered annually in the United States, and more than $ 460 million are allocated for the treatment of IK. The rates of incidence of CRI vary depending on the presence of various risk factors related to catheter and the patient. The most important risk factors for CRI are: length of catheterization, type of catheter, anatomical site of placement, parenteral nutrition, admissions in catheter care and care and therapy.The most common causes of CRI are coagulase negative staphylococci, Staphylococcus aureus and gram-negative bacteria.
OBJECTIVE: To show the most significant risk factors for the emergence of CRI and measures of prevention and control of CRI.
METHODOLOGY: Methodology of the Centers for Disease Control, Atlanta 2011, update in 2017 (Guidelines for Intravascular Catheter related infections, 2011, last updated February 2017).
CONCLUSION: Prevention measures are: the respect of aseptic procedures when placing, treating and applying various types of intravascular catheter.

KEY WORDS: epidemiology, hospital infections, Catheter related infections, prevention measures.

SESSION: MICROBIOLOGY TODAY

INVITED LECTURES

1.AFLATOXINS: EXPOSURE, DETECTION AND CONTROL METHODS

Mufida Aljičević
Department of Medicine, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

Molds are microscopic fungi that produce metabolites and release them to the surface where growth occurs. Aflatoxins are mycotoxins produced by Aspergillus flavus under favorable temperature and humidity conditions. Aflatoxins belong to a group of extremely toxic mycotoxins, and are therefore categorized in as Group I carcinogens by the International Agency for Research on Cancer (IARC). There are four main types of aflatoxins: B1, B2, G1 and G2, as well as two additional metabolic products: M1 and M2. The IARC has placed aflatoxin B1 on the list of human carcinogens.
The aim of this work was to determine if foods of plant origin present in our market have quantifiable concentrations of aflatoxin B1. A secondary objective was to examine whether the urine of healthy participants contains measurable aflatoxin B1, and compare this control to a population of patients with HBV and HCC.
Laboratory testing can detect the presence of aflatoxins in samples of food, as well as in the urine of patients. In our study of aflatoxin B1, samples were divided into three groups for analysis. The first group consisted of 32 samples foods of plant origin that were available in the marketplace, the second experimental group consisted of the urine of 30 patients with HCC and HBV, and the third (control) group consisted of the urine 30 “healthy” patients. All samples were processed using the Aflatoxin B1 Flow Through Rapid Test kit by Euro-Diagnostic. All samples were tested by Sensitive Aflatoxin B1 enzyme immunoassay (EIA) for screening and quantitative analysis. From a total of 32 food samples tested, first screening analysis with Flow Through Rapid Test yielded only 4 positive results, while EIA detected 11 positive results with quantitative values of aflatoxin B1 ranging from 0.23 to 11.67 ppb. In the healthy control patients and the experimental group, the values of aflatoxin B1 in the urine samples were below the detectable level of screening test (2 ppb) via the Flow Through Rapid Test. However, with Sensitive EIA testing we obtained values of 0.05 to 0.15 ppb of aflatoxin B1 in the control urine samples, and 0.05 to 0.26 ppb in the experimental group. Comparing the results clearly shows that the Aflatoxin B1 Sensitive EIA is more sensitive than Aflatoxin B1 Flow Through Rapid Test. The Rapid test is a simple and quick screening method, but is not sufficiently sensitive for quantifying aflatoxin B1 levels.
Of note, all of tested urine samples of both groups (experimental and control) showed the presence of aflatoxins B1. However, the concentration of aflatoxins was lower in the control group (maximum value of 0.15 ppb), relative to the experimental group (maximum value of 0.26 ppb).
These results suggest that aflatoxin-contaminated foods readily available in the marketplace serve as a vector for the introduction of small quantities of aflatoxins into hosts. These aflatoxins may pose a cumulative threat to human health over time given their greater concentration in patients with HBV and HCC. Thus, further research into aflatoxins and their role in the pathophysiology of HCC is indicated.

Key words: aflatoxins, mycotoxins, Sensitive EIA test, Flow Through Rapid test

2. ANTIMICROBIAL RESISTENCE VS. ANTIMICROBIAL CONSUMPTION – EXPERIENCE IN MONTENEGRO

Gordana Mijovic, Lopicic M, Nedovic-Vukotic M.
Institute of Public Health, Podgorica, Montenegro

Objectives: Antimicrobial resistance (***AMR***) has emerged as one of the principal ***public health problems*** of the 21st century. Resistance is developed more rapidly through the misuse and overuse of antimicrobial medicines. Surveillance of antibiotic consumption and resistance are essential to identify weak points in medical practice in order to plan activities to improve the use of antibiotics and containment of antimicrobial resistance.
The aim of this study is to investigate rates of antimicrobial prescribing in hospitalised patients and the resistance patterns present in clinical settings.
Materials and methods: Using the Point Prevalence Survey of antimicrobial consumption (PPS) as a standardized surveillance method, detailed data were collected in 2015 from 4 hospitals: 3 general hospitals and Clinical Center of Montenegro for all inpatients receiving an antimicrobial on the day of the survey.
In the Public Health Institute, in 2016, the results of antimicrobial susceptibility testing of invasive isolates *Klebsiella pneumoniae* and *E.coli* were collected from all public microbiological laboratories examining hospital samples (7 general hospitals and the Clinical Center of Montenegro).
Antimicrobial susceptibility testing was performed by standard disk diffusion method using ampicillin, gentamycin, amikacin, piperacillin-tazobactam, ceftriaxon, ceftazidim, ciprofloxacin and meropenem disks.
Results: A total of 969 patients were included in the PPS. The antimicrobial rate was 50.8% (in Europe 30.7%). The third-generation cephalosporins were the most commonly prescribed antibiotics (45.75%), mainly ceftriaxone (41.11%). Out of all antibiotics for therapeutic and prophylactic use, 39.8% were given for surgical prophylaxis, mainly ceftriaxone (47.6%).
Laboratories in Montenegro submitted antibiotic susceptibility testing results for 143 isolates from blood or CSF in 2016. Among the isolates, there were 19 *E.coli* and 28 *Klebsiella pneumoniae*. In *E. coli*, resistance ranged from 0% for carbapenems to 83% for third-generation cephalosporins. Multidrug resistance was 6% in *E. coli*. Resistance in *K. Pneumoniae* ranged from 4% (carbapenems) to 89% (third-generation cephalosporins). Multidrug resistance in *K. pneumoniae* was 63%.
Conclusion: Antibiotic prescribing in hospitals is very high in Montenegro, especially cephalosporins. According to our resistance results high use of ceftriaxone in hospitals is not reasonable. The patient population sampled had very high levels of resistance to third-generation cephalosporins in *E. coli* and *K. pneumoniae*. Although the percentages of resistance should be interpreted with care, because of relatively low number of isolates and low utilization of blood culture diagnostics, the data indicates the resistance patterns present in clinical settings in the country. There are identified several targets to improve antibiotic prescribing and control of high level resistance to antibiotics, especially to the third generation of cephalosporins: low antibiotic surgical prophylaxis guidelines compliance, lack of other guidelines and protocols for prudent use of antibiotics and poor knowledge of the existing level of resistance.

Key words: antimicrobial, resistance, consumption

3. NEW APPROACHES TO COMBATING ANTIMICROBIAL RESISTENCE

Nataša Opavski
Institute for Microbiology and Immunology, Medical Faculty Belgrade, Serbia

Antibiotics are one of the greatest discoveries of the 20th century. The introduction of penicillin, erythromycin, streptomycin, etc. marked the beginning of the so-called “golden era” of antibiotics. Between 1940 and 1962, most of the antibiotic classes were discovered. During next decades researches were focused on developing improved versions of existing molecule. Antibiotics were successfully used in the treatment of bacterial infections, significantly reducing morbidity and mortality from serious diseases (pneumonia, sepsis, meningitis, etc.). Unfortunately, bacteria developed resistance to antibiotics very rapidly. There are several causes of antibiotic resistance, such as over-prescription of antibiotics, bad compliance, overuse of antibiotics in livestock, poor infection control in health care settings, poor hygiene and sanitation and the absence of new antibiotics being discovered. Multidrug resistance patterns in bacteria are difficult to treat and may even be untreatable with conventional antibiotics and we are facing with antibiotic crisis. Thus, there is urgent need for new strategies to fight antimicrobial resistance. It requires action at many levels. While control measures are used to prevent infection and dissemination of drug-resistant bacteria, the other approach is search for novel antimicrobial compounds and alternatives. Alternatives to antibiotics include: i) herbal products - essential oils; ii) antimicrobial peptides with antivirulence properties; iii) antibiofilm peptides; iv) wild-type and genetically engineer bacteriophages and v) phage lysins – enzymes with antibacterial action. In addition, another approach is improving host immunity: i) novel vaccine development; ii) antibodies that inactivate pathogen; iii) probiotics; iv) immune stimulation in conjunction with antibiotics; v) host defense peptides and innate defense regulators that have indirect antimicrobial effects, by increasing expression of anti-inflammatory chemokines and cytokines. Some of them are on clinical, and the other are on preclinical development. Facing an impending post-antibiotic era, scientists have to generate alternative treatments and improved strategies to preserve our current arsenal of antibiotics and ensure the sustainability of antibiotic treatment.

Key words: antimicrobial drug resistance, combat, approaches

4. DETECTION OF CARBAPENEMASE –ENCODING GENES IN *ACINETOBACTER BAUMANNII* ISOLATES

Deana Medić[1,4], Đilas M[1], Gusman V[2,4], Dragovac G[3,4], Milosavljević B[1], Zivlak B.[1,4]
[1]Institut of Public Health of Vojvodina, Center for microbiology, Novi Sad, Serbia
[2]Institut of Public Health of Vojvodina, Center for hygiene and human ecology, Novi Sad, Serbia
[3]Institut of Public Health of Vojvodina, Center for disease control and prevention, Novi Sad, Serbia,
[4]Medical Faculty Novi Sad, Serbia.

Objectives: Nosocomial infections caused by *Acinetobacter baumannii* are considered a significant health problem worldwide. *A. baumannii* has an exceptional ability of survival and spread in the hospital environment, as well as the extraordinary capacity to quickly acquire different mechanisms of resistance to antimicrobial agents, including carbapenems. Acquired resistance to carbapenems is mediated by the Ambler class D and class B β-lactamases (OXA and MBL carbapenemases). The aim of this study was to detect the presence of encoding genes for oxacillinases (OXA-23, OXA-24, OXA-58 and OXA-51) and metalo-β-lactamases (IMP, VIM and NDM) in carbapenem-resistant isolates of *A. baumannii*.
Materials and methods: The study was conducted in the period from January 1st, 2013 to December 31st, 2016. Isolates were collected from blood of hospitalized patient. The identification to the species level of *A. baumannii* was confirmed by PCR detection of gene $bla_{\text{OXA-51-like}}$.Detection of bla_{OXA} and bla_{MBL} was conducted by multiplex PCR. Genotyping of selected *A. baumannii* isolates was performed by rep-PCR using DiversiLab system.
Results: Out of 211 isolates of *Acinetobacter* spp., 198 were identified as carbapenem-resistant *A. baumannii*. Genes $bla_{\text{OXA-24-like}}$ and$bla_{\text{OXA-23-like}}$ were detected in 126 and 68 isolates, respectively. Five isolates were positive for $bla_{\text{OXA-58-like}}$ gene.A simultaneous presence of three oxacillinases genes was detected in one isolate. The presence of bla_{IMP}, bla_{VIM} and bla_{NDM} was not detected. Rep-PCR genotyping revealed three distinct clones of *A. baumannii* in various wards within the hospital.
Conslusion: Carbapenem resistance in *A. baumannii* is caused by presence of $bla_{\text{OXA-24-like}}$,$bla_{\text{OXA-23-like}}$ and $bla_{\text{OXA-58-like}}$ genes, and not metallo-β-lactamase-encoding genes. The results of rep-PCR might indicate the cross infection and emphasize the importance of continued monitoring for emerging resistance trends.

Key words: *Acinetobacter baumannii*; beta-lactamases; antimicrobial resistance, carbapenems

5.KNOWLEDGE OF IMMUNOLOGY-BASED ANTIFUNGAL DEFENSE DERIVED FROM ANIMAL MODELS OF ASPERGILLOSIS: BASIS FOR THERAPEUTIC STRATEGIES

Milena Kataranovski[1,2], Mirkov I.[1]
[1]Institute for Biological Research "Sinisa Stankovic", University of Belgrade, Serbia
[2] Institute of Physiology and Biochemistry, Faculty of Biology, University of Belgrade, Serbia

Aspergillosis represent a spectrum of diseases which are caused by fungi of genus *Aspergillus*. Animal, mostly rodent, models were developed and used to adress immune-based mechanisms of defense against these fungi. Host defense against inhaled conidia of *Aspergillus* species in immunocompetent (non-immunosuppressed) individuals include protective mechanisms provided by innate immunity as well adaptive immune responses which are induced during the fungal infection. Innate immune responses are the first line of defense mediated by humoral factors (microbicide molecules, complement components, cytokines) and phagocytes (polymorphonuclear leukocytes and mononuclear cells including dendritic cells, monocytes, macrophages and natural killer/NK cells). Activation of these components results in fungal elimination through phagocytosis and production of fungicide compounds (reactive oxygen and nitrogen species, hydrolytic enzymes etc.) and/or in the induction of adaptive immune responses by pro-inflammatory cytokines following uptake, processing and presentation of fungal antigens to lymphocytes by dendritic cells (DC). Dendritic cells enable establishment of T cell-mediated responses which provide a state of protection against the fungi as well as those which regulate the intensity of antifungal responses. Insight into immune-mediated defense against fungi of genus *Aspergillus* obtained from animal models of infection provides help in better predictions of the risk of severe forms of aspergillosis.

Key words: Animal models of aspergillosis; innate immune responses; cellular adaptive immune responses; antibody- mediated responses; immuno-therapeutic strategies.

Funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia, [Grant number 173039].

6. CYCLURIDINE AGAINST FLAVIVIRUSES

Angel Galabov
The Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Sciences, Sofia, Bulgaria

This review describes the contemporary state of research for antivirals effective against flaviviruses, especially focusing on inhibitors of the pestivirus causative agent of bovine viral diarrhea virus (BVDV). We highlight cycluridine (CU), an originally synthesized Mannich's base [a tetrahydro-2(1H)-pyrimidinones derivative], as a highly effective antiviral possessing a strong inhibitory effect on BVDV replication. CU was active against replication of a wide variety of BVDV strains in cell cultures. The drug-sensitive period in the BVDV replication cycle includedthe latent period and the exponential phase; a 90-mindelay in viral RNA synthesis peaking was observed. CU administered orally manifested a pronounced protectiveeffect in calves with natural mucosal disease/viral diarrhea andcalves experimentally infected with BVDV. Its magnitude of activity and selectivity places CU in the lead among all known substances with anti-BVDV activity. Additionally, CU applied subcutaneously showed anti-TBEV activity, manifesting a marked protective effect in miceinfected with TBEV. CU could be a prospective antiviral in veterinary and medical practice for the treatment of BVDV and other flavivirus infections.

7. TEN YEARS ANNIVERSARY OF REFERENCE LABORATORY FOR *CAMPYLOBACTER* AND *HELICOBACTER*

Biljana Miljković Selimović[1,2], Kocić B[1,2], Babić T[2], Ristić Lj.[2]
[1]University of Niš, Faculty of Medicine, Niš, Serbia
[2]Institute for Public Health, Niš, Serbia

Reference laboratory for *Helicobacter* and *Campylobacter* (*RL*) for R. Serbia works at the Institute for Public Health since 2008, based on the decision of the Ministry of Health, after successful application. First task of the laboratory was to make a network of labs that cultivate or detect these to bacteria, and to make contacts. The goal was to gain annual reports of the number of isolated *Campylobacter* and serological positivity and later specific serological positivity for *H. pylori*. In the same time in the RL was introduced biochemical and molecular tests (multiplex PCR) for identification of *Campylobacte*r and *Helicobacte*r. RL is supplied with majority of control strains, necessary for control of the reactions proceeding. In collaboration with National Laboratory for Enteric Pathogen, Winnipeg, Canada we perform biotyping, serotyping, and genotyping of our strains. In addition, in our lab network we included several private laboratories, and extended collaboration to examination of resistance in *Campylobacter* in Serbia. Our colleagues showed good will and interest in realization that part of collaboration. Creation of RL website gave possibility for the interested ones to follow reports, resistance and trends in resistance in isolated strains, to find forms, which should follow sent material, and to find important Information for patients. Information on bacteria and diseases they caused can be found on the site are of importance for general population. RL takes a part in external control of quality by participation in EQAS and EQA. In addition, RL prepared numerous lectures as continual educations, released several papers in international journals, and was the base for one master thesis and three doctoral theses.
Conclusion:Our next goals could be extending the labs network to the whole territory of Serbia, and making visible our results on the ECDC map; improving present methods and included new ones.

Key words: Reference laboratory, *Campylobacter*, *Helicobacter*
Authors would like to acknowledge for financial support to the Ministry of Science and Technological Development of the Republic of Serbia (Project TR31079).

ORAL PRESENTATIONS

1. CARBAPENEM RESISTANT *KLEBSIELLA PNEUMONIAE* AT AN INTENSIVE CARE UNIT OF SPECIAL HOSPITAL FOR CEREBROVASCULAR DISEASES IN BELGRADE

Zorica Zrnić and Edita Grego
Insitute of Public Health of Serbia "Dr Milan Jovanović Batut"

Objectives: Antibiotic resistance is a global public health problem. Aim of this study is to find out the prevalence of *Klebsiella pneumoniae* strains resistant to carbapenems, to ascertain antibiogram of strains and formulate an advisory for control and treatment of infections
Methods: Between February 2016 and March 2017, 81 isolates *K. pneumoniae* were analyzed. All isolates obtained from a wide range of clinical samples (e.g.: wound, blood, bronchial aspirate) from ICU patients were evaluated for sensitivity patterns by Kirby-Bauer disc diffusion method and the susceptibility to selected antibiotics were tested by an automated system, VITEK2 Compact.
Results: A total of 81 clinical isolates of K. pneumoniae were studied, 27 clinical isolates showed a multidrag resistant profile. They were completely resistant to third and fourth generation cephalosporins tested, as well as hinolons and meropenem, while 17 isolates (63%) were resistant to imipenem and 14 isolates (51%) were resistant to amikacin.
Conclusion: Carbapenem resistant *Klebsiella* is a major problem in many hospitals. Early detection of carbapenemase producing *Klebsiella spp*. may avoid future spread of these isolates and ensure better patient care and timely introduction of appropriate infection control measures.

Keywords: Klebsiella pneumoniae, carbapenem resistance

2. DETECTION OF CARBAPENEMASE ENCODING GENES IN *KLEBSIELLA PNEUMONIAE* ISOLATED FROM PATIENTS AT INTENSIVE CARE UNIT OF SPECIAL HOSPITAL FOR CEREBROVASCULAR DISEASES IN BELGRADE

Edita Grego and Zorica Zrnić
Institute of Public Health of Serbia „Dr Milan Jovanović Batut”

Objectives: Carbapenem-resistant *Klebsiella pneumoniae* (CR-KP) isolates can spread among the hospitalized patients and result in serious infections and increase mortality. The current study aimed at investigating molecular characteristics of the carbapenem resistance *K. pneumoniae* isolates recovered from infection sites of the patients hospitalized in a tertiary hospital.
Methods: A total of 27 clinical CR-KP isolates from different specimens were collected during 2016 in Special Hospital for Cerebrovascular Diseases in Belgrade.
Carbapenemase-encoding genes including *bla*OXA-48, *bla*NDM, *bla*KPC, *bla*IMP, and *bla*VIM were investigated by polymerase chain reaction.
Results: The *bla*OXA-48 and *bla*NDM-1 were found in 70% (n = 19) and 30% (n = 8) of the resistant isolates, respectively. All *bla*NDM-1 positive isolates carried simultaneously both NDM-1 and blaOXA48 genes. Also, VIM gene in 3,7%, (n = 1), and KPC-2 in 22% (n = 6) were detected. 20 CR-KP strains contained AmpC genes, CMY-2 -70% (n = 19) and PER1 3,7% (n = 1).
Conclusions: Molecular studies provide useful information about resistance mechanisms and cross-transmission among the resistant isolates. This knowledge can have a profound effect on clinical treatment, infection control measures and public health policies for patients.

Keywords: *Klebsiella pneumoniae*, Carbapenemase-encoding genes

3. MONITORING OF INFECTION CAUSED BY HUMAN CYTOMEGALOVIRUS IN SOLID ORGAN AND BONE MARROW TRANSPLANT RECIPIENTS USING REAL-TIME POLYMERASE CHAIN REACTION METHOD

Dimitrije Tasić, Djurić-Petković D, Jovanović D.
Institut for Microbiology Militar Medical Academy (MMA), Belgrade, Serbia

Objectives: Human cytomegalovirus (HCMV) has been recognized as an important cause of morbidity and mortality in immunocompromised hosts such as recipients of solid organ transplants and stem cell transplants. The clinical importance of invasive HCMV disease in immunocompromised patients has led to the development of diagnostic procedures for rapid identification HCMV disease. The main aim of this study is to get review of quantitative results of real- time Polymerase Chain Reaction (RT-PCR) analyses about aforementioned patients, performed in a certain period at Department for Virusology of Institute for Microbiology, MMA.
Materials and methods: Nucleic acid was extracted from 0.2 ml of EDTA-anticoagulated whole blood by using „isolation kit DNA Quick-DNA Universal Kit ZYMO RESEARCH". For amplification and detection for human Cytomegalovirus by RT PCR method was used "GeneProof CMV PCR Kit". Quantitative PCR assay had been performed on an " LightCycler® 2.0 System". Results: Since December 18th 2017. until Jun 11th 2018., 196 plasma samples were tested by RT PCR method. In 167 samples obtained from Clinic for Haemathology 19 were positive.Three samples had concentration in range of 10^2 copies/ml, five in 10^3C/ml, eight with 10^4C/ml and three with 10^5C/ml. Out of 25 samples obtained from Clinic for Nephrology two were positive with concentration range of 10^3 copies/ml of HCMV. Clinic for General Surgery had three samples tested, all samples were negative. Clinic for Gastroenterology and Hepathology had one sample tested and that was negative too.
Conclusion:Human cytomegalovirus (HCMV) continues to be a significant cause of morbidity and mortality in immunocompromised patients, such as solid organ or bone marrow transplant recipients. Quantitative monitoring of human cytomegalovirus (HCMV) infection is helpful in determining appropriate antiviral management of transplant recipients.
Therefore, RT PCR has become an essential part of patient care.

Key words: human cytomegalovirus, immunocompromised,real- time Polymerase Chain Reaction.

4. PREVENTION OF THE REPRODUCTION OF BACTERIA *LEGIONELLA PNEUMOPHILA* AND THE BIOFILM FORMATION

Martina Oder
University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Objectives: *Legionella* are found in natural freshwater environments in low concentrations and do not represent a risk to human health. The problem occurs in the water supply systems in which the temperature of the water is between 25 and 42 °C. *Legionella* can be in the water supply systems as free-living or attached to the surface of tubes in the form of biofilm.
Materials and methods: To study the growth curve of the test strain of *L. pneumophila* the method of counting bacterial colonies was used. The intensity of the cell adhesion was established indirectly by measurement of the concentration of crystal violet dye released from pre-stained cells.
Results: In the first part of our study we examined the reproduction of *Legionella pneumophila* subsp. pneumophila ATCC 33152 in three different temperature. The results showed that the optimal temperature for bacterial growth was 36 °C. In the second part we examined the adhesion bacterial cells to five different materials used in plumbing systems. The largest biofilm formation was to galvanized pipes and biofilm formation was the lowest to polypropylene pipes.
Conclusion: The temperature of 50 °C had bactericidal effects and the temperatures of 15 °C bacteriostatic effects. The formation of *L. pneumophila* biofilms showed considerable dependence on surface material.

Key words: *Legionella pneumophila*, bacterial growth, bacterial adhesion, biofilms

5. TOWARD A CLEAR DEFINITION OF PSORIASIS ENDOTYPES: A NEW APPLICATION OF ARTIFICIAL NEURAL NETWORKS TO „OMICS“AND ITS RELEVANCE IN CLINCIAL MANAGEMENT

Giovani Damiani, Veil A, Ward N, Cameron M, McCormick T. S, Cooper K. D.
Dermatology unit, case western reserve university, Cleveland, oh, USA

Background: Psoriasis is a systemic inflammatory/autoinflammatory/autoimmune disease associated with several comorbidities. Those comorbidities seem to influence the response to therapy, both systemic and biologic and to date no algorithm can predict the occurrence of comorbidities, improve therapeutic outcomes, or predict what is/are the best drug(s) capable of better therapeutic results based upon more patient information. Nowadays biomarkers research is inconclusive, 'omics with big data is difficult to interpret and at the same time physicians treat patients based upon current paradigms and trial and error. In our proposed context, precision medicine, medicine centered on the uniqueness of the patient, meets machine learning in order to profile patients' omics and clinical data and assemble group(s) of characteristics termed endotypes. We started a multicenter prospective observational study that will enroll in 5 years 375 patients with psoriasis and 125 controls sex & age& ethnicity matched. Each patient, after signing an informed consent form will undergo medical history, clinical examination and blood samples, 2 punch biopsies (6mm each) on the buttocks on lesional and non-lesional skin, 2 skin swab. Blood samples will be processed with flow cytometry in order to evaluate different subsets of monocytes, neutrophils, T and B lymphocytes, NK cells. The two skin biopsy will be evaluated for transcriptome and metabolome. The skin swab will undergo myco- and microbiome identification. All data obtained will be analyzed with linear statistics preliminarily and upon completion combined and integrated using 4th generation artificial neural networks. Patients clustered in endotypes will be followed longitudinally to identify a group of characteristics that allow us to evaluate patient response to known and experimental therapies. Clinical data combined with extensive 'omics data will define the patient endotypes. We will correlate those endotypes with drug response by following those patients longitudinally. From all omics analyses new and alternative targets will be found useful for eventual drug development or even drug repurposing.

6. NANOTECHNOLOGY APPLICATION IN DERMATOLOGY-THE PHOTOPROTECTIVE EFFECT OF NANOLIPOSOMES

Kocić Hristina[1], Arsić I. [2], Stanković M. [2], Jović A. [1], Tiodorović D. [3], Zlatanović Z. [3], Damiani G. [4]
[1]Clinic for dermatology Clinical Center Nis, Serbia
[2]Medical Faculty University Nis-Department of Pharmacy
[3]Clinic for dermatology Medical Faculty Nis, Serbia
[4]Clinical Dermatology, Department of Biomedical, Surgical and Dental Sciences, IRRCCS Galeazzi, University of Milan Italy

The harmful effects of ultraviolet irradiation are increasingly focused due to the reduced protective ozone layer of the atmosphere, as well as because of the use of the solarium, especially of the younger population. The effects of UV irradiation are highly pro-oxidative and induce damage to the phospholipid bilayer of the membranes, degenerative changes and accelerated aging of the skin. An increasing number of skin preparations with protective factors that can contain toxic preservatives appeared, but they can be irritable, and may exhibit a number of adverse effects, and very often they also have poor penetrance. The importance of nanotechnology in dermatology and cosmetology may be promising, since nanoparticle-based creams can easily be applied because they are very adherent to the surface of the skin. Among the various nanoparticles, nanoliposomes take the leading role, because they structurally resemble the phospholipid bilayer of cell membranes, they show a polar amphiphilic properties, and are easily dissolved in both lipids and water. Nanoliposomes exhibit high structural stability and high capacity of encapsulation of various hydrophilic and hydrophobic drugs, various protective substances and nutrients. The encapsulation into nanosphere increases the penetration of these substances through the skin, and slows their release, thus showing a delayed effect, without harmful toxic doses. In addition, they are easily biodegradable, they are not excessivelly acumulated, as is the case with other nanoparticles. Our research has shown that nanoliposomes, even at a concentration of only 1%, can exhibit high antioxidant protection during *in vitro* induction of oxidative stress, and show a high percentage of encapsulation of proteins and amino acids, which, depending on the offered protein concentrations, can also be higher than 90%. Therefore, nanoliposome formulations, even in very low concentrations, may be one of the best anti-cancer agents.
key words: nanoliposomes, photoprotection

7. METALLO-β-LACTAMASE-PRODUCING *PSEUDOMONAS AERUGINOSA* IN CLINICAL CENTER NIŠ

Snežana Mladenović-Antić[1], Kocić B [1,2], Dinić M [1,2], Randjelović M[1,2], Krstić K.
[1]Institute for Public Health Niš,
[2]University of Niš, Faculty of Medicine, Niš, Serbia

Introduction: Emergence of metallo-*β*-lactamase producing *Pseudomonas aeruginosa* is being increasingly reported worldwide.
Objective: Phenotypic and genotypic detection of metallo-beta lactamases (MBLs) and antimicrobial susceptibility in carbapenem- resistant *Pseudomonas aeruginosa*.
Material and methods: A total of 75 carbapenem resistant clinical isolates of the species *Pseudomonas aeruginosa*, originating from the material of patients hospitalized at the Clinical Center Nis were included in the study. The antimicrobial susceptibility was determined by the Vitek2 system (bioMérieux, France), using AST-N240 card. The genotypic detection of resistance to carbapenem was performed by the PCR method. For the phenotypic detection we used: Vitek2 AES system, combined disc test (CDT) -KPC, MBL and OXA-48 Confirm Kit: Carbapenemases (Rosco Diagnostica, Denmark), MIC MBL test Liofilchem, Italy) and the colorimetric RAPIDEC® CARBA NP test (bioMérieux, France).
Results: A total of 51 isolates (68%) were resistant, 6 (8%) were intermediate and 18 (24%) were sensitive to imipenem. For meropenem, 50 (67%) were resistant, 8(10.6%) were intermediate, and 17(30.35%) were sensitive. The highest resistance was found in ciprofloxacin 56 (74.6%) and gentamicin, 60 (80%). A total of 75 isolates (100%) were multidrug resistant. For further phenotypic and genotypic analysis, 14 isolates with a MIC> 8μg/ml for imipenem were selected. By the PCR method, the presence of bla_{NDM} gene was detected in six isolates (42.85%). A total of 5 isolates were MBL positive by CDT, all of 6 MBL producers were MBL positive by MIC MBL and four isolates were MBL positive by Vitek AES and colorimetric test.
Conclusion: High rates of carbapenem resistance and the potential production of carbapenemases in *P.aeruginosa* in our region required an phenotypic screening of MBL in routine laboratory work and further evaluation by genotypic methods.

Key words: *Pseudomonas aeruginosa*, phenotypic and genotypic detection, metallo β-lactamase
Authors would like to acknowledge for financial support to the Ministry of Science and Technological Development of the Republic of Serbia (Project TR31079).

POSTER PRESENTATIONS

1. PREVALENCE OF HIGH-RISK HPV GENOTYPES, CATEGORISED BY THEIR QUADRIVALENT AND NINE-VALENT HPV VACCINATION COVERAGE IN MACEDONIA

Elena Krstevska-Kelepurovska, Krsteva E, Delova A.
Center for Public Health – Bitola, Bitola, R. Macedonia

Macedonia is in the second place for prevalence of cervical cancer in Europe. This is a disease that can be prevented by vaccination. So far, four-valent human papillomavirus (HPV) vaccines have been used, and a nine-valent vaccine should be soon introduced. The new nine-valent vaccine against HPV includes the four HPV genotypes (6,11, 16, and 18) that are targeted by the quadrivalent HPV vaccine, plus five additional oncogenic types (31, 33,45, 52, and 58).
Objectives: In order to ensure a successful introduction of available nine-valent HPV vaccine, there is a need to identify pre-vaccination HPV genotype prevalence of unvaccinated subjects in Macedonia.
Materials and methods: This study, conducted from March,2017 to April,2018, was composed of 253 women, who were positively screened for opportunistic cervical cancer by pap smears and attend family gynecologist for HPV testing.
HPV genotyping was performed with the Real Time PCR test for detection and genotyping of HPV(16,18,31,33,35,39,45,51,52,56,58,59,66 and 68), Sacaceae, Biotechnologies, Italy on Real Time 7500 Applied Biosystems.
Results: Of the 253 cases, 50 (20%) were positive for HPV DNA. 33 of HPV positive women have an infection with single HPV genotype, and 17 have Multiple HPV infection. Prevalence of HPV 16 was 24.65% and for HPV 18 was 4.10%. Excluding types 16 and 18, the prevalence of additional five high-risk genotypes was 39.75% (17.80% for HPV31, 6.84% for HPV 33 and HPV52, 5.47% HPV58 and 2.80% for HPV45).
Conclusion: The nine-valent HPV vaccine is likely to give the greater protection of women in Macedonia, because, inthe absence of genotype 16 or 18 infection, these five genotypes on their own remained significantly associated with high-grade cervical lesions.

Key words: Real time PCR, HPV prevalence, vaccines, cervical cancer

2. RESULTS OF TESTING STOOL SAMPLES FOR DETECTION OF CLOSTRIDIUM DIFFICILE TOXINES A&B IN MMA MILITARY MEDICAL ACADEMY FOR THE FIRST SIX MONTHS OF THIS YEAR, 2018

Jelena Ćitić, Tomić D, Malešević M, Krstić M.
Sector of preventive medicine, Military Medical Academy (MMA), Belgrade, Serbia

Objectives: Clostridium difficile has been found to be major etiologic agent of antibiotic associated diarrhea and colitis. Disruption of normal flora protection by antibiotic use may permit overgrowth of endogenous or nosocomially acquired pathogen.Spreading of C.difficile is a serious consideration for tertiary level institutions, particularly those with high inpatient population.The aim of this work is to show prevalence of detection and presence of toxins A&B of C. difficile among inpatient population throughout 18 different wards in Military Medical Academy.
Materials and methods: selected unformed stools from patients with diagnosis diarrhoea, comprising period for the first 6 months of 2018.Samples were analyzed using CERTEST C.difficile combo card test- quick coloured chromatographic qualitative immunoassay, for simultaneous separate detection of both toxins, A&B.When test was worn out, we used VIDAS C.difficile toxin A&B assay, two step enzyme immunoassay sandwich method, with a final fluorescent detection – ELFA.
Results: out of 100 stools tested using CER test, 80 were negative and 20 were positive in both toxins detected.Only one sample from Infectious disease ward was positive for toxin B only.Concerning VIDAS,of 143 samples-104 were negative, 27 positive for both of toxins – A&B, and 12 were equivocal.
Conclusion: CERtest with separate detection of toxins A&B showed high level of confidence,according to manufacturer- specificity and sensitivity is even more than 99%.In the case of VIDAS, 12 samples (approximately 9%) were borderline and recommendation is to retest them, in order to get undoubted result.

Key words: C.difficile, antibiotic use,dirrhoea, detection of toxins A&B,interpretation of results

3. PRESENCE OF STREPTOCOCCUS IN THE MUNICIPALITY OF PROBISTIP BETWEEN 2007 AND 2011

Zoran Stojanovski
P.H.O. Center for public health-Stip r.u. Probistip, R.Macedonia

Purpose of study: To show the presence of streptococcus in the municipality of Probistip. Material and method: Information from the Center for public health-Stip r.u. Probistip was used. The descriptive-analytical method was used, where the information is presented tabular and graphically. Results: For the given period out of the tested 3170 specimens streptococcus was isolated in 163 subjects with Mb.1006/100000. The yealy average is 203/100000. Most frequently streptococcus pneumoniae was isolated in 75 subjects with Mb.463/100000. Streptococcus pyogenes was isolated in 7 subjects with Mb.43.2/100000 or 4.3%. The biggest number of isolates was in 2008 in 49 subjects. When it comes to the age groups, streptococcus is most frequent in the age group 5-9 years old with 45 isolates. Streptococcus was more frequent with the female population(105:58). Conclusion: It can be concluded that in the given period streptococccus was present in 5.1% of the tested material, yearly it was isolated in 33 subjects on average, streptococcus pneumoniae is most frequent with 46%, it is most often isolated from the younger population and it is most frequent with the female population.

Keywords: streptococcus, isolated, cases, young, female

4. PRESENCE LEPTOSPIRA SPP.AND BORELIA BURGDORFERI IN RATS ON THE TERRITORY OF BELGRADE FROME JUNE 1 TO AUGUST 31 2018

Nebojša Tačević, Lončar A, Despot D.
The Institute for Biocides and Medical Ecology, Belgrade

In the pilot program, the idea was to determine the presence of Leptospira spp. and Borrelia in rats in Belgrade.
Solved that the catch of the rats in the territories where the presence of Borrelia in ticks confirmed. The animals were sacrificed and the kidneys were then dually homogenized to prepare samples to be analyzed to Leptospira spp. The liver were made same for prepare samples to be analyzed Borrelia. Then PCR were preformed for pathogens.
In the pilot program we have selected 150 samples. 150 for the analysis of Leptospira we obtained 17 positive samples (11.3%). 150 for the analysis of the Borrela we obtained positive 34 samples (22.7%).
The results we obtained for Leptospira spp. correspond to the expected and agree with the literature. Results for Borrelia are much higher than those according to the literature and we expected but we believe that they are the result of the selection of sites for which we are known to have been a large number of ticks infected with Borrelia. The aim of the research is to prove the presence of a pathogen to gradually map of the location and walked in combating rodents.

Key words: Leptospira spp, Borrelia, Lyme, rats

5.SIGNIFICANCE OF DERMOSCOPY IN EARLY DETECTION AND MANAGEMENT OF BASAL CELL CARCINOMA PRESENTED IN SINGLE CASE

Andrija Jović[1], Tiodorović D [1,2], Popović D[1], Zlatanović Z[1], Radić M[2], Kocić H. [1]
[1]Clinic of Skin and Venereal Diseases, Clinical Center Niš, Niš, Serbia
[2]University of Niš, Faculty of Medicine, Serbia

Basal cell carcinoma (BCC) is the most common non-melanoma skin cancer with continuously increasing incidence worldwide.Typically BCC is a slow growing tumor with low metastatic rate, most commonly occuring in the head and neck region. Diagnosis isusually clinical andstraightforward. Dermoscopy is noninvasive method that allows the evaluation of structures within the epidermis and dermis and it helps in establishing clinical diagnostic accuracy of melanocytic and nonmelanocytic skin lesions. Also, dermoscopy has value in treatment decision and monitoring. We present 75-year-old male patient who was admited to our Clinic for evaluation of the pink nodular lesion on lower right leg presented for a least two years of duration suspicius of BCC. General skin examinaton reviled two more lesions on chest clinically sugesstive for BCC and numerous solar lentigines on his back. After dermoscopic examinationmultiple small BCCs over the upper arms and the back were detected. We excluded genetic syndromes associated with multiple BCCs bydetailed personal and family history. Based on clinical and dermoscopic features, different therapeutic modalities for treatmentof BCCs were selectedincluding: surgical exsision, criotherapy andelectrocautery. In this case we highlightthe significance of dermosopy in early detection of clinically unnoticeable BCC and also we demonstrateutility of dermoscopy in decision of adequate treatment options for BCC. Since surgical excison of all lesions in patient with multiple BCCs would be unappropriate,another treatment modality should be selected.Based solely on clinical appearance selectionis some cases may bechallenging. Different subtypes of BCCs display specific dermoscopic features, thusdermoscopy may be helpful in decision making. In adition, dermoscopy may be also useful in monitoring of the success of the treatment and the identification of early recurrence.
Key words: basal cell carcinoma, dermoscopy, diagnosis

6. COMMON ISOLATES OF BETA HAEMOLYTIC STREPTOCOCCI ISOLATED FROM SKIN AND SOFT TISSUE INFECTION.

Marina Dinić[1,2], Mladenović-Antić S[2], Kocić B[1,2], Stanković-Đorđević D[1,2], Đorđević V[1,2], Ranđelović M[2].
[1] Faculty of Medicine University of Niš, Serbia.
[2] Public Health Institute Niš, Serbia.

Objectives: streptococcal skin and soft tissue infection are often superficial, but also they could progress to severe life-threating infections like necrotizing myositis, bacteriemia and toxic shock. Even though group A streptococcus (GAS) and group B streptococcus (GBS) are the most common causative agents, several reports suggested change in the frequency of other groups. The aim of this study was to examine which are common isolates of streptococci isolated from skin and soft tissue infection.
Material and method: we reviewed beta haemolytic streptococci isolated from skin and wound infection obtained from outpatients and hospitalized patients in the period from January 2013. to September 2018. Isolation and identification was performed according to standard microbiological methods in laboratory for pioculture, in Public Health Institute Niš.
Results: out of 481 isolates of beta haemolytic streptococci 22.87% were GAS, 59.25% GBS, 8.52% belong to group C, 8.10% to group G streptococci and 1.25% were *Streptococcus dysgalactiae ssp. equisimilis*. Majority of isolates obtained from wounds: GAS in 67,28%, GBS in 79.65%, group C in 85.36%, group G in 94.87%. Except GBS, beta haemolytic streptococci were more often isolated from male than from female.
Conclusion:other non-group A or B beta haemolytic streptococci are rare isolates obtained from skin and wound infection. Appropriate identification is needed to follow the trend of the frequency.
Key words: streptococci, skin and soft tissue infection.

Authors would like to acknowledge for financial support to the Ministry of Science and Technological Development of the Republic of Serbia (Project TR34008).

7. CHLAMYDIAL INFECTION AMONG STUDENTS OF THE UNIVERSITY OF NIŠ

Marina Ranđelović[1,2], Kocić B[1,2], Đorđević V[1,2], Kostić J[2], Mladenović V[2], Ristić LJ[2], Ranđelović G[1,2].
[1]University of Niš, Faculty of Medicine, Niš, Serbia
[2]Public Health Institute Niš, Serbia

Objectives: *Chlamydia trachomatis* is the most common cause of non-gonoccocal urethritis in men and cervicitis in women. The aim of this research is to determine the frequency of chlamydial infection in students of the University of Niš.
Materials and methods: The research was conducted in the Center for Microbiology of the Institute of Public Health Niš, in the period from January 2015 to December 2017. Urethral swabs of 2520 men and endocervical swabs of 9004 women, including 232 male students and 1854 female students, were examined by using direct Immunofluorescence (PathfinderTM DFA *Chlamydia trachomatis* FITC, Bio-Rad Laboratories Redmond, WA).
Results: Chlamydial urethritis was diagnosed in 121 men (4.8%) and chlamydial cervicitis in137 women (1.52%). In the student population, chlamydial infection was diagnosed in 37 male students (15.95%) and in 49 female students (2.64%). Chlamydial urethritis among students was significantly more common than chlamydial cervicitis ($\chi^2 = 92.35$, $p < 0.0001$, $OR = 6.99$, $4.34 < OR < 11.24$). Statistically significant findings were determined among male students in comparison to other men who were part of the rest of the population ($\chi^2 = 69.46$, $p < 0.0001$, $OR = 4.98$, $3.22 < OR < 7.67$). There were statistically significant more chlamydial infections among female students compared to the rest of the examined women ($\chi^2 = 19.59$, $p < 0.0001$, $OR = 2.18$, $1.51 < OR < 3.14$).
Conclusion: Chlamydial infection is more prevalent among students when compared to the rest of the population, and chlamydial urethritis is more common than chlamydial cervicitis.

Key words: *Chlamydia trachomatis*, urethritis, cervicitis

SESSION: ENVIRONMENT AND HEALTH

INVITED LECTURE

1. AIR POLLUTION AND ALLERGIES. IS THERE A CONNECTION?

Živković Aleksandra[1], Živkovic N.[2], Stark H.[1]
[1]Institute of Pharmaceutical and Medicinal Chemistry, Heinrich Heine University Düsseldorf, Düsseldorf, Germany
[2]Faculty of Occupational Safety, University of Nis, Serbia

Allergies constitute one of the major health issues in modern societies and the new data show that up to 40% of people has an allergy. This number has strongly increased in the last decades, with increase of the industrialization. Nowadays is considered that 56% of people will show an allergic reaction in a lifetime.[1] Among the risk factors for the development of allergic reactions are genetic predispositions, nutrition and very important environmental pollution (indoor and outdoor).[2,3,4] Under normal circumstances, when an allergen for the first time enters antigen presenting cells (APCs) these APC than enter lymphatic system and meet T-Cells (Th0). These T helper cells transform into Th1(T helper 1) cells which interact with B cells releasing several cytokines, including IL12 and IFN-γ and the B Cells will be stimulated to produce IgG antibodies. IgG antibody is a protective antibody and will not result in allergic reaction. In people with an allergic tendencies, when allergens enter an APC and APCs enters a lymphatic system, interact and activate Th0 cells, some Th0 cells turn into Th2 cells. When Th2 cells interact with B-Cells release cytokines (IL-4, IL-5 and IL-13) and cause B cells to produce IgE antibodies. This IgE antibody response is abnormal and is basic cause of allergies, producing histamine, which in turn binds to its receptors and causes allergic reactions. Allergies that involve IgE reactions are allergic rhinitis (hay fever), skin allergies, asthma, insect allergies, some drug allergies, some food allergies etc. The ratio between Th2 and Th1 cells is regulated with the help of Treg (T regulatory) cells. Excessed Th2 activity would also supress the activity of Th1. [5]
Medication cannot cure allergies but can relieve the symptoms. Most common available therapies involve H_1 antihistamines, mast cell ion channel blockers, phosphodiesterase inhibitors, IgE antibodies etc.[6] Desensitization treatment known as allergen specific immunotherapy is the treatment that is closest to the cure and available in two variations as subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT).[7,8,9]
Environmental pollution has been show to exert changes in DNA methylation, histone acetylation or/and micro RNA expression. Most important air pollutants that influence the increase of allergic reactions are considered: particular matter (PM), diesel exhaust particles (DEP), ozone (O_3), nitrogen oxides (NO_x), volatile organic compounds (VOT), cigarette smoke and carbon dioxide (CO_2). Air pollution on the one hand increases allergenicity of the plants by increasing the amount of the pollen they produce and/or by modifying the proteins in pollen making it more allergenic. On the other hand, the pollution also induces changes in the human proteins. Very well documented are the modification of proteins by reactive oxygen species and nitrogen species (as the direct consequence of the increased O_3 and NO_x concentrations in the air). The presence of these components leads to an imbalance in between oxidants and antioxidants in favour of oxidants, and leads to irreversible damage of proteins, nucleic acids, cellular lipids, and carbohydrates sometimes leading to cell death. Chemical reactions of nitric oxides and the proteins lead to different nitration reactions, mostly nitration of the amino acid tyrosine forming bulky and much more acidic 3-nitro tyrosine. This chemical reaction changes the conformation and function of the proteins. Indoor air quality is influenced by the outdoor air quality but in addition to outdoor pollutant come: cigarette smoke, formaldehyde, triclosan, perfluorocarbons etc. These indoor materials mostly supress Th1 function and direct the immune system towards production of Th2 cells, as the result of either disrupted Treg cell function or their number.[4,10]Particular matter (PM) and diesel diesel exhaust particles (DEP) disrupt epithelial barriers and facilitate the access of allergens to immunogenic effector cells.[2] In animal study, DEP exposure led to increased rates of allergic reactivity and asthma with elevated IgE and histamine production. Human data show that DEP exposure increases IL-4, IL-5, IL-6 and IL-10 m RNA levels and decreases IFN-γ levels that is associated with reduced Th1 function. [11]

Data suggest strong correlation in between air pollution components and rising burden of allergic diseases. However, it is not simple to research separate factors of air pollution and their role in the allergic diseases. There is certainly the need to formulate the most important pollutants, regarding their influence on allergies. The next open question that rises is how important is the role of air pollution compared to other environmental and lifestyle factors. There is certainly a need for the society to include measures (reduce number of cars, art of fuels etc.) to contribute to better air quality. Actual data of air pollution will be presented. The new data and a scandal from some German auto producers (Dieselgate) have raised the question of forbidding some fuel combustions all together.[12]

Key words: allergies, air pollution, sensitization, allergenicity, skew Th2 response

References

1. González-Díaz, S. N., Arias-Cruz, A., Macouzet-Sánchez, C. & Partida-Ortega, A. B. Impact of air pollution in respiratory allergic diseases. *Med. Univ.***18,** 212–215 (2016).
2. Reinmuth-Selzle, K. *et al.* Air Pollution and Climate Change Effects on Allergies in the Anthropocene: Abundance, Interaction, and Modification of Allergens and Adjuvants. *Environ. Sci. Technol.***51,** 4119–4141 (2017).
3. Takano, H. & Inoue, K. Environmental pollution and allergies. *J. Toxicol. Pathol.***30,** 193–199 (2017).
4. Lee, S. Y., Chang, Y. S. & Cho, S. H. Allergic diseases and air pollution. *Asia Pac Allergy***3,** 145–154 (2013).
5. Galli, S. J. *et al.* The development of allergic inflammation. *Nature***454,** 445–454 (2013).
6.Pertti Panula, Paul L. Chazot, Marlon Cowart, Ralf Gutzmer, Rob Leurs, Wai L. S. Liu, Holger Stark, Robin L. Thurmond and Helmut L. Haas, Eliot H. Ohlstein. International Union of Basic and Clinical Pharmacology. XCVIII. Histamine Receptors **64,** 1–15 (2013).
7.Holgate, S. T. & Polosa, R. Treatment strategies for allergy and asthma. *Nat. Rev. Immunol.***8,** 218–230 (2008).
8.Khanfar, M. A. *et al.* Multiple targeting approaches on histamine H_3 receptor antagonists. *Front. Neurosci.***10,** 1–17 (2016).
9.Stark, H. & Schubert-Zsilavecz, M. Entwicklungen, strukturen und neue tendenzen: H_1-antihistaminika. *Pharm. Unserer Zeit***33,** 92–98 (2004).
10.Peden, D. B. Does air pollution really cause allergy? *Clin. Exp. Allergy***45,** 3–5 (2015).
11.Sasaki Y, Ohtani T, Ito Y, Mizuashi M, Nakagawa S, Furukawa T, Horii A, A. S. Molecular Events in Human T Cells Treated with Diesel Exhaust Particles or Formaldehyde that Underlie Their Diminished Interferon-γ and Interleukin-10 Production. *Int. Arch. Allerg. Immunol.***148,** 239–250 (2009).
12.Wehrmann, B. 'Dieselgate' - a timeline of Germany's car emissions fraud scandal. Available at: https://www.cleanenergywire.org/factsheets/dieselgate-timeline-germanys-car-emissions-fraud-scandal. (Accessed: 18th August 2018)

2. BOTTLED WATER CONSUMPTION AMONG MEDICAL STUDENTS - HABITS, OPINIONS, KNOWLEGDE

STUDENTS - HABITS, OPINIONS, KNOWLEGDE

Paunović Katarina
Institute of Hygiene with Medical Ecology, Faculty of Medicine, University of Belgrade, Serbia

Introduction

Natural bottled water is defined as water of exquisite physical, chemical, microbiological and radiological characteristics, filled at the source into sterile bottles without treatment or disinfection (1). The types of bottled water include natural mineral water, natural spring water and table water, whose quality is regulated by a specific Serbian guideline (2). In the European Union, a Directive 2009/54/EC regulates the marketing and exploitation of natural mineral waters, including water treatments, chemical and microbiological requirements, and labelling (3). In the United States, the Food and Drug Administration regulates bottled water in terms of bottling, transport, protection of water sources, quality control and sampling (4).

One of the basic rights of consumers under the laws of the European Union is the right to access information that serves as a base for decision-making regarding the purchase of goods, products and foodstuffs. Consumers expect product information to be complete, clear and sufficient, which in the case of foodstuffs is provided by the rulebooks and declarations (5).

Medical students could be considered similar to the general population when it comes to consumer habits and behavior, but in certain situations may be expected to know more about drinking water. The curriculum of Hygiene with medical ecology at the Faculty of Medicine, University of Belgrade offers 10 classes in semester (out of 75), such as lectures, seminars and practical classes on hygienic-sanitary characteristics of drinking water and problems regarding its quality, disinfection and possible water-borne diseases. To the author's opinion, however, the information regarding bottled waters in Serbia, their definition, quality, characteristics, and current legislation provided during classes and published in textbook is insufficient (6).

Given the lack of studies exploring the role of medical students as consumers of water and/or other foodstuffs on the market, this research was conducted aiming to examine the habits of medical students in relation to the consumption of bottled waters, as well as their attitudes and knowledge about the content, characteristics and declaration of bottled waters.

Methods

Medical students enrolled in the sixth year at the Faculty of Medicine, University of Belgrade were recruited to participate in this survey. An anonymous questionnaire was delivered to all students (n=515) attending classes in Hygiene with medical ecology in November 2016; a total of 492 valid responses (173 males and 319 females) was collected. The average age of participants was 24.5 ± 2.3 years.

Beside basic socio-demographic data (age, gender, place of birth, average grade at the faculty), the questionnaire comprised data on the habits regarding the consumption of bottled water, such as: whether students consumed bottled water ("yes" or "no"), the average amount of bottled water consumed daily (liters per day), the frequency of the consumption of bottled water (times per week), and situations in which bottled water is consumed (travel, training, when tap water is not available). In addition, students were asked to grade the importance of the factors guiding the selection of bottled water; these factors included the characteristics of the label (message or picture on the label), the characteristics of the bottle (shape, colour), the characteristics of the water (origin, source, mineral content, carbonization), and the price of water on the market. Finally, several statements regarding the quality and the characteristics of bottled waters at the market, as well as the knowledge of students and their opinions about bottled waters were proposed; students responded with "yes", "no" or "I don't know". These statements were based on the available labels of bottled waters on the market, and on the national legislation regulating bottled waters in Serbia.

Results

Basic characteristics of the investigated medical students are presented on Table 1. About 80% of medical students state they consume bottled water; significantly more female students than male students. About two third of the students consume bottled water at least a few times per week, and up

to one liter per day. On the other hand, only about a third of all students read labels of bottled waters, slightly more male students than female students.

Table 1. Basic characteristics of the investigated medical students

Parameters	Male	Female	Total	p value
Number of participants	173 (35.2%)	319 (64.8%)	492 (100.0%)	
Consumers of bottled water	129 (74.6%)	267 (83.7%)	396 (80.5%)	0.015*
Consuming bottled water 2-7 times per week	88 (65.7%)	199 (69.6%)	287 (68.4%)	0.767*
Consuming up to one liter per day	57 (56.4%)	140 (66.9%)	197 (63.5%)	0.194*
Participants who read labels of bottled water	70 (40.5%)	114 (35.7%)	184 (37.4%)	0.301*

* Pearson's chi-square test

The habits of the consumption of bottled water of the investigated medical students are presented on Table 2. About 85% of all students reported consuming bottled water during travel and about a half of them during training; slightly more female students responded positively on these questions, but the difference between genders was not statistically significant. About a half of the students reported using bottled water when tap water is not unavailable, significantly more female students than male students.

Table 2. Situations in which bottled water is consumed by the investigated medical students

Habits of consumption	Male	Female	Total	p value
During travel	132 (80.5%)	267 (87.5%)	399 (85.1%)	0.109*
During training	68 (41.7%)	155 (50.6%)	223 (47.5%)	0.173*
Tap water unavailable	70 (40.9%)	168 (52.5%)	238 (48.5%)	0.006*

* Pearson's chi-square test

Factors guiding the selection of bottled water among the investigated medical students are presented in Figure 1. More than a half of students reported choosing bottled water based on its sparkling characteristics (carbonization). About 40% of the students chose bottled water with regard to its price or mineral content. Other important factors are the country of origin and the source of water. The brand name of water, the characteristics of the bottle and the label are not regarded as important among the investigated students.

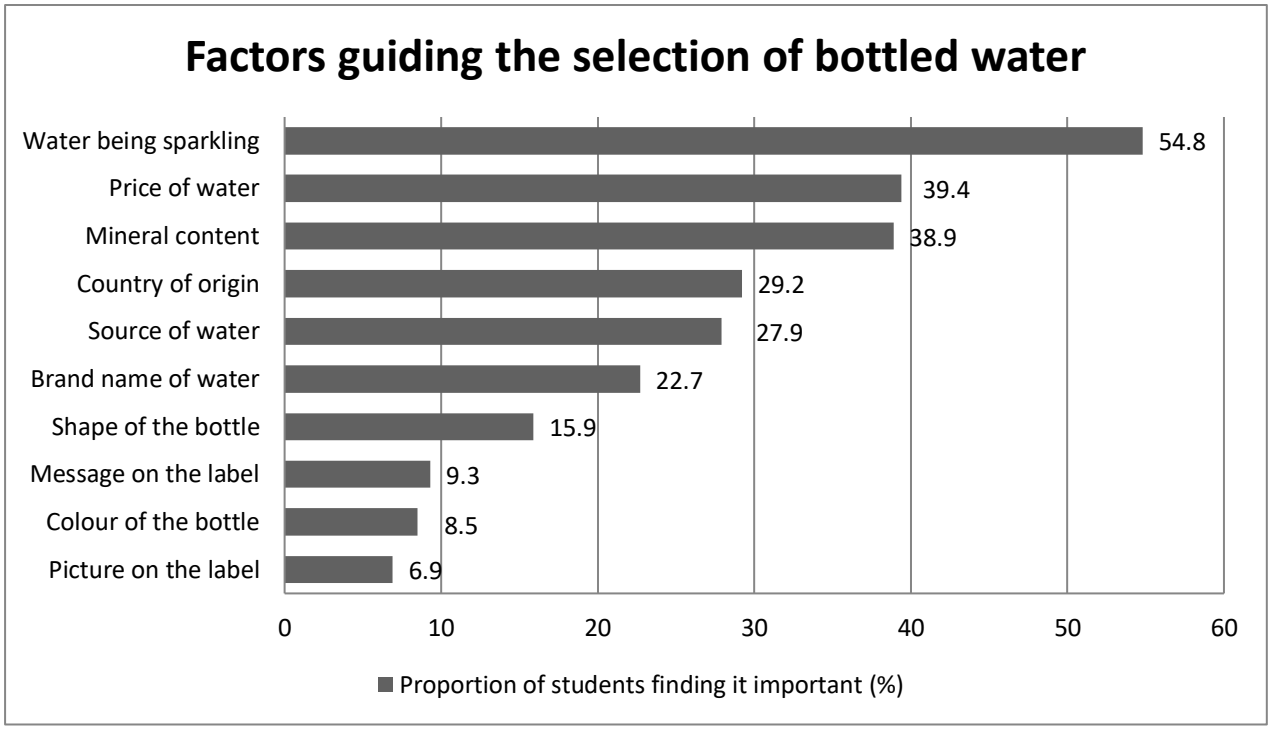


Figure 1. Factors guiding the selection of bottled water among the investigated medical students

Some facts that students answered correctly about the characteristics of bottled water included: the perception that magnesium-, sodium-, and iodine-rich bottled water are present on the market; the perception of the difference between spring and mineral waters, and the knowledge which water treatments are permissible (water carbonization) and not permissible (bottling tap water) (data not shown).

Discussion

This is the first study on medical students as consumers of bottled water. The findings suggest that students consume bottled water in large amounts (about a liter per day) almost every day (from two to seven times per week); they could, therefore, be considered regular consumers of bottled waters. The situations in which bottled water is used include travel and training, as well as situations when tap water is not available. Current data does not implicate that medical students doubt the quality of tap water, unlike what marketing messages promote (7).

This study suggests that the selection of bottled water depends on some characteristics of the water itself, primarily on carbonization or the presence of CO2 gas or its mineral content, as well as on the price of the product. In a similar study among college students, authors proved that students' intentions to purchase bottled water depend on perceived peer norms, behavioral control, and perceived benefits from consuming bottled water (8).

Female students in the presented study were more often consumers of bottled water, but there were no differences in factors guiding their selection of bottled waters. On the other hand, female students in Brazil reported perceiving bottled water as a product of superior quality, and chose water primarily for hydration and wellbeing, whereas male students chose bottled waters based on brands of water and the availability of purchase (9). A study among Dutch female students also showed that the consumption of bottled waters was related to their beliefs about health, lifestyle, and the environment on one side, as well to the taste of water, water quality, and perceived alternatives to drinking water on the other side (10).

To the author's opinion, the level of knowledge demonstrated by the medical students in this survey on the characteristics of bottled waters was not satisfactory. The only facts that the students correctly recognized was the presence of magnesium-, sodium-, and iodine-rich bottled water on the Serbian market. This kind of consumer perception can be explained by the strong and convincing marketing of some of these water brands in various mass media. On the other hand, students were not able to associate the above-mentioned cations with the appropriate anions in water, e.g. bicarbonates, sulfates

or chlorides. This ignorance is a direct consequence of lack of reading the labels of bottled waters. In addition, students showed poor knowledge regarding the differences between various types of bottled water, the treatments of bottled waters, and the nutrition and health claims found on the label.
In conclusion, all these gaps in students' knowledge depict the direction for further teaching within the curriculum in Hygiene with medical ecology.

References

1. Rulebook on hygienic correctness of drinking-water quality. Official Journal SRJ, No. 42/1998.
2. Rulebook on quality and other characteristics of natural mineral water. Official Journal SCG, No 53/2005.
3. Directive 2009/54/EC of the European Parliament and of the Council on the exploitation and marketing of natural mineral waters. Official Journal of the European Union, 2009, L 164/45.
4. Federal Food, Drug, and Cosmetic Act (FFDCA). Code of Federal Regulations. Title 21. Food and Drugs. Part 165 Beverages. Subpart B. Requirements for Specific Standardized Beverages. §165.110 Bottled water. Available at https://www.fda.gov/food/resourcesforyou/consumers/ucm046894.htm. Accessed on 20th July 2018.
5. Law on consumer protection. Official Journal RS, No. 62/2014.
6. Plećaš D, Paunović K. Drinking water. In: Jorga J (Ed.). Hygiene with Medical Ecology. Faculty of Medicine University of Belgrade, Belgrade, 2016.
7. Wilk R. Bottled water. The pure commodity in the age of branding. J Consumer Culture, 2006;6(3):303-25.
8. Xu X, Lin CA. Effects of cognitive, affective, and behavioral factors on college students' bottled water purchase intentions. Commun Res Rep, 2018;35(3)245-55.
9. Pacheco MHS, Kuriya SP, Capobiango CSC, et al. Exploration of gender differences in bottled mineral water consumption: A projective study of consumer's perception in Brazil. J Sens Stud, 2018;e12434.
10. van der Linden S. Exploring Beliefs About Bottled Water and Intentions to Reduce Consumption: The Dual-Effect of Social Norm Activation and Persuasive Information. Environ Behav,2015;47(5):526-50.

3. ANALYSIS OF THE SITUATION AND PROBLEMS IN DRINKING WATER REGULATIONS IN REPUBLIC SERBIA

Gligorijević Snežana
Institute of public health Niš- Centre for hygiene and human ecology, Serbia

In Serbia, the Law on water for human use has not been adopted to date, although a draft was passed the public debate. The area of drinking water is regulated by other laws, but new rulebooks have not been derived from them.
Objective: The aim of the paper is to analyze the situation and problems of applying the current regulations in the field of drinking water in the Republic of Serbia.
Material and method: The analytical method examines the application of current legislation in the area of health safety of drinking water and problems in practical work.
Results: Public utility companies take care of water supply in urban (Serbia) and partly rural areas (Vojvodina), but do not have plans for safe water supply according to the prescribed methodology by the WHO. There is no expert-methodological instruction for the area of safe and healthy water supply in regular and extraordinary circumstances that would find practical application in the network of institutes and public health institutes of the Republic of Serbia.
Conclusion: After Law on water for human use implementation, it is expected to solve problems detected in the practical work of the drinking water area.
Key words: drinking water, regulations, Serbia

4. RISK ASSESSMENT OF DRINKING WATER QUALITY IN AP VOJVODINA

Bijelović Sanja[1,2], Dragić N.[1,2], Živadinović E.[2]
[1]University of Novi Sad, Faculty of Medicine
[2]Institute of Public Health of Vojvodina (IPHV)

Objective: The objective of work is to assess the risk of drinking water quality (DWQ) in Autonomous Province of Vojvodina (APV) by using an international risk assessment matrix.
Methods: The data about DWQ were collected in 2016 by 7 regional public health institutions located of APV. The data were unified and evaluated in IPHV, considering 3 different types of drinking water (DW) available for population in APV - purified and disinfected (PDDW), non-purified, but disinfected (NDDW) and non-purified and also non disinfected (NDW). For the risk assessment standardize semi quantitative analyses defined in SRPS EN 15975-2:2015 with 3x3 risk assessment matrix, which assesses the likelihood and consequences of a hazard, rating the risks as low, medium and high, was used. Hazards were identified according to World Health Organization Guideline from 2017.
Results: In APV there are 45 settlements, among which PDDW is provided in 17, NDDW in 40 and NDW in 24. Among settlements with PDDW the low risk was dominant (in 82%), but in settlements with NDDW and NDW the medium and high risk were mostly determinate (in 40% and in 50%, in 46% and 50%, respectively), Consuming and using DW represents high risk for population living in the settlements Kikinda, Ada, Kanjiža, Novi Kneževac, Senta, Čoka, Zrenjanin, Novi Bečej, Pančevo, Bela Crkva, Kovin, Sremska Mitrovica, Inđija, Šid, Subotica, Bačka Topola, Sombor, Kula, Temerin, Vrbas, Bač, Bačka Palanka, Bački Petrovac, Novi Sad.
Conclusion: The systematically prioritizing risk assessment of DW intended for human consumption with proposed standardize methodology is an easily understandable tool which represents the greatest challenge in DW management.
Key words: Risk Assessment; Drinking Water; Public Health; Environmental Medicine

5. INTERNET AS AN IMPORTANT ENVIRONMENTAL FACTOR IN THE POPULATION OF ADOLESCENTS

Jović Jelena[1], Ćorac A.[1], Ignjatović Ristić D.[2]
[1]School of Medicine, University of Pristina-Kosovska Mitrovica
[2]Faculty of Medical Sciences, University of Kragujevac

Objectives: Researches have shown that using the Internet and social networks can change normal and healthy growing-up. The aim of our study was to investigate relationship between time spent on Internet, on FB, and playing sports on one hand, and problematic Internet use (PIU) on the other hand.
Materials and methods: The study sample was recruited from 48 schools and included 2113 adolescents (56% girls). Their mean age was 16.73. The Internet Use Disorder Scale (IUDS; α=0.944) was administered. These scale measure PIU and higher scores indicating greater Internet use-related difficulties. A questionnaire with questions about Internet and FB use and about sports activities was also used.
Results: The average score on the scale IUDS was 37.72 ± 14.11. There was a positive correlation between the time spent on the Internet and score on the IUDS ($r = 0.05$; $p< 0.05$), as well as the time spent on FB and score on the IUDS ($r = 0.26$; $p< 0.05$). On the other hand there was inverse relationship betvean time of sports activities and PIU ($r = - 0.59$; $p<0.05$).
Conclusion: The Internet is an important environmental factor in the population of adolescents. Adolescents spend a worryingly large percent of their free time on the Internet.
Key words: FB, adolescents, Internet, Problematic Intrent Use, PIU

Introduction

Adolescence is a period of intensive development, which gives adolescents unique, congruent, emotional and social characteristics. Adolescents are seen as older children or young adults, which is wrong. It is interesting to note that adolescents are often not visible in national health statistics and are the only population for which there is no medical specialization (WHO 2016). According to the WHO goals, Mental Hygiene, among other things, devotes special attention to the mental health of adolescents (WHO 2002). It is important because an adequate preventive medical approach to this population is the most important for the later healthy development of the personality (Milovanović S. et al., 2009).

Prefrontal cortex develops in the period of adolescence. In this period, myelinization comes to its climax, and the great revision of synapses takes place. The developing brain constantly revises the synapses, because there is not enough place in it for everything. Everything that is useful intensifies, and everything which is not gets pruned. In critical periods of the development, only the structure that gets the adequate stimulus can develop (Mitković Vončina M., 2015). Adolescents spend a large part of their time on the Internet, it can be considered one of the factors that substantially affect this process.

Researches have shown that using the Internet and social networks can change normal and healthy growing-up (Kormas G. et al., 2011; Kuss and Griffiths, 2017). It is therefore important to examine how much time adolescents spend online, what content they are searching for, what their activities are online and how and which social networks they use. It is also important to examine Problematic Internet Use (PIU) in these population. Therm PIU in science has been introduced by Beard et Wolf 17 years ago (Beard et Wolf, 2001), and he has replaced the term Internet addiction which is used till then. None of these terms is included in any official classification of the disease. However, there is a strong recommendation and need for investigations in this area.

The aim of our work was to establish: how much time do adolescents in Serbia spend online, what content are they searche, what are their activities while online, show how adolescents in Serbia use Facebook (FB), how much time they spend on FB, as well as, what are gender differences connected with this issue. We further investigated PIU in this population. In the and we were investigating relationship between time spent on Internet, on FB, and playing sports on one hand, and problematic Internet use (PIU) on the other hand.

Material and methods

The research was conducted in 48 high schools throughout the territory of Serbia. Final sample included 2113 adolescents. Their mean age was 16.73. The study obtained the approval of the Ethical committee and all subjects signed for informed consent. We got the permission from every school in which the study was conducted.The research was done in classrooms during classes. The following measurement instruments were used: Sociodemographic questionnaire; Questionnaire about intensity and way of using Internet; Questionnaire on content categories and online activities of respondents on the Internet; Questionnaire on the use of FB; Questionnaire about the life habits of the respondents; The Internet Use Disorder Scale (PIU scale; $\alpha = 0.91$). These scale measure PIU and higher scores indicating greater Internet use-related difficulties (Hinić 2002).

Results

This research included 2239 adolescents. In total, the questionnaire was filled out by 2113 (56% girls, 44% boys) participants and they went into the final analysis of this research. Demographic and socio-economic characteristics of participants are presented in Table 1.

Table 1 Characteristics of participants according to academic archievement and economic status

Region	%	School Type	%	Academic achievement	%	Economic status	%
Belgrade	14.3	Grammar	38.4	best	38.1	low	5.9
Vojvodina	20.6	Technical	24.1	very good	37.2	lower middle	10.6
Central and West Serbia	23.3	Economics	17.1	good	22.6	middle	39.5
South and East Serbia	32.3	Medical	14.4	passable	2.0	upper middle	27.2
Kosovo and Metohija	9.4	other	6.0			high	16.9

In our sample, 2.5% of participants do not have a computer. Of the total number sample of 74.6% say that they are satisfied with the connection to the internet (**Table 2**). None of the accesses distinguishes, that is they approach the Internet almost equally from PCs, Wireless (wi-fi), or from ADSL (Asymmetric Digital Subscriber Lin), or from mobile phones.

Table 2 Computer and Internet resurses

Satisfaction to Internet conection	n	%
low	69	3.3
lower middle	108	5,1
middle	358	17,0
upper middle	966	46,0
high	600	28,6
Internet approach		
Cable Internet	475	22.5
Wireless (wi-fi) from PCs	669	31.7
Wireless (wi-fi) from mobile phones	842	39.8
ADSL	858	40.6
Don’t now	62	2.9

Adolescents and the Internet (time spent on the Internet, contetnt and activities on the Internet, FB use)

The highest percentage of adolescents in Serbia spend about 20 hours online. According to data obtained, the maximum time taken in continuity was 5 hours for 62.8% of participants. On average, adolescents in Serbia use the Internet for about 6 years (5.54 ± 2.27), boys (5.57 ± 2.43) longer then girls (5.51 ± 2.13) but these diferences don’t signifficant.

The most browsed content for our participants was content related to music. The following content acccording to browsing popularity are related to education, sports, health and medicine. Next we have content which is related to travel, art, computer and technology, and pornography.
The most common activity of our participants online is social networks, and a targeted search for information. Then downloading music and movies. On fourth place is a search for favorite sites, then internet for school, then reading news and searching the net without a particular aim (surf). The next is reading and downloading books and texts and online games.
3.6% of our participants do not have Facebook (FB). In average, they spend 4.09 ± 4.92 hours on FB. Girls, statistically significant spend more time on FB than boys ((Girls 4.22 ± 4.99); (Boys 3.94 ± 4.82); $p<0.05$). The most common activity of a respondent on Facebook is a chat (**Table 3**).

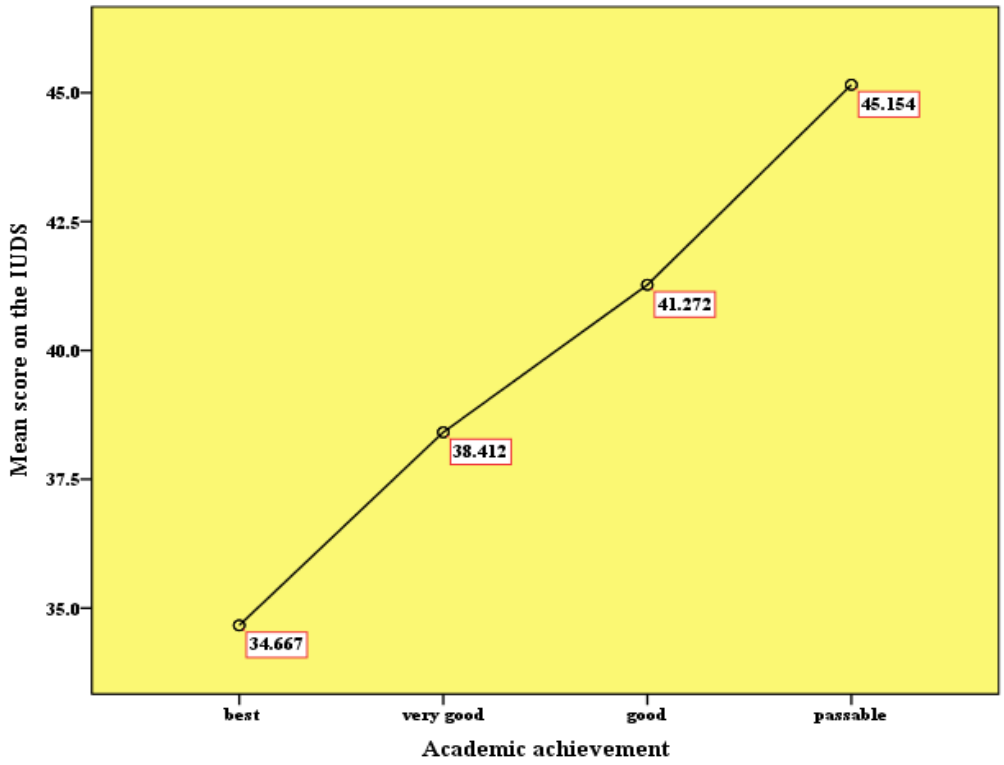
Table 3. Activities and contents on FB

Caracteristics	Whole samlpe	Boys	Girls	Chi	p
FB activities	n (%)	n (%)	n (%)		
Reading a posts	1040 (49.2)	438 (47.1)	602 (51.0)	3.54	0.08
Writing a posts	331 (15.7)	129 (13.9)	202 (17.1)	4.11	< **0.05**
Sharing various content	720 (34.1)	272 (29.2)	448 (37.9)	17.47	< **0.05**
Playing games	272 (12.9)	150 (16.1)	122 (10.3)	15.59	< **0.05**
Chat	1459 (69.0)	608 (65.4)	850 (72.0)	10.59	< **0.05**
Visiting various groups	476 (22.5)	198 (21.3)	277 (23.5)	5.66	0.25

Girls in a statistically significant greater percentage chating on FB (chi = 10.59, $p<0.05$), share various contents (chi =17.47, $p<0.05$) and write posts (chi =4.11, $p<0.05$). Boys in a statistically significant greater percentage play games on FB (chi =15.59, $p<0.05$). There was not a significant difference between gender in visiting various FB groups and reading of FB statuses.

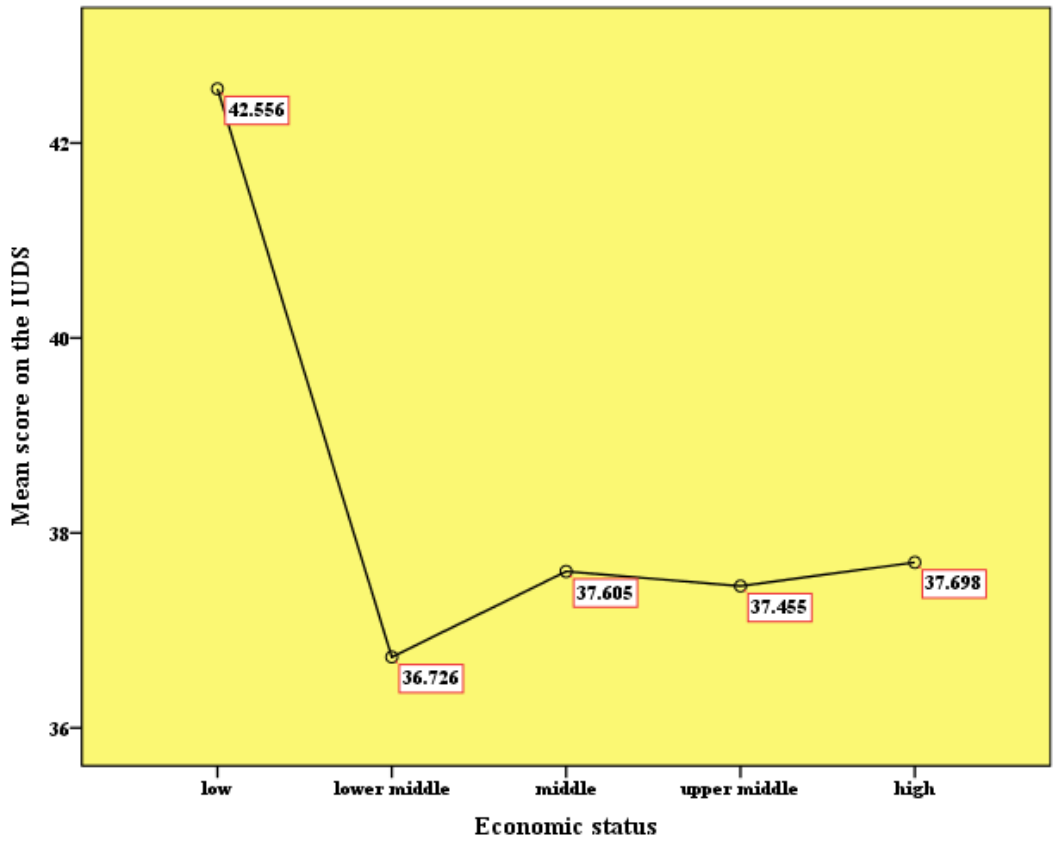
<u>PIU relationships with gender, academic achievement, economic status, time on the Internet and FB, sports activities</u>

The average score on the IUDS scale in the whole sample was 37.72 ± 14.12. In boys, the average score is 39.00 ± 14.38 and it is statistically significantly higher than for girls, where it is 36.74 ± 13.84 ($p< 0.05$).
Students with best achievement had lowest scores on the IUDS (34.67 ± 12.10), followed by students with very good achievement (38.41 ± 14.10), those with good achievement (41.27 ± 15.81) and students with passable achievement (45.5 ± 16.67). The differences between these scores were statistically significant ($F (3.1996) = 26.60$; $p < 0.05$) (**Graph 1**). When we analysed the difference between the groups by academic performance using post hoc Turckey test, we found a statistically significant difference in scores between best academic performance and all other students, as well as very good academic performance and all other students. We can see that there were no statistically significant differences on the scale between students with passable and good achievement



Graph 1. Mean score on the IUDS and academic achievement

A similar, inverse relationship was found between the socioeconomic status and scores on the IUDS, with students from a lower socioeconomic status scoring significantly higher on the IUDS (**Graph 2**). The differences between these scores were also statistically significant ($F(4.1982) = 3.23; p < 0.05$). These results were obtained using One-way ANOVA. However, when we used the post hoc Turckey analysis, we found that statistically significant differences were present only between subjects with lower socioeconomic status and the other groups.



Graph 2. Mean score on the IUDS and Economic status

Our participants are engaged in sports 4 days a week (3.94 ± 1.99), with an average training time of about 1 hour (64,91 ± 41,36). There was a positive correlation between the time spent on the Internet and score on the IUDS (r = 0.05; p< 0.05), as well as the time spent on FB and score on the IUDS (r=0.26; p< 0.05). On the other hand there was inverse relationship betvean time of sports activities and PIU (r= - 0.59; p<0.05).

Discussion

Our study is the first of such a range and content in Serbia. Research was planned as an observational cross - sectional study with the representative sample whose results would be a good foundation for some further clinical researches. The representative number of adolescents from the entire country is included in the research. The research is conducted in 48 high schools in Serbia. Out of that number, 24.1% examinees were from technical schools, 14.4% from a medical school, 17.4% examinees from an economic school, 38.4% examinees from gymnasiums and 5.9 % examinees from other high schools (art school, textile school) (**Table 1).** The obtained distribution of the academic achievement follows the distribution of the average success of 3rd - grade high school students in Serbia. The obtained distribution in the terms of the economic status partly fits with the distribution of the economic standard in Serbia. One of the explanations is that adolescents still do not earn money and probably do not have a clear insight into the financial status of their families. Another limitation is that this is only a questionnaire of the self-assessment.

Only 2.5% of examinees said that they do not have a computer. It is a data which coincides with the majority of data from researches in Europe and America (Vigna et al. 2017). According to the time spent on the Internet, our adolescents does not differ from their peers in the world. As far as the content and activities of the Internet are concerned, these data are in line with world-wide research (Kardefelt-Winther et al., 2017). Research shows that many of these contents can lead to PIU (Tan et al., 2016).

Nowadays, Facebook (FB) is a non-separable part of the adolescents social life. Among other things, it contributes to a better information exchange of various contents, and it is used for communication.

However, recent studies show that, the leading social network might potentially present itself as an emerging mental health problem (Mari et al.,2016). Our results show that adolescents spend worryingly more time on FB. The differences which exist between gender are expected and in accordance with the researches done so far. The next step in a further research, is to examine the connection between the time spent on FB and various FB use on one side and the possibility of the developing of a mental health problem, on the other side.
From earlier research, we know that family economic disadvantage and poorer academic performance are predictors of problematic internet use.Lower socioeconomic status is almost always connected with bad life conditions in the family (Xin et al. 2018). And Similar results were shown in previous studies, such as the study of Cohen et al. who found that poor academic performance contributed to the risk of PIU. These results are expected and are in a line with almost all research which showed that lower socioeconomic status is a characteristic associated with higher PIU risk (Mei et al. 2016; Shek and Yu, 2016;
Wang et al. 2011)

PIU is still not clearly defined as a disorder and there are no clearly defined criteria for setting the diagnosis. On the other hand, it is evident that the Internet use can lead to the entire spectrum of disorders. The scale used in this research is standardized into the Serbian language (Hinić, 2012). Cronbach's α coefficient of this scale in our research was α= 0.918, which speaks in favor of the excellent internal consistency of the scale. The boys showed statistically significantly higher scores compared to girls, which was quite expected.

One of the most important results of our research is that adolescents doing sports have statistically significantly less chance of developing PIU. What is worryingly is that a large number of hours spent on the Internet and FB leads to PIU development. Studies have shown that the adolescents with PIU very often have some other psychological problems as well (Yang et al., 2005; Yen et al., 2008).

In conclusion we can say that adolescents spend a worryingly high percentage of their free time on the Internet and FB. Time spent on the Internet with certain content that goes with activities while online may lead to increased risk of developing PIU. For us it is important that students with the lowest socioeconomic status and poorest academic performance should been a group for preventive interventions. In the future research, it would been interesting to see if students with poorer academic performance had better performance before problematic Internet use.Also our results show that sports activities reduce the possibility of developing problematic use of internet, which gives us great opportunities in terms of preventive work.

Key words: FB, adolescents, Internet, Problematic Intrent Use, PIU

References:
Beard KW, Wolf EM (2001). Modification in the proposed diagnostic criteria for Internet addiction. Cyber. Behav 4(3): 377–383.
Hinić D (2012). Evaluacija skale poremećaja upotrebe internet (PUI). Psihologija 45(3):311–325.
Kardefelt-Winther D, Heeren A, Schimmenti A, van Rooij A, Maurage P, Carras M, et al (2017). How can we conceptualize behavioural addiction without pathologizing common behaviours? Addiction 112(10):1709–1715.
Kormas G, Critselis E, Janikian M, Kafetzis D, Tsitsika A (2011). Risk factors and psychosocial characteristics of potential problematic and problematic internet use among adolescents: a cross-sectional study. BMC Public Health 11:595.
Kuss DJ, Griffiths MD (2011). Online Social Networking and Addiction – a Review of the Psychological literature, Int J Environ Res Public Health 8(9):3528-3552.
Mari, C., Vienoa, A., Pastore, M., Albery,I.P., Frings, D., Spada, M.M., 2016. Modeling the contribution of personality, social identity and social norms to problematic Facebook use in adolescents. Addictive Behaviors 63, 51–56.

Mei S, Yau YH, Chai J, Gu J, Potenza MN (2016). Problematic Internet use, well- being, self-esteem and self-control: data from a high-school survey in China Addict. Behav. 61:74-79.
Milovanović S, Jašović-Gašić M, Pantović M, et al (2009). The historical development of psychiatry in Serbia. Psychiatr Danub 21(2):156-165.
Mitković Vončina M.(2015). Psihosocijalni i psihopatološki činioci sklonosti ka ponavljanju zlostavlja nja dece u sledećoj generaciji [Doktorska disertacija].
Beograd :Medicinskifakultet Univerziteta u Beogradu.
Shek DTL, Yu L (2016). Adolescent internet addiction in Hong Kong: prevalence, change, and correlates. J. Pediatr. Adolesc. Gynecol 29:S22–S30.
Tan Y, Chen Y, Lu Y, Li L (2016). Exploring associations between Problematic Internet Use, Depressive Symptoms and Sleep Disturbance among Southern Chinese Adolescents. Int. J. Environ. Res. Public Health 13:313.
Vigna-Taglianti F, Brambilla R, Priotto B, Angelino R, Cuomo GL, Diecidue R (2017). Problematic internet use among high school students: Prevalence, associated factors and gender differences. Psychiatry Research 257:163–171.
Wang H, Zhou X, Lu C, Wu J, Deng X, Hong L (2011). Problematic internet use in high school students in Guangdong Province, China. PLoS One 6 (5), e19660.
World Health Organization (2002). Strengthening mental health: resolution of the Executive Board of the WHO. Geneva: WHO; 2002. EB109.R8.
World Health Organization (2016). Global Strategy for Women's,Children's and Adolescents' Health (2016-2030). Available from: http://www.who.int/life-course/partners/global-strategy/en/ [Accessed Jul 2018]
Xin M, Xing J, Pengfei W, Houru L, Mengcheng W, Hong Z (2018). Online activities, prevalence of Internet addiction and risk factors related to family and school among adolescents in China. Addict Behav Rep. 2017 Oct 19;7:14-18.
Yang CK, Choe BM, Baity M, Lee JH, Cho JS (2005), "SCL-90-R and 16PF profiles of senior high school studentswith excessive internet use," Canadian Journal of Psychiatry 50(7):407-414.
Yen JY, Ko CH, Yen CF, Chen SH, Chung WL, Chen CC (2008), "Psychiatric symptoms in adolescents with Internet addiction: comparison with substance use," Psychiatry and Clinical Neurosciences 62(1): 9–16.

ORAL PRESENTATIONS

1. HEALTH-RELATED QUALITY OF LIFE OF DIFFERENT POPULATION GROUPS IN THE AREA OF EXPRESSED ENVIRONMENTAL POLLUTION

Ćorac Aleksandar[1], Bukumirić Z.[2], Jović J.[1], Ilić D.[1], Barać M.[3]
[1]University of Pristina, with temporary headquarters in Kosovska Mitrovica - Faculty of Medicine
[2]University of Belgrade - Medic and nski college
[3]University of Pristina, with temporary headquarters in Kosovska Mitrovica - Faculty of Technical Sciences

Objectives: The aim of the paper was to establish the characteristics of quality of life in relation to health in the population belonging to different groups by ethnic and social characteristics, and live in an area with an increased presence of environmental pollution.
Methods: Applied is a multipurpose survey RAND- 36, which proved to be very useful for comparing the effects of various factors on the disease, as well as for making the difference between useful procedures for health in a wide range of possibilities.
Results : The research included 357 participants (66 % men, 34 % of women). Serbian ethnicity were 202 subjects (56.6%) and Albanian 155 (43.4%) who lived in 8 settlements. In "Trepca", 146 (20.5 %) participants worked, while the rest were participants who did not work in "Trepca", of which 70 (9.8%) worked in education sistem, 58 (8.1%) citizens who worked in municipality, and the rest citizens were 199 (61.5%).
For all participants, of all self-assessment segments, PF had the highest value, and the lowest GH and CSPY. Serbian nationality participants have higher values in the segments: LE, E, EWB, SF, L and SCPY. In segments: PF, LP, LE, E, EWB, SF, P and GH citizens who do not work in "Trepca" have significantly more value than Trepca workers. There are differences in the comparison of citizens who do not work in Trepca.
Conclusion: In persons living in similar conditions of life, there are differences in the perception of their own quality of life, depending on belonging to a different ethnic and/or social group.
Key words: health-related quality of life, environmental pollution, Rand-36.

POSTER PRESENTATIONS

1. CULTURE-DEPENDENT ANALYSIS OF MICROBIAL DIVERSITY IN HEAVY METAL POLLUTED SOILS IN BULGARIA

Satchanska Galina[1], Doicheva A.[2], Groudeva V.[2]
[1] Dept. Natural Sciences, New Bulgarian University, Montevideo Str. 21, 1618 Sofia
[2] Faculty of Biology, Sofia University, Dragan Tsankov 8, 1164 Sofia

Objectives: Heavy metal polluted soils represent one of the most severe environmental problems. Metal ions as Hg^{2+}, Cd^{2+}, Ag^{+}, Cu+, Zn^{2+} and Pb^{2+} form strong toxic complexes in the biological cells, bind to enzymes and erythrocytes and disrupt the cell membrane. Heavy metals are also responsible for genotoxic effects causing genetic damages as DNA adducts, changes in DNA methylation and histone modifications proved in vitro and *in vivo*. Bacteria are highly sensitive and adaptive to pollutants organisms and could serve as reliable biomarker for environmental contamination. Shifting of the microbial community structure was detected in three metal-polluted soils collected near the Pb-Zn smelter KCM and pesticide enterprise AGRIA, Bulgaria. Due to new waste water treatment plant functioning the environmental pollution was significantly decreased.
Materials and methods:CFU of heterotrophic aerobs, heterophic anaerobs, sporeforming bacteria, denitrifying bacteria, amonifying bacteria, nitrifying bacteria, Fe(II)-oxidizing bacteria, Mn(II)-oxidizing bacteria, Fe(III)-redicing bacteria, Mn(IV)-reducing bacteria, colourless sulphur bacteria, cellulose degradating bacteria, oligocarbophiles, actinomicetes and fungi were assesed *via* culturing on selective media. Presence of metal-leaching bacteria as *Acidithiobacillus thiooxidans*, *Acidithiobacillus ferrooxidans*, *Acidithiobacillus denitrificans*, *Acidithiobacillus thioparus* was analyzed as well. Ecotoxicological test of soil samples was conducted according ISO/DIS 10712.2. Twenty novel indigenous soil bacterial isolates were cultured. Most of them showed metal resistance.
Results: Microbial community structure in two of investigated soil samples was affected due to heavy metal and pesticide pollution. Our results demonstrated the nitrifying and denitrifying bacteria as well as actinomycetes and fungi were not detected in two out of three samples. Absence of above mentioned bacterial groups resulted in abundance of other groups as heterotrophic and spore-forming bacteria. All three samples showed ecotoxicology effect compared to the standard.
Conclusions: Microbial community responded to long-term heavy metal- and pesticide contamination through changes in its structure and selection of metal resistant bacteria.
Key words: heavy metal pollution, environment, microbial diversity, metal-resistant bacteria

2. EFFECT OF AIR POLLUTANTS ON THE POPULATION IN NORTHERN KOSOVSKA MITROVICA

Ilić Danijela[1],Ćorac A.[1], Mirković M.[1], Jović J.[1], Milošević J.[1,] Đurić S.[1], Bukumirić Z.[2]
[1] Institute of Preventive Medicine - Faculty of Medicine Pristina-Kosovska Mitrovica
[2]Institute for Medical Statistics and Informatics-Faculty of Medicine Belgrade

Objectives: Aim of this study was to analyze the level of pollutants in the air and their influence on the health of the population in northern Kosovska Mitrovica.
Methods:A time series study was performed in the period 2009-2013 using data of Primary Health Care Institution in Northern Kosovska Mitrovica. Emission of soot, sulfur dioxide and azote dioxide in the air was followed and analyzed. Associations between air pollutants and daily numbers of initial visits to the Primary Health Care Institution were analyzed by using Distributed Lag Non-Linear models (DLNM) by Gasparini.
Results: Significant associations were observed between respiratory diseases and increase of the concentrations of soot. The delayed effect of soot on increasing in the number of patients with respiratory diseases was the highest from the sixth to the eleventh day (RR = 1.00655 - 1.00709) in the patients up to 18 years old. There was no statistically significant impact of the pollutants on the blood system and respiratory diseases in the age over the 18.
Conlusion: This study shows that soot concentrations have a significant influence on health, especially for kids.
Kay words: pollutions, soot, respiratory diseases.

3. RELATIONSHIP BETWEEN THE CHANGES IN THE OUTSIDE TEMPERATURE WITH PATHOGENESIS OF DEEP VEIN THROMBOSIS OF THE LOWER EXTREMITIES IN THE PATIENTS WITH CHRONIC VENOUS INSUFFICIENCY

Damnjanović Zoran[1], Jovanović M.[1,2], Stepanović N.[1], Bogdanović D.[3], Milić D.[2,4]
[1] Vascular surgery clinic, Clinical center of Niš,Serbia
[2] University of Niš, School of Medicine, Niš, Serbia
[3] Department for biochemicaland medical sciences, The State University of Novi Pazar, Serbia
[4] Cardiac surgery clinic, Clinical center of Niš,Serbia

Objectives: The aim of this prospective study was to examine the relationship between the changes in the outside temperature with the pathogenesis of deep vein thrombosis (TDV) of lower extremities in patients with chronic venous insufficiency (HVI).
Materials and methods: The study covered 67 patients with diagnosed TDV in the lower extremities with HVI, treated at the Vascular Surgery Clinic at the Clinical Center in Niš, starting from January 2013 to December 2014.
Results: An increase in the outside temperature in all examined periods in patients over 60 years of age was associated with a decrease in the risk of developing TDV as a whole and at sites above the knee ($p < 0.01$). In men, an increase in external temperature at all-time interval intervals was associated with a reduction in the risk of TDV lower extremities as a whole ($p < 0.01$) and with a locality above the knee ($p < 0.05$ and $p < 0.01$).
Conclusion: It is possible to conclude the connection of the change in the outside temperature with the incidence of TDV in patients with HVI, as well as the association with sex and the localization of the thrombus.
Key words:deep vein thrombosis, external temperature, etiopathogenesis

4. AMBIENT PARTICULATE MATTER AIR POLLUTION AND HEALTH EFFECTS

Stošić Ljiljana, Stojanović D.
Faculty of Medicine University of Nis
Public Health Institute Niš

Particulate matter is the term for a mixture of solid or solid/liquid particles suspended in breathing air.Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Suspended particles can be: total suspended particles (TSP), PM_{10}, $PM_{2,5}$, fine and ultrafine particles, particles from diesel engines, fly ash, mineral dust metal dust and metal vapor, soot and others. In general, suspended particles are originated from a wide range of natural and anthropogenic sources.
Natural sources are: volcanic eruptions, desert dust storms, forest fires, sea salt spray, pollens, spores, plant fibers and anthropogenic use of fossil fuels for heating, transportation, industry and energy conversions, metal melting, agricultural areas. Anthropogenic sources are more dangerous to health because they are smaller and penetrate deeper into the respiratory tract.
Suspended particles have negative effects on human health and because of that they attract attention of experts, regulators and public.
The chemical properties vary depending on sources of particles. Still, even particles from the same type of source may vary in their chemical compositions due to different conditions, such as different source location, different time or different emission rates. The importance of the chemical characteristic has become known recently when some studies pointed out that chemical composition significantly contribute to adverse health effects.
The present paper is a review of the epidemiological research conducted during the last 10 yrs. In this review, we discuss the health effects of particulate matter on exposed people.
Key words: Particulate matter,air pollution, health effects

5. DANDELION (*TARAXACUM OFFICINALE* WEBB.) AS A INDICATOR OF ENVIRONMENT CONTAMINATION BY METALS

Velimirović Dragan[1], Stojković M.[2], Tošić S.[2]
[1]Faculty of Medicine, Department of Pharmacy, University of Niš
[2]Faculty of Sciences and Mathematics, Department of Chemistry, University of Niš

Objectives: The aim of this study was to examine whether the leaves of dandelion sampled in the territory of the city of Niš from different locations can serve as an indicator of environmental pollution.
Materials and methods: The content of metals (Cd, Cu, Pd and Zn) in the tested samples was determined using the technique of inductively coupled plasma optical emission spectrometry (ICP-OES).
Results: The contents of cadmium and lead ranged from 0.11 to 0.23 mg/kg (Cd) and 0.39 to 0.56 mg/kg (Pb) for samples collected in the uncontaminated area, i.e. in range from 0.50 to 0.60 mg /kg (Cd) and from 1.78 to 2.38 mg/kg (Pb) for samples that were exposed to the effect of the pollutant. While the content of copper and zinc ranged from 9.25 to 11.14 mg/kg (Cu) and from 34.08 to 44.68 mg/kg (Zn) for uncontaminated sites, compared with the content of these elements from the sites which were exposed to the source of the pollutant, which ranged from 14.12 to 20.02 mg/kg (Cu) and from 48.36 to 62.71 mg/mg (Zn).
Conclusion: Dandelion can be a good indicator of environmental pollution, because the content of detected metals, in tested samples, varies due to the exposure of pollutants.
Key words:dandelion; indicator; metals; environment

6. STATUS OF HYGIENE SCHOOL TOILETS

AzabagićSelma, Mulić M.
Public Health Department of Tuzla Canton, Tuzla, Bosnia and Hercegovina

INTRODUCTION : Functional toilets and appropriate equipment for personal hygiene are necessary, but also sufficient to minimize infectious diseases transmitted by fecal-oral route. Sanitation and personal hygiene are fundamental to health. This study is set up in order to determine the status of hygiene conditions of sanitary facilities in schools of Tuzla Canton.
METHODS: This cross-sectional study was conducted in 5 municipalities of Tuzla Canton (Kalesija, Banovici, Zivinice, Gradacac, Lukavac) from 2013. to 2014.year.The study was conducted on a sample of 101 school buildings (33 central and 68 regional schools). In total, 88 sanitary facilities. Insight into the equipment of sanitary facilities is done through a specially designed questionnaire and inspection of each facility.
RESULTS : The most common type of toilet squatting 73%, then squatting and urinals 11%, and the toilet bowl only two schools. School toilet is located outside the building in three schools in three school toilet is common for children of both sexes and teachers. In 16% of schools in the bathroom does not have garbage cans. The taps in most schools are correct, and in one school is missing. Only in 7 schools have hot running water. 72% of schools have no toilet paper, while 42% do not have liquid soap. None of the buildings has a hand dryer, as well as paper towels for hands. In most facilities the bathrooms have the old, dilapidated and frazzle sanitary facilities (sink, toilet cistern, toilet bowl). Sanitary rooms are not heated.
CONCLUSION: Hand washing is the most important and least expensive measures to prevent the occurrence and spread of infectious diseases. For that we need running water, liquid soap and disposable paper towels. The lack of basic resources for personal hygiene in primary schools is alarming. This important public health issue is not given adequate attention.
Keywords: school, school toilet, sanitation, personal hygiene

7. HEALTH HAZARDS ASSOCIATED WITH SWIMMING POOL WATER QUALITY IN REPUBLIC OF SRPSKA

Lazić Vesna[1], Grujić Rudić V.[2,4], Todorović M.[3], Grabež M.[2,4]
[1]JZU Institut of Public Health of Republika Srpska, Regional centar Zvornik
[2]JZU Institut of Public Health of Republika Srpska, Banja Luka
[3]JZU Institut of Public Health of Republika Srpska, Regional centar Doboj
[1]Faculty of Medicine,University of Banja Luka

Objectives: Examine the water quality of swimming pool water in Republic of Srpska in 2017., point to the public health significance of water control in swimming pools.
Matherials and methods: Swiming pool water was colected out according to the sampling plan of the Institute of Public Health of Republic of Srpska (Banjaluka and five regional centers) in the period from 01.Jan. until 31.Dec.2017.(n=1073). Sample testing was performed according to the standard methods.
Results: The most common causes of physico-chemical uncomplience were oxidation (n = 23) and pH (n = 33) in indoor swimming pools, trihalometans in outdoor respectively (n = 6).The most common causes of microbiological unsafetyin outdoorpools was the presence of *Pseudomonas aeruginosa* (n = 16), *Escherichia coli* (n = 15) and high number of aerobic bacteria (n = 3), microbiological unsafety was not detected in indoor pools.
Conclusion: Inadequate water quality in swimming pools poses a risk to swimmers and it's a Public health challenge. To reduce the health risk,it's necessary to establish an adequate water treatment, educationof the users,good operation and management procedures, regular monitoring and cooperationwith Public health institutions to prevent diseases associated with unsafeswimming pool water.
Key words: swimming pools, microbiological and physico-chemical hazards, Public health

8. OCCUPATIONAL EXPOSURE TO LEAD IN THE GALVANIZATION PROCESS AND HEALTH IMPLICATIONS

Lazarević Vesna[1], Krstić I.[2]
[1]Military Hospital Niš, Centre for Preventive Medical Care
[2]Faculty of Occupational Safety, University of Niš

Objectives: In the galvanization process, occupationallead poisoning isalmostexclusively of chronic character. This emphasizes the need to study itstoxiceffect, with the aim to discover its most sensitivesubclinicaleffects. The given research indicates the importance of the toxic effects of lead on the exposed population and suggests establishing statistical correlations of lead concentrations, age and length of service.
Materials and methods: The applied analytical method type of retrospective epidemiological cohort study. Biomonitoring is based on the determination of the concentration of lead in biological samples (blood and urine) in exposed and control groups of patients. We used data from the annual reports of social services and medical statistics, data from medical records and the specific primary health care professional is employed and the Institute for Health Workers and the Public Health Institute in Nis.Using atomic absorption spectrometry, the analysis of the concentration of lead in biological material.Statistical analysis and presentation of the results was performed software packages Excel, Matlab, SPSS19.0.
Results: The level of lead in blood and urine of exposed groups during the study period was positively correlated with age ($r=0,763$, $p<0,01$ i $r=0,627$, $p<0,01$, respectively). Determined by the high positive correlation between the concentration of lead in blood and urine and the exposed length of service in exposed subjects during the time of study, ($r=0,854$, $p<0,01$ i $r=0,722$, $p<0,01$, respectively).
Conclusion: These data confirm the association between occupational exposure to lead as well as the age and length of service exposed and pointing to a response to the effects of harmful effects. A retrospective cohort epidemiological study showed that the systematic effects of lead exposure results in an increase of its concentration in biological material, confirming the hypothesis of high toxicological risk.
Key words: lead, occupational exposure, galvanization process, health implications.

9. AIR QUALITY AND URBAN POPULATION MORTALITY

Dragić Nataša[1,2], Bijelović S.[1,2], Živadinović E.[2], Bjelanović J.[1,2], Velicki R.[2], Popović M.[1,2], Jevtić M.[1,2]
[1]University of Novi Sad, Faculty of Medicine, Hajduk Veljkova 3, 21000 Novi Sad, Republic of Serbia
[2]Institute of Public Health of Vojvodina, Futoska 121, 21000 Novi Sad, Republic of Serbia

Objectives: Investigate the relation between air quality and mortality of the population in the City of Novi Sad.
Materials and methods: For the City of Novi Sad, in the period from 2010 to 2014, the daily, annual and seasonal data on air quality (suspended particles (PM_{10}), soot, sulfur dioxide (SO_2) and nitrogen dioxide NO_2)), as well as annual data on mortality of the population (total, sex and cause specific mortality rate) were evaluated.
Results: Average annual concentrations of soot, SO_2, NO_2 and PM_{10} were 14.41 μg/m^3, 21.59μg/m^3, 20.15μg/m^3, 34.80μg/m^3, respectively. A statistically significant ($p < 0.05$) decrease trend was found for NO_2, SO_2 and PM_{10}, as well as increase trend for soot. Concentrations of analyzed pollutants were higher in the winter ($p<0.05$). Average annual PM_{10} concentrations correlated with specific annual rates of total mortality for females ($p<0.05$) and respiratory mortality of the total population ($p<0.05$). Also, a statistically significant correlation between average annual NO_2 and respiratory mortality was determined ($p<0.05$).
Conclusion: Although the analyzed pollutants do not exceed the nationally annual limit value the increase in the average annual concentrations of PM_{10} and NO_2 is related with total and respiratory mortality.
Key words: Air pollution, Mortality, Environment, Health

10. WATER QUALITY MONITORING IN THE RIVER RZAV BASIN

Petrović Vladimir, Janjić O., Prošić V.
Public Health Institute Užice

Objectives: The health of the population depends to a large extent on the availability of sufficient quantity of the right drinking water, which is also the most important substance in nature and the basic precondition for the survival of living beings.
The aim of this study is to present the state of the catchment area of the Rzav river in the period from 2013 to 2017.
Materials and methods: Local inspection and sampling of river waters on the physical-chemical, bacteriological and biological safety of the watercourses: Veliki Rzav, Mali Rzav, Katusnica, Ljubisnica and Prištevica. The analysis of the samples was done according to the current legal regulations.
Results: The classification of the Prištevica and Ljubišnica river bases on the basis of the tested parameters was from the first to the fourth class. Katusznica river was from the first to the third class in the investigated period, while Mali Rzav was classified from the second to the fourth class. The Great Rzav River was the second and third class. The reasons for the first class deviation were increased concentrations of nitrates, ammonium ions, suspended matter, iron, and biochemical oxygen demand.
Conclusion: By local inspection of the catchment area and by laboratory testing of the analyzed watercourses, it is estimated that the water pollution is minimal, ranging from first to fourth class, and for years, the water quality of most the rivers is getting worse. It is necessary to continue monitoring the condition of these watercourses.
Key words: Rzav river basin, water quality monitoring, watercourse classification

11. NATURAL TOXINS (ATROPINE AND SCOPOLAMINE) IN MAIZE – A POTENTIAL THREAT

Ristić Maja, Pantić Palibrk V, Koprivica D, Tadić M, Vuković G
Institute of Public Health of Belgrade

Objectives: Weeds containing tropane alkaloids (TAs) are increasingly being found in various crops, mainly corn, millet, buckwheat and sunflowers. A total of 25 notifications and/or alerts were reported for atropine/scopolamine in the period 1994 to 2016, from which four on corn-based products. The once neglected presence of TAs in foods has been recently reconsidered, leading to a specific Recommendation 2015/976 by the European Commission on the monitoring of the presence of TAs in food.
Methods: Two samples from border control due to RASFF notification were analysed using liquid chromatography with tandem mass spectrometry for the presence of atropine and scopolamine in maize.
Results: In both samples were detected atropine and in one scopolamine.
Conclusion: In recent years interest in natural toxins produced by plants has grown due to its recognized risks for human health. More analytical data on the occurrence of tropane alkaloids should be collected to better characterise and manage the risks to human health from TAs occurring in food and feed.
Keywords: atropine, scopolamine, maize, food

12. THE CONTENTS OF ROSMARINIC ACID IN *SALVIA VERTICILLATA* L. EXTRACTS

Milutinović Milica[1], Kostić M[1], Živanović S[2], Miladinović B[1], Kitić N[3], Branković S[4], Kitić D[1]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Faculty of Medicine, Research Center for Biomedicine, Niš, Serbia
[3]Faculty of Medicine, University of Niš, Serbia
[4]Department of Physiology, Faculty of Medicine, University of Niš, Serbia

Objectives: The plant species of *Salvia* L. genus are characterized by the high content of phenolic compounds. One of the most important phenolic acid present in these plants is rosmarinic acid which is attributed to many pharmacological properties. *Salvia verticillata* L., the lilac sage, is traditionally used in the cold and gastrointestinal disorders and its therapeutic effects have increasingly being examined. The objective is to determine the rosmarinic acid content in the *S. verticillata* extracts by high performance liquid chromatography (HPLC).
Methods: The above-ground parts of the plant were collected in Niš, in the full flowering period. Extraction was carried out by the ultrasonic method and maceration with absolute methanol and concentrated ethanol (96% v/v). Water extract was obtained after the hydrodestilation and isolation of the essential oil. The content of rosmarinic acid was determined by HPLC method.
Results: The highest extraction's yield was achieved with water (29%). The content of rosmarinic acid was the highest in methanolic extract prepared by the maceration (239.33±7.22 μg/mg) and the lowest in aqueous (75.01±2.22 μg/mg).
Conclusion: Considering the presence of rosmarinic acid, it is expected that the extracts, particularly methanolic, exhibit numerous pharmacological effects, primarily antioxidant, anti-inflammatory, antibacterial, antiviral, but attention should be, also, paid to solvent residues.
Keywords:*Salvia verticillata* L.; rosmarinic acid; extracts.

13. PHENOLIC CONTENT AND ANTIOXIDANT CAPACITY OF PINEAPPLE METHANOLIC EXTRACTS AND JUICE(*Ananas comosus* (L.) Merr.)

Miladinović Bojana[1], Stojanović D[1], Kostić M[1], Milutinović M[1], Jovanović M[2], Kitić N[2], Branković S[3], Kitić D[1]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Faculty of Medicine, University of Niš, Serbia
[3]Department of Physiology, Faculty of Medicine, University of Niš, Serbia

Objectives: Pineapple fruit is the most common part of plant used in both, nutrition and medicine, but other parts of the plant also have certain healing properties.
Methods: Plant material, originating from Colombia, was purchased at a local market. The skin and leaves of the fruit were separated, dried and extracted with absolute methanol, 80% methanol and 60% methanol in 1:10 ratio. The juice was prepared by crushing remaining part of the fruit in a blender and filtering. Total phenolic content was determined using *Folin-Ciocalteu* method and the antioxidant capacity was estimated in 1,1-diphenyl-2-picrylhydrazyl system.
Results: The highest content of total phenolic compounds was determined in the leaf M60% extract (25,94±3,54 mg GAE/g) while the lowest phenolic compounds content was detected in pineapple juice (0,79±0,07 mg GAE/g). Pineapple fruit skin extract in absolute methanol showed the highest antioxidant capacity (IC_{50}=1,75±0,05 mg/ml), while the lowest antioxidant capacity was estimated in pineapple juice (IC_{50}=88±2,09 mg/ml).
Conclusion: The significant amount of phenols in pineapple fruit extracts and juice indicates their high antioxidant activity**,** thus these extracts and juice can be used in both medicine and pharmacy. *In vivo* and *in vitro* studies are recommended to verify pharmaceutical effects of these extracts and juice, and to examine their possible toxicity.
Key words: *Ananas comosus* (L.), phenols, juice, antioxidant capacity

14. THE CONTENTS OF CAFFEIC ACID IN *SALVIA AETHIOPIS* L. EXTRACTS

Kostić Milica[1], Milutinović M[1], Živanović S[2], Miladinović B[1], Kitić N[3], Branković S[4], Kitić D[1]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Faculty of Medicine, Research Center for Biomedicine, Niš, Serbia
[3]Faculty of Medicine, University of Niš, Serbia
[4]Department of Physiology, Faculty of Medicine, University of Niš, Serbia

Objectives:*Salvia* L. species have been worldwide known as natural medicines, spices and aromas. The most famous is *Salvia officinalis* L. but there are less-known species with excellent pharmacological properties, as well. Literature data show that *Salvia aethiopis* L. extracts express antioxidant, antimicrobial, cytotoxic and anti-cholinesterase activity. One of the most prominent phenolic acid in sages is caffeic acid, which is attributed to many pharmacological activities. The aim of this study was to determine the caffeic acid content in *S. aethiopis* extracts. **Methods:** The above-ground parts were collected in the full flowering stage in the vicinity of Niš. Dried plant material was extracted with absolute and 80% methanol, 96%, 80% and 60% ethanol, and ethyl acetate by ultrasonic method. The caffeic acid quantification was carried out on Agilent 1200 HPLC chromatograph with a diode array detector.
Results: The highest extraction yield (14,05%) and caffeic acid content (4.39±0.80 µg/mg) were recorded in the extract obtained with most polar solvent, 60% ethanol. The smallest content of caffeic acid was determined in the ethyl acetate extract (1.00±0.01 µg/mg).
Conclusion: The polar *S. aethiopis* extracts contains a significant amount of caffeic acid, therefore it is expected to express significant biological effects and be potentially used in different pathological conditions.

Keywords:*Salvia aethiopis* L.; caffeic acid; extracts.

15. ANTIOXIDANT ACTIVITY OF A MILK THISTLE (*SILYBUM MARIANUM* (L.) GAERTN.) FRUIT EXTRACT

Kitić Dušanka[1], Miladinović B[1], Kostić M[1], Milutinović M[1], Branković S[2], Krstić N[3], Kitić N[3]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Department of Physiology, Faculty of Medicine, University of Niš, Serbia
[3]Faculty of Medicine, Research Center for Biomedicine, Niš, Serbia

Objectives: *Silybum marianum* (L.) Gaertn. seed (fruit) and its bioflavonoid complexsilymarin are well-known, clinically proved, hepatoprotective agents. Their activity is considered to come from the removal of free radicals, the prevention of their formation, and improvement of the integrity of mitochondria. The aim of the research is to investigate the antioxidant activity of the commercial *S. marianum* fruits extract along with the total phenols and tannins content.
Methods: The commercial acetone extract was obtained from Institute for Medicinal Plant Research "Dr Josif Pančic". The contents of total phenols and tannins were determined by the colorimetric *Folin-Ciocalteu* method. The antioxidant activity of the extract was determined in 1,1-diphenyl-2-picrylhydrazyl system evaluating its capacity to neutralize free radicals.
Results: The study showed a significant amount of total phenols and tannins in the extract with a content of 555.83±27.55 mg of gallic acid equivalents (GAE)/g and 472.28±28.19 mg GAE/g, respectively. The extract exhibited a strong antiradical effect whose concentration that inhibited 50% of the radicals was 52.59±0.57 μg/ml.
Conclusion: Acetone milk thistle extract is rich in phenolics and tannins and it is characterized by strong antioxidant activity. Therefore, the *S. marianum* fruits extract could have a potential place in the prevention of diseases which are based on oxidative stress.

Key words: *Silybum marianum* (L.) Gaertn.; extract; total phenols; total tannins; antioxidant activity

16. ICP-OES DETERMINATION OF HEAVY METAL CONTENT IN BELLIS PERENNIS L. LEAVES

Velimirović Dragan[1], Stojković M.[2], Jevtić M.[2], Pavlović A.[2]
[1] Faculty of Medicine, Department of Pharmacy, University of Niš
[2] Faculty of Sciences and Mathematics, Department of Chemistry, University of Niš

Objectives: The goal of this paper is to specify the content of the heavy metals of copper, cadmium and lead in the list of plan species Bellis perennis by using the ICP-OES spectrometry.
Materials and methods: The content of metals was specified in the samples of young daisy leaves (Bellis perennis L.), which were picked on various locations in September 2017 in the area of the city of Nis and its surroundings.
The content of mineral composition of the examined samples was determined by means of an optical emission spectrometer with inductive coupled plasma, iCAP 6000 (Thermo Scientific, Cambridge, United Kingdom).
Results: The content of copper in the examined samples of daisy leaves were from od 1.9 do 0.6 ppm (Cu), while in some of the samples it was below the detection limit (0.005). The content of cadmium was below the detection limit in all the samples (0.02), while the content of lead was from 4.85 to 0.6 ppm.
Conclusion: The contents of the detected metals in all the samples were below the level which would be considered toxic for this plant species. ICP-OES method proved to be sufficiently sensitive and accurate in specifying the content of the detected metals in this sort of real samples.
Key words: Bellis perrenis, ICP, mineral content, heavy metal, dry digestion

17. THE PROBLEM OF IMPLEMENTATION OF VALID LEGISLATION ON HYGIENIC AND SANITARY TECHNICAL CONDITIONS ON POOLS IN FBIH

Hamza Zlatan, Bursać – Aranđelović S., Kotorić – Keser Š., Operta – Maestro N., Porović - Hodžić A.
P.I. Institute for public health of Canton Sarajevo

Objectives: The aim of this tesis is to compare the "Decision on hygiene and sanitation - technical conditions in the pools in the city of Sarajevo (Decision No. 01-50-1 / 74 of 18.04.1974)", "Ordinance on drinking water health (Article 40/10, 30/12 and 62/17) " with " Proposal of the rulebook on sanitary and technical facilities of swimming pools and health basin water management", as well as the necessity of adopting a new statutory act that will regulate this segment of public health. The focus is on establishing sanitary - hygienic supervision over swimming pools and bathing health protection.
Materials and methodes: Three-year continuous monitoring (2015 2016 and 2017) of open and closed swimming pools controlled by P.I. Institute for public health of Canton Sarajevo included supervision of the sanitary and technical conditions in the pool, sampling pool water, laboratory microbiological and physical-chemical analysis (by accredited laboratory, BAS EN ISO / IEC 17025), and interpretation analysis results.
Results: Laboratory analysis of pool water has established that some water samples do not correspond to the Ordinance on the health of drinking water (Figures 40/10, 30/12 and 62/17).
Conclusion: Based on the opinion on the healthworthiness of the examined samples, it is apparent that there is a necessity of systematic continuous monitoring, a precise definition of the type and extent of the analysis, as well as the frequency of water testing for recreation and rehabilitation.
Key words: rulebook, pool water, control

18. CONTENT ANALYSIS OF HEAVY METALS IN WOODEN AND WAX CRAYONS-TOXICOLOGICAL RISK ASSESSMENT FOR CHILDREN OF PRESCHOOL AGE

Trišić Jelena[1], Mitrović N.[1], Đukić-Ćosić D.[2], Đogo Mračević S.[1],
[1]Department of Analytical Chemistry, Faculty of Pharmacy University of Belgrade
[2]Department of Toxycology "Akademik Danilo Soldatović", Faculty of Pharmacy University of Belgrade

Objectives: Crayons for children may contain heavy metals, and some of them with high potential of accumulation, may represent potential health risk. The aim of this study was assessment of total As, Pb, Cr, Cd and Ni content, their bio-accessibility and risk assessment regards to intake of these toxic metals in young age due to chewing or swallowing crayon parts.
Materials and methods: Samples are prepared on two ways: microwave digestion and extraction with simulated artificial saliva. Concentrations of As, Pb, Cd, Cr and Ni are measured by ICP-OES. Risk assessment is measured according to methodology for toxic metals in children toys given by Holland institute for public health and environmental protection (RIVM).
Results: Comparing our values with allowed thresholds of the European Union we saw that only two manufacturers had allowed lead levels while arsenic values were exceeded in two manufacturers. For all measured values % TDI is lower than 10% TDI which is considered the upper limit for metal intake in this way.
Conclusion: The results of this study have shown that in most tested samples the toxic metal content is below the predicted limits, as well as the calculated levels of toxic metal inputs acceptable in all tested samples.
Key words: heavy metals; children crayons; risk assessment;

19. THE IMPACT OF EDUCATION AND EMPLOYMENT OF PARENTS ON THE QUALITY OF LIFE OF CHILDREN AGED SEVEN TO NINE YEARS IN THE REPUBLIC OF MACEDONIA

Gligorova Biljana
Faculty of Education,,Sv. Kliment Ohridski", "St. Cyril and Methodius", University, Skopje, Macedonia

INTRODUCTION: The role of parents in shaping healthy eating habits is dominant. Parents represent an example to their children, so every eating habits of the parents is reflected on children. It is necessary that parents provide various meals and establish regular meals. In this respect, it is certainly of great importance and the employment status of a father or mother. The education of the parents plays a major role in preventing obesity and in achieving normal well-being. **Objective research:**To determine the state of obesity in children aged 7 to 9 years in the Republic of Macedonia, the dependence on parent education and employment.**Methods:**The study included a total of 1020 students of the first and third grade (ages 7 - 9) from 6 city and 5 rural elementary schools on the territory of the Republic of Macedonia. Anthropometric examinations were conducted on the basis of the WHO recommendations and the survey.**RESULTS:** In the Republic of Macedonia, the percentage of obese children who are 9.8% at the age of our research. The largest number of obese children (55.6%) among those whose parents do not have higher education, while the highest number of children normally born (51.3%) among those whose parents have high education. The results of the research show that the employment status of a father is a protective factor and reduces the obesity of children by about 35%. At the same percentage and the status of employment, the mother alleviates the condition for obesity.Based on the obtained results we conclude that in the cases when the father is employed the highest number of children normally born (483 or 57.6%) is in the pre-hospital bed, there are 199 (23.7%), obese It has 83 (9.9%), and only 73 (8.7%) unemployed. Eye employment affects the provision of good living conditions, provides a better standard in the family, and therefore a better quality of life. The same is true when it comes to the status of employment of the mother. The number of children normally born among the respondents is the highest when the mother is employed (386 or 56.0%), followed by the number of children in the pre-hospital (170 or 24.7%), then obese (71 or 10, 3%), while only 62 (9%) are unemployed.
CONCLUSION: In order to ensure a quality life for children of school age, the joint operation of parents, teaching staff and the society as a whole is required. Eye and mother's high education acts as a protective factor for the formation of obesity. In cases where both parents are of high education, the chances of a child being obese are reduced by 45%. Both the mother and father employment status is protective and contributes to the reduction of obesity.
Key words: children, obesity, prevention, parents, education

20. ANTIOXIDANT ACTIVITY OF WILD ROWANBERRY EXTRACTS IN THE PREVENTION OF SKIN AGING CAUSED BY SOLAR RADIATION

Stanković Milica[1], Kocić H.[2], Živković J.[1], Tadić V.[3], Arsić I.[1]
[1] University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia
[2] Clinic of Dermatovenerology, Clinical Center of Niš, Serbia
[3] Department for Pharmaceutical Research and Development, Institute for Medicinal Plant Research "Dr Josif Pančić", Belgrade, Serbia

Objectives: The aim of work was to investigate the antioxidant activity of extracts from wild rowanberry fruits. Fruits from *Sorbus aucuparia* L. (rowanberry), family Rosaceae, are used in traditional medicine and may be a valuable source of antioxidants due to the wide variety of bioactive components.
Materials and methods: Rowanberries were macerated using four different solvents, including methanol (ME), 70% (v/v) ethanol (EE), 45% (w/w) propylene glycol (PE) and water (WE). Obtained extracts were evaporated to dryness *in vacuo* and used for further evaluation. Antioxidant activity of extracts was examined using *in vitro* assays: DPPH radical scavenging activity and β-carotene/linoleic acid bleaching (BCB) assay. DPPH radical scavenging activity and inhibition of β-carotene bleaching were determined using the IC_{50} values (concentrations of extract required to scavenge the 50% of radicals or to demonstrate 50% of β-carotene bleaching inhibition).
Results: Extract PE demonstrated the highest DPPH radical scavenging activity (IC_{50} = 67.30 μg/ml), followed by extracts EE, WE and ME (IC_{50} = 71.05, 88.30 and 117.41 μg/ml, respectively). Regarding BCB assay, extract WE showed the highest activity with IC_{50} = 614.72 μg/ml, followed by extracts ME, EE and PE where IC_{50} values were 662.31, 727.31 and 1251.13 μg/ml, respectively.
Conclusion: Rowanberry extracts revealed high radical scavenging activity, as well as inhibition of β-carotene bleaching. With all phytochemicals with dermatological benefits present in these extracts, they should be used in the prevention of oxidative skin aging induced by solar radiation.
Key words: rowanberry, extracts, antioxidants, skin aging.

21. TANNINS AND ANTHOCYANINS FROM WILD ROSE HIP EXTRACTS AS NATURAL INGREDIENTS IN SKIN PHOTOPROTECTION PREPARATIONS

Stanković Milica[1], Arsić I.[1], Tadić V.[2], Savić V.[1], Stojiljković D.[3]
[1] University of Niš, Faculty of Medicine, Department of Pharmacy, Niš, Serbia
[2] Department for Pharmaceutical Research and Development, Institute for Medicinal Plant Research "Dr Josif Pančić", Belgrade, Serbia
[3] Health Care Institution Pharmacy "Farmakop", Niš, Serbia

Objectives: The aim of present study was to evaluate contents of tannins and anthocyanins in different *Rosa canina* L. (rose hip) extracts, in order to recommend their possible usage in skin photoprotection formulations.
Materials and methods: Extracts were prepared from fresh fruits, with four different solvents, including methanol (ME), 70% (v/v) ethanol (EE), 45% (w/w) propylene glycol (PE) and water (WE). Obtained extracts were evaporated to dryness (dry weight - dw) *in vacuo* and used for further analyses. The contents of total tannins and anthocyanins were determined according to the procedures described in European Pharmacopoeia 9th edition.
Results: The highest tannins content was found in EE extract (2.73%), followed by extracts PE and WE, with contents of 2.04 and 1.98%, respectively. Extracts WE showed the highest amount of anthocyanins (411.72 mg cyanidin-3-glucoside chloride (CG)/100g dw). Extracts PE and EE reported lower anthocyanins contents, 404.29 and 350.59 mg CG/100g dw), respectively. In both tests, extract ME had the lowest content of examined substances, tannins - 1.14% and anthocyanins - 276.71 mg CG/100g dw.
Conclusion: The results suggest that rose hips extracts have considerable amount of tannins and anthocyanins, which have beneficial properties on human skin. The extraction solvent plays an important role in isolating bioactive compounds from rose hips. Extracts (especially those with water and 70% ethanol) should be used as sources of natural ingredients in skin photoprotection preparations.
Key words:tannins, anthocyanins, rose hips, extracts, skin photoprotection.

22. QUALITY AND MINERAL COMPOSITION OF NATURAL WATERS OF SOKOBANJA

Ljubenović Biljana, Petrovic S.,Kamenovic I.
Public Health Institute Niš

Objectives: The aim of this paper is to confirm the healing properties of waters from the Sokobanja region through the analysis of key cations and anions in mineral water.
Materials and methods: During the calendar year 2017, water samples were sampled with three sources in Sokobanja. The movement of mineral parameters Na, K, Ca and Mg was monitored for four seasons, and their final impact on the quality of natural waters.
Results: Based on the complete results of the B1 mineral water test, it is estimated that in its physicochemical characteristics it has lower sodium concentrations (16.95 mg / l), calcium (57mg / l) and magnesium (23.3mg / l) of B2 where sodium (61.8 mg / l), calcium (87.7 mg / l) and magnesium (40.6 mg / l) and B3 has the highest sodium concentration (31.6 mg / l), potassium (23.2 mg / l), calcium (112.9 mg / l) and magnesium (70 mg / l). B1 springs from a depth of 168 m, B2 with 98 m and B3 110 m.
Conclusion: Based on the complete results of the B1 mineral water test, it is found that, according to their physicochemical characteristics, this water belongs to the category of calcium-hydrocarbonate oligomineral hypothermia B2 belongs to the category of calcium-magnesium-sodium-hydrocarbonate oligomineral hypothermia, and B3 belongs to the category of calcium-magnesium -natrium-hydrocarbonate oligomineral hypothermia.
Key words:potassium, sodium, calcium, magnesium

23. MONITORING LEVEL OF NITRATES IN DRINKING WATER IN MACVA DISTRICT IN THE PERIOD FROM 2008TH TO 2017TH

Dragicevic Igor[1], Sreckovic M.[1], Panic S.[2], Bogdanovic Vasic S.[3]
[1]Public Health Institute Sabac, Serbia
[2]High medical and business technology school of vocational studies in Sabac, Serbia

Objectives: Macva's district represents areas in Serbia with submersible drinking water resources in the volume of 5.4 billion cubic meters. This huge resource of drinking water is endangered by an increase in the concentration of nitrate in drinking water. Agriculture is one of the most important sources of nitrogen pollution (N) and is the main cause of nitrate growth in drinking water. The EU Nitrate Directive (91/676/EEC) establishes a maximum permitted level of 50 mg/l and a recommended level of up to 25 mg/l of nitrate in drinking water. The release of nitrates from agricultural sources can be influenced by the type of crop and soil properties, the duration of the period between the two crops, the weather conditions, the land cultivation practice, and above all the amount and type of fertilizers applied. According to literature, excessive intake of nitrate into the organism can contribute to the appearance of methaemoglobinaemia, cancer, spontaneous abortion and intrauterine growth disorders. The aim of this study is to investigate the ten-year trend of increasing the nitrates concentration in the drinking water of the Macva district caused by the use of fertilizers.
Materials and methods: The data were processed by retrospective analysis of water samples and statistical processing of water data from the database of the Public Health Institute in Sabac. Number of samples of drinking water analyzes in the period 2008th - 2017th was 17256. All water samples were analyzed in an accredited laboratory according to SRP ISO 17025.
Results: The data were processed by a retrospective analysis of water samples from the database of the Public Health Institute in Sabac. Data for the period from 2008th to 2017th show a trend of constant increase of nitrate in drinking water in the water supply of Sabac and Bogatic. In addition, in some parts of the district, extremely high concentrations were detected in local water supply and individual water facilities.
Nitrate concentrations in drinking water, by age and municipalities will be shown in a table. It is also planned to present the territorial distribution of nitrates in drinking water on the territory of the County of Macva.
Conclusion: The results of regular monitoring in the Macva district show the existence of a significant nitrates load of drinking water. A significant part of the population is exposed to elevated or submaximal nitrate concentrations.
Key words: Nitrates, drinking water, underground water, fertilizers.

24. SOIL CONTAMINATION WITHIN SPORT FIELDS AND PLAYGROUNDS GREEN AREAS ON THE TERRITORY OF BELGRADE

Pajić Dragan, Mladenović S., Slepčević V.
Institute of Public Health of Belgrade

Objectives: Green areas as part of sports fields and playgrounds are outdoor gathering areas for recreation and play, especially for children as vulnerable categories of the population. These zones are not spared of the harmful influences from the environment, as well as the contents within them.
Methods: The results of the laboratory testing of soil samples presented in this paper were collected during the implementation of the *Program for the Examination of the Soil Pollution in the City of Belgrade* in the period 2011-2017.
Results: The results show, in most of the locations, in the superficial soil layer at depths of 10 and 50 cm, the increase of examined pollutants, mostly the concentration of heavy metals, and also organic pollutants in some samples.
Conclusion: Testing of soil contamination within sport fields and playgrounds green areas has shown the presence of pollutants in the superficial soil layer, therefore it is necessary to perform regular testing in order to prevent harmful health effect on the youngest vulnerable population.
Key words: Sports fields, children's playgrounds, soil testing.

25. STUDY OF IMPACT OF AIR QUALITY ON HUMAN HEALTH THROUGH VARIOUS INDICATORS

Đorđe Vuković[1], Snežana Pakić[2]
[1]Institute of Public Health Valjevo
[2]High School Health Care School of Vocational Studies „Visan“, Beograd

Introduction: Air pollution, as a factor of the external environment, indisputably affects the quality of life, and this influence can be determined through properly selected indicators. The collected data on the type of disease affect the reliability of the conclusions obtained.
Aim: The aim of this paper is to monitor the effect of air pollution on the health of the inhabitants of the observed city, through two selected indicators. On this occasion, the frequency of chronic lung diseases and the frequency of lung cancer in relation to registered air quality were observed.
Material and methods: The medical condition was analyzed on the basis of the available medical documentation for the period 2011-2016. In particular, the number of patients reported in relation to chronic lung disease, especially in relation to lung carcinoma, is particularly high.
Air quality was observed over the mean annual concentration of soot. The mass concentration of the soot was measured reflectometrically and evaluated according to the *Regulation on conditions for monitoring and requirements for air quality* (Official Gazette of RS, No. 11/2010, 75/2010 and 63/2013).
Results: The analysis of medical documentation found that the number of newly infected with chronic lung diseases in Valjevo represents 34.67% of the total number of newborns in the entire district in the observed period.The number of new lung carcinoma in Valjevo represents 55.98% of the total number of newborns in the entire district during the study period.There is a certain difference between the trend of newborns for chronic respiratory illnesses compared to the lung carcinoma trend, which can be attributed to the reporting system.The average annual concentration of thunders in the city center is within legal limits.The reduction in the number of registered newborns patients coincides with the improvement of air quality, which is registered with the above method.
Conclusion: The impact of air pollution on human health can be studied through registered cases of respiratory system diseases. The results of the research show how much attention should be paid to the way in which certain diseases can be reported, because further activities on improving air quality depend on it.

Key words: chronic lung disease, lung cancer, air quality.

SESSION: NUTRITION AND HEALTH

INVITED LECTURES

1. ACRYLAMIDE IN FOOD

Popović Milka[1,3], Torović Lj.[2,3], Bjelanović J.[1,3], Velicki R.[1,3]
[1]University of Novi Sad, Faculty of Medicine, Department of Hygiene, Novi Sad, Serbia
[2]University of Novi Sad, Faculty of Medicine, Department of Farmacy, Novi Sad, Serbia
[3]Institute of Public Health of Vojvodina, Novi Sad, Serbia

Background

Acrylamide (AA, synonyms: 2-propenamide, acrylic amide and ethylene carboxamide) is an important highly reactive industrial chemical that has been widely used since 1950s for the production of polyacrylamides, utilized in different industrial branches. AA, a low molecular weight organic compound, is predominantly used as a building block for water-soluble polymers, which have consumed as additives for flocculants used for drinking water purification and sewage treatment, in paper and cosmetic industry, for soil conditioning, as well as in food packaging. Occasionally, workplace exposure through dermal absorption and/or inhalation can occur.

AA is also present in tobacco smoke, as a non-dietary source of exposure for smokers and non-smokers (through passive smoking). For smokers, tobacco smoking is a more prominent source of acrylamide exposure than food.

In addition, acrylamide is a contaminant and a chemical hazard in the food chain. From the food safety perspective, the turning point was year 2002, when Swedish scientists unexpectedly revealed that many heated foods contained significant levels of AA as a process contaminant, which is the result of the naturally occurring chemical reactions.

Acrylamide formation

Various cooking practices using temperatures greater than 120°C, in a variety of plant-based, carbohydrate-rich foods with low protein content, results in the formation of AA, as a part of the Maillard reaction. Maillard reaction (non-enzymatic browning) is a chemical reaction between free amino acids (asparagine) and reducing sugars (such as glucose/dextrose, fructose) in low moisture conditions that brown foods and enhance their flavor. Additionally, the ingredients, storage, and processing conditions also greatly influence acrylamide formation in food prepared industrially, catered or at home. It is present mainly in baked, grilled or fried foods, so a wide range of foods, including staple food (such as bread, fried potatoes, coffee) as well as other foods like potato crisps, biscuits were found to contain different levels of AA, ranging from few mg/kg to over 1000 mg/kg. There are other possible pathways of AA formation: from carnosine and aminopropionamide as additional precursors, from acrolein and acrylic acid found in food rich in lipids, from purified gluten, etc. It seems that formation of AA does not occur in microwaved or boiled foods.

Identification and characterization of the hazard - acrylamide

Acrylamide is a chemical with well–known toxic properties including neurotoxicity, genotoxicity, carcinogenicity and reproductive toxicity. Evidence from animal studies have shown that acrylamide and its reactive metabolite epoxide glycidamide (GA) are genotoxic and carcinogenic, through its binding to DNA. AA has been classified as a Group 2A carcinogen (probably carcinogenic to humans) by the International Agency for Research on Cancer.

After oral ingestion, acrylamide is rapidly absorbed from the gastrointestinal tract, distributed to all organs and extensively metabolized. Glycidamide is one of the main metabolites, responsible for carcinogenic effects in animals. Biomarkers of AA exposure include their urinary metabolites and adducts with hemoglobin and DNA.

Dietary exposure to acrylamide intensifies distress regarding probable risks for human health. Many international organizations, (UK scientific advisory committees, European Food Safety Authority (EFSA), World Health Organization, to name just some of them) have assessed the risks that acrylamide brings. One of the latest risk assessments studies, done by Scientific Panel on Contaminants in the Food Chain (CONTAM) of the European Food Safety Authority (EFSA)

determined that despite the fact that so far performed studies in human populations have not confirmed that acrylamide is actually a human carcinogen, the Margin of Exposure (MOEs) based on the up-to-date levels of dietary exposure to acrylamide across studies and age groups indicate a fear regarding its carcinogenic effects. This alarm can be applied to general consumer population. Nevertheless, due to the body weight factor, children are the most exposed and endangered.
In addition to malignancies, the Panel also indicated possible damaging effects of AA on nervous system, male reproduction capabilities, as well as pre- and post-natal development. Nevertheless, based on existing levels of dietary exposure, the aforementioned effects were not considered a concern.

Benchmark Dose and Margin of Exposure

Since any level of exposure to a genotoxic substance could potentially lead to development of malignancy, a tolerable daily intake (TDI) of acrylamide in food could not be established. Instead, EFSA's experts estimated the dose range within which acrylamide is likely to cause a small but perceptible tumor incidence and/or other potentially adverse effects. The lower limit of this range is called the Benchmark Dose Lower Confidence Limit ($BMDL_{10}$). For tumors, experts determined a $BMDL_{10}$ of 0.17mg/kg bw/day. Among other effects, neurological changes were seen as the most relevant, with a $BMDL_{10}$ of 0.43 mg/kg bw/day.
Comparing $BMDL_{10}$ with human dietary exposure to acrylamide, scientists can indicate a "level of health concern" known as a Margin of Exposure (MOE), an indication about a substance's presence in food without estimating the risk. Use of the MOE can help risk managers to determine activities required to keep exposure as low as possible.
The MOEs for the malignancies-related effects of AA range from 425 for average adult consumers down to 50 for high consuming toddlers. According to EFSA, MOE of 10,000 or higher is considered to be of low concern for public health.

Official controls

Appropriate sampling plans, as well as statistically relevant number of samples are crucial for determination of the AA amount in foods for establishing a baseline for AA level in particular food product and to monitor success of the reducing AA levels strategy.
Sampling of the products should be executed at market level, with a minimum size of 4 samples per product category (a total of 10 different product categories), providing a total annual number between 40 and 230 samples per country, depending on population size.

Methods of analysis

Having in mind the high variability of food matrices and food processing procedures, the choice of the reliable analytical methods is of utmost importance. There is a number of analytical approaches to determining AA in food, including methods based on gas chromatography (GC-MS) or liquid chromatography-tandem mass spectrometry (LC-ESI-MS/MS). It is recommended to perform analyses in an accredited laboratories that use validated and approved analytical methods for detection and quantification.

Food that contribute to acrylamide exposure

According to EFSA, foods that mainly contribute to AA exposure in Europe are different depending on age groups.
In adults, different fried potato products account for up to 49% of average exposure, followed by coffee (34%), soft bread (23%), biscuits, crackers and crisp bread, as well as other products based on potato.
In children (toddlers, other children, adolescents), potato fried products account for up to 51% of all dietary exposure. Soft bread, breakfast cereals, biscuits and other products based on cereals or potato can contribute up to 25%. Processed cereal-based baby food represents up to 14% of exposure for toddlers, while cakes and pastry contribute up to 15% in the groups of other children and adolescents; potato crisps and snacks account for 11% of exposure among adolescents.
In infants, baby foods other than processed cereal-based, other products based on potatoes and processed cereal-based baby food (mainly rusks and biscuits) contribute up to 60%, 48% and 30% respectively.
Although some food categories, such as potato crisps and snacks, as well as coffee substitutes contain relatively high levels of acrylamide, their overall contribution to dietary exposure is limited, based on a normal/varied diet.

Reduction of acrylamide levels in foods

Reduction of AA levels in foods has been recommended by many health and food expert authorities, having in mind that measures must not result in increase of other process contaminants nor compromise safety of the product.

The complexity of various factors influencing AA formation in food, including, but not limited to level of precursors of raw materials (e.g. asparagine and reducing sugars), food ingredients, product form (e.g. raising agents, pH, fermentation, dilution), processing elements, such as high temperature, moisture, pre-treatment, added enzymes (asparaginase), texture, flavor, color of the finished product, etc., as well as final preparation performed by end user. Even within a certain product category, different AA reduction strategy and mitigation tools developed by scientists and industries could be utilized. Available scientific literature and data, reviewed by EFSA, indicate how the choice of ingredients, storage method and the temperature at which food is cooked influence the amount of acrylamide in different food types.

However, there is no easy or single solution to reduce AA level in foods. The main food categories for implementing reduction strategies are: potato-based products (French fries, potato crisps, snack and crackers), cereal-based products (bread, crisp bread, breakfast cereals, biscuits and bakery products), roast and ground coffee, instant coffee, coffee substitutes, baby biscuits, infant cereals and baby foods other than cereal based foods.

Most of the strategies and tools are developed and standardized for industrial settings. Home-cooking choices can have a substantial impact on the level of acrylamide. The complete elimination of AA from food doesn't seem feasible using current mitigation approaches. Thus, additional interventions and improvements are needed.

Conclusion

Mitigation approach can be successful in lowering the levels of AA, and it can be done by implementing a good hygiene practices and applying procedures based on hazard analysis and critical control point (HACCP) principles. All food businesses operators should be required to put in place management of AA within their food safety management systems. By doing so, it would be ensured that AA levels are as low as reasonably achievable (ALARA concept) in their products. From April 2018 Commission Regulation (EU) 2017/2158 is in force, establishing best available practice, mitigation measures and benchmark levels for the reduction of the presence of AA in food. AA formation in domestic settings can be reduced by adjusted consumers' behavior at home. Consumers' education regarding reducing exposure to a possible carcinogen while purchasing industrially prepared food, cooking at home is an integral part of the risk management.

Key words: Acrylamide, Food Safety, Hazard, Mitigation, Risk Assessment

Literature

1. Tareke E, Rydberg P, Karlsson P et al. Analysis of acrylamide, a carcinogen formed in heated foodstuffs. J Agric Food Chem 2002 Aug 14;50(17):4998-5006.
2. IARC Working Group on the Evaluation of Carcinogenic Risk to Humans. Some Industrial Chemicals. Lyon (FR): International Agency for Research on Cancer; 1994. (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 60.) Available from: https://monographs.iarc.fr/wp-content/uploads/2018/06/mono60-16.pdf.
3. EFSA CONTAM Panel (EFSA Panel on Contaminants in the Food Chain), 2015. Scientific Opinion on acrylamide in food. EFSA Journal 2015;13(6):4104, 321 pp. doi:10.2903/j.efsa.2015.4104 Available from: https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2015.4104.
4. Exon JH. A review of the toxicology of acrylamide. J Toxicol Environ Health B Crit Rev. 2006 Sep-Oct;9(5):397-412. Review.
5. Yaylayan VA, Stadler RH. Acrylamide formation in food: a mechanistic perspective. J AOAC Int. 2005 Jan-Feb;88(1):262-7. Review.
6. EFSA explains risk assessment: Acrylamide in food. Available from: https://www.efsa.europa.eu/sites/default/files/corporate_publications/files/acrylamide150604.pdf.
7. COMMISSION REGULATION (EU) 2017/2158 establishing mitigation measures and benchmark levels for the reduction of the presence of acrylamide in food). Available from: https://eur-lex.europa.eu/eli/reg/2017/2158/oj.

8. Scientific Advisory Committee on Nutrition (SACN). COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT. Statement on potential risks from acrylamide in the diet of infants and young children. COT Statement 2016/07, October 2016. Available from: https://cot.food.gov.uk/sites/default/files/finalstatementonarsenic_0.pdf.
9. Seal CJ, de Mul A, Eisenbrand G, Haverkort AJ, Franke K, Lalljie SP, et al. Risk-benefit considerations of mitigation measures on acrylamide content of foods--a case study on potatoes, cereals and coffee. Br J Nutr. 2008 Apr;99 Suppl 2:S1-S46. doi: 10.1017/S0007114508965314.
10. FoodDrinkEurope. Acrylamide toolbox 2017. Available from: http://www.uvhvvr.gov.si/fileadmin/uvhvvr.gov.si/pageuploads/DELOVNA_PODROCJA/Zivila/onesnazevala/Food_Drink_Europe_Acrylamide_Toolbox_2017__4-New.pdf.

2. DIET AND HEADACHE DISORDERS

Lazarevic Konstansa[1,2], Dolicanin Z[1]., Milicevic S.[1]
[1]State university of Novi Pazar, Serbia
[2]Public Health Institute Niš, Serbia

Introduction

Headache disorders are characterized by recurrent headaches, pain, disability, poor quality of life and financial costs to society. Although there are over 300 different headache disorders, few of them, like migraine, tension-type headache and medication-overuse headache are of special public health importance (1). According to the data from Global Burden of Disease (GBD), migraine was the second most frequent cause of disability worldwide and the third most frequent cause of disability in Serbia (2).
Available data supports a direct association between lifestyle factors such as irregular sleep (3), smoking habits (4), low physical activity (5), dietary habits such as skipping meals or fasting (6), insufficient intake of water (7), and the occurrence of headache, its progression or relapse.
Food intake can affect the onset of a headache through several biochemical processes involving neuropeptides, neuroreceptors and ion channels, inflamation, sympathetic nervous system, release of nitric oxide, vasodilatation, and cerebral glucose metabolism (8).
According to the International Classification of Headache Disorders III (ICHD III-beta) specific criteria, related to secondary headaches induced by food and/or additives, include - the headache must have developed within 12h after the ingestion, and must have resolved within 72h after the ingestion, having one of the following features: bilateral, mild to moderate, pulsatile, and/or aggravated by physical activity (9).
The objective of this study was to present the current data available in literature related to dietary patterns and prevention and treatment of headaches.

The dietary factors as a trigger in headaches

It is know that skipping meals or fasting can be a factor triggering a headache as well as aggravating it, especially in case of tension-type headache during a long-standing fasting (10-12). Hypoglycemia and caffeine withdrawal are considered as causative factors of a headache during the fasting (10).
Further, the results of the available studies show that the prevalence of people reporting a type of food as a trigger for the onset of headache ranges from 10- 64% (13). As a dietary trigger of headache, patients usually report: chocolate, coffee, alcoholic beverages, milk and dairy products, cured meat products and citrus fruits, and food ingredients: caffeine, monosodium glutamate (MSG), artificial sweeteners, nitrites, gluten, and biogenic amines (eg, histamine, tyramine, and phenylethylamine (14).
Although the intake of chocolate is often considered as a trigger for the onset of headache, Perris et al. observed that chocolate is a trigger factor in only 2.5% of migraineurs, the headache being more common on the days when chocolate was consumed (15). The results of available studies suggest that the risk of migraine following chocolate intake is 2-3 times lower than other reported factors, and that frequency of migraine episodes attributable to chocolate varied from 0 to 22.5%. (16). It is evident that chocolate intake is a dietary trigger, but only for a small group of migraine patients.
Caffeine can be naturally present in food (coffee, tea, chocolate) or as food additive (beverage and energy drinks). Caffeine drugs, alone or in combination with other drugs, are widely used in the treatment of headache (17).
According ICHD III-beta criteria, caffeine intake may exacerbate primary headaches by triggering secondary headaches as two related disorders: caffeine withdrawal headaches and medication overuse headaches (9).
Based on the analyzed study results, Martin et Brinder, recommend the consumption of a small to moderate dose of caffeine (e.g., <400-500 mg/day) for the prevention headaches while the patients must avoid significant variations in dose and regularity of the daily intake of caffeine. They also suggest that the dosage interval between caffeinated drinks does not exceed 24 hours, since this may lead to a caffeine withdrawal headache. Intake of a daily dose of caffeine above 400-500 mg/day is

associated with headache in some patients, and in for these persons it is recommended to completely withdraw from caffeine use or to reduce daily consumption to <400-500 mg/day (14).
According ICHD III-beta criteria, two secondary headaches are related to alcohol intake: immediate and delayed alcohol-induced headaches (9). The results of retrospective studies indicate that even in one-third of migraine patients, headaches occur with occasional alcohol intake, and in only 10% of the migraine patients, headaches occur with frequent alcohol intake (17). However, migraine patients consume less alcohol than controls (18) and those with cluster headaches consume less alcohol than the general population (19).
While it has long been considered that red wine is the main trigger for the development of migraines (20), many studies suggest that white wines and other spirits may also be a trigger for migraines. These results raise the question whether alcohol per se or another component of alcoholic drinks such as biogenic amines (tiramine, histamine etc), sulphites, flavonoid phenols, 5-hydroxytryptamine can affect the onset of headaches (18). In support of this is the fact that patients in whom alcohol or wine/beer acts as a trigger factor also had significantly more other foods as triggers (21). Furthermore, histamine, in addition to alcoholic beverages, is also present in a large number of foods that are listed as triggers for the development of headaches: aged cheeses, processed meats, and chocolates and other cocoa based products.
Available data show that there is a link between cheese consumption and migraine attacks (22). The prevalence of cheese as a trigger for migraine shows heterogeneity ranges from 0 to 18.2 % (13). In Turkey 10.3% of migraine patients reported milk and cheese as triggers for migraine (23). A study in Belgium found that 2.3% of subjects reported milk as a trigger for migraine while 4.6% of the subjects reported ice-cream (21). Nevertheless, it must be taken into account that the headache that occurred after the ingestion of ice cream could be the consequence of a cold stimulus (ICHD-3) which is also known as ice-cream headache (ICH) (9).
That some food additives (nitrite/nitrate) can cause headaches was noticed in the early seventies of the last century when patient reported headaches after ingestion of frankfurters, bacon, salami, and ham (24). A recent study indicates that only 5% of persons with migraine were statistically more likely to have an attack on days in which they have consumed nitrites/nitrates. (15).Aspartame is an artificial sweetener, and the results from provocation studies indicate that there is conflicting evidence about its role in the onset of headaches (14). According ICHD-III beta criteria, MSG is classified as a headache-causative substance, but only MSG dissolved in liquids at high concentrations (e.g., >2%) appears to precipitate headaches (25).

Diet therapy and prevention headache

Several dietary approaches have been found to be effective in preventing migraine:elimination diet, low-sodium diets, low-fat diets, ketogenic diet (14) and the use of some nutraceuticals such as: (riboflavin (vitamin B2), coenzyme Q10, magnesium, butterbur root extract (*Petasites hybridus*), and feverfew (*Tanacetum parthenium*) (26).
Patient dietary regimen must be prescribed by a dietitian and for each patient individually, including regular meals, moderate physical activity and regular sleep (3,5,6). The choice of a diet depends on current drug therapy, patient's co-morbidities, as well as on the type of headache.
The use of prophylactic drug therapy for headaches may have various adverse effects such as weight loss or weight gain (27) and the therapy should be chosen to suit the patient. For example, in obese subjects weight loss is associated with a decrease in frequency, intensity and disability of the migraine (28).
Therefore, obese patients with migraine should observe a low fat diet, obese patients with hypertension will benefit from low-sodium diets while patients with cardiovascular diseases might benefit from low doses of alcohol (18). Patients with histamine intolerance might be considered for a low histamine diet with folate and vitamins B6/B12 supplementation (29) and antihistamine medications (8).
The choice of a diet also depends on the type of headache. Rist and al., observed that there are differences in dietary triggers between patients depending on the migraine aura status(30).
Elimination diet for headaches. It is recommended that persons with headaches eliminate foods and beverages identified as triggers by means of food diaries and/or specific serologic testing. However, a

number of factors may cause a moderate response to a dietary trigger (genetic factors, the dosage and exposure times to foods or ingredients).
Consequently, some foods or food ingredients precipitate headaches only in groups of persons with certain genotypes (mutations in the MTHFR gene) (31), other cause headache upon withdrawal (e.g., caffeine) or high intake (e.g., histamine) (14) or certain headaches can occur 24 hours after trigger exposure (32).
IgG is a useful marker for the identification of foods that could cause inflammation. Two out of three randomized controlled trials reported that IgG-positive foods based elimination diets decreased frequency of headache/migraine (8).
Low-sodium diets for headache. Available data support a direct association between blood pressure and the occurrence of headache (33), and Dietary Approaches to Stop Hypertension (DASH) can be the best option in patients with high blood pressure and headache. The Dietary Approaches to Stop Hypertension (DASH)-sodium randomized controlled trial found that reduced sodium intake was associated with a significantly reduced risk of headaches (34).
Low-fat diets for migraine. Several studies have reported that lower dietary fat diet significantly decreases the number and intensity of acute migraine attacks (35-37). Low fat and high omega-3/low omega-6 fatty diets decrease the frequency of attacks of migraines and/or other headache disorders (8). Results from National Health and Nutrition Examination Surveys conducted from 1999–2004 among USA population showed that higher dietary intakes of omega fatty acids (EPA and DHA) were associated with the lower prevalence of headaches (38).
*The ketogenic diet for headache*Ketogenic diet is usually a treatment for drug-resistant epilepsy and obesity. However, the first use of the ketogenic diet for headache was carried out in 1928, when half of a sample of 18 migraine patients had reported some relief after a ketogenic diet regimen (39). In one study, removing refined sugar from the diet resulted in a 75% reduction in migraine symptoms (40) while another dietary regimen without refined sugar showed reduction in migraine frequency in a chronic migraine (without aura) patient (41). In addition, ketogenic diet was more effective than a standard diet in reducing the frequency of migraine in a single nonrandomized clinical study (8).

Conclusion

Apart from fasting and skipping meals, insufficient intake of liquids, numerous food items and their ingredients were identified as triggers for occurrence of headaches and/or migraines either after their inclusion or after their withdrawal from the diet. The prevention of headaches can be achieved by avoiding intake of foods or their ingredients identified by food diaries and/or specific serologic testing as triggers for occurrence of headaches or aggravations of already existent headaches. Some dietary approaches (elimination diet, low-sodium diets, low-fat diets, ketogenic diet etc.) or their combinations have proven efficient in the prevention of headaches but in order to recommend them for widespread application further studies are needed.

References

1. WHO (2016). Headache disorders. Avaible from: http://www.who.int/news-room/fact-sheets/detail/headache-disorders
2. Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F et al. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. The Lancet 2017;390(10100):1211-59.
3. Jennum P, Jensen R. Sleep and headache. Sleep Med Rev 2002;6(6):471-9.
4. Taylor FR.Tobacco, Nicotine, and Headache.Headache. 2015 ;55(7):1028-44.
5. Ahn AH.Why does increased exercise decrease migraine?Curr Pain Headache Rep 2013;17(12):379.
6. Martin VT, Vij B. Diet and headache: part 2. Headache 2016;56(9):1553-62.
7. Blau JN, Kell CA, Sperling JM. Water-deprivation headache: A new headache with two variants. Headache 2004;44(1):79-83.
8. Martin VT, Vij B. Diet and headache: part 2. Headache 2016;56(9):1553-62.

9. Headache Classification Committee of the International Headache Society (IHS).The international classification of headache disorders, 3rd edition (beta version). Cephalalgia 2013;33:629–808.
10. Torelli P, Evangelista A, Bini A, Castellini P, Lambru G, Manzoni GC. Fasting headache: a review of the literature and new hypotheses. Headache 2009 49:744–752
11. Kelman L. The triggers or precipitants of the acute migraine attack. Cephalalgia 2007; 27:394–402
12. Torelli P, Manzoni GC. Fasting headache. Curr Pain Headache Rep 2010 ;14(4):284-91.
13. Zaeem Z, Zhou L, Dilli E. Headaches: a review of the role of dietary factors. Curr Neurol Neurosci Rep 2016;16(11):101
14. Martin VT, Vij B. Diet and headache: part 1. Headache 2016;56(9):1543-52.
15. Peris F, Donoghue S, Torres F, Mian A, Wöber C. Towards improved migraine management: Determining potential trigger factors in individual patients. Cephalalgia 2017;37(5):452-63.
16. Lippi G, Mattiuzzi C, Cervellin G. Chocolate and migraine: the history of an ambiguous association. Acta Bio Medica Atenei Parmensis 2014;85(3):216-21.
17. Lipton RB, Diener H-C, Robbins MS, Garas SY, Patel K. Caffeine in the management of patients with headache. J Headache Pain 2017;18(1):107.
18. Panconesi A. Alcohol and migraine: trigger factor, consumption, mechanisms. A review. J Headache Pain 2008;9(1):19-27.
19. Schurks M, Kurth T, Knorn P, Pageler L, Diener HC. Predictors of hazardous alcohol consumption among patients with cluster headache. Cephalalgia 2006; 26:623–7.
20. Krymchantowski AV, da Cunha Jevoux C. Wine and headache. Headache 2014;54(6):967-75.
21. Van den Bergh V, Amery WK, Waelkens J. Trigger factors in migraine: a study conducted by the Belgian Migraine Society. Headache 1987;27:191–6.
22. Wöber-Bingol Ç, Wöber C. Triggers of migraine and tension-type headache. Handb Clin Neurol 2011;97:161-72.
23. Mollaoğlu M. Trigger factors in migraine patients. J Health Psychol. 2013;18:984–94.
24. Henderson WR, Raskin NH. “Hot-dog” headache: Individual susceptibility to nitrite. Lancet 1972;2:1162-3.
25. Obayashi Y, Nagamura Y. Does monosodium glutamate really cause headache? : a systematic review of human studies. J Headache Pain 2016;17:54.
26. Puledda F, Shields K. Non-Pharmacological Approaches for Migraine. Neurotherapeutics 2018;15(2):336-345.
27. Taylor FR. Weight change associated with the use of migraine preventive medications. Clin Ther. 2008; 30(6):1069–80.
28. Verrotti A, Di Fonzo A, Penta L, Agostinelli S, Parisi P.Obesity and headache/migraine: the importance of weight reduction through lifestyle modifications. Biomed Res Int 2014;2014:420858.
29. Lippi G, Mattiuzzi C, Meschi T, Cervellin G, Borghi L. Homocysteine and migraine. A narrative review. Clin Chim Acta 2014; 433:5-11
30. Rist PM, Buring JE, Kurth T. Dietary patterns according to headache and migraine status: A cross-sectional study. Cephalalgia 2015;*35*(9): 767–75.
31. Samaan Z, Gaysina D, Cohen-Woods S, Craddock N, Jones L, Korszun A, et al. Methylenetetrahydrofolate reductase gene variant (MTHFR C677T) and migraine: A case control study and meta-analysis. BMC Neurol 2011;11: 66
32. Martin VT, Behbehani MM. Toward a rational understanding of migraine trigger factors. Med Clin North Am 2001;85:911–941.
33. Fagernaes CF, Heuch I, Zwart JA, Winsvold BS, Linde M, Hagen K. Blood pressure as a risk factor for headache and migraine: a prospective population-based study. Eur J Neurol 2015;22(1):156-e11.
34. Amer M, Woodward M, Appel LJ. Effects of dietary sodium and the DASH diet on the occurrence of headaches: results from randomised multicentre DASH-Sodium clinical trial. BMJ Open 2014;4:1–7.
35. Bunner AE, Agarwal U, Gonzales JF, et al. Nutrition intervention for migraine: A randomized crossover trial. J Headache Pain 2014; 15: 1–9.
36. Bic Z, Blix GG, Hopp HP, Leslie FM, Schell MJ. The influence of a low-fat diet on incidence and severity of migraine headache. J Womens Health Gend Based Med. 1999;8:623–9.

37. Ferrara L, PacioniD, Di FronzoV, Russo BF, Speranza E, Carlino V, et al. Low-lipid diet reduces frequency and severity of acute migraine attacks. Nutr Metab Cardiovasc Dis. 2015; 25(4):370–5. 123
38. Sanders AE, Shaikh SR, Slade GD. Long-chain omega-3 fatty acids and headache in the US population. Prostaglandins, Leukotrienes and Essential Fatty Acids. 2018;135:47-53.
39. Schnabel T. An experience with a ketogenic dietary in migraine. Annals of Internal Medicine. 1928;2(4):341-7.
40. Dexter JD, Roberts J, Byer JA. The five hour glucosetolerance test and effect of low sucrose diet in migraine. Headache 1978;18:91-94.
41. Kokavec A. Dietary Therapy could be an Important Factor in the Prevention of Headache Symptoms in Migraine (without Aura): A Case Study. Food Publ Health 2014;4:15-22

3. THE ROLE OF ALPHA – LIPOIC ACID IN CANCER PREVENTION AND TREATMENT

Damnjanović Ivana[1], Stojanović D.[1,2], Kocić G.[3], Najman S.[4], Stojanović S.[4], Pešić S.[5]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia,
[2]Public Health Institute Niš, Serbia
[3]Institute of Biochemistry, Faculty of Medicine, University of Niš, Serbia
[4]Institute of Biology and Human Genetics, Faculty of Medicine, University of Niš, Serbia
[5]Department of Pharmacology, Faculty of Medicine, University of Niš, Serbia

Objectives: Due to the impact of cancer on the society, the efforts to prevent and treat cancer are an ongoing research interest; studies that are attempting to find the link between oxidative stress and the process of carcinogenesis have found potential chemopreventive compounds and compounds with antioxidant activities. Alpha-lipoic acid (ALA) is one of the most efficient known endogenous antioxidants, and in recent years it has taken a special place as an anticancer agent. In its structure ALA contains two thiol groups which may participate in the reactions of oxidation and/or reduction. It is characterized by unique antioxidant abilities, since both endogenously and exogenously synthesized forms are actively involved in the capture of free radicals in oxidized and/or reduced form. Therefore, the aim of this study was to examine potential role of alpha-lipoic acid in the treatment of colon cancer cell lines via measuring the activation of nuclear factor-kappa B (NF-κB).
Material and methods: We examined the effect of both pure ALA or combined with cisplatin and 5-fluorouracil on proliferation of Caco-2, human colon cancer cells, by MTT test. The level of transcription factor NF-kB was also measured.
Results: The results of MTT test showed that ALA which acts as an antioxidant has strong cytotoxic and/or antiproliferative effects on the Caco- 2 cells, especially marked at the highest concentration examined. The research results showed that there was a significant reduction in the levels of NF-κB in Caco-2 cells treated with different concentrations of ALA.
Conclusion: The existence of dithiol ring in the oxidized and reduced forms of ALA makes them natural and potent antioxidants. At least one of the mechanisms of the antiproliferative and/or cytotoxic effect of alpha lipoic acid on Caco-2 cells at high concentrations is involved. The transcription factor NF-κB may be present, as well as the products of transcription of genes the factor controls. Potential biochemical and therapeutic roles of ALA are based on the participation of this powerful antioxidant in different inflammatory pathways, and therefore alpha-lipoic acid in addition to standard cytostatic therapy, could be a promising tool in cancer prevention and treatment.
Key words:*alpha-lipoic acid, cancer, prevention, treatment*
Acknowledgements: The study was supported by the Ministry of Science and Technological Development of the Republic of Serbia (TR 31060 and 41017)and internal project of the Faculty of Medicine, University of Niš (No 31).

4. FOOD LABELLING - HEALTH ASPECT

Davidović Dragana
Institute of Hygiene and Medical Ecology, University of Belgrade, Belgrade, Serbia

Noncommunicable diseases (NCD) are the leading cause of death in the world.The four main noncommunicable diseases - cardiovascular disease, cancer, chronic lung diseases and diabetes - kill three in five people worldwide.Each year, 15 million people die from a NCD between the ages of 30 and 69 years; over 85% of these "premature" deaths occur in low- and middle-income countries [1].Children, adults and the elderly are all vulnerable to the risk factors contributing to NCDs.Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, elevated blood lipids and obesity. These metabolic risk factors can lead to cardiovascular disease, the leading NCD in terms of premature deaths [1].

Like other developing countries, Serbia is in epidemiological and nutrition transition. Many changes in diet and in physical activity are occurring simultaneously in Serbia like in the developing world. While malnutrition and infectious diseases were the main diseases at the beginning of the 20th century, today it is a higher incidence of chronic diseases. Obesity, the key metabolic risk factor contributes to metabolic changes that increase the risk of NCDs, is important public health problem in Serbia.According to WHO, overweight and obesity estimates from 2008show that 58.6% of the adult population (>20 years old) in Serbia were overweight and 24.8% were obese [2].According to Institute of Public Health of Serbia data it is estimated that in Republic of Serbia approximately 630,000 persons or 8.6% of adult population suffer from diabetes [3].

NCDs are to a great extent preventable diseases. While genetic susceptibility to NCDs may be a factor, appropriate preventive action can alter environments, protect against risk factors and change life expectations. On a population scale, relatively modest behavioral changes can make swift and dramatic changes in population health. Premature deaths from NCDs, however, can be prevented by changed policies and active engagement not only in health but also in other sectors. Effective action will save millions of lives and avoid suffering.

Recent analysis show that dietary factors are the most important factors that undermine health and well-being. It is recognized that noncommunicable diseases as well as malnutrition, including undernutrition, micronutrient deficiencies, overweight and obesity, resulting from unhealthy diets. They have high social and economic costs for individuals, families, communities and governments [4]. In light of the growing prevalence of diet-related diseases, governments, retailers and food companies promote nutrition labelling to help the consumer make healthy, informed food choices. A nutrition label is one of the fundamental preventive measures. Nutrition labelling aims at highlighting essential information about the nutritional value and composition of products and enabling people to make informed choices and better quality food. The World Health Organization includes nutrition labelling as part of its global strategy on diet, physical activity and health [5]. The European Food and Nutrition Action Plan 2015–2020 identifies nutrition label as one of the four priority areas. Member States agreed to promote, through government leadership, product reformulation, use of easy-to-understand or interpretative, consumer-friendly labelling on the fronts of packages and healthy retail environments [6]. Organization for Economic Co-operation and Development (OECD) recognized nutrition labelling as main tool for preventing increasing rates of obesity and unhealthy diets in the OECD countries [7]. Consumers also find that nutrition labeling is very important. Nutrition labels facilitate choices and access to nutrient-dense foods and are a very important part of a supportive environment [8,9].Observational studies have consistently found a positive correlation between reading nutrition labels and healthier diets [9].

In order to help consumers to choose the kinds of food that bring them the greatest health benefits, legislation should provide accurate, standardized and comprehensive nutrition information on all foods. A nutrition label is a very powerful marketing tool as well. Marketing-based statements can lead consumers to a decision based on scientifically non-justifiable and tendentious statements. Because of that, and due to the broad use of nutrition labels in shops, fast-food restaurants, restaurants and cantinas, it is necessary to continuously improve both national and international legislation in the field [10].

Nutrition declaration became mandatory on packaging in the EU in December 2016. Regulation (EU) No 1169/2011 has also introduced a minimum font size for all of the mandatory information [11]. By

now, declaration of nutrition information was voluntary in Serbia and became mandatory in Jun 2018 [12].

But, do consumers notice such labels, do they read and understand them, and do they make use of them in their purchasing decisions?

In order for nutrition labels to have any effect, consumers must be exposed to them and must perceive them. But, this is not enough. The effect will then be mediated by consumer understanding. Based on their understanding, consumers may then use the label information to make inferences about the healthiness of the product, which, together with other information (e.g. about the taste of the product), may affect eventually the purchase decision [13]. There is evidence that most consumers read the nutrition declaration often or sometimes, but we do not know how consumers really understand information, and whether declaration affects the decision to buy groceries [14,15].A systematic review of 120 studies found that reported use of nutrition labels is high but more objective measures suggest that actual use of nutrition labelling during food purchase may be much lower [9].Self-reported prevalence of nutrition label use was typically greater than 50%. However, in-store research suggests that actual label use is typically much less, with just 27% of UK shoppers found to have looked at nutrition information on the label during observational research undertaken in supermarket aisles [16].

Food labelling - situation in Serbia, our results

We conducted a study to examine respondents attitudes on the labeling of pre-packaged foods and to examine the understanding of the information (nutrition information and information on potential allergens) depending on the nutritional status. The study included 1300 patients who were treated at the Dietetic Unit, Institute of hygiene and medical ecology, School of medicine Belgrade University during 2012-2014. To assess consumers' attitudes and knowledge on food labells specific questionnaire adapted to this study was used. To asses current problems on food labells, 2138 pre-packaged food products in the our territory were analyzed.

Our results show that food declaration in Serbia is not satisfactory. Generally, using food labels is poorly and understanding of the information presented on the label is insufficient. The above mentioned is especially connected with BMI increase that´s means obesity [17].

References

1. WHO. Global action plan for the prevention and control of NCDs 2013-2020. WHO, 2013.(http://www.who.int/iris/handle/10665/94384)

2. WHO. Global Health Observatory Data Repository [online database]. Geneva, WHO, 2013. (http://apps.who.int/gho/data/view.main)

3. Institut za javno zdravlje Srbije "Dr Milan Jovanović Batut". Rezultati istraživanja zdravlja stanovništva Srbije 2013. godina. Beograd: Institut za javno zdravlje Srbije "Dr Milan Jovanović Batut"; 2014.

4. WHO. European Food and Nutrition Action Plan 2015–2020. Copenhagen: World Health Organization Regional Office for Europe; 2014.

5. World Health Organization. Diet, nutrition, and the prevention of chronic diseases. Joint WHO/FAO Expert Consultation. WHO Technical Report Series, no. 916. Geneva: WHO, 2003.

6. World Health Organization Regional Office for Europe. Better food and nutrition in Europe: a progress report monitoring policy implementation in the WHO European Region. Denmark: WHO, 2017.

7. OECD. Promoting sustainable consumption – good practices in OECD countries. Paris: OECD; 2008.

8. Mhurchu CN, Gorton D. Nutrition labels and claims in New Zealand and Australia: a review of use and understanding. Aust N Z J Public Health 2007; 31(2):105-12.

9. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. Public Health Nutr 2011;14(8):1496-506.

10. Rayner M, Wood A, Mhurchu C N, Swinburn B, Vandevijvere S, Lawrence M, et al. Monitoring the health-related labelling of foods and non-alcoholic beverages in retail settings. Obes Rev 2013; 14 Suppl 1:70-81.

11. European Commission. Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers. Official Journal of the European Union 2011; L 304: 18-63.
12. Ministarstvo poljoprivrede, šumarstva i vodoprivrede Republike Srbije. Pravilnikodeklarisanju, označavanjuireklamiranjuhraneSl. glasnikRS, 19/2017 i 16/2018.
13. Grunert K, Fernández-Celemín L, Wills J, Storcksdieck genannt Bonsmann S, Nureeva L. Use and understanding of nutrition information on food labels in six European countries Z Gesundh Wiss 2010; 18(3): 261–77.
14. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. Public Health Nutr 2005; 8(1):21–8.
15. Grunert KG, Wills JM. A review of European researchon consumer response to nutrition information on food labels. J Public Health 2007; 15: 385–99.
16. Grunert KG, Wills JM, Fernández-Celemín L**.** Nutrition knowledge, and use and understanding of nutrition information on food labels among consumers in the UK. Appetite 2010;55(2):177-89.
17.Davidović DB, Tomić DV, Paunović KŽ, Vasiljević ND, Jorga JB. Nutrition labelling of pre-packaged foods in Belgrade, Serbia: current situation. Public Health Nutr 2015; 18(11):1969-78.

ORAL PRESENTATIONS

1. DOES MIGRATION OF ALUMINUM FROM ALUMINUM FOIL TO FOOD PRESENT A HEALTH RISK FOR CONSUMERS?

Poljak Marija[1], Ovca A.[2]
[1]Andrija Stampar Teaching Institute of Public Health, Zagreb, Croatia
[2]Faculty of Health sciences, Ljubljana, Slovenia

Introduction: Aluminum is one of the most common elements in our environment. It occurs naturally in food and water. Tolerable daily intake for aluminum is 1mg/kg body weight/day. Research indicates that using food contact materials made from aluminum can lead to aluminum migration.
Objectives: A literature review focusing on studies investigating leaching aluminum from aluminum foil.
Materials and methods: A search strategy was implemented in following bibliographic databases: Scopus, Since Direct and PubMed. The search algorithm comprised a targeted combination of material related term (aluminum foil), risk related terms (aluminum migration, health risk) and food related terms (packing, cooking).
Results: Results show that using aluminum foil for cooking represent health risk because aluminum is leaching from the foil into the food. The leaching is highly dependent on the cooking temperature, food pH and salt and spices added to food. Results show that wrapping food in aluminum foil during the cooking process can contribute to aluminum intake above the permissible limit.
Conclusion: Aluminum foil may be used for packing but not for cooking. Cooking with aluminum foil can represent a health risk, and that's why it is in the public health interest to inform the public about it.
Key words: Aluminum foil, aluminum migration, packing, cooking, health risk

2. PREVALENCE OF HYPERTENSION AMONG URBAN CHILDREN IN RELATION TO AGE AND NUTRITIONAL STATUS

Belojević Goran[1], Paunović K.[1], Ilić Živojinović J.[1], Jakovljević B.[1],
Stojanov V. [2]
[1]Institute of Hygiene and Medical Ecology, University of Belgrade, Serbia
[2]Multidisciplinary Center for Polyclinic Diagnostics, Assessment and Treatment of Blood Pressure Disorders, Clinic for Cardiology, Clinical Center of Serbia, Faculty of Medicine, University of Belgrade, Serbia

Objectives: To investigate the relationship between the prevalence of hypertension, age and nutritional status among urban children.
Materials and methods:A cross-sectional study was performed on 1827 children (872 boys: 47,7%) from the center of Belgrade, classified in three age groups: 356 pre-school children (3-6 years); 839 younger schoolchildren (7-10); and 632 senior schoolchildren (11-15). A software at the CDC website was used to calculate children's BMI-for-age percentile and to classify children into weight status categories. Blood pressure was measured in school settings with sphygmomanometer. Hypertension was diagnosed if systolic and/or diastolic arterial pressure were equal or exceeding 95th percentile of values, according to body height, sex, and age.
Results: Hypertension was more frequent among obese children compared to normal weight children in all three age groups: preschool children (13,0% vs. 1.2%): younger school children (13,6% vs. 1,5%) and senior school children (25.5% vs. 1,4%) /$p < 0,001$/. Odds ratio (95% CI) for hypertension in relation to BMI percentile was significant and higher among senior school children /1,067 (1,038-1,096) compared to younger school children /1,036 (1,016-1,055).
Conclusion: We found a significant positive association between the hypertension among urban children and their age and BMI.
Key words: child, hypertension, nutritional status

POSTER PRESENTATIONS

1. SIMPLE DESCRIPTIVE SENSORY ANALYSIS OF FOOD CONTACT MATERIALS

Milojević Miodragović Gordana, Lukić D.
Institute of Public Health of Vojvodina, Novi Sad, Serbia

Objectives: Food contact materials (FCM) present all materials and articles intended to come in contact with food, such as packaging and containers, kitchen equipment, cutlery and dishes. The materials should be manufactured in compliance with Serbian and also with EU regulations, including good manufacturing practices. The aim was to present the result of control of FCM analyzed in Institute for Public Health of Vojvodina during 2015. and 2016.
Methods: Testing the safety or product compliance begins with a sensory analysis (simple descriptive test). It implies appearance, fineness of processing, mistakes in structure and if needs residual odor. After testing contact of samples with food simulants chemical resistance of surfaces were checking and simple descriptive analysis was repeated.
Results: The control study included 570 samples made from different materials and it showed that only 38 of them were not in compliance with regulations. 60% of nonconforming samples have changes in sensory characteristics, 43% had noticeable residual scent, while 17% have had sensory characteristics changed after contact with food simulants.
Conclusion: In addition to the correct sensory characteristics, the FCM should provide safety with respect to the specific migration of other contaminants.
Key words: Food contact materials, Safety, sensory analysis

2. POTENTIOMETRIC DETERMINATION OF THE TOTAL ACIDITY IN RED WINE

Odović Jadranka[1], Jelić R.[2]
[1]Faculty of Pharmacy, University of Belgrade, Serbia
[2]University of Kragujevac, Serbia, Faculty of Medical Sciences, Department of Pharmacy

Objectives: Wine represents a product obtained by total or partial alcoholic fermentation of fresh grape.It is characterized by a diverse chemical composition whichinfluences organoleptic characteristics, nutritionas well as possible health benefits. The composition of wine includes water, ethanol, acids, vitamins, minerals, esters, phenolic compounds.
A number of acids are included in wine composition. One of the most important is tartaric acid. Through its content, wine acidity can be expressed as total (titrated) acidity.
Materials and methods: In this paper, the total acidity of ten different varieties of red wine samples was determined by application of potentiometric titration using a solution of sodium hydroxide (0.1 M).
Results: Obtained results were expressed as total acidity (g/L of tartaric acid) and ranged from 5.10to 6.65g/L.
Conclusion: Acids content in the wine is very important because itaffects wine taste and in addition havethe role of preservatives. Composition and the total content of wine acids depend on grapes quality, climatic conditions as well as the process of wine preparation. Wine titratable acidity, expressed in tartaric acid, should be in the range of 4.0-8.0g/L. Lowervalues than 4g/L of titratable acids inwine can be suspect for the origin or illegal preparation process.
Key words: wine, total acidity, potentiometric titrations
Acknowledgments: This work was supported in part by the Ministry of Education, Science and Technological Development of the Republic of Serbia as a part of Projects TR34031.

3. NUTRITIONAL STATUS OF ELEMENTARY SCHOOL STUDENTS' PARENTS IN NOVI SAD

Bjelanović Jelena
University of Novi Sad, Medical Faculty, Novi Sad
Institute of Public Health of Vojvodina, Novi Sad

Objectives: The aim of the paper was to determine the nutritional status parents of first grade students in elementary schools in Novi Sad.
Materials and methods: A survey conducted during the period 2013/2014 to 2015/2016 school year, and included 197 parents in 7 primary schools in Novi Sad. Parents provided data on their current body height and body mass. On the basis of the obtained data the body mass index was calculated and the nutritional status of the parents was determined.
Materials and methods: Based on the obtained data and the calculated body mass index, a significant percentage of irregular nutrition status were found in the parents sample. In particular, overweight and obesity were very present, more frequent in the fathers sample, while malnutrition was found only in the mother's sample.
Conclusion**:** The family environment is the most important factor in creating the habits in children related to nutrition. Eating habits of parents and, consequently, their state of nourishment, has far-reaching consequences on the state of nourishment of children. Obtained data indicate the need for interventions in the family environment.
Key words: family environment, nutritional status, parents

4.IRON AND MANGANESE CONTENT IN WINES FROM FRUŠKA GORA

Lukić Danijela[1], Jovanović M. [1], Simin N.[2], Lesjak M. [2], Beara I.[2], Torović Lj. [1,3]
[1]Institute of Public Health of Vojvodina, Novi Sad, Serbia
[2] University of Novi Sad, Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, Novi Sad, Serbia
[3] University of Novi Sad, Faculty of Medicine, Department of Pharmacy, Novi Sad, Serbia

Objectives: The aim of the study was to determine content of iron and manganese in wines from Fruška Gora.
Materials and methods: Sample collection of 57 bottled monovarietal wines produced during 2009-2015 included five red (Pinot Noir, Merlot, Portugieser, Cabernet Sauvignon and Frankovka) and five white varieties (Sauvignon blanc, Traminac, Chardonnay, Rhine Riesling and Italian riesling) from 22 wineries. Analysis was conducted by ICP-MS.
Results: The total mean levels of iron and manganese in red wines were 2766µg/L (min 1045µg/L, max 5487µg/L) and 1483µg/L (min 587µg/L, max 2579µg/L), respectively. Similar total mean levels were observed in white wines: iron 2864µg/L (min 1183µg/L, max 6470µg/L), manganese 1259µg/L (min 595µg/L, max 2711µg/L).
Conclusion: Statutory limitation for the content of iron (20000µg/L) was not exceeded in any case. If iron is considered as a mineral, low bioavailability of non-heme iron from red wines, probably due to the binding of iron to polyphenols, should be taken into account, whereas white wine is considered as iron absorption enhancer. Iron levels were far below the threshold that might adversely affect organoleptic properties of wine. Manganese, also essential dietary mineral, could originate from the application of certain pesticides and fertilizers or transfer from different materials in wineries.
Key words: wine, iron, manganese, Fruška Gora, ICP-MS

5.USE OF ASPIRIN AND NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs) AS RISK FACTOR FOR GASTRIC CANCER

Lazarević Konstansa[1], Bogdanović D.[1,2]., Milićević S[1]., Dolićanin Z[1].
[1]State university of Novi Pazar, Serbia
[2]Public Health Institute Nis, Serbia

Gastric cancer is the third most frequent cause of cancer deaths worldwide. The etiology of gastric cancer is multifactorial (genetic factors, Helicobacter pylori infection, diet and etc.) while inflammation has an important role in its development. Non-steroidal anti-inflammatory drugs (NSAIDs) and aspirin can inhibit inflammation. Presently, the evidenceabouttheroleof aspirin andNSAIDsandgastriccancerdevelopment thereisconflictingandnon-conclusive.
The aim of this study is to assess the dose–response association between aspirin and NSAIDs use and gastric cancer risk.
This hospital based study included 306 patients (102 with gastric cancer diagnosis and 204 controls) hospitalized in Clinical Center Nis, Serbia.
Patients with gastric cancer reported more frequent use of aspirin and NSAIDs than those in the control group (χ^2=4.13; p=0.042; p<0.05). Accordingto the resultsofunivariatelogisticregressionanalysis,long-term use of aspirin andNSAIDs (≥ 2y) is in positive correlation with gastric cancer frequency (OR=1.76; 95%IP: 1.02-3.06).
In order to determine whether the use of aspirin and NSAIDs increases or reduces the risk of developing stomach cancer, as well as to determine interaction with other risk factors, further research is needed.

Key words: gastric cancer, aspirin, non-steroidal anti-inflammatory drugs

6. OBESITY IN ADULT POPULATION IN SERBIA

Sekulić Marija[1], Vasiljević D.[1,2],Stajić D.[1], Stepović M.[3], Rajković Z.[3], Petrović I.[4], Djonović N.[1,2]
[1]University of Kragujevac, Department of Hygiene and ecology, Faculty of Medical Sciences, Kragujevac, Serbia
[2]Institute of Public Health, Kragujevac, Serbia
[3]University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia
[4]University of Kragujevac, Department of Patophysiology, Faculty of Medical Sciences, Kragujevac, Serbia

Objectives: Obesity is disease that has become a serious public health problem of epidemic proportions, and as that represents leading risk factor for many diseases. Aim of this study was to investigate the correlation between obesity and gender, age, marital, work and material status of the adult population of Serbia.
Materials and methods: Study was conducted as National investigational study of population's health in 2013 on territory of Serbia. The study included 13922 patients. Data were collected by appropriate questionnaire.The level of nutritional status was determined by body mass index (BMI).
Results: The percentage of subjects who had BMI≥25 (overweight and obese) amounted to 60.5%, which was 1.5 times more compared to the those with BMI<25. Women have higher percentage of normal weight compared to men (40.7%:33.3%). Overweight was more common in men, while obesity was more common in women. Higher proportion of those who have BMI≥25 was among those with lower level of education compared to those with a higher level of education (67.9%:54.2%). The highest percentage of respondents with BMI≥25 (69.8%) was among widowers.
Conclusion: Prevention of obesity must take place multidisciplinary accessin population, which would allow the acquisition and implementation of healthy lifestyles.
Key words: BMI, obesity, Serbia's population, socio-demographic factors, socioeconomic factors

7.FOOD CHANGES CONDITIONED BY PRESENCE OF LONG-TERM ILLNESS OR HEALTH PROBLEMS

Milošević Jovana[1], Mirković M[1], Đurić S[1], Ilić D[1], Mlošević N [1], Jovanović T [2].
[1]Institute of Preventive Medicine - Faculty of Medicine Pristina-Kosovska Mitrovica
[2] Institute of Preventive Medicine - Faculty of Medicine Niš

Objectives: Aim of this study was to show changes in the nutrition of respondents with the presence of a long-term illness or a health problem of adults respondents in Serbian communities in Kosovo and Metohija.
Methods: Research was conducted as a cross-sectional study and covers adults defined subpopulations in the territory of Kosovo and Metohija. To collect data on the existence of a long-term illness or a health problem and their changes in nutrition, was used a Questionnaire for examining the health of the population of the Republic of Serbia. From the statistical methods was used Chi-square test, with significance of 0.05.
Results: From the 1067 respondents, 262 (24.3%) reported that they had some long-term illness or a health problem. About healthwhen selectingfoodsthought20.8% which was not statistically significantly higher than the respondents without long-term illness or a health problem (21.5%). However, among the respondents with long-term illness or a health problem, significantly more were those who reduced salt, sugar and fat in the year of testing ($p < 0.001$), increased the intake of vegetables and fruits ($p < 0.01$) and reduced the intake of alcohol ($p = 0.03$) in the relation to respondents without long-term illness or a health problem.
Conclusion: Our research has shown that individuals with long-term illness or heath problem in the year preceding the study significantly changed eating habits in terms of reduced intake of harmful and increased intake of healthy foods.
Kay words: long-term illness, health problem.

8.OLIGOELEMENTS AS A WINE QUALITY PARAMETER

Basić Zorica, Janković I., Mašić S.
Institute of hygiene MMA Belgrade Serbia

Objectives: Wines have a reputation as a source of good health. They contain oligoelements which are necessary for good health. Inductively coupled plasma-atomic emission spectrometry (ICP-OES) provides a rapid and precise means of monitoring elements simultaneously for minor- and trace-levels. The ICP-OES technique is widely regarded as the most versatile analytical technique in the chemistry laboratory.Our aim-goal was to determine a content of oligoelements (iron, zinc, copper, chrome, manganese, cobalt) in fruit and in grape wines, using ICP-OES spectrometry, and to compare results obtained.
Materials and methods: We analyzed 4 types of fruit wines (blackberry, raspberry, cherry, blueberry) and grape wine of various producers, a total of 30 samples. Samples were prepared by microwave sample digestion. The metals were analyzed by Inductively Coupled Plasma-Atomic Emission Spectrometry.
Results: Domestic fruit and grape wines are a good source of oligoelements: zinc from 0,37 to 1,62 mg/l, manganese from 0,14 to 3,15 mg/l, iron from 1,31 to 6,06 mg/l, copper from 0,17 to 0,80 mg/l, chrome from 0,04 to 0,19 mg/l and cobalt max 0,01 mg/l.
Conclusion: Wines are good source of oligoelements, but advantage can be given to fruit wines because of lower ethanol content and suitability as a good excipient for some supplements.
Key words: ICP-OES, oligoelements, wines;

9. ASSESSMENT OF PANTOTHENIC ACID CONTENT IN INFANT MILK FORMULAS

Lalić Jelena, SunarićS., Kocić G.
Faculty of Medicine, University of Niš, Serbia

Objectives: Pantothenic acid, also known as vitamin B5, is an essential nutrient present in infant formulas, which support normal infant growth and development. Infant formulas as the nutrient source for the infant must include appropriate amounts of carbohydrate, vitamins, minerals, protein and fat. The aim of this paper was estimation of pantothenic acid content in formulas.
Materials and methods: Sample powder (0.5 g) was weighted in centrifuge tube and dissolved in warm deionized water (5ml). After deproteinization with acetic acid (3% v/v), volume of each sample was made to 10 ml, followed by centrifugation and filtration. HPLC determination of pantothenic acid was achieved using ZORBAX Eclipse Plus C8 column with mobile phase consisted of sodium phosphate buffer (0.1 M, pH 2.25) and acetonitrile (95:5, v/v) and UV detection (200 nm).
Results: Analyzed infant formulas had average pantothenic acid content of 4.05 mg/100 g which was in the range with those declared on their nutritional labels (2.4- 4.9 mg/100 g).
Conclusion: The concentrations of these vitamin that we found were in agreement with the values in the literature and in compliance with international recommendations. Considering that infant formulas are the artificial substitute for human breast milk, research on vitamins and their concentration is important for the quality control in infant nutrition industry.
Key words:pantothenic acid, infant formulas, HPLC determination, milk
Acknowledgement
This research was supported by grant TR 31060 from the Ministry of Education, Science and Technological Development of the Republic of Serbia.

10.DETERMINATION OF SULFITE IN FOODS BY ION CHROMATOGRAPHY

Dodevska Margarita[1], Šobajić S.[2]
[1]Center for Food Analysis, Belgrade, Serbia
[2]University of Belgrade, Faculty of Pharmacy, Department of Bromatology, Belgrade, Serbia

Objectives: In our market are present different foods what contain sulfite additives. Consumption of foods containing sulphites, in humans, and above all in sensitive people, can lead to irritation and redness of the skin, headache, and in some cases provoke asthma attacks. The objective of this paper was to determine presence and content of sulphites in foods who used in everyday nutrition.
Materials and methods: Total of 45 samples were analyzed for total sulfites using ion chromatography with conductivity detections (Dionex, ICS 5000+). The chromatographic column was AS11-HC 4µm. As eluent 30 mM potasium chloride was used. Analytical internal quality control was conducted using reference material: canned apricot T20103QC.
Results: The highest percentage of sulphite contains processed fruit (39-1310 mg/kg), while significantly less sulphite is present in processed vegetables (24-245 mg/kg) and fermented vinegars (20-143 mg/kg). The lowest content of sulphite was found in starch syrup (0-35 mg/kg).
Conclusion: Since different foods that are part of everyday nutrition contain a different amount of sulfite, it is necessary to read and understand the product declaration. This is necessary for combination at the daily level, because their quantities would be reduced to a minimum, and this reduce negative impact on health.
Keywords:sulfite in foods; nutrition, ion chromatography.

11.TOTAL FIBER IN BAKERY PRODUCTS

Dodevska Margarita
Center for Food Analysis, Belgrade, Serbia

Objectives: Among biologically active compounds fiber are the most important. Their health benefits, confirmed in many studies, manifests in decreasing the risk of diabetes, metabolic syndrome, heart diseases, colorectal cancer. The aim of the work was to determine the fiber in several sorts of bread, croissant and puff pastry, because they are part of everyday diet.
Materials and methods: In 30 samples of commonly consumed bakery products (seven sorts of bread, five sorts of croissant and six sorts of puff pastry), content of total fiber and energy value was determined. The analyses were performed by standard AOAC procedures.
Results: Analyzed bread samples contained 2.2-9.6% fiber, while croissant (2.1-4.6%) and puff pastry (1.6-4.0%) significantly less fiber was present. Whole wheat bread with added seeds contained the most percent of fiber, while puff pastry from white flour contained the smallest amount. In analyzed samples, fiber and fat contents was inversely proportional ratio.
Conclusion: White fat bakery products must be thrown out to design optimal diet. Three pieces of whole wheat bread per day satisfies a third of the need for fiber. Adequate intake of fiber, especially fiber from whole wheat bread, through optimal nutrition could promote expected health benefits.
Keywords: fiber, nutrition, bakery products.

12. USE OF BEE PRODUCTS IN PEDIATRIC POPULATION

Pavlović Dragana[1], Nikolić M. [1,2], Milojević A.[3], Milojević J.[3], Tasić-Kostov M.[1], Kitić D.[1], Živanović S.[4,1]
[1] Faculty of Medicine, University of Niš, Serbia
[2] Public Health Institute Niš, Serbia
[3] Citopharm Niš, Serbia
[4] Clinical Center Niš, Serbia

Objectives: Honey and bee products have been used in diet and as a home remedy from ancient times. We aimed to determine the frequency of their usage in pediatric population and assess parents'/guardians' attitudes about these products.
Materials and methods: The study was conducted in the form of an anonymous survey of the inhabitants of the district of Niš.
Results: The most commonly used bee products were honey and propolis, probably since they are accessible and popular due to many known positive effects on health. Univariate logistic regression analysis as significant independent factors that influence the giving of bee products to the child recognized the place of residence and the age of parents/guardians. Almost 80% of respondents declared that they do use some of bee products as part of child's common diet and/or for its health problems. Beside one case of allergic reaction to propolis, only a few mild undesirable effects (namely nausea and abdominal pain) were reported. The majority of respondents would like to learn more about bee products and the possibilities of their use.
Conclusion: Health workers could contribute to safe and effective application of these valuable natural products which must be compliant with the latest scientific knowledge.
Key words: honey, propolis, safe use, mild undesirable effects, parents'/guardians' attitudes
Acknowledgement: This research was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grants III 41018 and III 46013).

13. ASSOCIATION OF DIET COMPOSITION AND SEVERITY OF STEATOSIS IN OBESE PATIENTS WITH NONALCOHOLIC FATTY LIVER

Marinković Jelena[1], Ristanović-Ponjavić I.[2]
[1]University Hospital Zemun, Belgrade, Serbia
[2] Public Health Institute Belgrade, Serbia

Objectives: The aim of this study was to evaluate differences in usual dietary intake among obese patients with and without nonalcoholic fatty liver (NAFLD).
Materials and methods: In this case-control study we evaluated 120 obese patients (60 with NAFLD verified with ultrasound exam and 60 with normal liver ultrasound finding, matched for gender and age). The usual dietary intake was assessed by averaging 3 records of 24-hour recall (3 nonconsecutive days – 2 working days and 1 weekend day). Multiple pass method was used.
Results: Patients with NAFLD had a significantly higher caloric intake than the control, although both groups were in the category of hypercaloric nutrition (2694.07 +/- 357.34 vs 3045.86 +/- 451.24, $p<0.001$). In the NAFLD group, calorie intake increased with the degree of steatosis, but these differences were not significant. Daily intake of proteins, total fat and cholesterol was significantly higher, while fiber intake was significantly lower in the NAFLD group than in the control group. In the NAFLD group, the fiber intake decreased with severity of steatosis, while the intake of other macronutrients was not significantly different in patients with varying degrees of steatosis.
Conclusion: Calorie intake and macronutrient composition of the diet affect onset and progression of NAFLD.
Key words: NAFLD, obesity, diet composition

14. DETERMINATION OF ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY OF SERBIAN HONEYS

Živković Jelena[1], Sunarić S.[1], Stanković N.[2], Mihajilov-Krstev T.[3], Spasić A.[1]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Institute of Public Health, Niš, Serbia
[3]Department of Biology and Ecology, Faculty of Science and Mathematics, University of Niš, Serbia

Objectives: Honey has been well known for centuriesfor its high nutritional and medicinal value. Phenolic compounds have been recognized as the major constituents responsible for health promoting properties of honey. The purposes of the present study were to determine the total phenolic and flavonoid contents, as well as antioxidant and antimicrobial activity of Serbian honeys.
Materials and methods: Acacia, meadow and forest honey were provided directly from professional beekeepers. In honeys color intensity, total phenolic content (TPC),total flavonoid content (TF) were measured, while antioxidant activity were analyzed using DPPH and FRAP assays. The antimicrobial activities of samples were determined by micro well-dilution method against six bacterial strains isolated from human material, Gram (+) bacteria: *Streptococcus pneumoniae*, *Staphylococcus aureus* and *Enterococcus faecalis* and Gram (-) bacteria: *Pseudomonas aeruginosa*, *Escherichia coli* and *Acinetobacter baumannii*.
Results: Meadow honey had the highest TPC (899.56 ± 2.10 mg GAE/kg), TF (113.68 ± 1.58 mg CE/kg) and DPPH (1.43 ± 0.18 mmol TEAC/kg) values. Dark amber forest honey with color intensity 137 mm Pfund, also showed considerably TPC, TF and DPPH activity and highest antioxidant potential based on results of FRAP (5.47 ± 0.44 mmol Fe^{2+}/kg) assay. White, clear, acacia honey expressed the lowest antioxidant parameters. All samples showed antibacterial activity, where forest honey was the most effective against the all pathogenic bacteria (MIC/MBC = 25/50% w/w). Acacia honey expressed activity against five bacterial strains (MIC = 25% w/w), while MIC greater than 50% w/w was determined against *Staphylococcus aureus* isolated from wound. Meadow honey was effective against two Gram (+) and one Gram (-) bacteria (MIC = 25% w/w).
Conclusion: This study showed that samples of Serbian honey contained phenolic, antioxidants and antimicrobial compounds of good quality. Demonstrated antimicrobial activity suggests they may have a relevant role as antibacterial natural products to decrease the effects of bacterial infections.
Keywords: honey, phenolic content, antioxidant activity, antimicrobial activity
Acknowledgement: This research was financially supported by Faculty of Medicine University of Niš Internal Scientific Project No. 2 (11-14629-4/2) and by the***Ministry of Education, Science and Technological Development of the Republic of Serbia***(Grant No. TR 31060).

15. ANTIOXIDANT PROPERTIES EVALUATION OF SUPERCRITICAL CO_2EXTRACTSOF *SIDERITIS SCARDICA* GRISEB.

Živković Jelena[1], Stanković M.[1], Stojiljković D.[2], Antonijević J.[1], Arsić I.[1], Tadić V.[3]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Health Care Institution Pharmacy ″Farmakop″, Niš, Serbia
[3]Institute for Medicinal Plant Research "Dr Josif Pančić", Belgrade, Serbia

Objectives: *Sideritis scardica* Griseb. is an endemic mountain plant species of the Balkan Peninsula. In folk medicine aerial parts of mountain tea has been used in the treatment of bronchitis and bronchial asthma, coughs, inflammation and gastrointestinal disorders. The scope of the present study was to investigate antioxidant potential of mountain tea extracts obtained using supercritical fluid extraction (SFE) with carbon dioxide (CO_2)as the extracting solvent at different pressures and temperatures.
Materials and methods: SFEof *Sideritis scardica* was performed at following condition: 10 MPa and 40 ^oC, 30 MPa and 40 ^{o}, as well as 30 MPa and 100 ^oC. Further, the extracts were studied for antioxidant activity using DPPH, FRAP, β-Carotene bleaching assays and ***total phenolic*** content (TPC).
Results: SFE extract obtained at a pressure of 30 MPa and a temperature of 40 ^oC was found to be the most active (IC_{50} = 0.25 ± 0.04 mg/mL in DPPH scavenging assay, 0.18 ± 0.02 mmol $Fe^{2+/}$g of dry extract in FRAP assay, and 19,94 ± 0.21 mg GAE/g of dry extract TPC). Otherwise,by using the β-carotene bleaching assay lower IC_{50} value(IC_{50} = 0.83 ± 0.01 mg/ml) was estimated for extract produced at 30 MPa and 100 ^oC,comparing to (IC_{50} = 1.29 ± 0.06 mg/mL) for extract obtained at 30 MPa and 40 ^oC.
Conclusion: CO_2 represents the most extensively used compressed fluid, especially in***natural products extraction*** because is nontoxic, easy to remove from the final extract and does not cause major disruptions in valuable components. ***Our results showed that****Sideritis scardica* Griseb. extracts present a strong ***source***of***antioxidants***, with great potential for application in pharmaceutical, cosmetic and food industry.
Keywords: *Sideritis scardica* Griseb., supercritical fluid extraction, antioxidant activity, ***total phenolic***content
Acknowledgement: This research was financially supported by the ***Ministry of Education***, ***Science and Technological Development of the Republic of Serbia*** (Project No. III 45017 and TR 31060) and by the Faculty of Medicine University of Niš Internal Scientific Project No. 2 (11-14629-4/2).

16. POLYPHENOLS AND TANNINS OF *OCIMUM BASILICUM* L. ETHANOLIC EXTRACTS

Koraćević Maja[1,2],Kostić M[1], Miladinović B[1], Milutinović M[1], Baćević I[1], Branković S[3], Kitić D[1]
[1]Department of Pharmacy, Faculty of Medicine, University of Niš, Serbia
[2]Innovation Center, University of Niš, Serbia
[3]Department of Physiology, Faculty of Medicine, University of Niš, Serbia

Objectives: Antioxidant activity of basil (*Ocimumbasilicum* L., Lamiaceae) is attributed to the presence of polyphenolic compounds.They inhibit the processes of generating free radicalsin the body,which leads to a number of adverse effects.The aim of the studywas to determine the content of total polyphenols and tannins in the basil ethanolic extracts.
Methods: Dried above-groundpartsof the plantwere purchased from the Yumis Food Industry and extracted with concentrated, 80% and 60% ethanol by single maceration method. The content of total polyphenols and tannins was determined by Folin-Ciocalteu method. The results are presented as mg of gallic acid equivalent per g of the extracts (mg GAE/g).
Results: The highest extraction yield was recorded in the E80 extract (8.83%) and the lowest in extract E (3.93%). Extract E80 showedthe highest content of total polyphenols (106.99±5.59 mg GAE/g), and total tannin content (35.49±2.87 mg GAE/g), whileextract Ehad the smallest content of total polyphenols (91.06±2.21 mg GAE/g), and total tannins (25.26±1.85 mg GAE/g).
Conclusion: The highest yield and the highest amount of total polyphenols and tannins were obtained in the extract prepared with 80% ethanol. Resultsindicate the potential antioxidative effects and use of this extract in medicine and pharmacy.
Keywords:*Ocimumbasilicum* (L.), polyphenols,tannins, extracts.

17. NUTRITIONAL INTAKE AND IMPORTANCE OF OMEGA-3 FATTY ACIDS AMONG PREGNANT WOMEN IN NIS

Ilić Dušan, Cvetković M., Stojanović D.
University of Niš, Faculty of Medicine, Niš, Serbia

Omega-3 fatty acids are long-chain polyunsaturated fatty acids, essential for optimal health and development. Since a human organism is unable to carry out their synthesis, it is necessary to import them by food or supplements. The main food sources of omega-3 fatty acids are various forms of seafood, fish, nuts, linseed and olive oil and eggs. Numerous studies have shown that adequate intake of omega-3 fatty acids during the third trimester of pregnancy can prolong the gestation period, prevent the occurrence of preeclampsia, reduce the risk of cerebral palsy and have positive effects on the neurological development of the fetus.
The aim of this study was to estimate the daily intake of omega-3 fatty acids through food among pregnant women in Niš.
Methodology: The research was conducted in 2018. on a random sample of 85 pregnant women aged between 21 and 33. The respondents were asked to complete a 24-hour questionnaire according to their memory, on the basis of which the data were obtained on the type and amount of food they were consuming on a daily basis.
The results have shown that 17,65% of the pregnant women had a sufficient daily intake of omega-3 fatty acids through food, 44,71% of the respondents reached the desired omega-3 fatty acids intake only with the use of supplements, while 37,64% of the women did not take a sufficient amount of omega-3 fatty acids.
Conclusion: It is necessary to work on the education of pregnant women about the importance of the increased omega-3 fatty acids intake during the whole pregnancy period. This can be achieved with a dietary change or with the use of appropriate dietary supplements.
Key words: omega-3 fatty acids, pregnant women, nutrition, deficiency

18. USE AND IMPORTANCE OF INFANT FORMULAS IN INFANT NUTRITION

Cvetković Maja, StojanovićD., IlićD.,Miladinović B.
University of Niš, Faculty of Medicine, Niš, Serbia

Formulas for infants are an effective substitute for human milk. They contain all necessary components to satisfy nutritional needs and affect the growth and development of children. Although the production of an identical infant formula is not possible, a lot of effort has been made to supplement the formulas for babies with new biological ingredients that would benefit the child's health.
The aim of this study was to examine the extent to which infant formulas are used, the reasons for their use and the factors that influence the choice of the formula.
The survey was presented as a descriptive study that covered 103 respondents divided into three groups: from 20 to 25, from 25 to 30 and over 30 years of age.
The results show that most respondents, as many as 57% of the group from 20 to 25 years, reported the use of infant formulas. The reasons were the lack of milk secretion, insufficient milk secretion, and the lack of desire for breast-feeding. The highest number of respondents, 76.92%, bought milk formulas at a pharmacy, mostly by the recommendation of a doctor (46.15%).
Having in mind that science has yet to reveal the function of all bioactive components of infant formulas, it can be safely claimed that they are considered to be the best choice for mothers in case of insufficient secretion of milk and for the nutrition of infants who do not adequately advance in body weight.
Key words: infant formulas, nutrition, human milk

SESSION: CURRENT PARASITOSIS AND FUNGAL INFECTIONS

INVITED LECTURES

1. TAENIASIS/CYSTICERCOSIS IN HUMANS

Nataša Miladinović-Tasić
Public Health Institute Niš, Serbia
University of Niš Faculty of Medicine, Serbia

Abstract
The taeniasis/cysticercosis complex is included in the list of neglected zoonotic diseases, with *Taenia solium* (*T. solium*) parasite being consistently the first of these worldwide. Infections with adult *Taenia spp.* (taeniasis) are most commonly asymptomatic. The identification and treatment of individuals affected by taeniasis caused by *T. solium* is important because of possible transmission to others and consequential development of cysticercosis. Human neurocysticercosis is the most common parasitic disease of the central nervous system, representing the main source of concern in endemic regions. It is also considered as the main cause of acquired epilepsy in developing countries. The diagnosis and treatment of individuals affected by taeniosis, cysticercosis, and especially neurocystocercosis are rather complex, and usually require multidisciplinary approach, up-to-date diagnosis and adequate therapy.
Keywords: taeniasis, cysticercosis,transmission, diagnosis

Introduction
The parasites from the Taenia genus, *T. solium*, *T. saginata* and *T. asiatica* species, cause the complex disease taeniasis/cystocercosis, associated with the presence and development of adult tapeworms in the small bowel of humans as the definitive host and cysticercosis in intermediary hosts (cattle, pigs). The taeniasis/cysticercosis complex is included in the list of neglected zoonotic diseases by the World Health Organization and Food and Agriculture Organization, with *T. solium* ranking first among the parasites worldwide. It occurs mostly in developing countries (Asia, Africa and Latin America), where it is still endemic [1]. Larval forms of *T. solium* species, *cysticercosis cellulosae*, causes cysticercosis in humans, a disease which has been absent for long in western Europe and other highly developed regions, but which has recently re-emerged as the result of immigration, travelling and trade. The disease often remains undiagnosed due to clinical non-recognition, but often due to inavailability of adequate diagnostic procedures as well in developing countries. Clinical manifestations of the disease are diverse, and disease evolution may considerably vary too. Improvements of the diagnostic procedures have made possible higher detection rates of the condition in developed countries, especially the infections affecting the central nervous system (neurocysticercosis) [1]. *T. saginata* is globally distributed, causes considerable economic losses (especially in the meat indistry) and principally represents a food safety issue, not a public health problem [2]. While *T. solium* and *T. saginata* have a great medical and/or veterinary significance, *T. asiatica* species does not have medical relevance in Europe for the time being [3-5]; it is prevalent mostly in Asian countries and is probably medically insignificant, in view of its molecular similarity to *T. saginata* [4].

Morphological and biological characteristics of *T. solium* species
Tapeworm is a flat eukaryotic parasite, motile during particular developmental stages, without a cell wall and digestive tract. Its scolex contains two rows of hooks, while gravid proglottids contain 7-13 uterine side branches. Men can be intermediary and/or definitive hosts, while pigs are definitive hosts. A unique property of the species is the development of cysticercus in human central nervous system (neurocysticercosis). Adult *T. solium* parasite can reach the length of several meters (2-8 m) and is composed of several segments with characteristic morphology and structure. Gravid proglottids are situated at the end of the body, containing the uterus with 8-12 side branches, filled with around 50,000 eggs passively expelled from the organism. The eggs are segmented, oval or round in shape, light brown in color, sized from 30 to 45 μm, with characteristic structure. In the middle of an egg, there is the hexacanth embryo with three pairs of chitin hooks (stylets). Eggs within spontaneously shed proglottids (in contrast to active proglottid locomotion in *T. saginata* species) reach the external environment, where they may survive even up to two months, if optimal temperature and humidity

requirements are fulfilled. In the digestive tract of pigs (and humans as well), under the influence of gastric and bowel juices, the eggs are lysed and the embryos penetrate bowel mucose and via blood stream and/or lymphatic circulation reach most commonly the muscle tissue (however, other tissues and organs may be affected as well). Reaching its destination, in the days that follow, the larval form of *T. solium* develops (*cysticercus cellulosae*), representing a vesicle sized from 5 to 10 mm, filled with clear liquid containing an invaginated scolex. Nine to ten weeks afterwards, the larva reaches maturity and is infective, retaining infectivity for even up to 20 years (in the eye) thanks to its endurance. On the average, a cysticercus is vital for 3-6 years, and after host death it also dies in the following 70 days (in salted pork, in the following 14-21 days) [1-6].

Transmission routes and pathogenicity

Infection of humans with *T. soliumom/T. saginata* usually occurs upon ingestion of fresh or insufficiently thermally processed pork or beef containing the parasites in their larval phase of development, which subsequently develop into adult forms in the human small bowel [4, 6]. Furthermore, in humans, the infection with *T. solium* may also occur by accidental ingestion of the parasite eggs (fecal-oral route) and subsequent development of larval forms of the parasite (when these forms can be identified in the central nervous system - neurocysticercosis, NCC). Human NCC is the most prevalent parasitic disease affecting the central nervous system, and represents the main source of concern in highly endemic regions, causing up to 50,000 deaths per year [7-9]. It is also considered as the most common cause of acquired epilepsy in developing countries (with around 2,000,000 affected individuals) [1, 4]. Regretfully, the incidence rates in Europe have been rising in recent years, probably as the result of human migratory processes [10].

Individuals infected with adult forms of *T. solium*/*T. saginata* release via feces the proglottids which contain the eggs of the parasite. With open defecation, eggs may be spread further by water, wind, insects, animal feet, contaminating the open space at various distances. Cattle are usually infected via contaminated grass, while pigs (as coprofagous animals) are usually infected eating contaminated feces (directly) or living in a contaminated environment (indirectly). In the gastrointestinal tract, eggs release hexacanth embryos (oncospheres), which after bowel wall penetration enter the bloodstream, mature into metacestodes, and subsequently evolve into cysticerci (vesicles containing invaginated tapeworm scolexes) [9-12]. The most common scolex localizations are the central and peripheral nerve system, eyes and bulbar muscles, skeletal muscles (with high glycogen contents), subcutaneous tissues and heart. Cysticerci may be active (live) or inactive (dead). Live cysticerci may contribute with its movement to the development of inflammatory response of the host, which also happens after their death as the consequene of release of larval toxins. After death, a cysticercus involutes, transforms into granulation tissue and calcifies. The transition from active to inactive larval stage rarely occurs spontaneously – it is principally the result of medicamentous therapy. However, since humans may ingest the parasite eggs repeatedly in a prolonged period of time, different stages of tissue cysts may exist in an individual at the same time [12]. Adult *T. solium* forms have got a high biotic potential, so that a single parasite may infect numerous humans/animals in its environment; tapeworm carriers therefore constitute an important target in the attempts to control this infection [12].

Clinical manifestations of taeniasis/cysticercosis

Infections with adult forms of *Taenia spp.* (taeniasis) are most commonly asymptomatic, with the only primary pathognomonic sign being the spontaneous release of proglottids. Associated symptoms are often insufficiently specific, such as weight loss, abdominal pain, vomiting, diarrhea, obstipation, appetite changes. Toxic effects due to release of tapeworm metabolites have also been described [12]. Identification and treatment of individuals with taeniasis caused by *T. solium* is essential in view of possible transmission to other people and development of cysticercosis. In endemic regions, around 15-25% of NCC patients have had tapeworm or a history of taeniasis [13]. In Europe, intestinal taeniasis has been established in 0-3.8% of patients with autochthonic and imported cysticercosis [14], and in the USA 21% of patients with NCC have been asymptomatic tapeworm carriers [15].

Clinical manifestations of NCC may range from asymptomatic infection to severe disease presentations and death. Signs and symptoms of NCC are usually non-specific, and disease severity usually reflects the infection characteristics (cyst size, number and localization). One of the main determinants of clinical manifestations of NCC is whether the parasites are presents within the brain parenchyma or in extraparenchymal spaces. In parenchymal NCC, epilepsy is the symptom most commonly reported [16]. Epileptic seizures may occur either acutely or in the form of „chronic

epilepsy“, when calcified lesions are present [17, 18]. Recurrent or chronic tension-type headache is also common as the consequence of increased intracranial pressure [19]. These headaches are more frequent than epilepsy and lead to quality of life impairments [16]. In extraparenchymal NCC, cysticerci may reside in the ventricular system or in subarachnoid space, which may lead to acute intracranial hypertension and, if they are situated in the fourth ventricle of the brain, there may occur an obstruction of the flow of cerebrospinal fluid (CSF) resulting in obstructive hydrocephalus [16-18]. While neuropathological and clinical aspects of NCC have been extensively studied and documented in humans, the information concerning symptomatology in animals have been scarce. A recent study has shown that in pigs with NCC clinical signs and seizures similar to those in humans with symptomatic NCC may develop [20].

Principles of parasitology and immunodiagnosis

Laboratory diagnosis of taeniasis

The differentiation of *Taenia* species is essential in the surveillance and control of human taeniasis. Numerous diagnostic procedures have been used to differentiate among *T. saginata* and *T. solium*, with variable results though. Microscopic, immunological and molecular methods have been used to detect and differentiate among *Taenia spp*. and it seems that a combination of two or more methods is able to provide better sensitivity [21, 22]. Almost none of the immunological and molecular methods developed so far have been tested independently and confirmed on controlled negative and positive specimens, nor they have entered commencial use [6, 23].

Traditional, conventional diagnosis of taeniasis is based on the microscopical detection of eggs, without identification of the species in question. Based on morphological differences among the gravid proglottids, *T. solium* can be differentiated from *T. saginata*, with the provision that uterine side branches are intact. Scolex passing after the treatment could provide species identification and confirms parasite elimination (a single parasite is usually present) [6, 23].

Coproantigen detection is performed using the enzyme-linked immunosorbent assay (ELISA), with better sensitivity and specificity compared to microscopic diagnosis [24]. However, the tests for coproantigen detection have been developed in individual laboratories using their own reagents and without independent validation and use in other diagnostic laboratories [6].

Serological tests to detect specific antibodies against *T. solium* in human subjects have also been developed [25, 26], being more specific and more sensitive than microscopic techniques, but showing cross-reactivity in patients with cystic echinococcosis, ascariasis and schistosomiasis [26]. Furthermore, currently available immunodiagnostic assays may give false positive results after the treatment for a recent infection [27].

Molecular methods utilize the technologies based on polymerase chain reaction (PCR) in order to detect the presence of DNA specific for *Taenia spp.* in human stool samples or to differentiate among the *Taenia spp*. based on the analysis of DNA extracted directly from a tapeworm [28]. PCR-based methods are more sensitive and specific in tapeworm detection compared to microscopy. Combinations of diagnostic methods of PCR and microscopy may provide even better diagnostic sensitivity [21].

Laboratory diagnosis of *T. solium (neuro)cysticercosis*

The diagnosis of cysticercosis is much more complex and involves the observation of clinical manifestations, neuroradiological tests and immunodiagnosis. Since NCC is characterized by diverse clinical manifestations, a group of experts has developed a list of diagnostic criteria updated for NCC in 2001, reviewed in 2012 and revised in 2016 [29, 30]. A correct diagnosis of NCC represents a challenge, especially in developing countries, in an absence of neuroimaging methods or appropriate immunological assays [31]. The diagnosis of NCC relies on neuroimaging studies, detection of serum and CSF antigens, and biochemical analysis of the CSF, establishing the elements and degree of inflammatory reaction of the meninges (pleocytosis, spinal fluid protein concentration, glucose content in the spinal fluid) [32].

Human host immune response to the presence of cysticerci has not been sufficiently elucidated. A mature live larva (a cyst in the brain) may exist for years with a minimal induced inflammatory reaction. When a larva in the brain becomes a cyst and dies afterwards, an intense inflammatory reaction occurs, leading to increased antibody titers in the serum and CSF of the affected individual. However, a minimal inflammatory response to a living parasite may also occur and active response to

a dead parasite, influenced by host antigen absorption and immune suppressor secretion by living parasites [31, 32].
Numerous immunodiagnostic procedures for antigen detection in cysticercosis belong to the past [7]: a) complement fixation test used at the beginning of the 20th century (Weinberg reaction) has been considered a standard; b) indirect immunofluorescent test (IFT); c) indirect hemagglutination (IHA), the method gaining popularity after complement fixation had been abolished; d) immunoelectrophoresis; e) double immunodiffusion; f) precipitation. Nowadays, there are numerous immunodiagnostic tests, both commercial and „in-house", with different performance levels [23, 33]. ELISA is the test most commonly used for antigen detection, simple, sensitive, quantitative, with possible simultaneous processing of a number of samples and in use in epidemiological studies [34]. Near the end of 1990s, enzyme-linked immunoelectrotransfer blot (EITB, western blot) test was developed, which used enriched glycoprotein fraction (lentil lectin glycoprotein, LLGP) to detect *T. solium* specific serum antibodies [35]. Seven antigen glycoproteins (GPs) have been isolated from the metacestode complete homogenate and then purified using lentil-lectin chromatography, where the numbers following GP (GP50, GP42-39, GP24, GP21, GP18, GP14 and GP13) refer to their molecular weight expressed in kilodaltons. The presence of any of these seven bands in the test defines a positive test, with initial sensitivity and specificity of 98% and 100%, without cross-reactivity in heterologous infections [36]. Comparative testing has demonstrated superiority of LLGP-EITB over ELISA in the diagnosis of human cysticercosis [37, 38] and in porcine cysticercosis [39].
Antibody detection methods do not allow us to differentiate exposure, active from inactive infection, they have a low positive predictive value in cases of persistent cysticercosis (due to positive antibody reactions in individuals with calcified cysticerci and high seroprevalence in the general population in endemic regions) and they have low sensitivity in cases with a single brain lesion [40, 41]. LLGP-EITB method is currently thought of as a test of choice for immunodiagnosis of cysticercosis, with all its shortcomings (the method requires frest cysts of infected pigs as the antigen source, and the procedure itself is rather complex). The studies focus on the characterization and synthesis and afterwards the production of recombinant forms of seven LLGP antigens, aiming to eliminate the shortcomings of the method and to design as simple and reproducible tests as possible [7].
The development of new diagnostic tests involves the lymphocyte transformation test (LTT), with 94% sensitivity and 96% specificity. LTT requires lymphocyte separation, longer incubation times and radioactive labeling. It seems that it is a solid alternative in the assessment of exposure of the host to an antigen, but without differentiation of active from inactive infection, since the test is based on the presence of memory T cells [42].
In field conditions, antibody seroprevalence overestimates the actual prevalence of an infection, i.e. the exposure of a person and detection of early infection. Detection of parasite specific antibodies in asymptomatic individuals is of limited use in clinical settings. Antibody seroprevalence may provide valuable information about exposure to a parasite, transmission dynamics, risk factors and in incidence calculations within the programs of infection control [7]. The samples for antibody detection are usually the serum, CSF, a drop of peripheral blood on filter paper, urine, saliva, tears (ophthalmic cysticertcosis) [43].
Direct immunodiagnosis has a clear advantage in the detection of active infections. In most cases, antigen levels are associated with the burden of infection and infection severity, and may be useful in therapeutic considerations and for prognostic predictions. Disease cure is often associated with negative antigen results; on the other hand, reccurences, reinfections or complications often result in increased circulating antigen levels. Regretfully, in most cases, sensitivity of antigen detection tests is inferior to indirect antibody detection tests [7]. Antigen detection media can be the serum, CSF, saliva, urine [7].
Molecular techniques, such as conventional and real-time PCR, using CSF and/or biopsy tissue as the matrices, are specific and relatively sensitive [23, 44]. PCR amplification of pTso19 repeating segment of the parasite genome in patient spinal fluid has demonstrated best sensitivity (95.9%) and variable specificity (80-100%), depending on the controls used [44].
In animal cysticercosis, the diagnosis is based on traditional diagnostic tools (tongue or meat inspection), which still represent the gold standard, i.e. on serodiagnosis in porcine cysticercosis [46].

Geographical distribution, prevention and control of teniosis/cysticercosis

T. saginata is present in Latin America, Africa, Russia, Asia and the whole of the Muslim world. It is estimated that around 40 million people worldwide are infected by *T. saginata*. *T. asiatica* is present in Asia and is encountered mostly in the Republic of Korea, China, Taiwan, Indonesia and Thailand. *T. solium*, the parasite of humans and pigs, is most prevalent in regions where raw or insufficiently cooked pork is eaten (rarely present in Muslim or Jewish communities, although the situation is changing gradually, probably as the result of international travelling and a growing presence of immigrants as asymptomatic carriers), with around 3 million infected people. Infected pigs are commonly seen in Central and South America (especially in Mexico, Venezuela, Chile), Eastern Europe, Russia, Manchuria, China, India, Pakistan, Madagascar, and parts of Africa (especially Western Africa). „Imported" taeniasis may occur in the populations inhabiting the countries in which *T. solium* is not considered as a public health issue [1, 47-49].

Numerous attempts to eradicate teniosis/cysticercosis have been made. Regretfully, the results are still very poor, and the reasons for that are numerous: inadequate production of pork, lack of elementary sanitary conditions, slaughter of livestock in household and peridomicile conditions without any veterinary meat control, fertility and longevity of adult tapeworms, egg endurance in external, hot and humid environments, inefficient multidisciplinary approaches and epidemiological surveillance [1, 47-49].

It is thought that the conditions of pig farming are the main risk factor in the transmission of *T. solium* [49]. Pigs should be kept in closed spaces without any contact with human excrements, and meat inspection should be performed in order to identify and destroy infected meat or larvae (freezing at -10°C for 10 days or heating above 60°C) [50]. More extensive control strategies for developing countries involve the use of antihelminthic drugs for people (praziquantel, niclosamid or albendazole) [2, 31, 51] and pigs (single-dose oxfendazole) [52], as well as the vaccination of pigs and cattle against *T. solium*/*T. saginata*. Immunization of pigs has been able to provide variable degrees of protection, and cattle immunization is less important and has not yet been commercialized [2, 53].

Conclusion

In spite of scientific advancements in the field, the complex of human teniosis/cysticercosis still represents a public health and food safety problem in endemic regions in developing countries, with growing concerns in developed countries as well. Guidelines to control the parasite and disease are the result of engagement of the community of experts in the field. Further studies are needed so that better diagnostic methods could be developed, as well as the methods of prevention, education of the public, effective control and removal of risk factors for the infection. „One Health" concept and cooperation through public and private partnerships are essential in the improvement of global control over the complex of human and animal teniosis/cysticercosis. For a significant and sustainable reduction of transmission of the infection and morbidity to be attained, multiple tools have to be combined and employed for a longer period of time.

Literature

1. Isaia Symeonidou, Konstantinos Arsenopoulos, Dimitrios Tzilve, Barbara Soba, Sarah Gabriël, Elias Papadopoulos. Human taeniasis/cysticercosis: a potentially emerging parasitic disease in Europe. Ann Gastroenterol 2018; 31(4):1-7.

2. Okello AL, Thomas LF. Human taeniasis: current insights intoprevention and management strategies in endemic countries. Risk Manag Healthc Policy 2017; 10:107-116.

3. Ito A, Nakao M, Wandra T. Human Taeniasis and cysticercosis in Asia. *Lancet* 2003; 362:1918-1920.

4. Ito A, Yanagida T, Nakao M. Recent advances and perspectives in molecular epidemiology of *Taenia solium* cysticercosis. *Infect Genet Evol* 2016; 40:357-367.

5. M. Teresa Galán-Puchades and Mario V. Fuentes. Taenia asiatica: the Most Neglected Human Taenia and the Possibility of Cysticercosis. Korean J Parasitol 2013; 51(1):51-54.

6. Abdul Jabbar, Charles Gauci and Marshall W Lightowler. Diagnosis of human taeniasis. Microbiology Australia, 2016; 37:43-45.

7. Silvia Rodriguez, Patricia Wilkins, Pierre Dorny. Immunological and molecular diagnosis of cysticercosis. Pathogens and Global Health 2012; 106(5):286-298.

8. Garcia HH, Del B OH. Taenia solium cysticercosis. Infect Dis Clin North Am 2000; 14:97-119.
9. Fogang YF, Savadogo AA, Camara M, et al. Managing neurocysticercosis: challenges and solutions. Int J Gen Med 2015; 8:333-344.
10. Raoul F, Li T, Sako Y, et al. Advances in diagnosis and spatial analysis of cysticercosis and taeniasis. Parasitology 2013; 140:1578-1588.
11. Dorny P, Praet N. Taenia saginata in Europe. Vet Parasitol 2007; 149:22-24.
12. Del Brutto OH, Garcia HH. Control and perspectives for elimination of Taenia solium taeniosis/cysticercosis. In: Del Brutto OH, Garcia HH (editors): Cysticercosis of the human nervous system. Springer: Berlin; 2014, pp. 125-135.
13. Guezala MC, Rodriguez S, Zamora H, Garcia HH, Gonzalez AE, Tembo A, Allan JC, Craig PS. Development of a species-specific coproantigen ELISA for human Taenia solium taeniasis. Am J Trop Med Hyg 2009; 81:433–437.
14. O'NealSE, Townes JM, Wilkins PP, Noh JC, Lee D, Rodriguez S, Garcia HH, Stauffer WM. Seroprevalence of antibodies against Taenia solium cysticerci among refugees resettledin United States. Emerg Infect Dis 2012; 18:431–438.
15. Zarlenga DS, Mc Manus DP, Fan PC, Cross JH. Characterization and detection of anewly described Asiantaeniid Using cloned ribosomal DNA fragments and sequence amplification by the polymerase chain reaction. Exp Parasito 1991; 72:174–183.
16. Carabin H, Ndimubanzi PC, Budke CM, et al. Clinical manifestations associated with neurocysticercosis: a systematic review. PLoS Negl Trop Dis 2011; 5:e1152.
17. Nash TE, Garcia HH, Rajshekhar V, Del Brutto OH. Clinical cysticercosis: diagnosis and treatment. In: Murrell KD (editor): WHO/FAO/OIE guidelines for the surveillance, prevention and control of Taeniosis/Cysticercosis. OIE: Paris; 2005; 73-99.
18. Nash TE, Mahanty S, Loeb JA, et al. Neurocysticercosis: a natural human model of epileptogenesis. Epilepsia 2015; 56:177-183.
19. Fogang YF, Camara M, Diop AG, Ndiaye MM. Cerebral neurocysticercosis mimicking or comorbid with episodic migraine? BMC Neurol 2014; 14:138.
20. Trevisan C, Mkupasi EM, Ngowi HA, Forkman B, Johansen MV. Severe seizures in pigs naturally infected with Taenia solium in Tanzania. Vet Parasitol 2016; 220:67-71.
21. Yamasaki, H. et al. Cysticercosis/taeniasis: recent advances in serological and molecular diagnoses. Southeast Asian J. Trop. Med. Public Health 2003; (34)98–102.
22. Praet, N. et al. Bayesian modelling to estimate the test characteristics of coprology, coproantigen ELISA and a novel real-time PCR for the diagnosis of taeniasis. Trop. Med. Int. Health 2013; (18):608–614.
23. Gómez-Morales MA, Gárate T, Blocher J, et al. Present status of laboratory diagnosis of human taeniosis/cysticercosis in Europe. Eur J Clin Microbiol Infect Dis 2017; 36:2029-2040.
24. Allan, J. C. et al. Immunodiagnosis of taeniasis by coproantigen detection. Parasitology 1990; 101:473–477.
25. Levine, M.Z. et al. Characterization, cloning, and expression of two diagnostic antigens for Taenia solium tapeworm infection. J. Parasitol. 2004; 90: 631–638.
26. Levine, M.Z. et al. Development of an enzyme-linked immunoelectrotransfer blot (EITB) assay using two baculovirus expressed recombinant antigens for diagnosis of Taenia solium taeniasis. J. Parasitol. 2007; (93):409–41.
27. Lightowlers, M.W. et al. Monitoring the outcomes of interventions against Taenia solium: option and suggestion. Parasite Immunol. 2016; 38(3):158-69.
28. Verweij, J.J. and Stensvold, C.R. Molecular testing for clinical diagnosis and epidemiological investigations of intestinal parasitic infections. Clin. Microbiol. Rev. 2014; (27):371–418.

29. Jimenez JA, Rodriguez S, Moyano LM, CastilloY, García HH, Cysticercosis Working Group in Peru. Differentiating Taenia eggs found in human stools:does Ziehl-Neelsen staining help? Tropical Med Int Health 2010; 15:1077–1081.
30. Robertson LJ, Sprong H, Ortega YR, vander Giessen JW, Fayer R. Impacts of globalisation on food borne parasites.Trends Parasitol 2014; 30:37–52.
31. Garcia HH, Nash TE, Del Brutto OH. Clinical symptoms, diagnosis, and treatment of neurocysticercosis. Lancet Neurol 2014; 13:1202-1215.
32. Takayanagui OM, Odashima NS. Clinical aspects of neurocysticercosis. Parasitol Int 2006; 55 Suppl: S111-S115.
33. Carod JF, Randrianarison M, Razafmahefa J, et al. Evaluation of the performance of 5 commercialized enzyme immunoassays for the detection of Taenia solium antibodies and for the diagnosis of neurocysticercosis. Diagn Microbiol Infect Dis 2012; 72:85-89.
34. Coker-Vann MR, Subianto DB, Brown P, Diwan AR, Desowitz R, Garruto RM, et al. ELISA antibodies to cysticerci of *Taenia solium* in human populations in New Guinea, Oceania, and Southeast Asia. Southeast Asian Jtrop Med Public Health. 1981; 12:499–505.
35. Deckers N, Dorny P. Immunodiagnosis of Taenia solium taeniosis/cysticercosis. Trends Parasitol 2010; 26:137-144.
36. Tsang VC, Brand JA, Boyer AE. An enzyme-linked immunoelectrotransfer blot assay and glycoprote in antigens for diagnosing human cysticercosis (Taenia solium). J Infect Dis. 1989; 159:50–59.
37. Rodriguez S, Dorny P, Tsang VC, Pretell EJ, Brandt J, Lescano AG, et al. Detection of Taenia solium antigens and anti-T. solium antibodies in paired serum and cerebrospinal fluid samples from patients with intra parenchymal or extraparenchymal neurocysticercosis. J Infect Dis. 2009; 199:1345–1352.
38. Proano-Narvaez JV, Meza-Lucas A, Mata-Ruiz O, Garcia Jeronimo RC, CorreaD. Laboratory diagnosis of human neurocysticercosis:double-blind comparison of enzyme-linked immunosorbentassay and electroimmunotransferblot assay. J Clin Microbiol. 2002; 40:2115–8.
39. Gonzalez AE, Cama V, Gilman RH, TsangVC, Pilcher JB, ChaveraA, et al. Prevalence and comparison of serologic assays, necropsy, and tongue examination for the diagnosis of porcine cysticercosis in Peru. Am J Trop Med Hyg. 1990; 43:194–199.
40. Wilson M, Bryan RT, Fried JA, Ware DA, Schantz PM, Pilcher JB, et al. Clinical evaluation of the cysticercosis enzyme-linked immunoelec trotransfer blot in patients with neurocysticercosis. J Infect Dis. 1991; 164:1007–1009.
41. Singh G, Kaushal V, Ram S, Kaushal RK, Dhanuka AK, Khurana S. Cysticercus immunoblot assay in patients with single, small enhancing lesions and multilesional neurocysticercosis. J Assoc Phys India. 1999; 47:476–479.
42. Amit P, Prasad KN, Kumar GR, Shweta T, Sanjeev J, Kumar PV, et al. Immune response to different fractions of Taenia solium cyst fluid antigens in patients with neurocysticercosis. Exp Parasitol. 2011; 127:687–692.
43. Sahu PS, Parija SC, Sahu PK. Tear IgA-ELISA: a novel andsensitive method for diagnosis of ophthalmic cysticercosis.Acta Trop. 2008; 106:168–174.
44. Yera H, Dupont D, Houze S, et al. Confrmation and follow-up of neurocysticercosis by real-time PCR in cerebrospinal fuid samples of patients living in France. J Clin Microbiol 2011; 49:4338-4340.
45. Michelet L, Fleury A, Sciutto E, et al. Human neurocysticercosis: comparison of diferent diagnostic tests using cerebrospinal fuid. J Clin Microbiol 2011; 49:195-200.
46. Dorny P, Phiri IK, Vercruysse J, et al. A Bayesian approach for estimating values for prevalence and diagnostic test characteristics of porcine cysticercosis. Int J Parasitol 2004; 34:569-576.

47. Bobes RJ, Fragoso G, Fleury A, et al. Evolution, molecular epidemiology and perspectives on the research of taeniid parasites with special emphasis on Taenia solium. Infect Genet Evol 2014;23:150-160.
48. Johansen MV, Trevisan C, Braae UC, et al. Te Vicious Worm: a computer-based Taenia solium education tool. Trends Parasitol 2014; 30:372-374
49. Devleesschauwer B, Allepuz A, Dermauw V, et al. Taenia solium in Europe: Still endemic? Acta Trop 2017; 165:96-99.
50. European Commission. Commission Regulation (EU) No 854/2004: laying down specifc rules for the organization of ofcial controls on products of animal origin intended for human consumption. Union TEPatCotE: Brussels; 2004.
51. Tomas LF. Landscape Analysis: Control of Taenia solium. World Health Organization: Geneva; 2015.
52. Gonzalez AE, Gavidia C, Falcon N, et al; Cysticercosis Working Group in Peru. Protection of pigs with cysticercosis from further infections afer treatment with oxfendazole. Am J Trop Med Hyg 2001; 65:15-18.
53. Gonzalez AE, Gauci CG, Barber D, et al. Vaccination of pigs to control human neurocysticercosis. Am J Trop Med Hyg 2005; 72:837-839.

2. NEUROCYSTICERCOSIS: CLINICAL AND SURGICAL ASPECSTS

Aleksandar Kostic
Clinic for Neurosurgery, Clinic Center Nis, Serbia
University of Niš Faculty of Medicine, Serbia

Abstract
Neurocysticercosis is a huge epidemiologic problem, as tens of million people are estimated to have cysticercosis infestation, with predilection in tropical and subtropical areas of the world. Combining epidemiological, clinical, radiological and laboratory parameters can lead the clinician to proper diagnosis of neurocysticercosis. Cases of it vary from asymptomatic to life-threatening.
Treatment of the disease, with antihelmintic drugs (praziquantel and albendazole), anti-inflammatory medication and anticonvulsive therapy is essential.
Surgical treatment of neurocysticercosis is limited, only to cases where raised intracranial pressure appears or in cases of obvious hydrocephalus. Whenever endoscopic intervention is amenable, it should be performed as it seems that minimally invasive techniques have a higher success rate than classic neurosurgical approaches.
Keywords:neurocysticercosis, clinical manifestations, neuroimaging, treatment

Introduction
Neurocysticercosis is a specific form of the infectious parasitic disease cysticercosis (CC), a parasitic tissue infection caused by ingestion of eggs from the adult pork tapeworm, Taenia solium (T. solium) (1). Tenium Saginata can also cause it, but as a specific meat diet in endemic parts of the world is mostly connected to consumption of pigs, a bovine form of cysticercosis is pretty rare (2). CC usually invades skin, muscles, eyeballs or and, when the specifically severe form of the disease, central nervous system (CNS). Then it is referred to as neurocysticercosis (NCC).
Today, it is a huge epidemiologic problem as around 50 million people are estimated to have CC infestation (3). It is endemic in many regions of Central and South America, sub-Saharan Africa, India, and Asia (4). The disease is extremely rare in Eastern Europe, while the growing number of migrants in western and south parts EU and USA makes this health issue actual even there (5).
After ingestion of the cysticercus, when the tapeworm eggs are inside the stomach, they hatch, penetrate the intestine to the mesenterial veins, travel through the bloodstream, and may irradiate to the whole organism. Dissemination to the CNS is via brain capillaries to the parenchyma or subarachnoid space, or via plexus choroideus intoa brain ventricle(6).
Cysticercus in brain parenchyma is usually 5–20 mm in diameter. In subarachnoid space and fissures, lesions may be as large as 6 cm in diameter and are lobulated. They may be numerous and life-threatening (7).

Diagnosis
Combining epidemiological, clinical, radiological and laboratory parameters can lead the clinician to proper diagnosis of NCC (8). *Absolute* diagnostic criteria are histological verification and brain ComputedTomography (CT) or Magnet Resonance Imaging (MRI) verification of the scolex of the cyst. (9).

Clinical Aspects of the NCC
Cases of NCC vary from asymptomatic to life-threatening. The clinical manifestations are pleomorphic and dependant on the location, number, and stage of the cysts at presentation. NCC is typically presented either with seizures (70% to 90% of acutely symptomatic patients) or a headache (10). A headache appears usually due to increased intracranial pressure, the presence of hydrocephalus or meningitis. Cysticerci with little or slight enlargement or edema usually do not give any symptoms. Epileptic seizures are a common manifestation of

parenchymal NCC and occur through two basic mechanisms. First is due to an inflammatoryresponse, the other is caused by perifocal edema around alive or calcified lesion (11). In population-based studies, calcified lesions on CT are much more common than viable cysts, and they are more prevalent in patients with epilepsy than they are in asymptomatic patients (12, 13, 14). Perilesional edema related to calcifications seems to be a relatively frequent phenomenon, with reports ranging from 23%–35% in the literature (11, 15). The natural history or pathophysiology of perilesional edema is not yet known, but it appears that it recurs, and repeated episodes tend to be associated with the same lesions in a patient. Depending on location and dimension of the cysts, different focal symptoms can occur, like numbness and neurological weakness of the face or limbs, if eloquent areas of the parenchyma are affected.

Intracranial hypertension may occur in patients with parenchymal NCC and is termed cysticercosis encephalitis (16). This manifestation has been best described in children and a young woman and is, in fact, the brain edema as a result of the acute inflammatory response to massive cysticercalinfestation. Patients present with a syndrome characterized by altered consciousness, seizures, loss of vision, papilledema, vomiting, and headache (17).

Hydrocephalus is usually associated with racemates (cluster) cysticerci formed inside subarachnoid or intraventricular space. It is a serious clinical manifestation of NCC caused by obstruction of the flow of cerebrospinal fluid. When cysticerci find their way to the Sylvian fissure or the basilar cisterns the result can be quite unfortunate for the patient. The CC larva (after embedding itself in the parenchyma) undergoes four stages of evolution: vesicular, vesicular colloid, granular nodular, and nodular calcified. This evolution does not occur in the intraventricular or the subarachnoid form of NCC.Therefore racemose NCC occurs there and form a multilocular cyst resembling a bunch of grapes, and can reach large sizes producing the local mass effect. Arachnoiditis can occur with resulting communicating hydrocephalus secondary to either chronic inflammation or fibrosis of the arachnoid villi causing obstruction to the reabsorption of CSF or extension of the subarachnoid inflammatory reaction to the meninges at the base of the brain occluding the formins of Luschka and Magendie (18). The optic nerves and the optic chiasm can also be encased within the exudates with subsequent development of decreased visual acuity and visual field defects (19). Extraocular muscle paralysis, diplopia,and papillary abnormalities are the results of entrapment of the ocular motor nerves.

Restriction of CSF flow could be due to the presence of the cysts inside lateral, third or fourthventricle. Sometimes granular ependymitis can occur. Location of cyst in any of the ventricles may cause acute hydrocephalus. Patients with third ventricle cysticerci complain of progressively worsening headaches and vomiting due to developing obstruction or may present with sudden loss of consciousness,episodic vomiting from acute hydrocephalus which can lead to death. A well-described clinical presentation of fourth ventricle cyst is the Bruns' syndrome which is characterized by an episodic headache, nausea, and vomiting, papilledema, neck stiffness, sudden positional vertigo, loss of consciousness with rapid recovery.

Cerebrovascular disease is the complication of NCC and is presented as arteritis that leads into a stroke. Arteritis is presented with the wall inflammation and characterized by thinning of the adventitia, fibrosis of the media and endothelial hyperplasia of the arterial wall near cysticerci (20) Cerebrovascular complications of NCC include cerebral infarction, transient ischemic attacks, and brain hemorrhage (21, 22, 23).

Psychiatric manifestations of NCC, such as depression and psychosis, have been described, also (24). Presentation of CC inside the spinal canal is very rare accounting 1% (25), and it extramedular form is more common than intramedular. Clinical, it mimics intradural tumors, with clinical signs of both myelopathy and radiculopathy.

Neuroimaging of the NCC

Both MRI and CT play a significant role in the visualization of NCC, but MRI is a major diagnostic tool in the most of the cases. In the vesicular stage, the disease appears as cystic lesions within the brain parenchyma and both MRI and CT scan reveal thin walled formation, without perifocal edema and the abilityof dyeing. Sometimes scan can involve the scolex itself („hole with a dot“). In the next, colloidal stage, perifocal edema appears and contrast enhancement of the cyst wall is visualized. This is the “so-called “acute encephalitic phase” of NCC, best visualized on the FLAIR sequence of the MRI (the fluid-attenuated inversion recovery technique) (30). Third, granulation phase of the parenchymatous NCC is also best seen on MRI as nodular hyperdense lesions surrounded by edema or a rim of gliosis after contrast medium administration. CT brain scan is a diagnostic of choice when representing the end stage of the parenchymatous parasite, as calcified (dead) cysticercus appear on CT as small hyperdense nodules without perilesional edema, and could be invisible on MRI. Contrary to this, a subarachnoid form of the disease is best seen by MRI. While most subarachnoid cysts over the convexity of the cerebral hemispheres are small, lesions located in the Sylvian fissure may reach more than 5 cm diameter; usually appearing as a grape-like structure that produces a mass effect and embraces neurovascular elements of the skull base. Also, FLAIR sequence of the MRI is a tool of choice when visualization ventricular form of the disease, because their signal properties differ from those of the CSF (26). Ventricular migration sign is a phenomenon that is best observed with MRI (27) and it refers to a movement within the ventricular cavities in response to movements of the patients' head.
In the spinal form of the disease, especially in the intramedular form, the MRI is superior to CT scan and reveals intramedullary cysticerci to be ring-enhancing lesions.
Sometimes, simple X-ray of the skull can reveal the 4th stage of the parenchyma form of the disease (28).

Therapy

Therapy of the NCC is a still matter of debate. Each of the forms of the NCC has its one therapy specifics (29, 30). Therapy approach, also, depends on the number, size and location of the lesions, their stage and clinical symptoms of the patients (31).

Surgical Aspects of the NCC

Surgical treatment of NCC is limited, only to cases where raised ICP appears or in cases of obvious hydrocephalus. Whenever endoscopic intervention is amenable, it should be performed as it seems that minimally invasive techniques have a higher success rate than classic neurosurgical approaches (32, 33). Nevertheless, classic surgery is mandatory when the immediate decline of the intracranial pressure is needed, in large, superficial lesions of the brain parenchyma, in the non-eloquent area. Also, when the diagnosis is not certain on imaging studies. All cases of hydrocephalus and patients with a ventricular cyst and ependymitis/arachnoiditis required placement of a ventriculoperitoneal (VP) shunt after the cyst was removed. Unfortunately, shunts in these patients suffer from frequent obstructions and require multiple revisions. Shunt-related infection was the most frequent complication, and the global mortality rate during the follow-up period was 21.2%. Complications were more frequent in the first 2 postoperative years, but they could occur at any time. Long-term prognosis in patients with cerebral CC who required surgery is not good. Poor prognostic factors were the location of the cysts in the basal cisterns and patient age under 40 (34). For incompletely excised cysts intracranial and cysts or granulomas in locations such as the spinal cord, conservative treatment with albendazole and steroids should be undertaken (35).

Conservative treatment of the NCC

Treatment of the NCC, with antihelmintic drugs, anti-inflammatory medication and anticonvulsive therapy is essential.
Praziquantel and albendazole are antiparasitic agents that are effective against cysticercus killing between 60% and 85% of parenchymal brain cysticercus (36). When speaking about

the antihelmintic drugs, albendazole is a drug of the first choice, as steroids decrease the plasma level of praziquantel, but not albendazole (37). It is administered at a dose of 15 mg/kg TT, divided into two daily doses for 8-28 days. It inhibits the polymerization of the cytoskeletal protein tubulin and therefore microtubules of the parasite.

Praziquantel disrupts the homeostasis of calcium and causes mild paralysis of the adult parasite. It is administered per os at a dose of 50-60 mg/kg TT three times daily for 15 days or 100 mg/kg TT three times a day, but only one day. Both drugs penetrate the cerebrospinal fluid and reach 25% or 45% of the serum concentration, but albendazole is more effective than praziquantel (6). High doses of albendazole (30 mg/kg daily) promote the disappearance of cysticercus in subarachnoidal and intraventricular cysticercosis. Nevertheless, there is no consensus on the dose of antiparasitic agent or length of treatment for a subarachnoidal form of the disease. A single course in this usually inadequate and long-term therapy like few months might be for treating some patients. In the patients requiring long-term steroids treatment methotrexate is used as a steroid-sparing agent (38). The therapy of parenchymal NCC can be conducted with albendazole or praziquantel for 14-28 days. Multiple lesions require a longer duration of antiparasitic therapy. Massive infections are generally not treated with anthelmintics due to the possibility of extensive inflammatory response by degenerate cysts. Some authors, suggest treatment of single enhancing or cystic lesions with albendazole and steroids (39), but more than two cystic lesions should be treated with combination therapy with albendazole and praziquantel (30).

Therefore, anti-inflammatory therapy is usually presented with steroid treatment. Nevertheless, applying the combined therapy is a usual treatment strategy, and the results of some studies clearly point out this. According to Singhi et al., single cysts disappear on 3-month follow-up CT in 53% of patients receiving steroids, in 60% of those receiving albendazole, and in 63% of those receiving both treatments (40). Perifocal edema around calcified lesions is refractory to therapy and there are no data that shows that treatment with steroids will prevent recurrent edema (16). Usually,Mannitol administered in a dose of 2 mg/kg per day in adults during a period of 3 or 4 days is the antiedematous therapy of the short-term manner. Corticosteroids are applied up to 32 mg per day (41).

Anticonvulsants are must be used for seizures control. Praziquantel affects serum levels of phenytoin and carbamazepine, so lowering of dose antiepileptic therapy is an option when combined (42). In half of the cases of the adult or pediatric patients with active cyst, seizures occur during the first 4 years despite therapy. The recurrence rate for those patients with persisting, active cysts (61%) is more than double the rate of patients with normal imaging (22%) (43). Patients with calcified cysts are especially prone to seizures in approximately two-thirds of the cases (62.8%) (44).

Conclusion

Introducing specific cysticidal therapy (albendazole, praziquantel) for human and animal use, in combination with corticosteroid drugs (in certain indications), mortality decreased from more than 50% to 3%. Medical treatment is used as the only form of therapy and/or in combination with a neurosurgical intervention, depending on the localization of the lesion and the condition of the patient.

Literature

1. Garcia HH, Gonzales AE, Evans CAW, Gilman RH. ***Taenia solium*** cysticercosis. Lancet. 2003; 362:547–556.

2. Wandra T, Sudewi R, Susilawati NM, Swastika K, Sudarmaja IM, Diarthini LPE et al. Neurocysticercosis Diagnosed in a Patient with ***Taenia saginata*** Taeniasis after Administration of Praziquantel: A Case Study and Review of the Literature. Primary Health Care. 2016; 6:231.

3. World Health Organization (WHO). Control of neurocysticercosis. Report of the Secretariat, Fifty-sixth World Health Assembly. Document A56/10. Geneva: World Health Organization; 2003.
4. Willingham A. 3th, Engels D. Control of Taenia solium cysticercosis/taeniosis. Adv Parasitol 2006; 61: 509.
5. Sorvillo FJ, Portigal L, DeGiorgio C, Smith L, Waterman SH, Berlin GW, Ash LR. Cysticercosis-related deaths, California. Emerg Infect Dis. 2004; 10:465-9.
6. Nikolić S, Stevanović S. Neurocysticercosis – pathogenesis and clinical aspect. Srp Arh 2006; 134: 246-250. (in Serbian)
7. Fleury A., Deddein A., Preux PM., Dumas M., Tapia G., Larralde C., Sciutto E.Symptomatic human neurocysticercosis--age, sex and exposure factors relating with disease heterogeneity. Journal of Neurology 2004; 251:830-837.
8. Del Brutto OH, Rajshekhar V, White AC Jr, Tsang VC, Nash TE, Takayanagui OM, et al. Proposed diagnostic criteria for neurocysticercosis. Neurology 2001; 57: 177-83.
9. Anthony S. Fanci et al. Harrison's principles of internal medicine. Philadelphia: Mc Graw Hill, New York, 2008.
10. Carpio A. Neurocysticercosis: An update. Lancet Infect Dis. 2002; 2: 751–762.
11. Nash TE, Pretell J, Garcia HH. Calcified cysticerci provoke perilesional edema and seizures. ***Clinical Infectious Diseases***. 2001; 33 49–1653.
12. Nash TE, Del Brutto OH, Butman JA, et al. Calcific neurocysticercosis and epileptogenesis. *Neurology*. 2004; 62:34–1938.
13. Fleury A, Gomez T, Alvarez I, et al. High prevalence of calcified silent neurocysticercosis in a rural village of Mexico. *Neuroepidemiology*. 2003; 22:139–145.
14. Garcia-Noval J, Moreno E, de Mata F, et al. An epidemiological study of epilepsy and epileptic seizures in two rural Guatemalan communities. *Annals of Tropical Medicine and Parasitology*. 2001; 95:167–175.
15. Rajadhyaksha S, Shah KN, Kanhere S, Naik N, Mehta R. Does treatment change the outcome of seizures and computerized tomographic lesions in intracranial granulomas? ***Journal of Tropical Pediatrics***. 1999; 45:161–165.
16. Rangel R, Torres B, Del Bruto O, Sotelo J. Cysticercotic encephalitis: a severe form in young females. ***American Journal of Tropical Medicine and Hygiene***. 1987; 36:387–392.
17. Garg RK. Neurocysticercosis. ***Postgraduate Medical Journal***. 1998; 74:321–326.
18. Lobato RD, Lamas E, Portillo JM, Roger R, Esparza ***J***, Rivas JJ, et al. Hydrocephalus in cerebral cysticercosis. Pathogenic and therapeutic considerations. ***Journal of Neurosurgery***. 1981; 55:786–793.
19. Keane JR. Neuro-ophthalmologic signs and symptoms of cysticercosis. ***Archives of Ophthalmology***. 1982; 100:1445–1448.
20. Garcia HH, del Brutto HO, Nash ET, WhirteAC, Tsang JrCWV, and Gilman HR. New concepts in the diagnosis and management of neurocysticercosis Taenia solium. Am. J. Trom. Med. Hyd. 2005; 72: 3–9.
21. Del Brutto OH. Cysticercosis and cerebrovascular disease: a review. ***Journal of Neurology, Neurosurgery and Psychiatry***, 1992; 55:252–254.
22. Barinagarrementeria F, Del Brutto OH. Lacunar syndrome due to neurocysticercosis. ***Archives of Neurology***. 1989; 46:415–417.
23. Soto-Hernandez JL, Andrade SG-L, Rojas-Echeverri LA, Texeira F, Romero V. Subarachnoid hemorrhage secondary to a ruptured inflammatory aneurysm: a possible manifestation of neurocysticercosis: case report. ***Neurosurgery***. 1996; 38:197–200.
24. Forlenza OV, Filho AHG, Nobrega JPS, et al. Psychiatric manifestations of neurocysticercosis: a study of 38 patients from a neurology clinic in Brazil. ***Journal of Neurology, Neurosurgery and Psychiatry***. 1997; 62(6):612–616.

25. Del Brutto OH, Sotelo J, Roman G. ***Neurocysticercosis: A Clinical Handbook***. Lisse, The Netherlands: Swets & Zeitlinger; 1998
26. Garcia HH, Del Brutto OH. Imaging findings in neurocysticercosis. ***Acta Tropica***. 2003; 87:71–78.
27. Rangel-Guerra RA, Herrera J, Elizondo G, Gonzalez-Morantes J. Neurocysticercosis. ***Archives of Neurology***. 1988; 45:492.
28. Debabrata B, Sumit S. Disseminated cysticercosis with huge muscle hypertrophy. Indian J Dermatol 2009;54:49-51.
29. Garcia HH, Nash TE, Del Brutto OH. Clinical symptoms, diagnosis, and treatment of neurocysticercosis. Lancer Neurol. 2014; 13:1202-15.
30. Webb CM, White AC Jr Update on the Diagnosis and Management of Neurocysticercosis. Curr Infect Dis Rep. 2016; 18:44.
31. Anthony S. Fanci et al. Harrison's principles of internal medicine. Philadelphia: Mc Graw Hill, New York, 2008.
32. Rangel-Castilla L,Serpa JA, Gopinath SP, Graviss EA, Diaz-Marchan P, White AC Jr. Contemporary neurosurgical approaches to neurocysticercosis.Am J Trop Med Hyg. 2009; 80:373-378.
33. Anandh B, Mohanty A, Sampath S, Praharaj SS, Kolluri S. Endoscopic approach to intraventricular cysticercal lesions. ***Minimally Invasive Neurosurgery***. 2001; 44:194–6.
34. Colli BO, Carlotti CG Jr, Assirati JA Jr, Machado HR, Valença M, Amato MC. Surgical treatment of cerebral cysticercosis: long-term results and prognostic factors. Neurosurg Focus. 2002; 15:12(6):e3.
35. Raishekhar V. Surgical management of neurocysticercosis. Int J Surg. 2010; 8(2):100-104.
36. García HH, Evans CAW, Nash TE, Takayanagui OM, White AC, Jr., Botero D, et al. Current Consensus Guidelines for Treatment of Neurocysticercosis. Clinical Microbiology Reviews. Published online October 1, 2002. https://cmr.asm.org/content/15/4/747
37. Vazquez ML, Jung H, Sotelo J. Plasma levels of praziquantel decrease when dexamethasone is given simultaneously. ***Neurology***. 1987; 37(9):1561–1562.
38. Mitre E, Talaat KR, Sperling MR, Nash TE. Methotrexate as a corticosteroid-sparing agent in complicated neurocysticercosis. ***Clinical Infectious Diseases***. 2007; 44(4):549–553.
39. Zhao BC, Jiang HY, Ma WY, Jin DD, Li HM, Lu H, Nakajima H, Huang TY, Sun KY, Chen SL, Chen KB. Albendazole and Corticosteroids for the Treatment of Solitary Cysticercus Granuloma: A Network Meta-analysis.PLoS Negl Trop Dis. 2016; 10(2): e0004418. Published online 2016 Feb 5
40. Singhi P, Jain V, Khandelwal N. Corticosteroids versus albendazole for treatment of single small enhancing computed tomographic lesions in children with neurocysticercosis. J Child Neurol 2004; 19:323–327.
41. Del Brutto OH. Neurocysticercosis. ***Seminars in Neurology***. 2005; 25:243–251.
42. Bittencourt PRM, Gracia CM, Martins R, Fernandes AG, Diekmann HW, Jung W. Phenytoin and carbamazepine decrease oral bioavailability of praziquantel. ***Neurology***. 1992; 42:492–496.
43. Carpio A, Hauser A. Prognosis for seizure recurrence in patients with newly diagnosed neurocysticercosis. Neurology. 2002; 59: 30–1734.
44. Durón R, Medina MT, Osorio J, et al. Prognosis of the epilepsy due to neurocysticercosis: A five-year follow-up from the Salamá epilepsy study in Honduras. Epilepsia. 2003; 44:38.

3. PARASITIC AND FUNGAL INFECTIONS OF THE CORNEA

Džamić AM, Mijatović S, Cvetković M, Čolović Čalovski IV
Laboratory of Parasitology - Mycology, Institute of Microbiology and Immunology, University of Belgade Faculty of Medicine, Belgrade, Serbia

Parasites and fungi infect cornea by trauma or surgery. Delayed diagnosis is the major factor for poor outcome. The number of *Acanthamoeba* keratitis (AK) cases worldwide is increasing, mostly in contact lens (CL) wearers. The ability of *Acanthamoeba* to produce infection is related to phagocytosis, acanthaporin and dormant cysts. The clinical course is protracted with severe pain. Important point is that all patients with unresponsive keratitis must be evaluated for AK. Demonstration of parasite in wet/stained preparations of corneal scrapings is the traditional method of diagnosis. Agent may be detected by culture and PCR. In Serbia, AK was diagnosed by detection of parasite in corneal scrapings/CL solutions by microscopy/culture.

Microspora are spore-forming parasites which are affiliated with the fungi. Keratitis caused by *Encephalitozoon, Vittaforma, Anncalia* and *Pleistophora* were reported after ocular trauma and in CL wearers. Spores are demonstrated in corneal scrapings or biopsy by stained slides and PCR.

Mycotic keratitis accounts for approximately 1-44% of all cases of microbial keratitis. The most common risk factors are trauma with vegetable material, soil and CL wearing. CL - associated fungal keratitis is almost always due to *Candida*. Fungi implicated in keratitis in Serbia are *Aspergillus, Fusarium, Alternaria, Penicillium, Aureobasidium, Lecythophora-Acremonium, Phaeoacremonium* and *Candida*.

Key words: *Acanthamoeba*, *Microspora*, fungi, keratitis, contact lenses

4. A NEW DIAGNOSTIC APPROACH OF INVASIVE FUNGAL DISEASES

Čolović Čalovski IV, Cvetković M, Dubljanin E, Mijatović S, Džamić AM
Laboratory of Parasitology-Mycology, Institute for Microbiology and Immunology, University of Belgrade Faculty of Medicine, Belgrade, Serbia

Introduction

Invasive fungal diseases (IFD) according to European authors (European Organisation for the Research and Treatment of Cancer - EORTC) or systemic mycoses according to American authors (Mycoses Study Group - MSG) are an important cause of considerable morbidity and mortality among immunocompromised patients, especially those with solid organ or hematopoietic stem cell transplantation (SCT). Beside conventional microscopy and cultivation techniques, two key advances in the diagnosis of IFD are antigen/antibodies testing and molecular techniques. The most frequent causes of fungal nosocomial infections are *Candida* and *Aspergillus* species. Although *Candida* is the most frequent fungal isolate from intensive care units (ICU) patients, invasive aspergillosis is associated with higher morbidity and mortality rates.

EORTC criteria define three diagnostic categories of IFD. Proven IFD requires demonstration of fungal elements in direct microscopic preparation and/or positive culture. This category does not depend on host factors or clinical features. Cases of probable IFD require presence of a host factor, clinical features, and mycological evidence such as detection of antigens and/or antibodies. Category of possible IFD is retained only for invasive aspergillosis (IA), and include appropriate host factors with sufficient clinical evidence consistent with IFD, but for which there was no mycological support (1).

Candida

Candida species account for 70–90% of fungal infections and are responsible for 2–3% of bloodstream infections, ranked as the 6th–10th most frequent pathogen in Europe. Because improved infection control practices in high-risk patients, incidence rates of candidemia in ICU patients decreased over recent years. Invasive candidiasis is a highly lethal infection associated with mortality rates between 40 and 60% despite antifungal therapy (2).

The most frequent isolated species are *Candida albicans*, *C. glabrata*, *C. tropicalis*, *C. parapsilosis*, and *C. krusei*. Although, previously *C. albicans* was predominant species with isolation frequency of 65-70% among patients with invasive candidiasis, recent studies showed non-albicans species are now responsible for about half of the cases. *C. parapsilosis* tends to be more frequent in southern Europe, while *C. glabrata* is more frequent in the older population.

In aim to start adequate and timely antifungal therapy, appropriate and early diagnosis of invasive candidiasis is crucial. Microscopic examination is rapid and can be helpful but requires confirmation in a case of negative result.

Given that positive blood culture allude proven invasive candidiasis, sensitivity of hemoculture during *Candida* blood stream infections ranged from 50 to 70%. Shortcomings of cultivation method are rapid elimination of viable *Candida* cells from circulation, rare positivity in patients with deep-seated candidiasis, as well as time needed for identification and susceptibility testing. Other than blood sample, deep tissue samples obtained by invasive and surgical procedures are challenging (3).

First nonculture-based diagnostic tests, belonging to probable diagnostic criteria, have been developed to detect *Candida* fungal cell wall components such as mannan and β-D-glucan by immunoassays, mainly in blood and BAL. There is a long experience of serum *Candida* mannan and anti-mannan antibodies detection assays. Different studies showed sensitivity range from 58 to 93% for mannan detection with specificity around 93%. The same studies reported sensitivity of 59-83% for anti-mannan antibodies assay with specificity around 83%.

Sensitivity can be improved (up to 86%) by combining both tests, while specificity remains the same (4).
In our laboratory, about 1700 samples are processed for detection of mannan antigens and anti-mannan antibodies per year, with positivity of about 3% for mannan and 7-14% for anti-mannan antibodies.
First PCR tests for suspected invasive candidiasis were designed to detect only *C. albicans* in blood sample, or different *Candida* species in urine sample by multiplex PCR. Considerable disadvantage of these tests is that urine as a sample can make difficulties in differentiation between colonization and infection, given that *C. albicans* may be present in distal uretra as microbiota. Nowadays, new generation multiplex Real-Time PCR tests are designed to detect *C. albicans, C. glabrata, C. krusei,C. parapsilosis* and *C. tropicalis* in blood, promising earlier and more accurate diagnosis (5).

Aspergillus

Aspergillosis often begins as pulmonary infection, but can affect any organ system and cause disseminated disease in immunocompromised hosts, especially among patients with SCT and acute leukaemia with prolonged granulocytopenia following chemotherapy. Regarding the risk of IA, there are two peaks: first is in first 20 days, and the second is after 100 days after transplantation due to the use of cytostatic drugs and corticosteroids.
The incidence of IA among patients with haematological malignancy varies from 1,7% to nearly 30%. Different studies report mortality rate from 27 to 72,4% (6). The most common species isolated in cases of invasive aspergilosis are *Aspergillus fumigatus*, *A. flavus*, *A. terreus* and *A. niger*.
Specific diagnosis of IA includes imaging, direct microscopy, histopathology, culture, antigen/antibodies detection and PCR.
One of the simplest approaches to diagnose proven IA is to examine appropriate specimens microscopically by histopathologic or direct microscopic examination of a specimen obtained by needle aspiration or biopsy in which fungal elements are present. Another method to make a diagnose of proven IA is a recovery of *Aspergillus* by culture of a specimen obtained by a sterile procedure from a normally sterile and clinically or radiologically abnormal site of infection. In neutropenic patients diagnosed with IA by antigen detection in BAL, sentivity of BAL culture ranges from 10% to 58%.
Given the difficulties of obtaining tissue samples and the variable sensitivity of culture, nonculture-based diagnostics have been developed and remain key methods for probable IA.
Diagnose of IA may also include β-D-glucan assay, as a nonspecific, sensitivity improving test, since it can be also positive in patients with other fungal infections caused by *Candida, Pneumocystis, Fusarium, Acremonium* and *Histoplasma capsulatum*.
One of the tests commonly used in microbiology practice is detection of antigen galactomannan, a component of the *Aspergillus* cell wall. The sensitivity of this test ranges from 44–90% and depends on type of immunosuppression. The sensitivity is higher in patients with hematologic malignancy than in those with lesser degrees of immunosuppression. This test should be carefully interpreted in patients on antifungal therapy because they can be false galactomannan negative. The sensitivity of this test is strongly related to receiving of antifungal therapy and by introducing therapy it decreases from 80-87,5% to 16,7-20%. Nevertheless, false positive results may also be subject of concern because of cross-reactivity between galactomannan and some antibiotics (i.e. piperacillin tazobactam), as well as bacterial lipoteichoic acid (i.e. *Bifidobacterium* sp.). Most recently, galactomannan has been found in some preparations of electrolyte solutions for intravenous administration. Significance of detection of galactomannan value is particularly emphasized by its feature to provide prognostic information with declining values in positive outcomes (7).
Detection of aspergillus antibodies is useful for confirmation of chronic pulmonary aspergillosis and aspegilloma, given that concentrations of IgG antibodies are increased in these conditions. It is good to mention that IgG antibodies can also be increased in other

conditions such as allergic bronchopulmonary aspergillosis, asthma, cystic fibrosis and aspergillus bronchitis (8).
In our experience, about 1800 samples are processed for detection of galactomannan antigens and aspergillus antibodies per year, with positivity of 14% for galactomannan and 19-25% for anti-galactomannan antibodies.
After a long period of testing different in-house PCR assays, recently new commercial Real-Time PCR tests are available for detection of *A. fumigatus*, *A. flavus*, *A. terreus* and *A. niger* from different samples such as blood, plasma, serum, sputum, BAL and CSF (8).

Conclusion

The growing number of immunosuppressed patients, the use of more aggressive chemotherapy protocols and more aggressive immunosuppressive practices in solid organ transplant recipients make continued increase of IFD, which can be additionally explained by greater physician awareness of possible fungal infection and use of increasingly sensitive diagnostic tests.
Molecular or nucleic acid amplification tests have the potential to improve diagnosis of IFD, although data for pan-fungal PCR remains to be assessed and are not implemented in most diagnostic laboratories yet. When PCR assays are used, results should be considered in conjunction with other diagnostic tests, especially antigen detection.

Keywords: IFD, *Candida*, *Aspergillus*, laboratory diagnosis.

Literature

1. Ben De Pauw, Thomas J. Walsh, J. Peter Donnelly et all. Revised Definitions of Invasive Fungal Disease from the European Organization for Research and Treatment of Cancer/Invasive Fungal Infections Cooperative Group and the National Institute of Allergy and Infectious Diseases Mycoses Study Group (EORTC/MSG) Consensus Group. Clinical Infectious Diseases 2008; 46:1813–1821.
2. Calandra T, Roberts JA, Antonelli M, Bassetti M, Vincent JL. Diagnosis and management of invasive candidiasis in the ICU: an updated approach to an old enemy.Critical Care 2016; 20:125-130.
3. Clancy CJ, Nguyen MH. Finding the "Missing 50%" of Invasive Candidiasis: How Nonculture Diagnostics Will Improve Understanding of Disease Spectrum and Transform Patient Care. Clinical Infectious Diseases 2013; 56:1284–1292.
4. Mikulska M, Calandra T, Sanguinetti M, Poulain D, Viscoli C. The use of mannan antigen and anti-mannan antibodies in the diagnosis of invasive candidiasis: recommendations from the Third European Conference on Infections in Leukemia. Critical Care 2010; 14:R222.
5. Schelenz S, Barnes RA, Barton RC, Cleverley JR, Lucas SB, Kibbler CC, Denning DW. British Society for Medical Mycology best practice recommendations for the diagnosis of serious fungal diseases. Lancet Infectious Diseases 2015; 15: 461–74.
6. Barton RC. Laboratory Diagnosis of Invasive Aspergillosis: From Diagnosis to Prediction of Outcome. Hindawi Publishing Corporation Scientifica 2013, 29-59.
7. Mennink-Kersten M, Donnelly PJ, Verweij PE. Detection of circulating galactomannan for the diagnosis and management of invasive aspergillosis. Lancet Infectious Diseases 2004; 4: 349- 357.
8. Cadena J, Thompson III GR, Patterson TF. Invasive Aspergillosis Current Strategies for Diagnosis and Management. Infectious Disease Clinics of North America 2016; 30: 125–142.

5. ANTIFUNGAL RESISTANCE - CURRENT TREATMENT PRINCIPLES FOR SYSTEMIC MYCOS

Mitrović S, Dubljanin E, Čolović Čalovski I
Laboratory of Parasitology-Mycology, Institute of Microbiology and Immunology, University of Belgade Faculty of Medicine, Belgrade, Serbia

Antifungal resistance represents a major clinical challenge to clinicians in treating invasive fungal diseases due to the limited arsenal of systemically available antifungals. The emergence of resistance to single drug classes and now multidrug resistance greatly hampers patient management. Azole resistance among *Candida* and *Aspergillus* is one of the greatest challenges to clinical success. Fluconazole resistance is of particular problem in non-*Candida albicans* species due to the increased incidence of infections caused by these species worldwide and the elevated prevalence of resistance to fluconazole. Resistance to echinocandins has also been documented to be rising, especially in *Candida glabrata.* Azole resistance in *Aspergillus fumigatus* and non-*fumigatus* spp.due to clinical and environmental exposure to this class of agents has also been found worldwide. Other molds, including *Scedosporium* and *Fusarium*, which have reduced susceptibility or pan-resistance to antifungals, also can cause invasive infections with high mortality rates. Multidrug resistant *Candida glabrata* and *Candida auris* are also alarming. *Candida auris* is inherentlymultidrug resistant, while other species typically develop resistance through stepwise selection of multiple drug-resistancemechanisms. An effective antifungal stewardship programme isessential to control drug resistance and should incorporate rapid fungal diagnostics with susceptibility testing and therapeutic drug monitoring.
Keywords: antifungals, resistance, Candida, Aspergillus

SESSION: PUBLIC HEALTH TODAY

INVITED LECTURES

1. THE MAKING OF THE CONTEMPORARY SOCIETY: INTERNATIONAL ORGANIZATIONS AND GLOBAL DEVELOPMENT

Luca Rossi
Italian National Institute of Public Health, Roma, Italy

What is psychology today and how it relates with globalization and global health and development? It is a science and as such should be defined from the conservative and evolutionary point of view of the term. In popular wording i would say that it is the best tool to understand biological and social phenomena in their flexibility and that if well used allows anticipating the reading of the mutability of the behaviors, both for individual and for the masses. Fundamental condition in a job like mine. As I often tell my students, regardless of the context of the study, it is the lesson that allows you to learn the difference between kicking a ball that is still and kicking a sleeping lion, because it makes you understand in advance the possible actions you need to implement.
Health in the world, which are the "healthiest" countries in the world? If we take literally the term health (or what is needed to improve the health of a person or a population) and would say that paradoxically we live in a world that is very unhealthy. In the light of the main indicators of health status (those of the who to be clear or recently used by Bloomberg with the health index score) - and therefore according to a purely technical reading - i am happy to see that Italy is always considered among the top healthiest country thanks to a well balanced mix of health indicators.
While Italy is the healthiest country, growth has stagnated for decades, almost 40 % of its youngsters are out of jobs, poverty rate is 18% and it's saddled with one of the world's highest debt loads relative to the size of its economy. Yet Italians are in way better shape than Americans, Canadians and Brits, who all suffer from higher blood pressure and cholesterol and poorer mental health.
Your motto probably is "the health of the world, in the world and for the world", then as a public health policy advisor, what are, still today, the problems that must be solved in healthcare? More than a motto i would say that sounds like the road to the Shakespearean dilemma. At global level there are many challenges to be addressed just for the next year, and the year after, and the year after... Let me tell you: 400 million people still do not have access to essential health services; 20 million women continue to experience ill health each year as a result of pregnancy, about 500,000 women, almost 90 per cent of whom are in Africa and Asia, die as a result of causes related to pregnancy and childbirth, around 17 % of potentially healthy years of life are lost in women of reproductive age because of sexually transmitted diseases, including HIV/AIDS.
Moreover, the latest report from UNICEF shows that every year, 2.6 million babies die before turning one month old. Half of them take their first and last breaths on the day they are born. Another 2.6 million are stillborn. In 2016 alone, 7,000 newborn babies died every day. Newborn deaths made up 46 per cent of all child deaths, an increase from 41 per cent in 2000. Most of these deaths are due to infections like sepsis, pneumonia, tetanus and diarrhea; and these children are also dying because of the environment they were born into – whether it be an impoverished family, a marginalized community or a country consumed by conflict. Each of these deaths is a tragedy, especially because the vast majorities are preventable and can be treated or prevented with affordable solutions. This opens questions like: achievable or not achievable?

In my view what we need to solve now is: equity in accessing health care, prevention and basic hygiene, and zero hunger. Moreover, i support a new conceptual paradigm of research in health science from how to live longer to how to live better. I know it sounds like propaganda…there are too many dynamics that intervene in the implementation of responses that have little to do with health per se (political, economic, cultural, scientific, ethical, etc.). I realize that the issue involve very complex decisions, especially at global level.

How new technologies and globalization affect health? Very much and not necessarily in a positive way. We could talk about it for hours, evaluate the progress we are witnessing on a daily basis, but remain with ample doubts. I believe in globalization and new technologies. However, from a health perspective the actual system of governance does not work.

2. GLOBAL HEALTH, A CURRENT PERSPECTIVE FOR PUBLIC HEALTH

Gianfranco Damiani
Department of Public Health, Università Cattolica del Sacro Cuore, Rome, Lazio, Italy

The term globalization has acquired various and debated meanings. It is used to stress the connections and interdependence and ways countries are related one another, regardless of national borders, in a growing context of economic integration, communication, cultural and travel diffusion (1). This process is associated with deep changes in three dimensions: space, time and cognition (2). The first concerns the way the physical space is experienced: the world is seen as a global village. This results from an increased number of people that travel, faster trading goods and services and virtual reality (2). The second concerns the way time is perceived that is faster in communications, in mass transportation and in human interactions. The cognitive dimension is related to the way we perceive ourselves and our planet. This dimension is connected with politics, religions, increasing shared thoughts deriving from a global culture, from a worldwide diffusion of scientific researches (2). Forces that are speeding up these aspects depend on changes in the sector of economics (trade liberalization and regulation, rise of global marketplace), policies (redistribution of power within and across countries, growth of global civil society), social and cultural elements (shifts in lifestyle, culture westernization) and technology changes (global telecommunications, transportation linkages) (2). All of them impact on health determinants, such as genes and biology, health care, health related behavioral risk factors, social and natural environments, with main consequences on communicable and non-communicable diseases, environment, food and nutrition (3). Here are some consistent examples:

Communicable diseases:

They still play an important role in the burden of disease, even if with a decreasing trend; e.g. in low-income countries 8.9% people living with HIV/AIDS died in 2000, 5.5% in 2016 whereas in high-income countries, they accounted for less than 1% in both years (4).

Non-communicable diseases: Worldwide one in four men - 933 million people- is estimated to be a daily smoker (5), 80% of them live in low/middle-income countries and 50% of them can be expected to die because of their habit (6).Food and nutrition: Obesity is affecting rich countries and increasingly poor countries: in 2000, 17.2% European population was obese while in 2016 the obesity prevalence was 23.3% (35% increase); in the same period, among African people it increased from 6.0% to 10.6% (76% increase) (4).Environment: A total of 250,000 additional deaths per year are expected between 2030 and 2050 because of the climate change (15% because of heat exposure among the elderly, 20% because of diarrhea, 25% because of malaria or other infectious disease, and 40% because of childhood under nutrition) mainly affecting low-income countries (8, 9).

This impact doesn't affect equally every layer of the population. The socio-economic status (measured using the educational, occupational and income level), that means having different control over all kinds of resources, leads to an asymmetric exposition to psychosocial, environmental and behavioral risk factors and, therefore, enhances vulnerability to morbidity and mortality -impacting on general wealth (i.e. medical poverty trap) (10).

These inequities are created and maintained by following causes: the imposition of structural adjustment programs (SAPs) by financial institutions, unfair terms of trade between rich and poor countries which means that the economic situation of poor countries is unable to improve and the ability to live with and accept the massive global inequities as if they are part of some natural order (11).

The health-related effects of globalization are the study objectives of three discipline such as Public Health, International Health and Global Health.

In particular, Public Health is a field of study which focuses on population health analysis and interventions: it ranges from surveillance and health determinants assessment (problems and causes) to intervention assessment, implementation and improvement referring to a specific population or a community at national or local level (12, 13).

International health is generally addressed to developing countries, it concerns infectious and tropical diseases, water and sanitation, malnutrition, and maternal and child health and often requires binational cooperation (13).

Eventually, Global Health is an area of study, research and practice that places a priority on improving global population health, that focuses on issues directly or indirectly affecting health and transcending national boundaries. Its major objective is to seek health equity among nations, it promotes the development and the implementation of solutions that often require global cooperation, embracing both preventive interventions on populations and clinical care of individuals (13).
Global and Public Health have a degree of overlapping when public health strategies such as systemic approach, prevention programs and interventions, that are evidence-based and tailored on the basis of facilitators and barriers of a targeted context, are focused on health issues and equality, having a linked etiology and a global impact.
In an increasingly globalized world, institutional and non-institutional actors, policy making processes and arrangements should be aimed at jointly govern and respond to health issues, reaching a proper Global Health Governance (14, 15).
Global Institutions include actors, both inside (WHO) and outside the health sectors (policy decision of multilateral financial institutions -World Bank, International Monetary Fund, WTO, OECD), influencing broader social determinants of health.
Governance agreements emerged with a new urgency to address health on a global scale and are most commonly used to address health needs of the poor, vulnerable, disadvantaged people of the developing world.
The Global Health Governance (GHG) is firstly based on "deterritorialization" of the way we think of and promote health, and needs to address factors which cross national boundaries.
Secondly, the definition and response to determinants of health should respect a multi-sectorial perspective.
Eventually, a relevant role is given to a formal and informal involvement of a broader range of actors and interests including NGOs, citizen's movements, multinational corporations, the global capital market and global mass media (16).
A proper GHG needs first the involvement of governments, institutions and professionals. As for governments, when economic and social redistributive policies are undertaken and are more equity-seeking, health population improvement is more likely to succeed. Institutional and non-institutional organizations should seek to influence governing bodies so that public health concerns are on their agendas (17).
Health professionals groups and international public health movements should advocate and support the analysis and development of policy responses to global public health issues, in order to ensure that public health is given appropriate priority even in non-health sectors (17).
Public health professional should keep providing their independent professional advice on the medical aspects of global public health issues and raising the matter among health professionals and policy makers.
According to the perspective of "Thinking Globally, acting locally" each clinicians should consider globalization effects on health and health inequalities during his daily practice. Physicians should collaborate with public health specialists, researchers, social care services and local government to promote and protect people's health, prevent illnesses and tackle health inequalities. They should promote global health education and research, among medical students and resident doctors and by sharing information and best practices among health professionals in the country, should be a personal commitment and a social responsibility.

REFERENCES

1. Labonte, Ronald N., and Ted Schrecker. "Globalization and social determinants of health: Analytic and strategic review paper." (2006)
2. Lee, Kelley. "Globalisation: what is it and how does it affect health?" Medical journal of Australia 180.4 (2004): 156.
3. Lee, Kelley. "For debate. The impact of globalization on public health: implications for the UK Faculty of Public Health Medicine." Journal of Public Health 22.3 (2000): 253-262.
4. Institute for Health Metrics and Evaluation (IHME). GBD Compare. Seattle, WA: IHME, University of Washington, 2015. Available from http://vizhub.healthdata.org/gbd-compare. [last access 20.07.2018]

5. GBD 2015 Tobacco Collaborators. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990–2015: a systematic analysis from the Global Burden of Disease Study 2015. Lancet.
6. WHO. Tobacco fact sheet. World Health Organization, Geneva 2016. www.who.int/mediacentre/factsheets/fs339/en/
7. World Health Organisation. Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. (2014)
8. World Health Organization. Climate change and health. (2018)
9. A Haines, R S Kovats, D Campbell-Lendrum, C Corvalan. Climate change and human health: impacts, vulnerability, and mitigation. Lancet 2006; 367: 2101–09
10. Whitehead, Margaret et al.; Equity and health sector reforms: can low-income countries escape the medical poverty trap? The Lancet, Volume 358, Issue 9284, 833 – 836
11. Baum, Fran. "Health, equity, justice and globalisation: some lessons from the People's Health Assembly." Journal of Epidemiology & Community Health 55.9 (2001): 613-616.].
12. Centers for Disease Control and Prevention (CDC). Introduction to Public Health. In: Public Health 101 Series. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2014. Available at: https://www.cdc.gov/publichealth101/public-health.html.
13. Koplan, Jeffrey P., et al. "Towards a common definition of global health." The Lancet 373.9679 (2009): 1993-1995
14. Lee K, Kamradt-Scott A. The multiple meanings of global health governance: a call for conceptual clarity. Global Health. 2014 Apr 28;10:28.
15.Ng, Nora Y., and Jennifer Prah Ruger. "Global health governance at a crossroads." Global health governance: the scholarly journal for the new health security paradigm 3.2 (2011): 1.
16. Dodgson R, Lee K, Drager N: Global health governance: a con-ceptual review. London, Centre on Global Change and Health, London School of Hygiene and Tropical Medicine; 2002
17.Baum, Fran. "Health, equity, justice and globalisation: some lessons from the People's Health Assembly." Journal of Epidemiology & Community Health 55.9 (2001): 613-616

3. QUALITY OF HEALTH CARE IN SERBIA AND WORLDWIDE

Roberta Marković[1,2], Olivera Radulović[1,2], Aleksandar Višnjić[1,2], Milena Vasić[3]
[1]Public Health Institute Niš
[2]Medical Faculty Niš
[3] Public Health Institute "Dr Milan Jovanovic Batut"

Fascination with quality in all fields in life is as well present in the field of Health care, especially regarding new global trends: there is not any more tend to quality in Health care, there is tending to excellence. The main characteristics of the healthcare system in former Yugoslavia, have been a very high level of socialized healthcare available free of charge to all age and social groups, meeting requirements as equity, availability, accessibility, continuity. Primary health care was on the highest level of quality, and organizational model of primary health care in Public Health Centre Ivanjica (Serbia) was presented in 1978. at Alma Ata Conference as model that should be copied[1]. The primary health care approach has since then been accepted by member countries of the World Health Organization (WHO) as the key to achieving the goal of "Health for All" but only in developing countries at first.

From 1978. till 2017. there were a huge social, economic, political influences and changes in the Republic of Serbia. Years of war, followed by UN economic and political sanctions, influenced all sectors including health sector. The health system was ruined. Starting with 2000., year any activities were undertaken, any strategies developed, but still, in 2012., according to EHCI(Euro Health Consumer Index) Serbia was the last on the list of 40 countries ranged by the quality of health care. In the last decade, healthcare in Serbia had characteristic of the transition countries working with limited financial resources and a lot of initiatives have been taken to create a healthcare system in line with European standards. Ministry of Health and the Institute of Public Health of Serbia "Dr Milan Jovanovic Batut" with the network of Public Health Institutes issued a number of multi-sector, strategic and planning documents. The main directions of the healthcare system were also defined:

- Equal access to healthcare for all citizens, and improvement of health protection of vulnerable population groups
- Setting up the healthcare consumers in the center of the healthcare system
- Improvement of the quality of healthcare
- Improvement of healthcare human resources capacities
- Strengthening of the national health potential
- Sustainability of the health system
- Definition of the role of the private health sector[2]

Serious strategic and program activities have been implemented for years, and in 2017. year it seems change starting to be evident.

There are different methods for measuring Quality of Health Care; one of it is "measuring", valuing through Euro Health Consumer Index (EHCI). Euro Health Consumer Index (EHCI) enables comparison of European health care systems based on 48 indicators grouped in six groups of indicators: Patient rights and information, Accessibility, Outcomes, Range and reach of services provided, Prevention and Pharmaceuticals.

The results are presented as a graphic index. It claims to measure the "consumer friendliness" of healthcare systems. The index is defined by scoring performance as good, intermediary or not-so-good, based on arbitrary cut-off points. Theoretical maximum is 1000 – "all green on every indicator". The performance of the respective national healthcare systems were graded on a three-grade scale for each indicator, where the grades have the rather obvious meaning of Green = good (C), Amber = so-so (F) and red = not-so-good (D). A green score earns 3 points, an amber score 2 points and a red score (or a "not available", n.a.) earns 1 point.

Index tries to compare states with very different financial resources. There are 12 Western European countries belonging the "800 Club", i.e. scoring more than 800 points out of the theoretical maximum of 1000 (it means "All Green on every indicator")[3].

The Netherlands is the very first with 924 points (they have consistently been among the top three in the total ranking). It is not surprising having in mind how many financial resources a country is spending on healthcare. Switzerland was the second, with 898 points, and is also the country with very respectable money ploughed into the healthcare system). Denmark is the third with 864 points.

Following are Norway, Luxemburg, Finland, Germany, Belgium, Iceland, France, Austria, and Sweden. There is the 58-point gap now visible between the first 12 countries of the 800 Club, and those behind.

"Climber of the Year" 2017 is Montenegro, mainly by implementing their real time e-Booking system eliminating wating lists. Serbia was "climber of the year" in 2016, and continues its upward movement. The major part of the climb is the effect on Waiting Times by licensing and implementing the Macedonian IZIS system for direct specialist care booking, plus e-Prescriptions, in Serbia named MojDoktor (www.mojdoktor.gov.rs). Serbia is also slowly improving on clinical results (Outcomes indicators), which were All Red in 2013. Serbia took 20th place with 673 points and shares it with Italy. The fact that Italy and Serbia share the same 20th place is intriguing, considering complete different social, economic and political background. The second dilemma arises from the fact that Serbia was last on the list in 2012. (after eight years of Program of Health Care Quality improvement implementation), and five years later, it is on 20th place. For sure, the reason could be found in needed time to make the change; the Program of Health Care Quality improvement in Serbia started in 2004. Analyzing Italy and Serbia position, there is a difference between financial capacities in Serbia and Italy, Italy has the largest internal difference of GDP/capita between regions (the GDP of the poorest region is only 1/3 of that of Lombardy-the richest). That is why the national Index score of Italy is a mix of Northern Italian and Rome Green scores, and Southern Italian Red scores, resulting in a lot of Yellows (and finally equal EHCI score as Serbia).

The EHCI indicates several negative phenomena in the health system in Serbia:

- Poor access to the system of receiving treatment and long waiting times
- Adverse outcomes of treatment
- The overemphasis of hospital care
- Poor prevention mechanisms
- Low range of services provided and pharmaceuticals
- Traditionally, elderly people in Serbia primarily rely on family support.
- The cancer survival rate is less than 50%.

In general, there is much room for improvement of the health system in Serbia. There are following countries after Serbia: Macedonia, Malta, Ireland, Montenegro, Croatia, Albania, Latvia, Poland, Hungary, Albania, Greece, Bulgaria, Romania, and Cyprus.

The previous ten years have shown very important fact: European healthcare has been continuously improving. All European Health care systems, according to quality, are showing increasing trend. The second important conclusion could be that financial resources spent in Health care are not the dominant precondition for quality. The national scores seem to reflect more of national and organizational cultures, rather than presenting how many financial resources a country is spending on healthcare. The performance of countries such as Portugal, FYR Macedonia and, in 2016, Serbia confirmed that conclusion.

EHCI results can serve as inspiration for how and where European healthcare can be continuously improved.

---

[1] Timotić B, Janjić M, Bašić S, Jović S, Milić Č. Socijalna medicina. Velarta, Beograd. 2000:42

[2]Vlahovic Z, Radojkovic D. Healthcare in Serbia in transition period. The EPMA Journal. 2010;1(4):601-606.

[3]Bjornberg A, Euro Health Consumer Index. Health Consumer Powerhouse LTD. 2018.

ORAL PRESENTATIONS

1. INFORMED DECISION-MAKING-TRUE NEED OR FASHION PER BASIC BENEFIT PACKAGE FORMULATION IN THE REPUBLIC OF SERBIA

Dragana Atanasijevic[1,2], Vladimir Zah[2]
[1]Intitute of Public Health of Serbia
[2]ISPOR Chapter Serbia

Objectives: Analysis of the place and role of health technology assessment and other tools, such as multi-criteria decision analysis in the decision-making process in the Republic of Serbia.
Materials and methods: A non-systematic review of literature has been carried out, including the review of current legislative, reports and publications.
Results: Despite declaratively granted broad rights to the health care, there are several negative phenomena such as long waiting lists, the average length of stay in hospitals, weak mechanisms of health promotion and prevention (blood pressure, alcohol, smoking, physical activity). The current healthcare system is too expensive and essentially unsustainable. Several World Bank projects have recommended creating a list of services covered by basic insurance package, as well as activating private health insurance options for additional health services etc.
Conclusion: It has been recognized the importance of improvement of the entire concept of drug regulation especially in order to maximize the value of medicines provided by the state (reimbursed medicines) and to improve the coverage. In that purpose, there are ongoing different project and activities supported by World Health Organization (related to the development of National Medicine Policy) and World Bank (related to the introducing of health technology assessment as a tool to support decision making process in the area of medicines and medical devices).

Key words: Republic of Serbia, Health Technology Assessment, Reimbursement, Basic Benefit Package, Drug List

2. ASSESSMENT OF IMPLEMENTED PREVENTIVE AND PROPHYLACTIC SERVICES IN CHILDREN'S DENTISTRY

Jelena Brcanski, Mirjana Živković Šulović, Danijela Dukić
Instutute of Public Health of Serbia

Objective: To determine the level of realized rights of children to preventive and prophylactic dental health care in the Republic of Serbia in 2017.
Method: Comparison of the content and extent planned in relation to preventive and prophylactic dental health services provided to pre-school and school children (0- 18) in the Republic of Serbia.
Results: Preventive and prophylactic health care is planned for 1,250,083 children under 18 years of age.
Only 23% of the parents took their infants on the preventive dental examination and 18% gained the right to individual health-care work in relation to oral health and maintenance of oral hygienic. The right to dental examination in the second year of life was realized by 20% of children, while 17% of parents of children of this age with their children gained the right to individual health-related work related to oral health. Systematic dental examination was provided by 20% of children aged three years, while 81% of children aged 7 and 12 used this right. Preventive dental treatment in 8, 9, 10, 11, 13 and 14 received three out of four children (77%). Only half of the children (55%) aged 15 to 18 years had the dental preventive examination. Service applications fluoride was reported by 55% of children aged 7-13 years of age.
Conclusion: Early-life dental healthcare is implemented in insufficient extent. It is necessary to strengthen the connection service for the health care of children with dental services at the level of health centers and intensify health and educational work with pregnant women and families relating to oral health.

Key words: dental healthcare, preventive services

3. SATISFACTION WITH CHILD DENTIST SERVICES IN SERBIA 2017

Mirjana Živković Šulović, Jelana Brcanski, Aleksandar Medarević, Maja Dobraš
Instutute of Public Helth of Serbia

Introduction: In patient-oriented health care systems, user satisfaction is an important outcome, but also an indicator of quality. The aim of this study is to moderate the patients satisfaction with child dentist services.
Materials and methods: Annual survey with health care services in primary health centers, child dentist department. Statistic: description, frequency, regression.
Results: The questionnaire was completed by 4961 respondents (child parents). Very satisfied were 40% and satisfied 42% users. Parents/caregivers of children with chosen dentist are more satisfied (84%) then the parents of children who do not have their own dentist (64%).
The highest mean satisfaction rating is in district Niš (4.60) and the lowest in the district Bor (3.89). Users are most pleased with the dental service working hours (Monday to Friday), but also the most dissatisfied are with the availability of review over the weekend. Every fifth respondent complained about long waiting (21%). The preventive advice the patients received during regular visits. The satisfaction with the high statistical significance was influenced by dentists' councils on proper tooth brushing (positive) and long wait before the visit in the waiting room (negative). The statistical significance of satisfaction was influenced by the number of visits to the dentist, time spent by the dentist in conversation with the patient, emergency availability, dental team collaboration and free services.
Most of the respondents' comments were positive, while suggestions related to the availability of the dentist during the afternoon and during the weekend, better ambulance equipment, and the need for informed attendance of doctors.
Conclusion: Users of dental care are very satisfied with the services provided in these services, and in particular the work of elected dentist.

Key words: dental service, customer satisfaction

4. MENTAL WELLBEING AND DRINKING MOTIVATIONS OF THE UNIVERSITY STUDENTS IN SERBIA

Aleksandar Višnjić[1,2], Dragan Nikolić[2], Saša Ristić[2], Nikola Tiodorović[2], Olivera Radulović[1,2], Roberta Marković[1,2]
[1]Faculty of Medicine, University of Niš, Serbia
[2]Institute of Public Health of Niš, Serbia

Objectives: Mental well-being and excessive alcohol consumption represent a significant public health concern, and evidence suggests an association between them.
Materials: Drinking motivations associated with harmful drinking have been studied in the university student's population in Serbia on the representative sample of 2285 students.
Results: Low risk drinkers were found to have higher mental well-being than hazardous, harmful, and, probable, dependence drinkers. Among people drinking to cope, those drinking in more harmful ways were statistically significantly more likely to have low well-being compared to less harmful drinkers. Coping was a significant motivation to drink for many with low mental well-being. While mental well-being was found to be directly linked with levels of harmful drinking, the motivation for drinking was a stronger predictor of mental well-being.
Conclusion: In the university students population there is a clear association between poor mental well-being and harmful drinking.

Keywords: alcohol consumption; drinking motivations; university students; mental health

5. PUBLIC HEALTH ACTIVITY IN THE STUDENT DORM "STUDENT'S TOWN" ON THE OCCASION OF THE DAY OF STUDENTS OF BELGRADE UNIVERSITY

Marijana Pešić, Milena TomaševićZorica Žikić, Mila Paunić
Institute for Student's Health of Belgrade University, Belgrade, Serbia

Objective: The preventive activity was organized in the student dormitory on April 4, 2018 by the Institute for Student's Health of Belgrade. The aim is to demonstrate how effective is preventive work in the community.
Methods: Descriptive presentation.
Results: Activity offered the lung function test - spirometry,capillary blood glucose determination, blood pressure measurement, determination of body fat percentage as well as advice in order to reduce the risk of chronic noncommunicable disease. A "mini marathon" was organized to promote physical activity in preserving and improving health. During the activity was done: 65 spirometry examinations (10 students requiring further monitoring), 85 capillary blood glucose determination (1 student requiring monitoring), 36 determination of body fat percentage (half of them requiring monitoring).
Conclusion: Community activity has been proven to be effective, as shown by data in the period from January 1, 2017. until December 31, 2017. the Institute were performed capillary blood glucose determination total 31 (during the activity 85) ; lung function test – spirometry total 178 (during the activity 65). A great student response speak of the importance of organizing public health activities outside institutions, in the community, in the space where the target population lives and works / learns.

Key words: preventive activity, community, student dorms, students.

6. DETERMINANTS OF HOSPITALIZATION AMONG THE ELDERLY PEOPLE IN VOJVODINA

Sonja Čanković[1,2], Vesna Mijatović Jovanović[1,2], Dušan Čanković[1,2], Ivana Radić[1,2], Sanja Harhaji[1,2], Tanja Tomašević[2], Dragana Milijašević[1,2]
[1]University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia
[2]Institute of Public Health of Vojvodina, Serbia

Objectives: Population of Vojvodinais very old, and projections indicate that by 2050 one in three persons will be older than 60 years. This study aimed to examine the socio-economic and health status factors associated with hospitalization among the elderly people.
Materials and methods: We analyzed data from the National Health Survey Serbia conducted in 2013. Study included 886 examinees (58% females and 42% males) aged 65 and over who were interviewed in Vojvodina. To analyze determinants of hospitalization two multivariate logistic regression models were implemented: model 1 included socio-economic variables and model 2 included socio-economic, life-style and health status variables.
Results: In past 12 months, 11.1% of respondents were hospitalized with average length of stay 12 days. Majority of hospitalized were males (14.2% vs 8.9%). In model 1, males had higher odds of hospitalization (OR=2.38; 95%CI=1.41-4.01), respondents with the lowest level of education (OR=2.82; 95%CI=1.03-7.72) and one who had out-of-pocket payments for outpatients health care (OR=3.71; 95%CI=1.59-8.66).In model 2, higher odds of hospitalization had males (OR=2.74; 95%CI=1.28-5.84) and one who assessed their health as poor (OR=2.90; 95%CI=1.06-7.87).
Conclusions: In this study we found several factors associated with hospitalization of elderly people in Vojvodina: gender, self-assessed health, educational level and out-of-pocket payments.

Key words: Aging, Health services, Hospitalization

7. COMPARISON OF COMMUNITY PHARMACISTS' AND PUBLIC'S KNOWLEDGE AND BEHAVIOUR REGARDING INFLUENZA VACCINATION

Margita Držaić[1], Ingrid Kummer[1], Martina Šepetavc[2]
[1]City Pharmacies Zagreb, Zagreb, Croatia
[2]Farmacia community pharmacy chain, Croatia

Objectives: Influenza vaccination is the best method to prevent influenza occurence and to restrain influenza propagation (1). Aim of this survey was to examine and compare community pharmacists' and citizens' knowledge and behaviour regarding influenza vaccination.
Methods: Survey was conducted among two groups, community pharmacists and citizens from 29 September until 12 October 2017. Questionnaire for community pharmacists was available as on-line form while citizens attending community pharmacies were offered questionnaire, which they filled themselves. Statistical analysis of collected data was carried out using IBM SPSS (*Statistical Package for Social Sciences*) v. 20.0.
Results: 353 community pharmacists and 1846 citizens from different parts of Croatia participated in this survey. Of all community pharmacists participating in this survey 296 (84,8%) do not vaccinate, where statistically significant number ($p < 0,05$) of younger community pharmacists ($\leq$ 40 years) less frequently vaccinate. Of all parcitipating citizens 1474 (79,9%) do not vaccinate, where statistically significant number ($p < 0,05$) of younger citizents ($\leq$ 55 years) less frequently vaccinate. Despite high rate of community pharmacists who do not vaccinate, 218 (62,8%) consider themselves competent to counsel citizens about influenza vaccination.
Conclusion: Analysed data showed importance of community pharmacists and citizens education about influenza vaccination in order to prevent influenza appearance.

Key words: influenza vaccination, community pharamacists, members of public

8. ANTIBIOTICS PRESCRIBING IN MONTENEGRO

Marija Palibrk[1], Lidija Šćepanović[1], Milena Lopičić[2]
[1]Center for health system development, Institute of Public Health of Montenegro
[2]Center for microbiology, Institute of Public Health of Montenegro

Objectives: Antimicrobial resistance is a serious public health issue. One of the main factors for its development and spread is irrational and inadequate use of antibiotics. The aim is to analyze antibiotic (ATC group J01) prescribing in public primary health institutions in Montenegro.
Materials and methods: Data on antibiotic prescription were collected from public primary health institutions through the Health Information System. The number of Defined daily doses per 1000 inhabitants and per day (DDD/1000 inhabitants/day), and the number of packages per 1000 inhabitants and per day were applied for showing antibiotic consumption. It was used 2016 version of the ATC/DDD index.
Results: 2.71 packages of antibiotics per inhabitants per day were prescribed in 2016 compared to 3.15 packages per inhabitants per day in 2015. Antibiotic prescribing decreased for 12%, from 20, 22 DDD/inhabitants/day in 2015 to 17.75 DDD/inhabitants/day in 2016. Ratio of the consumption of broad-spectrum to the consumption of narrow-spectrum penicillins, cephalosporins and macrolides was 2.67 in 2015 and 2.62 in 2016, respectively. Amoxicillin was the most often prescribed antibiotic.
Conclusions: Although there is evident decrease in antibiotic prescribing in public primary health institutions, total outpatient consumption of antibiotics (ATC group J01) in Montenegro is still very high. About 40% of total outpatient consumption of antibiotics was not reimbursed; it was paid out of pocket.

Keywords: antibiotics prescribing, primary health care, general practitioners, outpatient consumption, antibacterial

9. DEATH CERTIFICATE COMPLETION AND IMPLEMENTATION OF AUTOMATED CODING SYSTEM FOR CAUSE-OF-DEATH STATISTICS IN NIŠ

Aleksandra Ignjatović[1,2], Svetlana Stević[1], Zoran Milošević[1,2,] Marija Anđelković Apostolović[1,2], Marija Topalović[2,] Bojana Vuković Mirković[2]
[1]Public Health Institute Niš
[2]Medical Faculty Niš

Objectives: Death certificate (DC) completion is a routine part of medical care. In many countries, an automated coding system is routinely used. The aim of this study was to assess the quality of DC completion by physicians and to estimate the level of agreement between the automated coding system – IRIS and the medical coder.
Methods: In this study 207 death certificates were graded by the principal author using a modified version of the Mid America Heart Institute Death Certificate Scoring System. All death certificates with a natural cause of death were simultaneously coded by the medical coder and the automated coding system for the cause of death.
Results: The overall performance was poor, with only 19.3% DCs completed by physicians scoring in the optimal range. In 188/198 cases (94.9%), DCs coded by the medical coder were in agreement with IRIS. Ten DCs that were not in agreement with IRIS were coded in the following way: 2 DCs in endocrine diseases, 4 DCs in vascular diseases, and one DC in gastrointestinal diseases, musculoskeletal diseases, and genitourinary diseases.
Conclusion: The quality of DC completion by physicians is poor. The implementationof IRIS had excellent agreement with the medical coder in this pilot study. The implementation of the automated coding system improved the reliability of mortality statistics, the comparability of data, allowed a more detailed analysis of DCs, and reduced the workload of the medical coder.

Keywords: death certificate, WHO guidelines, automated coding system IRIS, mortality statistics

10. HOW MANY OF US ARE BEING BORN

Mariola Stojanović
Public Health Institute Niš

Introduction: Population is renewed and rejuvenated by births, which affect the average age of the population and the relative relationship of age-related contingents within it.
Objective: Statistical overview of the relation between census data and birth rate and the importance of adjusting rates in the period 1953 - 2017 * (estimated).
Data source: Publications of the census and vital statistics of the (Federal and) Republic Statistical Office.
Methodology: Retrospective comparative analysis of census and demographic data for the territory of Central Serbia and Nis.
Results: The birth rate is generally informative and does not measure the impact of the internal structure of the population on birth. The fertility rate is a more precise indicator that takes the population of fertile women for base value, but without considering the role of male reproductive population in population reproduction. This leads to a new relative relation that takes into account the role of reproductive male population - the formula of author Dr Relja Petrovic, which represents the impact of the overall reproductive contingent of the population of both sexes on birth. The application of this formula indicated that in the territory of Central Serbia and especially in Nis, a large reproductive contingent of 60% did not sufficiently exploit its biological potential in the seventies of the twentieth century, and that 45% of the reproductive population of today can not replace the previous lack of reproduction.
Conclusion: The formula for fertility correction has the significance of standardization and is therefore suitable for longitudinal and transversal comparisons of birth circumstances in populations (in the same population over time or by comparison of multiple populations). It is more than that - it shows the behavior and capacities of the reproductive contingent of the population.

Keywords: birth rate, reproductive contingent, standardization.

11. RISK PREVENTION OF HEALTH PROFESSIONAL WORKPLACE

Dragan Nikolić[1], Saša Ristić[1], Roberta Marković[1,2], Katarina Bulatović[1], Katarina Nikolić[2]
[1]Public Health Institute Niš
[2]Medical Faculty Niš

Objective: Prevention of psychosocial hazards or risk factors in health activities that can produce bad psychological and physical effects.
Methodology: The study of the research was done in which were used two standardized questionnaires: 1. COPSOQ - Questionnaire for the assessment of psychosocial factors in the work environment (National Centre for the Working Environment (NRCWE), Copenhagen, Denmark) 2. WAI - Questionnaire for the assessment of the Work Ability Index (Work Ability Index, National Institutes of Health and Safety at Work, Finland).Total has tested 815 health workers, 680 tested health workers Clinical Center in Nis, 44 respondents from Special hospital for nonspecific pulmonary diseases in Sokobanja, while 91 respondents from General Hospital in Aleksinac.
Results: Evaluation of the connection between the COPSOQ questionnaire scores for domains with IRS values, the results of a univariate linear regression analysis. ANOVA and Tukki test showed that health workers from Special hospital for nonspecific pulmonary diseases in Sokobanja have significantly higher scores for 9 domains from COPSOQ questionnaires than respondents from Clinical Center in Nis and General Hospital in Aleksinac for the following domains: possibility for improvement, predictability, rewards, role - definition, quality leadership, social support, job satisfaction, trust in leadership, and justice and reputation. On the contrary, health workers from Special hospital for nonspecific pulmonary diseases in Sokobanja have significantly lower scores for 4 domains than respondents from Clinical Center in Nis and General Hospital in Aleksinac for the following domains: emotional demands, work-family conflict, combustion at work and stress. In addition, health workers from Special hospital for nonspecific pulmonary diseases in Sokobanja have significantly lower values of cognitive requirements than respondents from Clinical Center in Nis.
Conclusion: Management of health care institutions, within a defined strategy in the fight against stress, should provide professional, expert team for drafting the Prevention and continuous monitoring of the implementation of interventions regarding the adoption of healthy lifestyles, involvement in anti-stress management programs and mastering strategies for coping with stress, to improve health, professional skills, readiness and preservation of working capacity.

Keywords: risk factors, psychosocial hazards, management of health care institutions

12.ONLINE SOCIAL NETWORKING SITES AND ADDICTION

Jovanović Tamara [1,2], Aleksandar Višnjić [1,2], Zoran Milošević [1,2], Jovana Milošević[3], Dragan Nikolić[2], Olivera Radulović[1,2], Roberta Marković[1,2]
[1] Faculty of Medicine, University of Niš, Serbia
[2] Institute of Public Health of Niš, Serbia
[3] The Faculty of Medicine of the University of Pristhtina, with a temporary seat in Kosovska Mitrovica

Objectives: Social Networking Sites (SNSs) are virtual communities where users can create individual public profiles, interact with real-life friends, and meet other people based on shared interests. The aim of the research was to examine the extent of usage of SNSs in young adults and also their attitude towards the impact it has on other aspects of their lives.
Materials and methods: A cross-sectional design was adopted recruiting 176 participants.
Results: Most participants (84.3%) indicated that they occasionally (more or less frequently) feel the overwhelming need to use social networks increasingly. More than 60% of participants reported that they use social networks to escape from personal problems and become restless or upset if their access to social networks is restricted or suddenly discontinued. The study also found that 59% of the total access social networks in situations when they are aware it is forbidden or indecent.
Conclusion: The constant need to be online may result in compulsive use of SNSs, which in extreme cases may result in symptoms traditionally associated with substance-related addictions.

Keywords: social networking sites; addiction; social media

13.100 GIANTS OF WORLD MEDICINE, ON THE OCCASION OF ONE CENTURY SINCE THE END OF THE WORLD WAR I, OFFICIAL CONTRIBUTION TO THE PUBLIC HEALTH INSTITUTE NIS IN JUBILEE INTERNATIONAL MANIFESTATION, "THE NIGHT OF MUSEUM - WINS AND WINNERS"

Marjanović Stanko[1], Zoran Milošević[1,2], Dragan Nikolić[1], Saša Ristić[1], Roberta Marković[1,2], Katarina Bulatović[1], Aleksandra Višnjić[1,2], Tamara Jovanović[1,2], Nikola Tiodorović[1]
[1]Public Health Institute Niš, Serbia
[2]Faculty of Medicine, University of Niš, Serbia

Objectives: To emphasize the importance of medical thought, ethics, humanity, and knowledge through the presentation of biographies of world-renowned doctors, humanists and scientists in their work and contribution to the promotion of humanity, as well as the promotion of health in the overall creation of the importance of medical history and the preservation of world peace. The goal is to enhance the visibility of medicine over the centuries through a comprehensive historical aspect. Doctors would be urged to be representatives of not only the business dealt with by promoters of the importance of medicine in the development of human civilization. History now writes pages that are mainly based on human suffering, conquests, wars and often violent changes in states, cultures, cities... doctors should therefore be active missionaries in spreading historical medical thought through the basic postulates of humanity, healing and understanding for the common civilization.
Methods: Use of foreign and domestic literature, monographs and encyclopedias, a seven-year study of medical history and accomplished achievements, exhibited paintings with portraits of world-renowned doctors and their biographies, scientists and humanitarians on the occasion of marking the end of the First World War.
Results: A great interest in the history of medicine has been established through the importance of marking the anniversary of the Great War that brought great world suffering and suffering. Institute of Public Health Niš presented an exhibition of paintings of 100 giants of medicine in the premises of the Museum of Health Culture Nis, so that it became an official part of the program of the international manifestation "THE NIGHT OF MUSEUM" titled "Victories and Winners" on May 19, 2018. The Museum of Health Culture was then visited by more than 700 interested art lovers but also medicine.
Conclusion: Conducting continuous education of physicians and citizens about the history of medicine is extremely important for improving the general picture of the values of the doctor's call in the improvement and development of humanity in general. One hundred years have passed since World War I, each biography and portrait represent one year to this year, many years have brought many innovations and advances in the treatment of people. The theme is to improve health, talk about humanity about the values of life on the treatment of patients through this aspect of history, not just about wars, destruction and suffering. We doctors and health professionals need to take a more active role in disseminating positive ideas and work, and, as people of heterogeneity and knowledge, each of us in our communities gives a small, but nevertheless, contribution to the essential development of humanity in the struggle for world peace.

Key words: 100 great medicine, history of medicine, World War I

POSTER PRESENTATIONS

1. PATIENTS' ATTITUDES REGARDING SELF-MEDICATION - USE OF OVER-THE-COUNTER MEDICATIONS (OTC) AND DIETARY SUPPLEMENTS

Ingrid Kummer[1], Margita Držaić[1], Marcel Leppée[2], Lea Bušković[3]
[1]City Pharmacies Zagreb, Zagreb, Croatia
[2]Institute for Healthy Ageing, Zagreb, Croatia
[3]Pharmacy Čakovec, Čakovec, Croatia

Objectives: World Health Organization (WHO) defines self-medication as the process in which patient uses medications to treat self-diagnosed disorders or symptoms by him-/herself. As a result patient is enabled active role, as well as faster and easier access to the medications safe for use without physician's monitoring (1). Aim of this survey was to examine the correlation of patients' socidemographic characteristics and their behavior regarding self-medication.
Methods: Survey included patients attending community pharmacies in Zagreb and Kotoriba from March until October 2014. Patients who bought at least one self-medication were asked to fill questionnaire. Statistical analysis of collected data was carried out using IBM SPSS (*Statistical Package for Social Sciences*) v. 20.0.
Results: In this survey 206 patients participated (M: 57; F: 149), where 156 (75,7%) of them were from the city of Zagreb. Median age was 68 years (range 23-94).When buying self-medications, 107 (51.9%) participants already had knowledge and experience with the preparations they bought, though 115 (55.8%) of them believe these preparations are completely safe. More than a half of the participants, 107 (51.9%) of them were partially satisfied with the self-medication.
Conclusion: It is necessary to increase community pharmacists´ role in responsible self-medication in order to ensure its safety and efficiency.

Keywords: self-medication, over-the-counter medications (OTC), dietary supplements, patient’s behavior

SESSION: APPLICATION OF INFORMATICS IN THE HEALTH SYSTEM

INVITED LECTURES

1. IMPORTANCE OF INFORMATION TECHNOLOGY IN INTEGRATION OF HEALTH CARE

Miodrag Stojanović[1,2], Zoran Milošević[1,2]
[1]Public Health Institute Niš
[2]Medical Faculty Niš

The healthcare information system consists of people, material assets and procedures using for production and communication. The World Health Organization (WHO) identifies it as part of the general information system which includes a mechanism for collecting, processing, analyzing and receiving information that is necessary for the organization and implementation of health care. Other definitions also exists, such as it is the organization of people, machines and methods that work together to provide the necessary data and information of the population for health planning and management purpose.

In providing and organizing the healthcare system, in addition to stuff, equipment and space, information is increasingly important. Information nowadays is becoming increasingly important and a significant resource of health care. The use of information technology nowadays contributes to the improvement of the health system and increasing the quality of health care. They are necessary for the management and use of health data and adequate use of available resources.

Medical informatics is accepted as a basic medical science. Analogy with other basic sciences is recognized in the use of previous experiences and results in order to structure and codify objective medical findings, making them suitable for analysis, integration and further use. Medical informatics, by its very nature, belongs to experimental science; characterized by a number of questions for which experiments are designed and analyzes performed, and the obtained results are used to pose new questions and experiments. It is also a medical technology (a set of rules, procedures and equipment used in medical work) participating in the process of formal medical decision-making, diagnosing, treatment and therapy managing. Information technologies represent a key factor of development and progress in the healthcare system. Thanks to the continuous improvement of information technology, the functioning of healthcare institutions is considerably facilitated. The effectiveness of providing health care, its organization and interactions with patients, reduced communication costs, are significant advantages by which the health care system will move into the future.

The information technology network in the healthcare system should register and record all information. In Serbia, information from health institutions is transferred to the Institutes and Public Health Institutes, and they forward them to the Ministry of Health and the Republic Health Insurance Fund. Thanks to the promptness of the Ministry of Health and a large involvement of their team in the last five years there has been a significant progress in the application of information technology. A large number of projects that have been running for decades have come to life in a significant number of health care institutions. Niš was a place where many activities in this field started as a pilot project.

The flow of information through healthcare networks was ineffective and mostly outdated. For this reason, the need to build an integral information system has been recognized, and after the measures taken by the Ministry of Health, the implementation of information technologies in all health institutions has been started.

Application of information technology gives benefit to all participants in healthcare: patients- finding the right information in a form that suits them; health care providers- access to patient

electronic documentation, medical information creators- providing good information base and evidence-based decisions in the health system.
For the smooth functioning of information technologies in the health care system, the most important is:
1. Procurement of computer equipment and its regular maintenance. Creation of organizational, personnel and technological prerequisites for the development of the information system, establishment and maintenance of electronic patient documentation-electronic health card;
2. Creating technology standards for safe communication, management and storage of medical data in the health system;
3. Building an integral information system in healthcare and networking of all relevant entities. Integration of all health information systems into a unique information system through the construction of an electronic portal of the Republic Institute for Public Health, the Health Insurance Fund and the Ministry of Health.
The patient is the center of information in the hospital information system, where it monitors the patient's treatment process, both in specialist outpatient clinics and in the stationary part. All patient's data are thus preserved, accurate, accessible to authorized doctors and nurses, and thus facilitate the work of employees, the accelerated procedure, allows statistical monitoring and electronic reporting.
The information, generated and transmitted within the health information system, has the following meaning:
1. In administering health and medical documentation – the number of data gathered in health institutions is very high. Provision of medical services is a highly specific and complex job, whose main characteristic is the quantity and diversity of data and information. The foundation of the modern process of health care is that the information needs to be easily accessible in time and place of need. Only with the use of the computer can such requests be processed.
2. In medical diagnostics – computers are used (in medical diagnostics) in processing and analysing of biophysical signals, and medical images (CT, MRI) or computers are used in biomedical imaging.
3. Use in therapy and rehabilitation – the beginning of computer use in the medical field is related to cancer radiation therapy planning (dose calculation, size of the radiation field). These methods are widely used nowadays, and their application is almost impossible without the use of computers. The use of computers in therapy includes patient follow-up in intensive care units.
4. In the healthcare management (organization) – arranging appointments in the outpatient setting; issuing prescriptions, patient admission; sick leave; healthcare records.
5. In medical research – the use of computers in medical research has a broad application, and it is very difficult, or even impossible, to research without the use of informatics, or rather the application of complex processes in informatics and computer use. Besides the advancement of data analysing, scientific research is also improved by the computerization of medical literature database.
6. In medical education – educational materials distributed in forms of CDs or via the internet are widely used nowadays. Very/extremely convenient/suitable are the patient and population simulation programs, where students, guided by the computer, solve certain medical or health problems and cases.

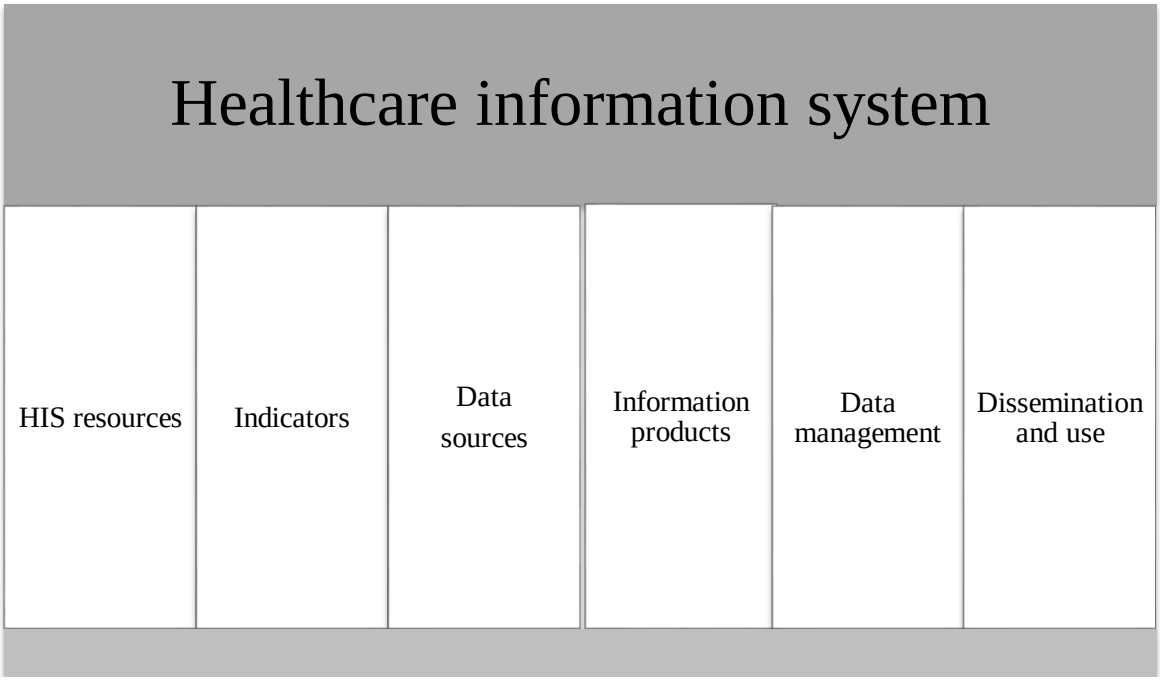


Figure 1. Components and Standards of HIS

HIS represents the basis of the overall health care. It enables the access to the information that illustrates the state of the healthcare. HIS allows the insight to the exact record of expenses and the control of the parameters of every system member, which results in the total transparency of the process. Furthermore, this approach allows the preparation of the precise plans and strategies that eliminate the arbitrariness and lessens the misapplication. It provides the state with fine analytical information useful in the development of the national health care strategies and enables planning and regular assessment of the current situation. Insurance fund/companies can rely on transparency required for their work and participate in a healthy competitive market.

One of the important aspects of the electronic healthcare is telemedicine, which includes a set of processes and the application of IKT in the provision of health care. The transfer of medical information is neither affected by the distance between doctors and patients nor by the location of the provider of health services or equipment, as long as the patient can log in to the network. Numerous telemedicine projects have shown that telemedicine significantly improves the health of women and children in the countryside. It is applicable in all phases and methods of health care.

Electronic health records are going to be used in the primary and secondary health care and for the introduction of national health files, which should integrate all of the patient's data. The electronic health record is based on the PACS system for image archiving and processing, and DIS that operates with all the other information.

The introduction of the electronic health records is a part of the health care reform which is meant to decrease the waiting time for patients and interconnect different institutions. Some studies show that a significant part of the effective work hours is spent on the filling out of various forms, and daily and monthly reports (medical doctors approximately 30%, nurses up to 70% of work hours). The change to the electronic health records will enable a faster and simpler patient's data manipulation which will result in better insight into a patient's health. An application which represents an electronic database will offer doctors various search possibilities of patient information using different criteria. Data input will also be simplified and, more importantly, all data will gain in significance. Data from each Electronic Health Record will be used for research and statistical purposes.

EHR represents qualitative progress/step forward towards the development of the health care system and medical services provision. To this day, paper and electronic health records are kept simultaneously at the Community Health Centre in Nis. HER developed at the Faculty of Electronic Engineering, University of Nis was used until March 2016, which was replaced by the EHR from the program of the integrated information system (IZIS).
Electronic prescriptions (eRecept) from IZIS program were first implemented on October 30, 2017, in Community Health Centers in Belgrade and later, at the beginning of June 2018, in Nis. It is estimated that this will decrease the number of doctor appointments in primary health care for 60%. Essentially this would mean that chronic patients would have two doctor appointments per year unless the family doctor prescribes a different therapy/treatment ili there is a need for a treatment/therapy change requested by the family doctor. 65 million paper prescriptions are issued annually in Serbia. The introduction of the eRecept will be beneficial for everyone in the health care system.
Switching to the use of information technologies entirely it is expected to:
1. Making doctor appointments on the website of the Community Health Centers, which will enable patients to see the available time slots for the appointment and plan their time accordingly.
2. The introduction of the electronic health insurance card would ideally happen with the introduction of the electronic ID. Same chip could be used to store a small database of the health record and personal information. This would eliminate the following: loss of health records, illegible handwriting, potential physical paper damage and unnecessary time spent searching for health records in a huge archive.
3. The introduction of an electronic data reader. At arrival, patients swipe the card through the reader/ patients put the health insurance card into the reader, which is connected to the server and sends the information to the assigned/chosen doctor's computer. The time until the same health insurance card is put in the doctor's computer is marked as the patients' waiting time.
4. The elimination of duplicated records and the decrease in administrative activities.

References:
1. Đuro Deželić, Josip Kern, *Medicinska informatika*, str 105-108,Hrvatsko društvo za medicinsku informatiku, Zagreb, 1997. god.
2. Mr. Radmila Petaković, *Elektronsko poslovanje u zdravstvu*, Beograd, 26. okt. 2008. god.
3. Ana Gobovac, *Elektronski zdravstveni kartoni*, Beogra, 10 januar 2007. god.
4. Ministarstvo zdravlja, *Druga konferencija o informacionim tehnologijama u zdravstvenom sistemu Republike Srbije "e-zdravlje'09"*, Beograd, 24. april 2009. god.
5. E Magazin, Elektronski zdravstveni karton u Srbiji, Beograd,24. o6. 2005. god.
6. Nikola Puđa dipl. maš. ing. *Zdravstveni*, 2006 *informacioni sistem, savremena organizacija zdravstva,* Vršac. 2006. god.
7. Goran Ančić, *Primena računara u medicini,* Beograd, 17. 05. 2008. god.
8. M. Dačić, *Biomedicinska naučna informatika,* Barex, Beograd 2006.
9. www.openehr.org
10. www.hl7.org
11. www.who.int
12. Pešić S, Stanković T, Janković D. Benefits of Using OLAP Versus RDBMS for Data Analyze in Health Care Information Systems. Electronics 2009; 13(2): 56-60.*(PDF) PRIMENA MEDICINSKIH INFORMACIONIH SISTEMA U EDUKACIJI I ISTRAŽIVANJIMA U MEDICINI*.

2. USE OF STATISTICAL METHODS IN MEDICAL JOURNALS

Dragan Bogdanović[1], Zoran Milošević[2]
[1]State University of Novi Pazar, Serbia
[2]Faculty of Medicine University of Nis, Serbia

Trends of statistical methods used in medical journals

Over the past decades, a great increase in the use of statistics has been documented, for a wide range of medical journals.[1-5] Favored by the availability of manifold statistical software packages, a trend towards usage of more sophisticated techniques can be approved.
We report on trends of statistical methods used in medical researches, by presenting results of studies reviewing research papers from the Journal of the American Medical Association (JAMA), and The New England Journal of Medicine (NEJM), two of the journals with the highest impact factor in the medicine science.[6]

JAMA was specifically chosen due to its reputation for being read by a diverse clinical audience in a range of specialties and for publishing high-quality research. A total of 361 articles were reviewed: 133 articles from 1990, 122 from 2000, and 106 articles from 2010. Overall, the most commonly reported statistics in the Journal among the articles reviewed included descriptive statistics (e.g. means and percentages), "low-level" epidemiologic statistics (e.g. standard deviations, standard errors), and measures of morbidity and mortality (e.g. incidence, prevalence, mortality) (Table 1). Power was reported infrequently overall, with significantly differences over time; more studies reported power in 2010 (26.5%, n=28; $p<0.001$) as compared to 2000 and 1990. Between 1990 and 2010, there was a significant increase in the reporting of more advanced statistics, specifically sensitivity analysis (49.1% in 2010 vs. 22.6% in 1990), multiple regression (48.1% in 2010 vs. 23.1% in 1990), survival analysis (43.4% in 2010 vs. 14.3% in 1990), multi-level modeling (32.1% in 2010 vs. 2.3% in 1990).

Figure 1 and Figure 2 show the percentages of the different statistical methods used in NEJM scanned articles. Of the 238 articles analyzed in 2015, a total of 14 (6%) used no statistical methods or used descriptive statistics only, and these articles were largely case reports without statistical inference. This finding was not substantially different from the 1989 study or the 2004–2005 studies.
The average number of methods used per article was 1.9 in 1978–1979, 2.7 in 1989, 4.2 in 2004–2005, and 6.1 in 2015. In particular, there were increases in the use of power analysis (i.e., calculations of power and sample size) (from 39% to 62%), epidemiologic statistics (from 35% to 50%), and adjustment and standardization (from 1% to 17%) during the past 10 years. In 2015, more than half the articles used power analysis (62%), survival methods (57%), contingency tables (53%), or epidemiologic statistics (50%).
The t-test, one of the simplest statistical tests, was used most frequently - and more than any other statistical approach - in 1978 through 1979 (44%), but the frequency of its use tended to decrease over time (39% in 1989, 26% in 2004 through 2005, and 31% in 2015).
In general, there was a continued trend toward increased use of more diversified and advanced statistical methods.

Table 1. Statistical measures and methods in JAMA articles published in 1990, 2000, and 2010

Characteristics	1990 (n = 133)	2000 (n = 122)	2010 (n = 106)	p-value
Descriptive statistics	124 (93.2%)	122 (100%)	106 (100%)	-
Low-level statistical measures (SD, SE, CI, p-values)	108 (81.2%)	116 (95.1%)	105 (99.1%)	<0.001
Morbidity & mortality	76 (57.1%)	60 (49.2%)	73 (68.9%)	0.011
ANOVA	26 (19.5%)	24 (19.7%)	18 (17.0%)	0.844
Chi square	54 (40.6%)	51 (41.8%)	51 (48.1%)	0.471
Fisher exact	19 (14.3%)	18 (14.8%)	20 (18.9%)	0.583
Mantel-Haenszel	11 (8.3%)	15 (12.3%)	7 (6.6%)	0.301
Epidemiologic statistics (OR, RR, sensitivity, specificity)	28 (21.1%)	34 (27.9%)	33 (31.1%)	0.190
t-test	28 (21.1%)	31 (25.4%)	28 (26.4%)	0.577
Power	7 (5.3%)	7 (5.7%)	28 (26.4%)	<0.001
Pearson correlation coefficient	13 (9.8%)	10 (8.2%)	5 (4.7%)	0.340
Logistic regression	27 (20.3%)	42 (34.4%)	28 (26.4%)	0.039
Simple linear regression	12 (9.0%)	17 (13.9%)	13 (12.3%)	0.460
Poisson regression	0 (0.0%)	11 (9.0%)	8 (7.5%)	0.003
Log-rank test	2 (1.5%)	9 (7.4%)	15 (14.2%)	<0.001
Multi-level modeling	3 (2.3%)	11 (9.0%)	34 (32.1%)	<0.001
Multiple comparison	7 (5.3%)	8 (6.6%)	9 (8.5%)	0.609
Multiple regression	32 (24.1%)	52 (42.6%)	51 (48.1%)	<0.001
Non parametric test	17 (12.8%)	19 (15.6%)	23 (21.7%)	0.173
Wilcoxon Rank	13 (9.8%)	14 (11.5%)	19 (17.9%)	0.150
Survival analysis	19 (14.3%)	27 (22.1%)	46 (43.4%)	<0.001
Cox models	10 (7.5%)	17 (13.9%)	34 (32.1%)	<0.001
Kaplan Meier	5 (3.8%)	13 (10.7%)	24 (22.6%)	<0.001
Sensitivity analysis	30 (22.6%)	44 (36.1%)	52 (49.1%)	<0.001
Transformation	9 (6.8%)	12 (9.8%)	10 (9.4%)	0.637

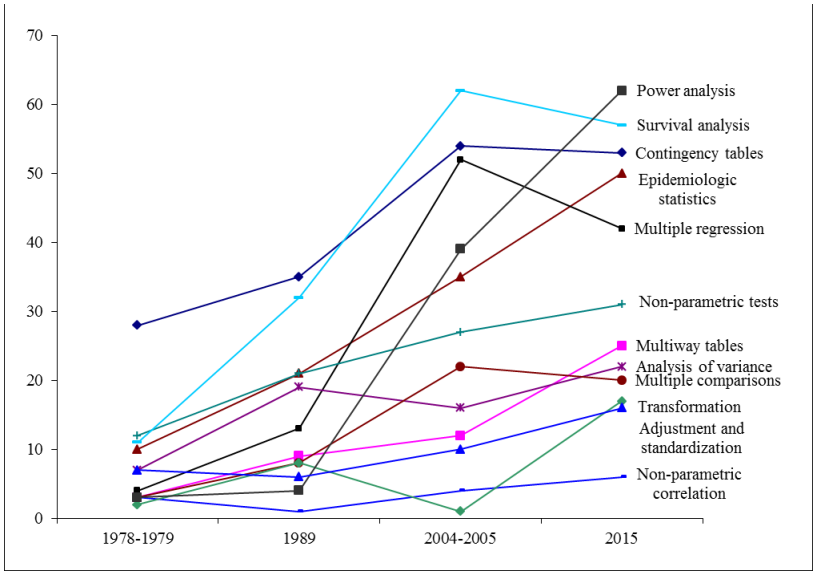


Figure 1. Percentage of NEJM studies using particular types of statistical analysis with increased use trend during four periods between 1978 and 2015
Source: Sato Y, Gosho M, Nagashima K, Takahashi C, Ware J, Laird N. Statistical methods in the Journal - an update. N Engl J Med 2017; 376:1086-7

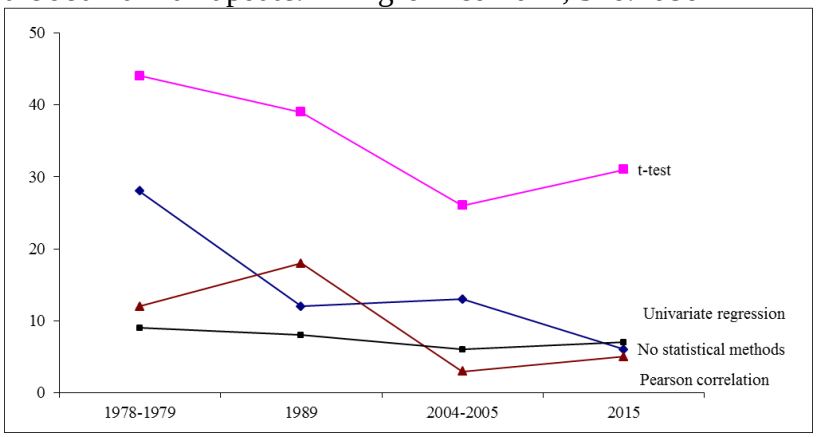


Figure 2. Percentage of NEJM studies using particular types of statistical analysis with decreased use trend during four periods between 1978 and 2015
Source: Sato Y, Gosho M, Nagashima K, Takahashi C, Ware J, Laird N. Statistical methods in the Journal - an update. N Engl J Med 2017; 376:1086-7

Statistical errors in medical publication

Causes of errors related to the statistical topics in the scientific process[7] can be classified into the three groups:
a. Not consulting a specialist on the topic,
b. Not having adequate knowledge, and
c. Carelessness.

The statistical errors can occur at different stages of the study such as planning, implementation, analysis, interpretation, and presentation.
The statistical errors committed in the journals in the medical field can be summarized under the categories below:
A. Errors related to p-values

a. p-values given in closed form (e.g., $p<0.01$, $p<0.05$, $p>0.05$),
b. non-reported p-values,
c. incorrect p-values,
d. incorrect demonstration of p-values (e.g., $p=0.000$, $p<0.0005$ etc.)
B. Errors related to tests
a. Statistical technique used but not defined,
b. Insufficient data presented for the statistical test,
c. Incorrect name of the statistical test,
d. Statistical technique defined but not used,
e. Use of incorrect test,
f. Statistical analysis required but not performed
C. Errors in the summarization of data (e.g., reporting mean and standard deviation when nonparametric tests are applied)
D. Mathematical demonstration errors (e.g., lacking demonstration of decimals, using ":" rather than "=")
E. Statistical symbol errors
F. Incomprehensible statistical terms
G. Inappropriate interpretation
H. Errors in (statistical) terminology
I. Incorrect and insufficient demonstration of descriptive statistics
J. Presentation of statistical method-analysis and results in the incorrect section of the manuscript

When we evaluate the statistical errors that are committed in published articles in terms of their effects on the study results, we need to acknowledge the fact that some of the errors
a. Are directly pertinent to the results, some of them
b. Occur in demonstration and terminology only and do not affect the results.

At the publication stage, three fundamental negative situations can ensue regarding possible negative effects of errors:
a. Publications with statistical errors induce a negative effect on science and mankind.
b. When these errors are identified during the reviewers' assessment, they will cause a loss of academic confidence in the study, leading to an early rejection.
c. Statistical errors in published articles are likely to cause a loss of an author's academic credibility.

Researchers who do not have a solid statistical background commit errors in the utilization of statistics in their studies. In some cases, although researchers obtain statistical counseling, they commit errors in the presentation while writing papers.
From researchers' point of view, the following main issues should be considered to prevent the occurrence of statistical errors during the process of a scientific study and in the phase of publishing,
a. Understanding the role and importance of biostatistics in scientific research
b. Knowledge of basic biostatistics
c. Consultation with a biostatistics specialist in the planning, analysis and interpretation stages of the research
d. Review by a biostatistics specialist before submitting the manuscript to a journal
e. The statistical approach from other similar research studies should not be copied
f. Avoiding overreliance and overconfidence on "user friendly" software programs
g. Avoiding a "copy-paste" approach from the text of other publications.

The manuscripts submitted to journals should certainly be reviewed by biostatistics specialists, and these specialists should participate in the editor/reviewer/advisory boards of journals. Otherwise, statistical errors are more likely to be encountered in published articles.

References

1. Emerson JD, Colditz GA. Use of statistical analysis in The New England Journal of Medicine. N Engl J Med 1983; 309:709-13.
2. Horton NJ, Switzer SS. Statistical methods in the Journal. N Engl J Med 2005; 353:1977-9.
3. Emerson JD, Colditz GA. Use of statistical analysis in the New England Journal of Medicine. In: Bailar JC III, Mosteller F, eds. Medical uses of statistics. 2nd ed. Waltham, MA: NEJM Books,
1992: 45-57.
4. Sato Y, Gosho M, Nagashima K, Takahashi C, Ware J, Laird N. Statistical methods in the Journal - an update. N Engl J Med 2017; 376:1086-7
5. Altman DG. Statistics in medical journals: Some recent trends. Statistics in Medicine 2000; 19:3275-89.
6. Arnold LD, Braganza M, Salih R, Colditz GA. Statistical Trends in the Journal of the American Medical Association and Implications for Training across the Continuum of Medical Education. PLoS ONE 2013; 8(10): e77301
7. Ercan I, Demirtas H. Statistical Errors in Medical Publication. Biom Biostat Int J 2015; 2(1): 00021.

ORAL PRESENTATIONS

1. THE IMPORTANCE OF SYSTEMATIC REVIEW IN EVIDENCE BASED MEDICINE

Jelena Milić[1,2]
[1]Institute of Public health of Serbia, Center for biomedical Informatics in healthcare
[2]Department of Epidemiology, Erasmus University, Erasmus medical center, Rotterdam, NL

Objectives: Systematic reviews provide clinicians with a convenient, precise summary of published evidence on a topic. As such, they are powerful instruments for patient care decisions and form the basis for medical practice guidelines. Systematic reviews play a crucial role in Evidence-based medicine. Thus, the aim of this overview is to explain the role and methodology of systematic reviewing
Methods: Current narrative overview defines and elaborates steps in performing Systematic review. The presented methodology seeks to implement new therapies and treatments previously identified as effective by original clinical research of high quality.
Results: Systematic reviews are created according to well-defined methods. They are prepared in seven steps: 1- Defining the review question, 2- Search and selection of studies, 3- Critical evaluation of studies for biases, 4- Data Collection, 5- Data analysis and presentation of results, 6- Interpretation of results and drawing conclusions, 7- Improving and updating reviews. The precision of systematic reviews is increased through meta-analysis. Finally, to use the provided evidence more effectively, the reader should be able to evaluate the quality of a systematic review.
Conclusion: Systematic reviews provide suggestions for future research.

Key words: Systematic review, methodology, guidelines, evidence based medicine

SESSION: HEALTH PROMOTION – PROMOTING THE HEALTH OF CHILDREN AND YOUNG PEOPLE

INVITED LECTURES

1. HOW TO ENABLE CHILDREN IN NURSERIES AND SCHOOLS TO ENJOY VARIED AND HEALTHY DIETS

Mihaela Erjavec, PhD
School of Psychology, Bangor University, Bangor, UK

Healthy eating: context and introduction

In most developed countries, the contemporary changes to eating habits have led to less-than-optimal nutrition despite our relative wealth and food availability. This is a problem that needs to be addressed. For example, in high-income countries, poor dietary habits have been recognised as the leading cause of childhood obesity, which is also on the rise in mid- and low-income countries. Indeed, in some of the latter there is a direct transition from stunting and malnutrition due to lack of resources to a different kind of malnutrition as parents became able to afford to purchase highly palatable, energy-rich nutrient-poor 'junk' foods such as sweets and processed meals. WHO noted that, for the first time in recorded history, obesity overtook undernutrition as the main preventable health risk in children and adults globally.

We understand that early childhood is a time of rapid development and that inadequate nutrition can jeopardise its outcomes; we also know that poor dietary habits track from childhood into adulthood, and that eating behaviour is easier to change in the early years than late. Consequently, over the past couple of decades, there had been a plethora of drives and initiatives aimed at improving children's eating. However, in most part, they have met with little success and few can boast significant, long term improvements.

Not all healthy-eating initiatives have been created equal. Many are driven by a 'common sense approach'; others are constrained by lack of funds or willingness to act on a wide enough scale. We all know that effective prevention, especially in the early years, saves public money in the long run – but there is a catch. Today's policy makers are politicians who like fast results and immediate savings. Feel-good stories bring in votes. However, effective prevention requires insight, concerted action, substantial commitment, and a longer time frame.

What is the best way to improve children's dietary habits?

First, we need to define what change we are aiming for. 'Healthy eating' is a broad term that can mean different things to different people. Much had been written about this in the media under the influence of temporary fads and pervasive food industry lobbying. Vegetable 'superfoods', gluten-free produce, protein-based diets, and low-fat processed foods laden with sugar, to name but a few, have all been labelled as 'healthy' at one time or another. The advice always changes, or it would not be newsworthy. No wonder that many adults and children have learned to respond negatively to this label, expecting 'healthy' food to be less tasty and enjoyable.

But there is no ambiguity when it comes to the most important findings. Following decades of serious multidisciplinary research, there is at present consensus that a diet rich in fruit and vegetables offers protection from many non-communicable conditions, such as coronary heart disease, type two diabetes, cancers, and obesity. Yet data show that few children and indeed adults eat their recommended portions of fruit and veg every day. WHO experts agreed on recommending that adults should eat about 400g daily, with more veg than fruit. These guidelines have been translated differently in different countries, with no agreed guidelines for children. Nevertheless, aiming to increase children's consumption of fruit and veg is a very reasonable and concrete goal.

Second, we need to look for the existing evidence of effective behaviour change.Creativity and innovation are good, but when it comes to effective methods of behaviour change, solid evidence base is the key to success. There is a wealth of collective knowledge developed through research and accessible to everyone that should be applied in prevention – and changing children's eating habits are no exception.

Even in the existing peer-reviewed research literature, there are different kinds of evidence. For example, many school- or nursery-based health interventions have been evaluated indirectly, by asking teachers and carers and parents whether they think the project was fun, enjoyable, or effective. However, this is not objective evidence of behaviour change. Instead, behaviours of interest should be measured directly, before and after. In our example, we would seek those interventions that have demonstrated how children's consumption of target foods – fruit and veg – increased as the result. Increases should have been shown by direct measurement of eating rather than parental reports and other indirect means, which are prone to biases and distortions.

Third, in order to effectively develop or apply behaviour change interventions that improve children's eating, we need to make contact with children's psychology. It is not possible to change behaviour without understanding its causes. Some of the principles are universally applicable; for example, sugary foods are innately rewarding and most humans are likely to seek these foods. Other influences develop as we grow; for example, as we learn to like new foods or follow culinary trends.

As researchers, carers, public health professionals, and parents, we need to learn what motivates and maintains children's eating habits, and how these influences change over the course of their development. Understanding how determinants of children's food choices change over time enables us to tailor the interventions accordingly.

Developmental timelines and appropriate intervention strategies

It is never too early to start. Research shows that the quality of prenatal nutrition determines developmental outcomes for the child. This is why interventions should target parents-to-be. From the adults' psychological perspective, pregnancy is a good time for learning to make healthier choices and establishing better life routines. Appropriate interventions at this time include ensuring that nutrient-rich foods are readily available and that social support and correct information are there for those wishing to improve their diet.

During infancy, parents and carers have a complete control over their children's diet. Infants are born with innate preferences for sweet and high-calorie foods and are quite willing to accept new foods. Breast feeding is recommended, especially early on, and in most cases ensuring a ready availability of a range of nutritious foods, including fresh fruit and veg, will suffice to maintain a good diet.

To many parents' dismay, around the age of two years old, compliant children become fussy eaters and start to reject previously accepted and novel foods, sometimes based on their appearance, texture, and other apparently random attributes. Thankfully, this is a transient developmental phase, caused by factors including slowing growth, loss of appetite, and shift in children's cognitions. Individual differences emerge, partly caused by genetic differences in perceiving strong tastes (e.g., bitter). It is difficult to intervene to change toddlers' eating at this point, but their despairing parents can be helped with appropriate advice and assurance.

At three to four years old, children start to develop their taste preferences in earnest and this is a good time to introduce new tastes and foods. This should be done with no pressure and much patience, using evidence-based ingredients to assemble effective interventions. At this age, children look up to role models – their family members, peers, cartoon characters – for guidance on how to behave. Extensive research shows that role modelling works best when multiple models, a little older than the children themselves, perceived as 'cool', are shown to enjoy eating target foods (in our case, fruit and veg). Familiarisation with novel foods works well, as does repeated unpressured tasting. This is more likely

to happen if children receive small tokens or rewards for tasting new foods. Repeated tasting leads to 'taste-bud training'; a biological change in perception whereby previously disliked foods become genuinely tasty and pleasant. Although there are individual differences in taste perception, applying these principles works for most children.

Evidence-based interventions for primary age children are based on much the same principles, but modelling and accompanying narratives become more elaborate. As developments in cognition continue, complex messages can be conveyed. Overall aim is to provide the children with multiple tasting opportunities and positive messages until these are internalised; children start thinking of themselves as fruit and veg eaters and are guided in their daily food choices by this conceptualisation. Children should learn through experience that nutrient-rich foods are nice and tasty. Their repertoires should expand to include the whole rainbow of colours, textures, and tastes. Finally, the power of branding can be harnessed to signal to children that fruit and veg are 'cool' and desirable.

Unfortunately, these very effective behaviour change principles are routinely used by large junk food manufacturers who have a very different agenda.

In adolescence, children are given more freedom to choose their own foods. At this age, they often turn to the convenience 'junk' foods again, especially if their peers and media signal that those foods are more desirable. Nevertheless, their eating can be influenced by 'nudges' which present healthier options in an attractive way but without reducing the number of choices. There is evidence to show that changes to the choice architecture can be effective in school canteens, delis, and shops. The same principles have been shown to work for adults.

Finally, it is worth noting that the interventions that consist of providing information about healthy eating, in public health campaigns or school curricula, make no differences to eating behaviour at any age. Yet they are probably the most widely used of all. The reasons for this? They are comparably inexpensive, wide reaching, and sound reasonable. They rest on the assumption that our daily choices are made based on knowledge, and that we decide what to eat in a rational manner. Yet the entire bodies of work in psychology, neuroscience, and economics show that nothing could be further from the truth.

Where should we intervene?

Even though we know that family eating patterns are a strong determinant of children's food choices – healthy or otherwise – the interventions to improve children's intake of fruit and veg that are set at home show low effectiveness. This is probably because of their lack of consistency and program fidelity. Nevertheless, family has an important part to play, especially in the early years.

A number of evidence-based interventions have successfully targeted children's eating at nurseries and schools. Such interventions have the advantage because the carers and teachers can exercise strong control over all aspects of children's environment, and implement the effective procedures, such as modelling and repeated tasting, or 'nudges' to provision and presentation of target foods.

Targeting wider community makes sense but it is seldom done. Extra-curricular projects usually target groups or clubs, which may not be well attended by children of lower socioeconomic means. Yet it is those children who often have the poorest diets and worst habits, and need to be helped the most.

Governments have a large part to play, for example by incentivising production and distribution of heathier foods, ensuring that all children have access to fruit and veg at their school, and so on. But the powerful food industry lobbies are often preventing more effective action, such as additional taxes on sugar, advertising bans on junk foods, discouraging production of highly processed foods, or restricting sales of energy-dense foods near to schools.

Overall, we have the knowledge and evidence base that could, in principle, enable us to help all children to learn to enjoy varied and healthy diets, rich and fruit and veg. However, successful behaviour change is only the beginning. Maintaining healthy habits in an obesogenic environment, where attractive and tasty energy-dense nutrient-poor 'junk' foods are readily available, inexpensive, and heavily marketed, is much harder. It can be very disheartening to succeed in getting a class full of children to enthusiastically consume a rainbow range of veg including peppers, broccoli, and beetroot, only to see this behaviour disappear a few months later, displaced by junk food feasts, because of the environmental pressures beyond our control. Nevertheless, we all know from experience that important changes take a long time, so it is necessary to persevere and to keep talking to those who have the power.

Alas, bringing solid scientific evidence to the table does not change behaviour, not quickly anyway, and careful application of psychology and principles of behaviour change are needed to persuade the decision makers to mend their ways. But this is another topic for another talk.

***

At several points in the presentation, especially when I speak of the key determinants of eating behaviour in preschool and school age children, I will show media illustrations of the evidence-based interventions that have used the behaviour change principles listed. Most of these illustrations will come from our work in the CAER lab at Bangor University.

I have avoided citing individual research papers in this talk, but I plan to ask the audience members who want to know more to contact me for further discussion, bibliography, and recommendations.

2.THE ROLE OF YOUNG PEOPLE IN THE PROCESSES OF CREATION AND REALIZATION OF HEALTH EDUCATION ACTIVITIES - EXPERIENCES OF THE HEALTH PROMOTION CENTER

Čedomir Šagrić, Radulović O., Marković R., Stefanović A., Šagrić M.
Institute for Public Health Niš, Niš, Serbia

Responsible communities are focused on youth development and they are also very concerned about youth health. It is active investment in the future of society. The progress of the Community is impossible without youth development and completely support for their huge capacities. We leave behind different approaches and experiences in youth development in order to keep and make their health better. Many methods have been applied to young people in health-education work for years. Many of these methods are new, promoted or modified. However, the key of success in modern approaches is unequivocally clear. It means that young people should be involved in all phases of health-education process (e.g. problem detection, kind of creating work, choice of appropriate approach and youth contribution in these programmes implementation).
Despite the needs of users or young people, the experts who are involved in activities with young people often fall into the trap of learnt theoretical settings and gains.Many of these “excellent” programmes are without significant effect. Fundamentally, the experts make mistake about what young people really need. These applied methods and resources are not attractive enough to young people and they make young population less motivated on a given permanent changes.
. The significant and positive outcomes of given youth development are resulted in the youth development and their active involvement in all contributing processes that are connected directly among themselves and also individual’s concepts that are used on purpose. The young people have the crucial role in risk health prevention and control but programme development of prevention, too. These programmes are being made better and effective by youth contributing in these programmes. In that case they realize clearly programmes` aims and make them existing with the clear meaning intended for other young people.The young population have to realize what personal benefits of health-education programmes are.They will not otherwise accept nor make some changes in their behavior in order to keep and make their health better.
What is the youth participation?
The youth participation in health-education programmes or promotion of health programmes help young people to get abilities, skills as well as authority in making their own decisions in order to improve social standards, change their life style.It means to change their attitudes towards their environment and health risk reduction.
What is the advantage of youth participation?
The young people have a strong ability to raise people of their ages for different activities and make them to do easier some positive changes in their life. The advantage is reflected in increasing number of active participants and places for dissemination of information.
A reminder on Roger Hart`s ladder of youth participation shows exactly and precisely where promoted health programmes can be understood wrongly even if there is a good intention of forsake necessary youth participation. Furthermore, the thing that we should leave in the past are young people who manipulate people of their ages, young people who are passive participants in programme`s settings and people who are asked for their ideas but in real their ideas are not included in further planning. The programmes where young people are given a certain role and they don`t know the aim of their participation and etc.The most perfect form of participation is when the young people take the leadership and activities. It means the activities where the decisions are made between youth and adults who participate equally in their work and help other young people with using methodology and recourses that are well-known for them.
The important rules in working with young people are as follows: to be consulted and involved into detection of the most popular questions related to their health and progress. Young people with different cultural, social and educational profile should be involved equally without giving advantage to pupils and students with excellent marks; the ways of communication and language should be adopt to the speech of young people in respect and using slangs; the young people should be involved into choosing the interesting and attractive methods of work and resources.; the programmes should be in premises that young people use for other purposes (entertainment, sport activities) and in convenient

time. It is essential for young people to be leaders in doing programmes` activities. The only adults` role is that they should insist on having democratic principles between young participants. The young people should be informed about their proposal and suggestions as well as activity results. There is a need to motivate young people and give them opportunity to present the results of their activities in media or other channels of communication. It is important to realize what they have done and how much is their strength of their activities in order to change and make progress in the community.
The experiences of the Centre for health promotion on this field have been making more than 15 years with permanent communication and partners` cooperation with the institutions and organizations that are deal with questions of young people. The central role was the cooperation with youth association and their active contribution that was supported in order to motivate them and be active participants in all activities referred to their health and benefit in all fields.
Health-education activities of Centre for health promotion of Institute for Public Health Nis are in cooperation with over 40 institutions, organizations and associations of citizens. The programmers' contents of most partners` subjects are intended for young people.The group activities were created and implemented according to Health Calendar but also to extraordinary needs of users. Working the network of institutions is based on signed protocol of health promotion section and also protocols of smoking prevention among young people signed with youth chamber in the Nis district.
The former work of Centre was based on respect and support youth initiative of referred organizations.Furthermore, it was also consisted of organizations` meetings where proposals were analyzed,considered the users` needs,possible solutions and chosen the most appropriate way of promoted activities. Then, the programmes were preceded by young volunteers. After processing young participants were informed about all process details, effects, possible omissions and users` benefit.
The themes of health-education programme were referred to following days in Health Calendar: National no Tobacco Day, World Health Day, Week of traffic injures prevention, International day of physical activity" Moving to Health", International Family Day, Day of healthy cities, World no Tobacco Day,International Day of Remembrance for people died of AIDS, National Dental Hygienists Week, International day against drug abuse and illicit trafficking, World Hepatitis Day, International Youth Day, World Suicide Day, World Heart Day, October-regular nutrition month, World Mental Health Day, World Hand Hygiene Day, World Food Day, World Diabetes Day, World HIV/AIDS Day,International Day of Persons with disabilities.
The previous role of young people in health –education processes was the guarantee of success of all programmes. That role is the challenge for the forthcoming period when the rapid changes in social, cultural, economical and technical spheres are a serious risk for youth health and their progress. In that case there is the constant improving process of youth participation and continual considering of their health-education needs in order to keep and make their health better.

ORAL PRESENTATIONS

1. TESTING AT THE TRAMWAY – SUCCESSFUL „STORY“ AT THE COMMUNITY BASED TESTING ON HIV

Mila Paunić,[1] Obradović M.,[1] Pešić M.,[1] Laketić V.,[1] Tomašević M.[1]
[1]Institute for Student's Health of Belgrade University, Belgrade, Serbia

The Institute for Students Health of Belgrade (ISH) is one of the oldest medical institutions in Belgrade, and today 170 medical staff and other employees take care of 120,000 students. At the primary health care level the services are provided within several departments: general medicine, gynaecology, dentistry and Preventive Department withCenter forvoluntary confidential counselling and testing on HIV (VCCT Center). VCCT Center provide complete VCCT services for all citizens and organize a lot outreach activities.
Objective: In this article we would like to describe the main activity that ISH VCCT Centre carried out in 2017.
Methods and results: The most successful activity in 2017 was "VCCT at the Tramway" during the European Testing Week (ETW), when ISH Belgrade try to raise awareness about the importance of HIV testing. During a 5 days, from 20 to 24 November 2017 from 17h to 23h, counseling and testing on HIV were organized in a tram, designed and adapted for this activity, visibly painted and branded. The tram, as a mobile HIV counseling center, was taking the usual route of Belgrade's public transport line 2 and had all the conditions for a comfortable and confidential conversation between our fellow citizens and an HIV counselor. Anyone who wanted to do a test could enter the tram for HIV testing at 5 pick-up points (tramway stations), where the volunteers were standing (30 volunteers from IFMSA and 5 from Rainbbow), sharing educational material and inviting citizens to get tested. During this 5 days of ETW, a mobile "site for counseling" hosted 3 councelors and 1 lab technitian in this specially adapted tram – separated in 3 main setions: for councelling, testing and results waiting space. Testing was done with rapid HIV tests (243 people were tested); and the results were available after 20-30 minutes. Perfect atmosphere and wonderful energy throughout every minute of the activity, incredible enthusiasm of the volunteers, almost romantic ride in a comfortable, warm tram, great interest of young people and a large number of clients made this event unforgettable. Everyone, including people just passing by, could enjoy a free tram drive and get tested on HIV, doing a lot for themselves and for others, because testing is an example of responsible behavior towards oneself and others: https://youtu.be/RjDoJpMuyMM
Conclusion: This event has symbolically shown that HIV counseling and testing should be accessible to everyone and that doing well for ourselves and others is the responsible thing to do, if at risk (or after having had a risk).
Key words: VCCT, HIV testing, community based VCCT

2.THE ROLE OF PARENTS IN DRUG ABUSING

Vesna Tomić
Institute of Public Health of Serbia, Belgrade, Serbia

The facts about increasing drug abusing among adolescents and beginning with this addict at less ages demands urgent intervention in the community.
The aim of this paper is to give practicle recomandations for parents and make them capable to recognize potential problem abusing drugs in family. This paper is organized through three wholes off: changing structure and dinamics of interpersonal relations, oppose social pressure of same ages children, social support in the community.
The number of motives of drug abuses are numerous and different. In every of this wrong making decision parents participate: not understanding the youth, having no time for talking, don't knowing how in parents obligations and responsibilities – directly and indirectly.
In the conclision emphasized it will be behind recommandations for detecting problem will be suggested the plan for education of parents in primary and high schools.

Key words: parents, drug abuse, communication, social pressure.

3. DEVELOPING RESISTANCE ON SOCIAL PRESSURE OF SAME AGE CHILDREN

Vesna Tomić
Institute of Public Health of Serbia, Belgrade, Serbia

Developing resistance on social pressure of same age children
Threating the problem of social pressure children of same age is introduction to programme of health education action on promoting mental health of school children and youth.
Preventive programme intervention will be focused on: communication, makong decision, forming the personal capacities and developing tolerance and undiscrimination behavior in the interpersonal relations.
The aim of this paper will be learning for life through makong ability for: asking questions, making decision, knowing self. Forming values of thinking as active answer on social pressure.

Key words: communication, makong decision, attitudes, self efficiency.

4. SEXUAL RISK BEHAVIOUR AMONG MEDICAL STUDENTS IN NOVI SAD

Vesna Mijatović Jovanović[1,2] Ukropina S[1].,[2]Harhaji S.[1,2] Dragnić N.[1,2] Čanković S.[1,2] Tomasević T.[2], Šušnjević S[1.2]
[1]University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia.
[2]Institute of Public Health of Vojvodina, Novi Sad, Serbia.

Objectives: The aimof this study was to examine risk behaviour of the student population regarding reproductive health.
Methods: A total of 813 students of first and third years of study of all courses in the Faculty of Medicine in Novi Sad were examined. The differences in sexual risk behaviour were analysed regard to the sociodemographic characteristics of students and their parents.
Results: The largest number of students had first sexual intercourse at the age of 18 (29.6%), followed by 17 (26.1%), whereby boys engage earlier than girls (average of 17.2 years vs. 17.8 years), as well as students whose material status was good (average of 17.3 years). Boys had a significantly more partners than girls (average 3.2 vs. 2.1), had sex during shorter relationships (10.2% vs. 1.2%; $p<0001$) and also had more sexual partners in the same period (14.4% vs. 4.7%; $p<0.001$). During the first sexual intercourse with a new partner, a condom was used by 74.0% of boys and 77.5% of girls. Before their last sexual intercourse, 13.3% of sexually active boys and 5.3% of girls consumed alcohol ($p<0.001$). Differences in observed sexual risk behaviour according to the courses as well as sociodemographic characteristics of students and their parents were not statistically significant.
Conclusion: Results indicate the necessity of improvement of health education of youth for more responsible sexual behaviour and prevention of reproductive health disorders.

Key words: Sexual Behaviour, Reproductive Health, Students, Contraception, Health Education

5. NEW CONCEPT OF CELEBRATING THE "DAY OF HEALTH" FOR STUDENTS OF BELGRADE UNIVERSITY

Vesna Laketić,Tomašević M.
Institute for Student's Health of Belgrade University, Belgrade,Serbia

Objectives: The aimof this study was to examine risk behaviour of the student population regarding reproductive health.
Methods: A total of 813 students of first and third years of study of all courses in the Faculty of Medicine in Novi Sad were examined. The differences in sexual risk behaviour were analysed regard to the sociodemographic characteristics of students and their parents.
Results: The largest number of students had first sexual intercourse at the age of 18 (29.6%), followed by 17 (26.1%), whereby boys engage earlier than girls (average of 17.2 years vs. 17.8 years), as well as students whose material status was good (average of 17.3 years). Boys had a significantly more partners than girls (average 3.2 vs. 2.1), had sex during shorter relationships (10.2% vs. 1.2%; $p<0001$) and also had more sexual partners in the same period (14.4% vs. 4.7%; $p<0.001$). During the first sexual intercourse with a new partner, a condom was used by 74.0% of boys and 77.5% of girls. Before their last sexual intercourse, 13.3% of sexually active boys and 5.3% of girls consumed alcohol ($p<0.001$). Differences in observed sexual risk behaviour according to the courses as well as sociodemographic characteristics of students and their parents were not statistically significant.
Conclusion: Results indicate the necessity of improvement of health education of youth for more responsible sexual behaviour and prevention of reproductive health disorders.

Key words: Sexual Behaviour, Reproductive Health, Students, Contraception, Health Education

6. NEW CONCEPT OF PREVENTIVE HEALTH WORK WITH YOUNG PEOPLE-„CAFÉ COUNSELLING“

Marija Obradović
Institute for Student’s Health of Belgrade University,Belgrade,Serbia

Objective: The aim of this study is to show how important is to understand vulnerabilities in students population occupied with everyday obligations and to show benefits from preventive activities that are realized in the place where they live and learn.**Methods and results:**An action called„Caravan of Health“during which the doctors and nurses from the ISHBU organized„Coffee time“ in Students dormitories everyday on weekdays from 17:30 to 20:00 included preventive examinations and promotion of healthy living practice through:meausurements of blood sugar level and blood pressure, determinations percantage of body fat in the body,spirometry,talking about the most common psyhological problems,testing for HIV,prevention of STI and HIV,counseling about reproductive health and contraception and advicing on proper nutrition and physical activity as a healthy lifestyle.**Conclusion:**This kind of work represents a friendly approach in working with young people where health professionals recognize the needs of young people and are ready to help them to avoid high risks life styles.On that way every young person will focus on that to care and save health in the future.

Key words:young people,students,preventive actions in the community,ISHBU-Institute for Student’s Health of Belgrade University

7. ONE-MONTH PUBLIC HEALTH ACTIVITIES ON THE OCCASION OF THE WORLD ASTMA DAY

Milena Tomašević[1], Laketić V.[1], Ristić S.[1], Pešić M.[1], Paunić M.[1], Obradović M.[1], Žikić Z.[1], Tomašević A.[2],Veković V.[3]
[1]Institute for Student's Health of Belgrade University, Belgrade, Serbia
[2]Institute for Oncology and Radiology of Serbia, Belgrade, Serbia
[3]Children's Hospital for Pulmonary Diseases and Tuberculosis, Medical Centre "Dr. Dragiša Mišović", Belgrade, Serbia

Institute for Student's health of Belgrade University, together with its partners – City Institute for lung diseases and tuberculosis, GSK, IFMSA and Belgrade Marathon organization, has organized a series of manifestations dedicated to the occasion of the World Asthma Day and promotion of the healthy life style.
Objective: The goal of this paper is to show that the use of common public activities and series of preventive manifestations could be used to point out the significance of the World Asthma Day and raise the people's awareness about this important topic.
Methods and results: During one month of intense preventive manifestations, organized with excellent media coverage, the following activities were performed: on 31st of March at Ada Ciganlija, during the Belgrade Marathon preparations, Institute for Student's health of Belgrade University physicians and nurses have performed spirometry tests for the all of the interested marathon participants (in total of 54), and have distributed leaflets about prevention and treatment of asthma. For the occasion of the Student's Day on 4th of April, from 12:00 till 14:00, a check of the pulmonary function was performed in the Student's City (in total 64 spirometry tests). At the same time other examinations were performed, such as glycemia and blood pressure check, lipid status, dermatology, gynecology, epidemiology and dental consultations. An expert panel took place in the Dom Omladine on the 20th of April, when dr Snežana Stojanović Ristić held a lecture "Running - an asthma cure", with 33 spirometry tests of lung function performed during the panel. As the crowning activity, the main manifestation was held during the 31st Belgrade Marathon on the World Asthma Day - 21st of April. Institute for Student's health of Belgrade University, together with its partners organized a check point near the marathon finish, hepled by the huge interest of the citizens and marathon participants, performed 265 spirometry tests.
Conclusion: All the manifestations that were organized from 31st of March till 21st of April have passed in an exceptionally cheerful and friendly atmosphere. Institute for Student's health of Belgrade University has performed 417 free spirometry tests during these manifestations.

Key words: asthma, the world asthma day, preventive community actions

8. PREVALENCE OF POOR POSTURE, SPINE DEFORMITIES AND FLAT FEET AMONG SCHOOLCHILDREN IN VOJVODINA

Sonja Šušnjević[1,2],Mijatović Jovanović V.[1,2], Ukropina S.[1,2],Čanković S.[1,2],Nićiforović Šurković O.[1,2],Tomašević T.[1,2]
[1]University of Novi Sad, Faculty of Medicine, Hajduk Veljkova 3, Novi Sad, Serbia.
[2] Institute of Public Health of Vojvodina, Futoška 121, Novi Sad, Serbia.

Objectives: This study was designed to assess the prevalence of poor posture, spine deformities and flat feet of schoolchildren in Vojvodina, based on the data collected during yearly checkups in children health care services.
Methods: Out of total sample (N=69.659) 71,9% of children were from elementary school and 28,1% from high school. To assess potential gender and age specific differences in distribution of poor posture, spine deformities and flat feet, Chi square was calculated.
Results: Poor posture was found in 10.323 (20,6%) children from elementary school, more in boys than in girls (51,7% vs. 48,3%, $p>0,05$) and in 5.564 (28,4%) children from high school, more in girls than in boys (52,3% vs. 47,7%, $p<0,001$). The most common spine deformities in students from elementary school as well as from high school were scoliosis (6,7% vs. 13,2%, $p<0,001$), than kyphosis (1,8% vs. 3,1%, $p<0,05$) and lordosis (0,4% vs. 0,3%, $p<0,001$). Flat feet were found in 19,% students from elementary school and 15,2% from high school.
Conclusion: These high prevalence of poor posture implies that prevention through physical activity and early effective treatment should be essential.
Key words: Schoolchildren, Poor posture, Spine deformities, Flat feet

POSTER PRESENTATIONS

1. REPRODUCTIVE HEALTH AMONG YOUNG PEOPLE - KNOWLEDGE, ATTITUDES AND PRACTICE

Majda Sarihodžić[1], Krdžalić T.[1]
[1]Institute of Public Health of Tuzla Canton, BiH

GOAL:
To show the level of knowledge, attitudes and practices related to reproductive health on the sample of populations of nurse interns.
METHODS:
Survey of the population of nurse interns at the Public Health Institute of Tuzla Canton conducted by a questionnaire created for this purpose. The sample covered 123 respondents, of whom 33% were male and 67% female. The choice of respondents is based on a voluntary questionnaire with respect to the anonymity of each respondent.
THE RESULTS:
Testing has shown that 42% of respondents answered incorrectly what is reproductive health, and 18% do not know the correct answer to what is menstruation. When asked about the reasons for sexual intercourse, 20% state that this is because the partner wants them, because they all do that, because they are more popular among peers. Of the 65% of those who came into sexual intercourse, 17% did so with less than 18 years of age. Protection in sexual intercourse is never or occasionally used by 90% of respondents.
CONCLUSION:
The research results point to the need to introduce sexual education into the education system to enable information, acceptance of positive opinions and values and responsible sexual behavior of males, and to prevent the many unwanted consequences of ignorance and risk behavior.

2. EPIDEMIOLOGICAL CHARACTERISTICS AND TREND OF CHANGES IN CHILDBEARING IN SERBIA

Sanja Kocić[1,2], Radević S.[2], Radovanović S.[1,2], Popović P.[1], Mihailović N.[1], Janićijević K.[2], Žilović S.[3]
[1]Department of Social medicine, Institute for Public Health Kragujevac, Kragujevac, Serbia
[2]Department of Social Medicine, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia
[3]Department of Social medicine, Health center Studenica Kraljevo, Serbia
[3]Department of Social medicine, Health center Studenica Kraljevo, Serbia

Objectives: Childbearing and fertility are crucial variables of population development. The aim of this paper is to analyze the epidemiological characteristics and trend of births in Serbia in the period 2007-2016.
Materials and methods: A descriptive epidemiological study was applied. Analysis was made on the basis of the Health Statistical Yearbook from Institute of Public Health of Serbia for the period 2007. to 2016. The linear trend has been calculated.
Results: In Serbia a continuous descending trend in the number of deliveries is registered (y=-439.99x+68427, R2=0.6279) as well as the in the number of live births (y=-421,44x+69084, R2=0,5906). The average total fertility rate in Serbia is 1.5 children per woman, which is one third lower than the level necessary to ensure a basic reproduction. The average birth rate during the reporting period amounted to 41,1 / 1000 women of childbearing age, and the highest proportion of births is registered in the age group of women 20-29 years old. We have noted a continuous increasing trend in delivery in the older age groups, particularly in the age group of 30-39 years of age (y=872.54x+22704, R^2=0.8718). On the other hand, a declining trend in birth among adolescents under 19 years is recorded. The highest rate of stillbirths is recorded in the oldest group of 45-49 years of age (23,3 / 1000 live births), and then in the age group of 40-44 years of age (13,0 / 1000 live births). Also, the high rates of stillbirth among adolescent females aged 15-19 years are recorded (8,4 / 1000 live births).
Conclusion: Population policy measures towards the revitalization of birth must engage all levels of society to build awareness and moral responsibility towards fertility and provide conditions, first of all for the expanded reproduction, and later for a higher level of birth and for a shift of the birth age towards the younger age cohorts of women.
Keywords: dilivery, fertility, mortinatality, trend

3. FACTORS ASSOCIATED WITH PSYCHOACTIVE SUBSTANCE ABUSE BY ADOLESCENTS: EVIDENCE FROM NATIONAL HEALTH SURVEY IN SERBIA

Snežana Radovanović[1,2], Kocić S.[1,2], Radević S.[2], Simić Vukomanović I.[1,2], Janićijević K.[2], Vasiljević D.[3], Đonović N.[3]

[1]Department of Social medicine, Institute for Public Health Kragujevac, Kragujevac, Serbia

[2]Department of Social Medicine, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

[3]Department of Hygiene, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

Objectives: The study is related to the impact of demographic and socioeconomic factors on the frequency of the psychoactive substances abuse among young population in Serbia.

Materials and methods: The research is a part of 2013 Survey of the Health of Serbian Population, conducted by the Ministry of Health of the Republic of Serbia. The study covered 1722 subjects at age between 15 and 24.

Results: The only factor that is associated with the consumption of cigarettes is self-assessment of health, respondents who evaluate their health as good for 30% less often smokers than in those who evaluate their health as poor (OR = 0.700). Men are 1.8 times more likely to use alcohol than women (OR = 1.882). Respondents with higher education have 55.3% greater chance of alcohol consumption compared to those with low education (OR = 0.477). Young people who live in urban areas are 1.8 times more likely to consume alcohol in relation to those who live in rural areas (OR = 1.843). Members of poor class for 33.9% less consume alcohol (OR = 0.661) compared with those who belong to the rich class of the population. As the most important predictors of use of drugs/ illicit drugs were found to be gender and self-assessed health. Men 88% less likely to use drugs and illicit drugs than women (OR = 0.120). Also those who assess their health as good to make less frequently by 56.9% compared to those who assess their health as poor (OR = 0.431).

Conclusion: The results of the study of psychoactive substances abuse among young people in Serbia point to the necessity to work on the prevention of risky behavior and the abuse of and dependence on the psychoactive substances.

Keywords: psychoactive substances, Serbia, youth, National Health Survey

4. PROMOTING THE ORAL HEALTH OF CHILDREN IN PRIMARY AND SECUNDARY SCHOOLS IN OHRID AND THE IMPACT ON THEIR QUALITY OF LIFE

BiljanaTaushanova [1], Pavlovska I.[1], Ljuljzime B.,[2]Veljanoska S.[3]
[1]Medical Faculty, Institute of Epidemiology and Biostatistics with Medical informations, University "Ss. Cyril and Methodius ", Skopje, R. Macedonia
[2]Centre for Public Health, Skopje, R. Macedonia
[3]Centre for Public Health, Ohrid, R. Macedonia

Introduction:Oral health is part of the global health of the individuals. Great impact has the influence of problems with teeth and mouth on the general health. They are in the part of functional and social restrictions, physical pain, psychological problems. There is the need of using the preventive programs in the goal of improving and providing the oral health of the children population on the higher level.
Objective:The objective of the study is to see the real situation of the teeth and mouth of the children in Ohrid and the impact of oral health on the quality of life.
Material and methods: Cross-sectional study was performed on 248 respondents (children of the age from 11 to 18 years), selected on the base of randomization from the primary and secondary schools in Ohrid. They filled out the questionnaire (OHIP) and were reviewed by a dentists who noted the current state of teeth. Then, by the statistical processing of data in SPPS program version 17, they were divided in two groups, (A and B), according to whether they are in secondary schools, or in primary.
Results: Showed that social-demographic characteristics are important factors for treatment and care of the individuals in oral health, the common reason for postponing a visit to the dentist, although in need of it, dental problems that impair social aspects of everyday life and dental problems that lead to poor nutrition or difficulty while eating. From 248 respondents, 56% are female and 44% are male. ($p>0,05$) Out of 88 respondents who are postponing the visit to the dentist, although in need of it, 39,8% belong to group A, 60,2% belong to group B. ($p<0,05$) Out of 68 children who feel self-awareness of oral health care, 33,8% belong to group A, while 66,2% belong to group B. (Odds Ratio=0,400). ($p<0,05$) Out of 44 children who thing that remediation is an extra expense on the family budget, 36,4% belong to group A, 63,6% belong to group B. (Odds Ratio=1,125), ($p<0,05$) Out of 44 children who thing that the life is less quality, due to problems with teeth, 34,1% belong to group A, while 65,9% belong to group B. (Odds Ratio=1,147), ($p<0,05$) CEP index used by the dentists, denotes the average number of carious, extracted and sealed teeth among the children population.
Conclusion: Factors: postponing the visit to the dentist, although in need of it, feeling self-awareness of oral health care, remediation is an extra expense on the family budget, represent values that are statistically significant associated with the conclusion that the life has less quality, due to problems with teeth.
Keywords: quality of life, oral health, children population

5. THE ROLE AND IMPORTANCE OF HAELTH PROMOTION IN REDUCING MORTALITY RATE OF BREAST CANCER ON THE TERRITORY OF PIROT

Slavica Ciric Pejcic
General Hospital Pirot, Serbia

Breast cancer, the name of Anglo-Saxon authors includes breast cancer that develops from the ducts and glandular breast structures. In Central Serbia breast cancer is the leading cause of death in women (18% of all cancers).

Work aim: The observation mortality rate of new breast cancer sufferers in the Pirot municipality and suggestions for prevention of breast cancer as relevant social-medical issue.

The method: Application of descriptive-epidemiologist studies of breast cancer for the female population in Pirot municipality for period between 1999. to 2012.

Analysing: The mortality rate from breast cancer considering regions and the age of group samples for chosen time period in Pirot municipality.

The results of the work and discussion: In Pirot region the rate of mortality from breast cancer is showing a slight growth from 1999. (36,7) to 2012. (39,7/100.000). The average growth rate for breast cancer mortality rate in the Pirot municipality for observed time period is 34,3/100.000 and it is slightly lower than average mortality rate for Central Serbia which was 43,4/1000.000 in the year 2012.

The other municipalities in the Pirot region similarly have slightly lower mortality rate comparing to Central Serbia: Dimitrovgrad municipality (40,76/100.000), Pirot municipality (36,5/100.00), Babusnica municipality (28,67/100.000), Bela Palanka municipality (29,9/100.000).

The average specific-increase in mortality from breast cancer in regions of Pirot municipality shows that the risk of dying from breast cancer is closely link with the aging factor: the highest percent of woman dying in the age over 50 years old is documented in the Pirot municipialtety (88,9%), followed by Dimitrovgrad municipality (78,6%), Babusnica municipality (78,3%), with the lowest mortality rate being registered in Bela Palanka (72,6%).

The highest percent of woman dying under the age of 50 years old is in the municipality of Bela Palanka (13%), followed by Pirot municipality (10,6%), then Babusnica municipality (7,4%) and lastly Dimitrovgrad municipality (7%).

The conclusion: Influence the changing attitude of the community at the national and local level about the values of undertaking preventive actions in promoting healthy lifestyles. Primary prevention measures should be carried out on an individual and population level.

6. THE AVAILABILITY OF TOBACCO, ALCOHOL AND ILLICIT DRUGS TO THE SIXTEEN YEARS AGED PUPILS IN THE CITY OF NOVI SAD

Snežana Ukropina[1,2], Mijatović Jovanović V[1,2]., Ivana Radić I[1,2]., Dušan Čanković D[1,2]., Čanković S.,[1,2] Nićiforović Šurković O[1,2]., Tomašević T[1,2].
[1] University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia
[2] Institute of Public Health of Vojvodina, Novi Sad, Serbia

Objective: Determination of availability of tobacco, alcohol and illegal drugs to the sixteen years aged pupils in the City of Novi Sad, according to their gender, school success and level of parental control.
Materials and methods: Surveyapplied ***ESPAD*** questionnaire on availability of tobacco, alcohol and illicit drugs, among 480 male and 587 female pupils, aged sixteen years.
Results:
Females were more often stating tobacco as easily available (85.6%) ($p<0.05$). All acoholic beverages were easily available at both genders but larger availability has been stated for beer by females compared to males (86.9% vs 84.5%; $p<0.05$) and young whose parents are not aware where their children are spending Saturday evening (93.3%) compared to others (84.9%; $p<0.05$). Larger availability of alcopops (74.8%) was asserted by young of excellent or very good school success ($p<0.05$). Larger availability of strong alcoholic drinks was determined at young whose parents has lower level of parental control (83.9% vs. 69.1%; $p<0.05$). Wine has been available in 79.0% cases. Marijuana has been determined as the most available illegal drug at 50.2% of young, more often at young whose parents had lower control criterion for off-time (33.1% vs. 48.0%; $p<0.05$). The high estimate of young on availability of amfetamine (25.9%), metamfetamine (26.2%), sedatives (47.2%), extasy (35.6%), cocaine (19.6%) and crack (18.4%) was found.
Conclusion: The high estimate on availability of psychoactive substances among sixteen years old pupils in Novi Sad has been determined. It is necessary to increase controlling mechanisms for the application of relevant laws in this field and enhance education of young and their parents.
Key word: Tobacco use, Alcohol use, Illegal drugs abuse, Availability

7. THE ASSOCIATIONS OF SOCIO-ECONOMIC DETERMINANTS WITH CONDOM USE IN SECONDARY SCHOOL STUDENTS IN VOJVODINA

Tanja Tomašević[1]., Ukropina S[1,2]., Mijatović Jovanović V[1,2]., Čanković S[1,2]., Šušnjević S[1,2]., Kvrgić S[1,2].

[1]Institute of Public Health of Vojvodina, Novi Sad, Serbia

[2]University of Novi Sad Faculty of medicine Novi Sad, Serbia

Objectives: To determine the association of socio-economic determinants with the condom use during the first sexual intercourse with a new partner in secondary school students.

Material and methods: Self-administrated questionnaire was used in secondary schools in Vojvodina on a sample of 5.230 second grade students as a part of the project "Health Education on the Reproductive Health of Secondary School Students in Vojvodina" conducted in 2015/2016.

Results: Sexual intercourse had 30.6% students, significantly more boys than girls (57.4% compared to 42.6%; $p<0.001$). Among sexually active students, 64,0% always used a condom during the first sexual intercourse with a new partner, 21.1% sometimes used it and 14% never used it. In the analysis, gender, material status and school success were shown as predictors of not using condom. Boys (OR= 1.2; 95%CI [1.0-1.6]; $p<0.05$), students with poor material status compared to students with good material status (OR=2,0; 95%CI [1.2-3.5]; $p<0.01$) as well as students with good and poor school success compare to students with excellent and very good school success (OR=1.3; 95%CI [1.0-1.7]; $p<0.05$) were more likely to not use a condom during their first sexual intercourse with a new partner.

Conclusion: These results points to the necessity to take measures in terms of better accessibility of condoms as contraception.

Keywords: Condom use, Socio-economic determinants, Secondary school students

CIP - Каталогизација у публикацији - Народна библиотека Србије, Београд

614.4(048)
616-084(048)

INTERNATIONAL Congress Days of Preventive Medicine (52; 2018; Niš)
Book of Abstracts - Зборник резимеа / 52nd Days of PreventiveMedicine, International Congress [25-28. September 2018. Niš] - 52. Данипревентивне медицине, међународни конгрес; [endorsed by] Public HealthInstitute Niš [and] Faculty of Medicine Niš [and] Serbian Medical Society of Niš - [у организацији] Институт за јавно здравље Ниш [и] Медицинскифакултет Ниш [и] Српско лекарско друштво подружница Ниш; [editor inchief, уредник Biljana Kocić]. – Niš : Public Health Institute : Facultyof Medicine : Serbian Medical Society, 2018 (Ниш : Галаксија). - 240 str. : ilustr. ; 30 cm

Tiraž 350. - Bibliografija uz pojedine apstrakte.

ISBN 978-86-915991-9-5 (PHI)
1. Public Health Institute (Niš) 2. Faculty of Medicine (Niš) 3. Serbian Medical Society (Niš)
a) Превентивна медицина - Апстракти
COBISS.SR-ID 268784396