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**POZIV ZA RUKOPISE ZA TEMATSKI BROJ ČASOPISA POD NAZIVOM
„JAVNOZDRAVSTVENI, KLINIČKI, DIJAGNOSTIČKI, TERAPIJSKI I
EKONOMSKI ASPEKTI COVID-19“**

U pripremi je tematski broj časopisa „Zdravstvena zaštita“ koji će biti posvećen koronavirusnoj bolesti COVID-19. Tematski broj biće objavljen u septembru, pod nazivom „*Javnozdravstveni, klinički, dijagnostički, terapijski i ekonomski aspekti COVID-19*“. Komora zdravstvenih ustanova Srbije na ovaj način želi da da doprinos sagledavanju izazova sa kojim se suočava zdravstveni sistem u Srbiji ali i zdravstveni sistemi širom sveta.

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Sve detaljnije informacije u vezi sa časopisom „Zdravstvena zaštita“ možete naći na sajtu Komore zdravstvenih ustanova Srbije <http://www.komorazus.org.rs/>, a za komunikaciju su na raspolaganju e-mail: urednik@komorazus.org.rs i brojevi telefona: +381-11-3622-523 ili +381-11-3622-524.

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“THE PUBLIC HEALTH, CLINICAL, DIAGNOSTIC, THERAPEUTIC AND ECONOMIC ASPECTS
OF COVID-19”**

A thematic issue of the Journal “Health Care”, which will be dedicated to the coronavirus disease COVID-19, is being prepared. The thematic issue will be published in September under the title “The public health, clinical, diagnostic, therapeutic and economic aspects of COVID-19”. The Serbian Chamber of Healthcare Institutions in this way hopes to contribute to realizing challenges faced by the health system of Serbia, and health systems around the world.

We invite all the interested parties to send their original, unpublished expert and scientific papers, review articles, meta-analyses, case reports, actual topics, short communications from the field of medicine, pharmacy, biochemistry, stomatology and economy, which relate to COVID-19, to the editorial board of the journal until August 15th, 2020, via the following address: **<https://aseestant.ceon.rs/index.php/zdravzast>**.

The topics of these papers can relate to: epidemiology, etiology, physiology, development of diagnostic and prognostic technologies, clinical research, which test the efficacy of specific interventions and different treatments etc.

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The aim is to help the Serbian, as well as international society, to prepare for future events and to realize different aspects of COVID-19.

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IMPORTOVANA MALARIJA NA PODRUČJU BEOGRADA U PERIODU OD 2014. DO 2018. GODINE

Sonja Giljača¹, Slavica Maris¹

¹Gradski zavod za javno zdravlje Beograd, Beograd, Srbija

SAŽETAK

Uvod/Cilj: U bivšoj Jugoslaviji eradikacija malarije zvanično je potvrđena od strane Svetske zdravstvene organizacije 1974. godine. Od tada u Srbiji se registruju samo importovani slučajevi malarije. Cilj ovog rada je da se analiziraju epidemiološke karakteristike importovane malarije na području Beograda u periodu od 2014. do 2018. godine.

Metode: Primenjena je deskriptivna epidemiološka studija. Podaci o broju novoobolelih od importovane malarije po polu, uzrastu i regionu odakle je malarija importovana, za navedeni period, preuzeti su iz Gradskog zavoda za javno zdravlje Beograd. U analizi podataka korišćene su proporcije, sirove i uzrasnospecifične stope incidencije.

Rezultati: U periodu 2014-2018. godine, na području Beograda registrovano je 77 novoobolelih od importovane malarije, a prosečna sirova stopa incidencije iznosila je 0,9 na 100.000 stanovnika. Najveći broj obolelih (28) i najveća sirova stopa incidencije (1,7/100.000) importovane malarije zabeleženi su u 2017. godini, a najmanji broj obolelih (7) i najmanja sirova stopa incidencije (4,0/100.000) u 2014. i 2018. godini. Muškarci (89,6%) su češće oboljevali od importovane malarije nego žene (10,4%). Najveća uzrasno specifična stopa incidencije importovane malarije registrovana je u uzrasnoj grupi od 10 do 19 godina (3,5/100.000). *P. vivax* (45,4%) i *P. falciparum* (37,7%) su bili najčešći uzročnici importovane malarije u Beogradu. Oko 88% importovanih slučajeva malarije činile su osobe koje su boravile u endemskim područjima Azije i Afrike. Najveći broj obolelih od importovane malarije navodi migraciju (44,2%) i odlazak zbog posla (39,0%) kao razloge putovanja u endemska područja. Oboljenje se registruje tokom čitave godine, sa pikom oboljevanja u mesecu avgustu (19,5%).

Zaključak: Neophodno je kontinuirano zdravstveno vaspitanje stanovništva, u cilju edukacije stanovništva o načinu prenošenja malarije i neophodnosti primene mera prevencije tokom boravka u zemljama gde se endemski održava malarija.

Ključne reči: importovana malarija, incidencija, endemski regioni

Uvod

Malarija je oboljenje uzrokovano parazitima koji pripadaju rodu *Plasmodium* (*P.*). Čovek se inficira ubodom zaraženih ženki komaraca roda *Anopheles*. Poznato je preko 250 vrsta roda *Plasmodium* koje mogu parazitirati kod različitih životinja, uključujući primata, glodare, ptice i gmizavce. Uzročnici malarije kod ljudi su *P. falciparum*, *P. malariae*, *P. vivax*, *P. ovale*, a od nedavno i zoonotska vrsta *P. knowlesi*, zbog pojava epidemija u jugoistočnoj Aziji. Malarija je vezana za vodena staništa vektora, pre svega tropskih i suprotropskih regiona sveta, gde visoke

temperature pogoduju vektorima i obezbeđuju razvoj plazmodijuma u ženki komaraca (1,2).

Klinička slika malarije zavisi uglavnom od obrasca i intenziteta prenosa malarije u mestu prebivališta, što određuje stepen stečene zaštite i profil kliničkog oboljenja. Malariju karakteriše groznica i simptomi slični gripu, uključujući jezu, glavobolju, bol u mišićima i slabost. Navedeni simptomi se mogu javiti u intervalima (3). Najveći broj slučajeva malarije se klasifikuje kao umerena ili nekomplikovana malarija. Međutim, malarija može dovesti do anemije, uvećane slezine, trombocitopenije,

IMPORTED MALARIA ON THE TERRITORY OF BELGRADE FROM 2014 TO 2018

Sonja Giljaca¹, Slavica Maris¹

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SUMMARY

Introduction/Aim: In the former Yugoslavia, malaria eradication was officially confirmed by the World Health Organization in 1974. Since then, only imported cases of malaria have been recorded in Serbia. The aim of this study was to analyze epidemiological characteristics of imported malaria on the territory of Belgrade from 2014 to 2018.

Methods: A descriptive epidemiological study was applied. Data on the number of newly diagnosed patients with imported malaria by gender, age and region from which malaria was imported, for the specified period were taken from the Institute of Public Health of Belgrade. Proportional, crude and age-specific incidence rates were used in the data analysis.

Results: There were 77 cases of imported malaria registered on the territory of Belgrade from 2014 to 2018, and the average crude incidence rate was 0.9/100,000. The highest number of patients (28) and the highest incidence rate (1.7/100,000) of imported malaria were registered in 2017, and the lowest number of patients (7) and the lowest incidence rate (0.4/100,000) were registered in 2014 and 2018. This disease was more common among men (89.6%) than among women (10.4%). The highest age-specific rate of imported malaria was registered in the age group of 10-19 years (3.5/100,000). *P. vivax* (45.4%) and *P. falciparum* (37.7%) were the most frequent causative agents of imported malaria in Belgrade. About 88% of imported malaria cases were from people living in endemic areas of Asia and Africa. The largest number of newly diseased cases of imported malaria stated migration (44.2%) and work (39.0%) as the reason for their stay in endemic regions. The condition is registered throughout the year, with the peak of the disease in August (19.5%).

Conclusion: It is necessary to continuously improve the health education of the population, in order to educate population about the manner of transmission of malaria, and to apply measures of prevention during their stay in endemic countries.

Key words: imported malaria, incidence, endemic regions

Introduction

Malaria is a disease caused by parasites, which belong to the genus *Plasmodium* (*P.*). People get infected when they are bitten by an infected female mosquito of the *Anopheles* genus. There are more than 250 species of the *Plasmodium* genus, which can infect different animals, including primates, rodents, birds and reptiles. Causative agents of malaria in humans are *P. falciparum*, *P. malariae*, *P. vivax*, *P. ovale*, and recently zoonotic species *P. knowlesi* has been recognized, due to the occurrence of epidemic in Southeastern Asia, as the fifth

causative agent of malaria in humans. Malaria vectors are associated with water habitats, in the tropical and subtropical regions of the world, where high temperatures favor vectors and ensure the development of plasmodium in female mosquitoes (1,2).

The clinical picture of malaria depends mainly on the pattern and intensity of malaria transition at the place of residence, which determines the degree of the acquired protection and the profile of clinical illness. Malaria is characterized by fever and symptoms similar to influenza, including chills, headache,

blage žutice, uvećane jetre, ubrzanog disanja, ali i teških komplikacija i smrtnog ishoda. Za pojavu ozbiljnih oštećenja organa u kratkom periodu, kao i za većinu smrtnih slučajeva odgovoran je *P. falciparum*. Inkubacija obuhvata vreme od uboda komarca do početka ispoljavanja bolesti i varira od 7 do 30 dana, ali može biti i znatno duža. Najkraća inkubacija, sa retkim izuzecima, vezuje se za *P. falciparum*, dok *P. malariae* može imati dugu inkubaciju, merenu i decenijama (1).

Tehnika mikroskopskog pregleda razmaza periferne krvi i dalje predstavlja zlatni standard u dijagnostici malarije. Pored mikroskopije, dijagnostika malarije uključuje: brze dijagnostičke testove (engl. *Rapid Diagnostic Test* - RDT), serologiju i molekularne metode zasnovane na reakciji lančane polimeraze (engl. *Polymerase Chain Reaction* - PCR) (1,2).

Dve ključne mere u prevenciji malarije su: hemioprofilaksa i borba protiv komaraca (4). Svetska zdravstvena organizacija, u saradnji sa Vladom Malavija, pokrenula je u Malaviju 23.04.2019. godine pilot program za prvu vakcinu protiv malarije u svetu. Malavi je prva od tri zemlje u Africi, u kojoj će „moskiriks” vakcina (engl. *Mosquirix*), poznatija kao RTS,S vakcina, biti dostupna deci starosti do 2 godine. U Gani i Keniji je planirana primena RTS,S vakcine krajem 2019. godine. Vakcina se daje u četiri doze, tri doze između 5. i 9. meseca života, a četvrta doza oko druge godine (5). Do sada, RTS,S je jedina vakcina protiv malarije koja je bila u trećoj fazi ispitivanja u Africi od 2009. do 2014. godine, i koja se pokazala efikasnom i do 36% u prevenciji malarije (6).

Cilj ovog rada je da se analiziraju epidemiološke karakteristike importovane

malarije na području Beograda u periodu 2014 – 2018. godine.

Metode

Primenjena je deskriptivna epidemiološka studija. Podaci o broju novoobolelih od importovane malarije po polu, uzrastu, datumu dijagnostikovanja, endemskom regionu odakle je malarija importovana, razlogu boravka u endemskom području, i dužini vremena koje protekne od boravka u endemskom području do pojave simptoma malarije, su preuzeti iz Gradskog zavoda za javno zdravlje Beograd. Kao izvor podataka korišćene su pojedinačne prijave zaraznih bolesti, epidemiološke ankete i informacije iz Centra za kontrolu i prevenciju bolesti Gradskog zavoda za javno zdravlje Beograd.

U analizi podataka korišćene su proporcije, sirove i uzrasno specifične stope incidencije. Za izračunavanje stopa incidencije, kao brojilac korišćen je broj novoobolelih od importovane malarije za posmatranu godinu, a za imenilac broj stanovnika Beograda sredinom posmatranog perioda, a prema podacima popisa stanovništva iz 2011. godine.

Rezultati

U periodu 2014-2018. godine, na području Beograda registrovano je 77 novoobolelih od importovane malarije, a prosečna sirova stopa incidencije je iznosila 0,9/100.000. Najveći broj novoobolelih (28) i najveća sirova stopa incidencije (1,7/100.000) importovane malarije je zabeležena u 2017. godini, a najmanje novoobolelih (7) i najmanje sirove stope incidencije (0,4/100.000) registrovane

Tabela 1. Broj novoobolelih i uzrasno specifične stope incidencije (na 100.000) za importovanu malariju, Beograd, 2014 – 2018. godina

Uzrasne grupe (Age groups)	≤ 9	10-19	20-29	30-39	40-49	50-59	60+	Ukupno (Total)
	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	
Godina (Years)								
2014	0 (0.0)	0 (0.0)	1 (0.4)	1 (0.4)	2 (0.9)	3 (1.2)	0 (0.0)	7 (0.4)
2015	0 (0.0)	0 (0.0)	3 (1.3)	4 (1.5)	0 (0.0)	4 (1.6)	2 (0.5)	13 (0.8)
2016	0 (0.0)	11 (6.9)	4 (1.8)	2 (0.7)	3 (1.3)	2 (0.8)	0 (0.0)	22 (1.3)
2017	0 (0.0)	17 (10.7)	2 (0.8)	4 (1.5)	1 (0.4)	2 (0.8)	2 (0.5)	28 (1.7)
2018	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.7)	2 (0.9)	2 (0.8)	1 (0.2)	7 (0.4)
2014-2018	0 (0.0)	28 (3.5)	10 (0.8)	13 (0.9)	8 (0.7)	13 (1.0)	5 (0.2)	77 (1.0)

*Stopa incidencije

pain in muscles, and weakness. These symptoms can appear in intervals (3). The greatest number of malaria cases is classified as mild or uncomplicated malaria. However, malaria can lead to anemia, splenomegaly, thrombocytopenia, mild jaundice, enlarged spleen, fast breathing, but also to complications and deathly outcome. *P. falciparum* is responsible for the appearance of severe organ damage in a short period of time and for most of deathly outcomes, as well. The incubation period includes the time following the mosquito bite until the first symptoms appear and it varies from 7 to 30 days, but it can be much longer. The shortest incubation period, with rare exceptions, is associated with *P. falciparum*, whereas *P. malariae* can have a long incubation period, lasting even decades (1).

The technique of viewing the peripheral blood smears under the microscope is the golden standard diagnosis test for malaria. Beside the microscopy, malaria diagnosis includes: Rapid Diagnostic Tests (RDT), serology testing and molecular testing based on Polymerase Chain Reaction – PCR (1,2).

Two key measures regarding the prevention of malaria are: chemoprophylaxis and combating mosquitoes (4). The World Health Organization, in cooperation with the government of Malawi, launched the pilot program for the first vaccine against malaria in the world on the 23rd of April, 2019. Malawi is the first of the three countries in Africa, in which the Mosquirix vaccine, known as RTS,S vaccine, will be made available to children up to two years of age. The application of RTS,S vaccine was planned in Ghana and Kenya near the end

of 2019. The vaccine is given in four doses, three doses between 5 and 9 months of age, and the fourth around two years of age (5). RTS,S has been the only vaccine against malaria so far, which was in the phase three trial in Africa from 2009 to 2014, and which proved to be efficient in up to 36% regarding malaria prevention (6).

The aim of this study was to analyze the epidemiological characteristics of imported malaria on the territory of Belgrade from 2014 to 2018.

Methods

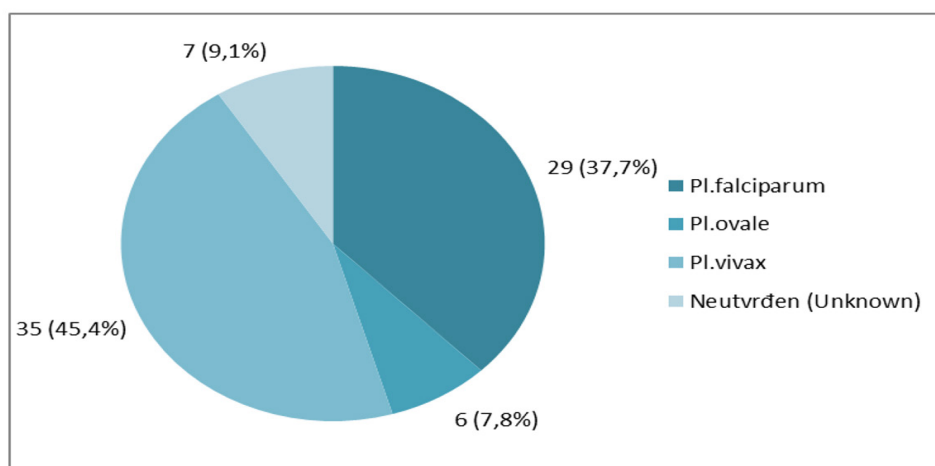
A descriptive epidemiological study was applied. Data on the number of newly diagnosed patients with imported malaria regarding gender, age, date of diagnosis, endemic region, where malaria was imported from, the reason for staying in endemic regions, and the time which passed from their stay in endemic region to the first symptoms of malaria were taken from The Institute of Public Health of Belgrade. Individual reports on contagious diseases, epidemiological survey and information from the Centre for Disease Control and Prevention of The Institute of Public Health of Belgrade were used as a source of data.

Proportions, crude and age-specific incidence rates were used for the analysis of data. In order to calculate the incidence rates, the number of new cases of imported malaria for the observed year was used as a numerator, while the mid-year population number of Belgrade, according to the Census from 2011, was used as a denominator.

Table 1. Number of new cases and age-specific incidence rates (per 100,000) for imported malaria, Belgrade, 2014 – 2018

Uzrasne grupe (Age groups)	≤ 9	10-19	20-29	30-39	40-49	50-59	60+	Ukupno (Total)
	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	Broj (Stopa*) No (Rate*)	
Godina (Years)								
2014	0 (0.0)	0 (0.0)	1 (0.4)	1 (0.4)	2 (0.9)	3 (1.2)	0 (0.0)	7 (0.4)
2015	0 (0.0)	0 (0.0)	3 (1.3)	4 (1.5)	0 (0.0)	4 (1.6)	2 (0.5)	13 (0.8)
2016	0 (0.0)	11 (6.9)	4 (1.8)	2 (0.7)	3 (1.3)	2 (0.8)	0 (0.0)	22 (1.3)
2017	0 (0.0)	17 (10.7)	2 (0.8)	4 (1.5)	1 (0.4)	2 (0.8)	2 (0.5)	28 (1.7)
2018	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.7)	2 (0.9)	2 (0.8)	1 (0.2)	7 (0.4)
2014-2018	0 (0.0)	28 (3.5)	10 (0.8)	13 (0.9)	8 (0.7)	13 (1.0)	5 (0.2)	77 (1.0)

*Incidence rate



Grafikon 1. Distribucija novoobolelih od importovane malarije prema vrsti prouzrokovala, Beograd, 2014 – 2018. godina

su 2014. i 2018. godine (tabela 1). Muškarci (89,6%) su češće obolevali nego žene (10,4%). Najviša uzrasno specifična stopa incidencije importovane malarije je zabeležena u uzrasnoj grupi od 10 do 19 godina (3,5/100.000), a najniža u najstarijem uzrastu (60 i više godina) (0,25/100.000).

U posmatranom periodu kod najvećeg broja obolelih uzročnici importovane malarije su bili *P. vivax* (45,4%) i *P. falciparum* (37,7%), a najmanje *P. non specificata* (9,1%) i *P. ovale* (7,8%) (grafikon 1).

Najviše obolelih od importovane malarije je boravilo u endemskim područjima Azije (44,2%) i Afrike (44,2%), a najmanje je bilo sa područja Centralne Evrope (1,3%) (grafikon 2).

Kao razlog boravka u endemskom području, najveći broj novoobolelih od importovane malarije je naveo migraciju (44,2%) i posao (39,0%), a najmanji privatne razloge (2,6%) i

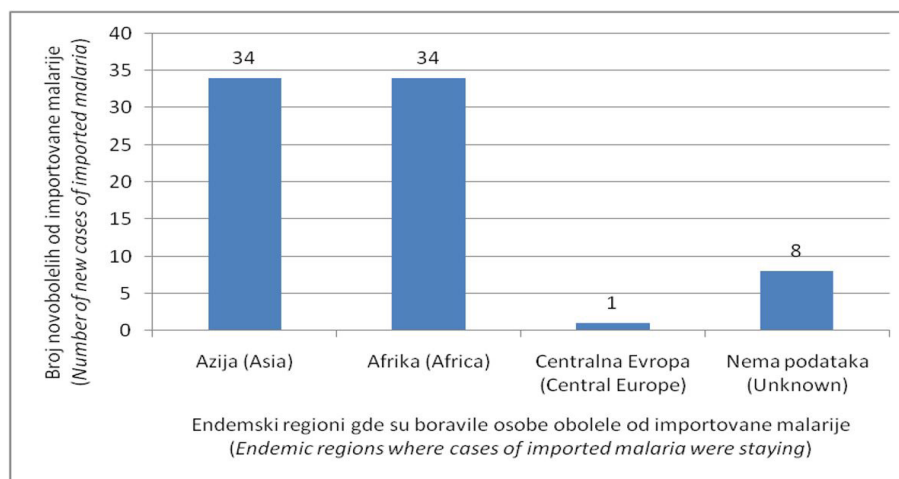
turizam (1,3%) (grafikon 3). Za deset osoba sa importovanom malarijom nije bio poznat razlog boravka u zemljama gde postoji endemska malarija.

Interval između dolaska u Srbiju i pojave simptoma malarije je bio poznat za 77% ispitanika (grafikon 4). Kod najvećeg broja obolelih (42,8%) od importovane malarije je došlo do pojave simptoma u periodu do 30 dana od povratka u Srbiju, a najmanje (3,9%) nakon godinu dana od dolaska u našu zemlju.

Oboleli od importovane malarije se registruju tokom cele godine. Najveći broj novoobolelih od importovane malarije je bio zabeležen u avgustu (19,5%), a najmanji u januaru (2,6%) (grafikon 5).

Diskusija

Iako je u poslednjih 50 godina značajno smanjena geografska teritorija zahvaćena



Grafikon 2. Broj novoobolelih od importovane malarije prema endemskom regionu gde su osobe boravile, Beograd, 2014 – 2018. godina

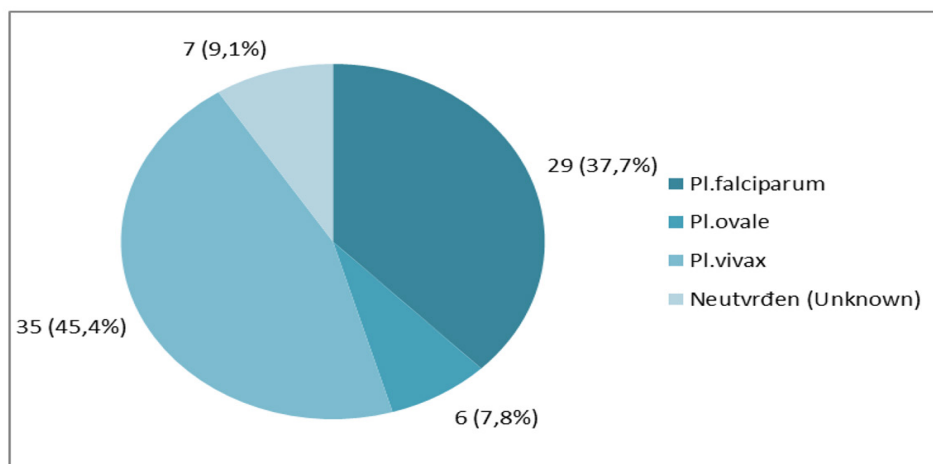


Figure 1. Distribution of new cases of imported malaria by species, Belgrade, 2014 – 2018

Results

There were 77 cases of imported malaria registered on the territory of Belgrade from 2014 to 2018, and the average crude incidence rate was 0.9/100,000. The largest number of newly diseased (28) and the highest crude incidence rates (1.7/100,000) of imported malaria were noted in 2017, whereas the smallest number of newly diseased (7) and the lowest crude incidence rates (0.4/100,000) were registered in 2014 and 2018 (Table 1). This disease was more common among men (89.6%) than among women (10.4%). The highest age-specific incidence rate of imported malaria (3.5/100,000) was noted in 10 to 19 age group, and the lowest rate (0.25/100,000) was in the oldest age group (60 years and older).

In the observed time period, the largest number of cases of imported malaria was caused by *P. vivax* (45.4%) and *P. falciparum* (37.7%), whereas the smallest number was caused by

P. non specificata (9.1%) and *P. ovale* (7.8%) (Figure 1).

Of 77 imported cases of malaria, 44.2% were from Asia, 44.2% from Africa, 1.3% from Central Europe, while for 10.4% cases it was not known where malaria was imported from (Figure 2).

The largest number of newly diseased cases of imported malaria stated migration (44.2%) and work (39.0%) as the reason for their stay in endemic regions, and the smallest number stated private reasons (2.6%) and tourism (1.3%) (Figure 3). The reason for staying in countries with endemic malaria was not known for ten people with imported malaria.

The interval from their arrival in Serbia and the first symptoms of malaria was known for 77% of examinees (Figure 4). In most cases of malaria patients (42.8%), the first symptoms appeared within 30 days after their arrival in Serbia, while the smallest number of patients

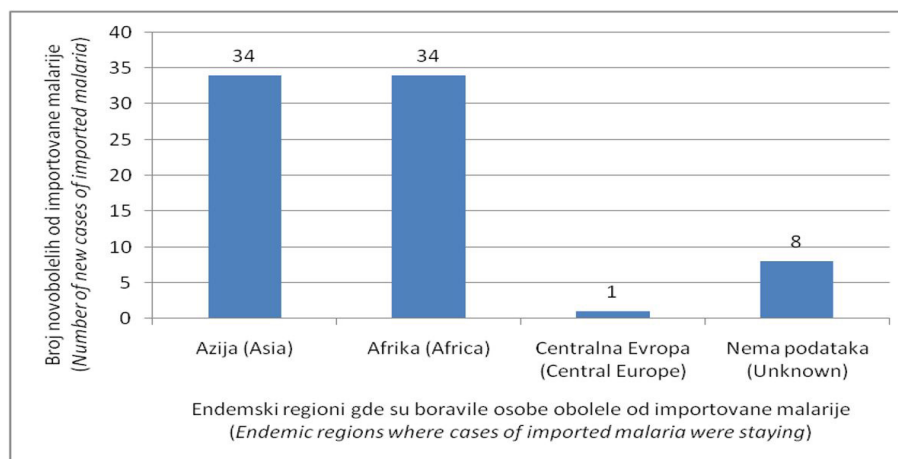
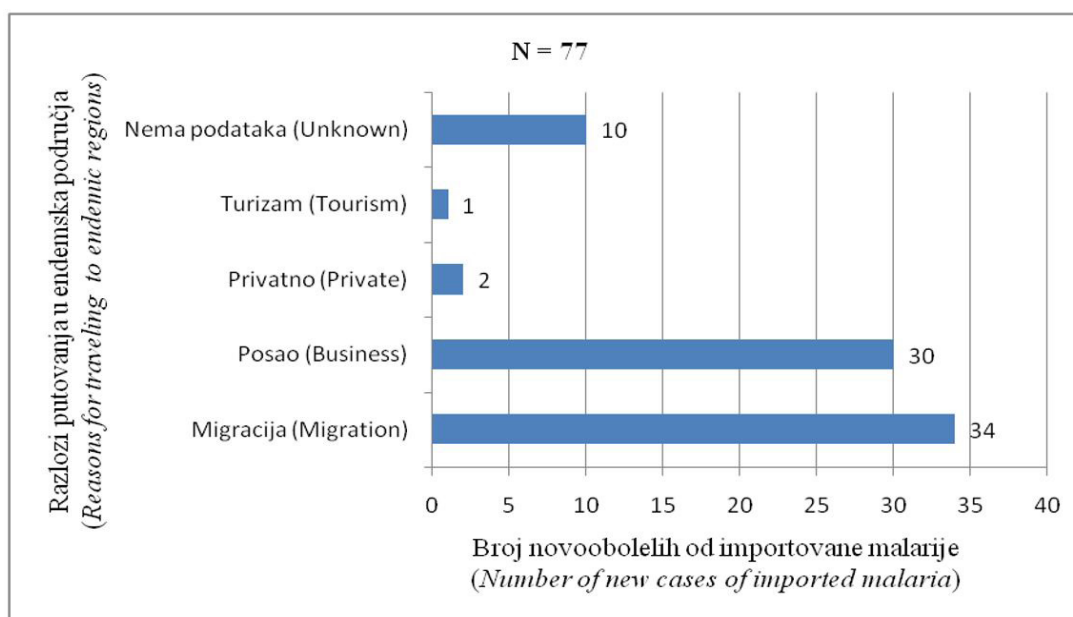


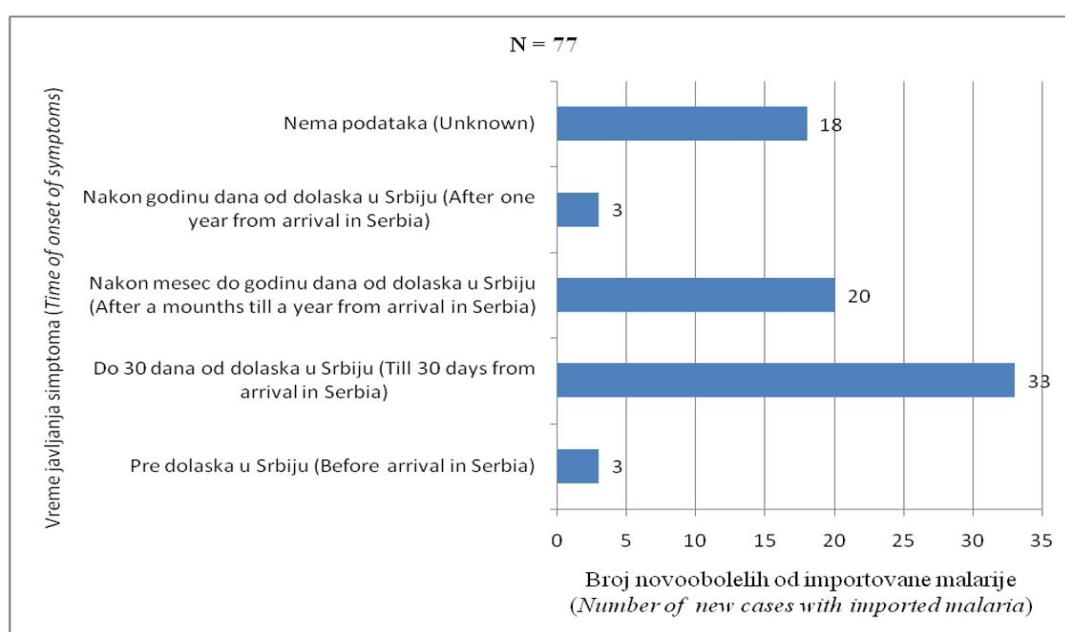
Figure 2. Number of new cases of imported malaria according to endemic region where they were staying, Belgrade, 2014 – 2018



Grafikon 3. Broj novoobolelih od importovane malarije prema razlozima putovanja u endemska područja, Beograd, 2014 – 2018. godina

malarijom, malarija i dalje predstavlja veliki javno-zdravstveni problem. Na globalnom nivou, u 2018. godini, prema podacima Svetske zdravstvene organizacije (SZO), od malarije je obolelo oko 228 miliona ljudi i umrlo 405 hiljada, što je manje nego u 2017. godini kada je bilo 231 milion obolelih i 416.000 umrlih (7-9). U pet država supsaharske Afrike (Nigerija, Demokratska Republika Kongo, Uganda, Mozambik i Obala Slonovače) prisutno je 50% svih slučajeva malarije. Trudnice i deca mlađa od pet godina u supsaharskoj Africi su

pod najvećim rizikom od malarije. Trudnoća smanjuje imunitet, čineći trudnice podložnijim infekciji i povećavajući rizik od obolevanja od malarije, teške anemije i smrti. U 2017. godini bilo je procenjeno da je čak 29% svih trudnica u supsaharskoj Africi inficirano malarijom, što je negde oko 3,2 miliona trudnica (7,9). Takođe, 67% svih smrtnih ishoda usled malarije na globalnom nivou je kod dece mlađe od 5 godina. Pored supsaharske Afrike, u riziku od malarije su jugoistočna Azija, istočni Mediteran, zapadni Pacifik i obe Amerike.



Grafikon 4. Vreme javljanja simptoma kod novoobolelih od importovane malarije nakon boravka u endemskom području, Beograd, 2014 – 2018. godina

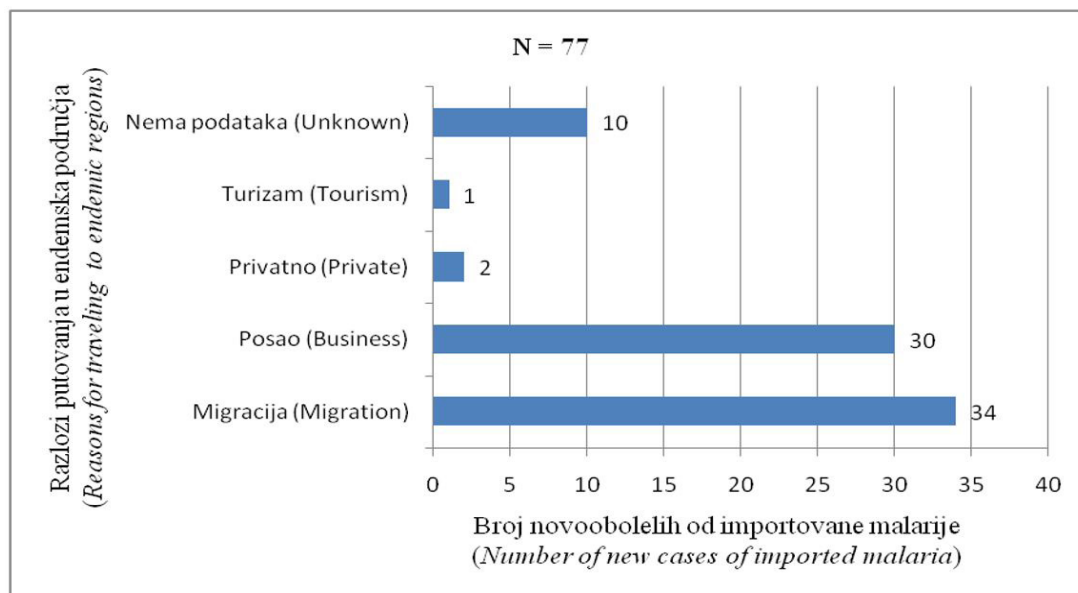


Figure 3. Number of new cases of imported malaria by reasons for traveling to endemic regions, Belgrade, 2014 - 2018

(3.9%) had symptoms one year after their arrival in Serbia.

Patients with imported malaria are registered during the whole year. The largest number of patients was registered in August (19.5%), and the smallest in January (2.6%) (Figure 5).

Discussion

Although geographic territory exposed to malaria has been significantly reduced during the last 50 years, malaria still presents a big public

health problem. In 2018, according to the World Health Organization, there were around 228 million cases of malaria around the world and 405,000 deathly outcomes, which is less when compared to 2017, when there were 231 million cases and 416,000 malaria deaths (7-9). 50% of all malaria cases are present in five Sub-Saharan African countries (Nigeria, the Democratic Republic of Congo, Uganda, Mozambique and Ivory Coast). Children younger than five years and pregnant women in Sub-Saharan Africa are at the greatest risk of malaria. Pregnancy lowers

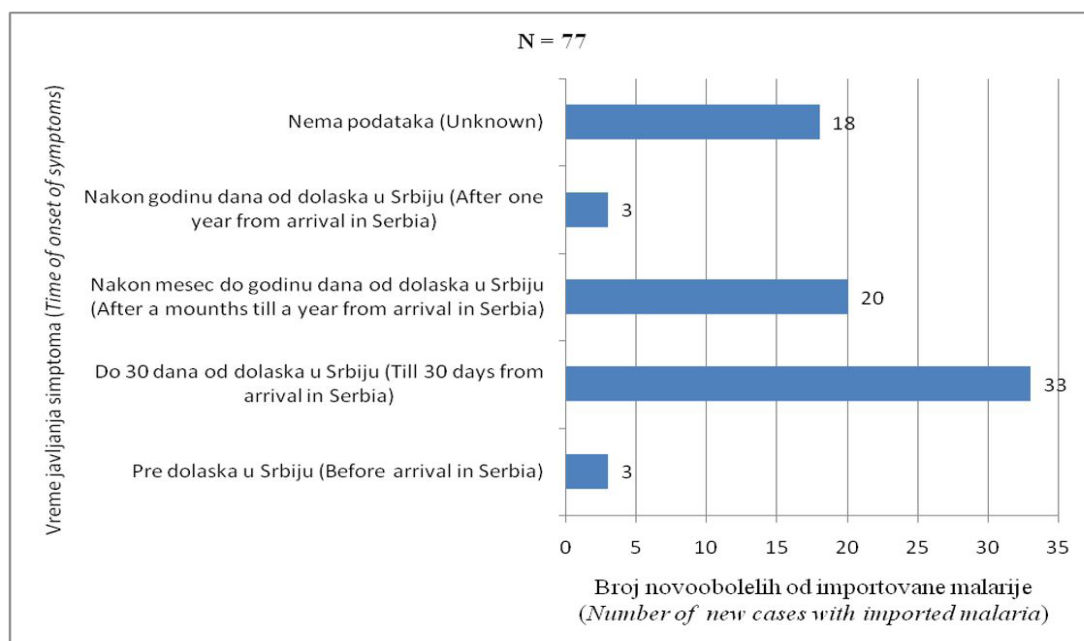
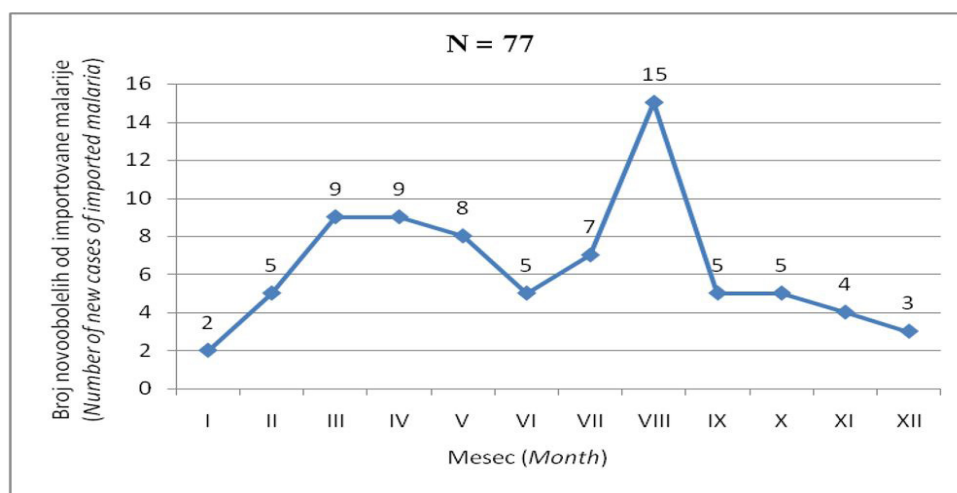


Figure 4. Time of onset of symptoms in newly diagnosed patients with imported malaria after staying in the endemic area, Belgrade, 2014 - 2018



Grafikon 5. Distribucija novoobolelih od importovane malarije po mesecima, Beograd, 2014 – 2018. godina

Mreža eliminacije malarije se svake godine širi i sve više zemalja ide ka cilju nulte malarije. Povećava se broj zemalja gde je broj autohtonih slučajeva manji od 100, sa 17 zemalja u 2010. godini na 27 zemalja u 2018. godini.

Malarija se održava endemski u 31 zemlji sveta, ali je u period od 2015. do 2018. godine došlo do značajnog smanjivanja obolelih što bi doprinelo redukovanju obolelih za 40% i više do 2020. godine.

Ponovno javljanje malarije je sve učestalije u regionima gde je malarija eradikirana ili u kojima je incidencija bila značajno smanjena. Razlozi su mnogobrojni i uključuju globalne klimatske i ekološke promene nastale pod uticajem čoveka, koje favorizuju održavanje i širenje populacije komaraca, multirezistenciju parazitskih vrsta, kao i masovne migracije, izazvane konfliktima ili porastom turističkih i poslovnih putovanja u područja gde ima malarije (1).

Prema rezultatima naše studije, prosečna sirova stopa incidencije importovane malarije, u periodu od 2014. do 2018. godine, u Beogradu se kretala od 0,4/100.000 do 1,7/100.000 stanovnika. U Srbiji, tokom istog perioda, sirova stopa incidencije importovane malarije je bila od 0,14/100.000 do 0,40/100.000 stanovnika (10), a u Evropskoj uniji (EU) od 1,2/100.000 do 1,3/100.000 stanovnika (11). Podaci Evropskog centra za sprečavanje i kontrolu bolesti pokazuju da su, u 2018. godini, skoro svi slučajevi (99,8%) malarije u zemljama EU importovani (11). Posebno zabrinjava činjenica da je u EU registrovano 14 slučajeva autohtone

malarije (deset u Grčkoj, dva u Španiji, po jedan u Francuskoj i Italiji), što ukazuje da su i druge zemlje EU, kao i naša zemlja pod rizikom i od autohtone malarije (11).

U Beogradu je broj obolelih od importovane malarije bio 8,6 puta veći kod muškaraca nego kod žena. Kao i u našoj studiji, u zemljama EU, u 2018. godini, stopa potvrđenih slučajeva malarije je bila 1,9 puta veća za muškarce (1,6 na 100.000) nego za žene (1,6 na 100.000) (11).

Posmatrajući obolevanje od importovane malarije po uzrasnim grupama u Beogradu, uočeno je da je uzrasno specifična stopa incidencije malarije najviša u uzrasnoj grupi od 10 do 19 godina, a najniža kod osoba uzrasta 60 i više godina. Ovo se može objasniti boravkom u Beogradu velikog broja mladih ljudi, migranata, koji dolaze iz zemalja Azije, gde je malarija autohtona. Epidemiološka ispitivanja importovane malarije u Australiji, pokazuju da je uzrasno specifična stopa incidencije malarije najviša u dobnoj grupi od 25 do 29 godina (12).

Najveći broj obolelih od importovane malarije u Beogradu je boravio u endemskim područjima Azije i Afrike, a razlozi boravka su bili najčešće migracija i posao. U zemljama EU u kojima se prijavljuje najveći broj importovanih slučajeva (npr. Francuska, Velika Britanija i Nemačka) uočeno je da one imaju istorijske, ekonomske i kulturne veze sa endemskim područjima u Africi i Americi (11). Među 7.338 potvrđenih slučajeva importovane malarije u EU, čak 99,8% je bilo povezano sa putovanjima. Interesantno je da je četrnaest slučajeva autohtone malarije registrovano u

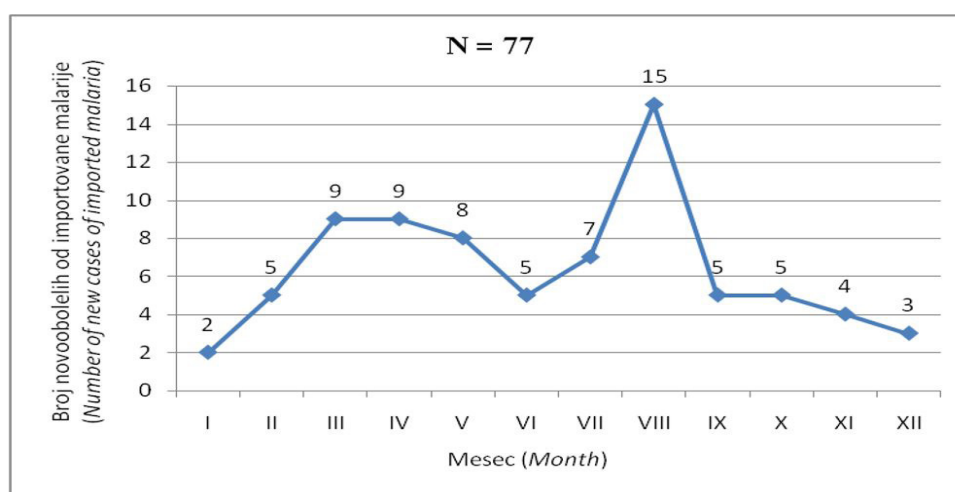


Figure 5. Distribution of new cases of imported malaria by months, Belgrade, 2014 – 2018

immunity, making pregnant women more susceptible to the infection, and increasing the risk of being infected with malaria, severe anemia and death. It was estimated that 29% of pregnant women in Sub-Saharan Africa were infected with malaria in 2017, that is, around 3.2 million pregnant women (7,9). Also, 67% of all deathly outcomes due to malaria at the global level were in children younger than five years. Beside Sub-Saharan Africa, Southeast Asia, the Eastern Mediterranean, Western Pacific and Americas are at risk of malaria.

The network of malaria elimination spreads every year, while more and more countries are reaching the zero malaria. The number of countries, where the number of autochthonous cases is lower than 100, increased from 17 countries in 2010 to 27 countries in 2018.

There are 31 malaria-endemic countries, but during the period 2015-2018 there came to the significant decrease of patients, which will contribute to the decrease of the number of patients for 40% and more until 2020.

Recurring malaria is all the more frequent in regions, where malaria has been eradicated, or in which incidence has significantly decreased. The reasons are numerous, including global climate and ecological change, which appeared due to the human influence, and which favor the maintenance and spread of the mosquito population, multi-resistance of parasitic species, as well as mass migrations, caused by conflicts or rise in touristic and business travels (1).

According to the results of our study,

the average crude incidence rate of imported malaria for the period 2014-2018 ranged from 0.4/100,000 to 1.7/100,000 people in Belgrade. In Serbia, during the same time period, the crude incidence rate of imported malaria ranged from 0.14/100,000 to 0.40/100,000 residents (10), and in the European Union from 1.2/100,000 to 1.3/100,000 residents (11). Data of the European Centre for Disease Prevention and Control show that in 2018, almost all cases (99.8%) of malaria in EU countries were imported (11). The fact that 14 cases of autochthonous malaria were registered in the EU is especially worrying (ten in Greece, two in Spain, one in France and Italy), which points to the fact that the other EU countries, as well as our country, are at risk of autochthonous malaria (11).

In this study, imported cases of malaria were 8.6 times more common among men than among women. As in our town, in EU countries in 2018 the rate of confirmed malaria cases was 1.9 times higher among men (1.6/100,000) than among women (1.6/100,000) (11).

By observing the disease of imported malaria in relation to age groups in Belgrade, it was noted that the age-specific incidence rate was highest in the age group 10 to 19 years, while the lowest rate was in people who were 60 and older. This may be explained with the fact that a lot of young people, migrants stayed in our town, and they came from Asian countries, where malaria is autochthonous. Epidemiological investigation of imported malaria in Australia showed that age-specific

samoj EU (deset slučajeva uzrokovanih *P. vivax* u Grčkoj, jedan nepoznate vrste plazmodijuma u Francuskoj, jedan slučaj uzrokovan *P. falciparum*, jedan slučaj mešovite infekcije uzrokovane *P. malariae* i *P. ovale* u Španiji, i jedan slučaj uzrokovan *P. falciparum* u Italiji) (11).

Prema rezultatima studije sprovedene u Australiji u periodu od 2014. do 2015. godine najviše registrovanih obolelih od malarije je bilo iz regiona Afrike (23%) i sa Pacifičkih ostrvskih zemalja (20%) (12). Međutim, u zemljama Ujedinjenog Kraljevstva tokom 2017. godine, najveći broj obolelih od importovane malarije je kao razlog bolesti naveo putovanje rođacima/prijateljima 814 (80%), potom turizam 108 (11%) i posao 98 (10%) (13).

Importovana malarija kod obolelih u Beogradu najčešće se javljala do 30 dana (43%), a najređe nakon godinu dana od dolaska u zemlju (4%). Prema rezultatima studije sprovedene u Sjedinjenim Američkim Državama (SAD), tokom 2015. godine, kod najvećeg broja obolelih od malarije došlo je do pojave simptoma tokom prvih mesec dana od povratka (76,5%), a najmanje nakon godinu dana od povratka u zemlju (0,8%) (14).

U Beogradu, najčešći prouzrokovani importovane malarije su bili *P. vivax* i *P. falciparum*. Suprotno našim rezultatima, epidemiološka istraživanja importovane malarije u zemljama Ujedinjenog Kraljevstva ukazuju da dominira serotip *P. falciparum*, a zatim *P. vivax* (13). Od 4.516 potvrđenih slučajeva malarije u EU za koje je bio poznat uzročnik, čak u 84,0% slučajeva uzročnik je bio *P. falciparum* (11).

U periodu 2014-2018. godine, na području Beograda, oboleli od malarije su se registrovali tokom cele godine. Najveći broj obolelih je bio u mesecu avgustu, a najmanji u mesecu januaru. Slično je zabeleženo u SAD-u, gde se malarija registruje tokom cele godine, sa pikom u avgustu mesecu (8). U EU zabeležen je izražen sezonski trend u svim zemljama, a broj obolelih je povećan tokom i neposredno nakon leta (od jula do septembra) (11).

U održavanju eradikacije malarije u Beogradu, kao i u drugim zemljama, glavnu prepreku predstavljaju importovani slučajevi malarije i prisustvo komaraca roda *Anopheles*. Neke od mera koje treba sprovoditi za održavanje stanja bez malarije su: suzbijanje

komaraca, praćenje vrsta komaraca, hemioprofilaksa putnika koji putuju u endemska područja, nadzor nad osobama koje dolaze iz endemskih područja, nadzor nad migrantima, dobra snabdevenost lekovima za lečenje i hemioprofilaksu malarije, laboratorijska dijagnostika i dr. Realizacija održavanja eradikacije malarije nezamisliva je bez saradnje svih odgovornih za detekciju i nadzor iste, a u cilju boljeg razumevanja gde i kako se malarija kreće, koje mere se preduzimaju, kao i šta se dešava sa brojem importovanih slučajeva malarije tokom vremena.

Zaključak

Broj novoobolelih od importovane malarije na području Beograda osciluje u periodu 2014-2018. godine i kreće se od 7 do 28. Neophodno je raditi na kontinuiranom zdravstvenom vaspitanju stanovništva u cilju informisanosti o načinu prenošenja malarije, primeni preventivne mere tokom boravka u zemljama gde se malarija održava endemski, kao i na podizanju svesti o značaju blagovremenog javljanja zdravstvenoj službi prilikom pojave prvih simptoma bolesti. U cilju daljeg smanjenja broja obolelih od malarije od značaja bi bio pronalazak efektivne vakcine. Zbog prisustva malaričnih komaraca na teritoriji Beograda, pogodnoj za održavanje komaraca roda *Anopheles* usled prisustva velikih vodenih površina, kao i zbog povećanog broja slučajeva importovane malarije, postoji rizik ponovnog javljanja autohtone malarije.

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incidence rate of malaria was highest in the age group 25 to 29 years (12).

The largest number of patients (around 88%) with imported malaria in Belgrade stayed in the endemic regions of Asia and Africa, while the reasons for their stay were most frequently migration (44.2%) and work (39.0%). In EU countries, in which the largest number of cases was registered (e.g. France, Great Britain, and Germany), it was noticed that they have historical, economic and cultural bonds with the endemic regions in Africa and America (1). Among 7,338 of confirmed cases of imported malaria in the EU, even 99.8% were connected with travels. It is interesting that fourteen people got this infection in the EU itself (ten *P. vivax* in Greece, one of the unknown species of plasmodium in France, one *P. falciparum*, one mixed case of *P. malariae* and *P. ovale* in Spain, one *P. falciparum* in Italy) (11).

According to the results of one study conducted in Australia for the period 2014-2015, most of the registered cases were from the region of Africa (23%) and from Pacific Islands (20%) (12). However, in the countries of the United Kingdom during 2017, the largest number of patients stated traveling to cousins/friends 814 (80%), tourism 108 (11%) and work 98 (10%) as their reasons (13).

Imported malaria in patients in Belgrade appeared most frequently within 30 days from their arrival in the country (43%), and most rarely one year after their arrival in the country (4%). According to the results of studies conducted in The United States during 2015, in most malaria cases symptoms appeared within the first month from their return to the USA (76.5%), and the smallest number of cases had symptoms one year after return to the USA (0.8%) (14).

P. vivax and *P. falciparum* were the most frequent causative agents of imported malaria in Belgrade. Contrary to our results, epidemiological investigation of imported malaria in the United Kingdom pointed that serotype *P. falciparum* was dominant, and then *P. vivax* (13). Of 4,516 confirmed cases of malaria in the EU, for whom the causative agent was known, in 84% of cases the causative agent was *P. falciparum* (11).

Patients with malaria are registered during

the whole year. The largest number of patients is registered in August, and the smallest number in January. Similar situation was recorded in the USA, where malaria is registered throughout the entire year, with the peak in August (8). In the EU, the pronounced seasonal trend was recorded in all countries, and the number of cases was increased during and immediately after summer (from July till September).

Imported malaria cases and the presence of mosquitoes of the *Anopheles* genus present the main obstacle to maintaining the eradication of malaria in Belgrade, as well as in other countries. Some of the measures, which should be taken in order to maintain the absence of malaria, are: repelling mosquitoes, following mosquito species, chemoprophylaxis of passengers who travel to endemic regions, surveillance of people who come from endemic regions, surveillance of migrants, good supplies of medicines for the treatment and chemoprophylaxis of malaria, laboratory diagnostic tests etc. The realization of the maintenance of malaria eradication is unimaginable without the cooperation of all the people responsible for its detection and surveillance, in order to understand better where and how the parasites move, what measures are taken, as well as what happens with the number of imported malaria cases over time.

Conclusion

The number of new cases with imported malaria on the territory of Belgrade varies from 7 to 28 for the period 2014-2018. Continuing health education of population is necessary, aimed at informing them about the ways in which malaria is transmitted, applying the preventive measures during the stay in malaria endemic-countries, as well as raising awareness of the significance of timely notification of healthcare service when the first symptoms appear. In order to further decrease the number of patients with malaria, the efficient vaccine discovery would be of great significance. Due to the presence of malaria-transmitting mosquitoes on the territory of Belgrade, suitable for the maintenance of the *Anopheles* genus due to the great water areas, and because of the increased number of cases of imported malaria, there is a risk of autochthonous malaria appearance.

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PSIHIČKO ZDRAVLJE I SOCIJALNO FUNKCIONISANJE DECE I ADOLESCENATA SA CELIJAČNOM BOLEŠĆU

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SAŽETAK

Uvod/Cilj: Celijačna bolest predstavlja sistemsku autoimunu bolest koju karakteriše trajna nepodnošljivost glutena. Stanje koje nameće bolest, poseban režim ishrane bez glutena, često izaziva stres, što kod dece, a posebno adolescenata, može dovesti do poremećaja psihičkog zdravlja i socijalnog funkcionisanja. Cilj istraživanja je da se ispita da li postoje značajne razlike između dece i adolescenata sa i bez celijačne bolesti u odnosu na njihovo psihičko zdravlje i socijalno funkcionisanje.

Metode: Studijom slučajeva i kontrola obuhvaćeno je 116 dece i adolescenata uzrasta 5-18 godina sa dijagnozom celijačne bolesti i 116 dece i adolescenata bez ovog oboljenja. Ispitivane grupe su sparivane prema uzrastu i polu. Pored opšteg upitnika, za procenu stepena anksioznosti korišćen je Upitnik za pretragu anksioznih poremećaja kod dece (engl. *Screen for Child Anxiety Related Disorder - SCARED*). U statističkoj analizi podataka korišćen je hi kvadrat test.

Rezultati: Ispitanici sa i bez celijačne bolesti nisu se značajno razlikovali u odnosu na pol i uzrast. Deca i adolescenti sa celijačnom bolešću su značajno češće imali anksiozni (33,9%) ($p < 0,001$) i panično-somatski poremećaj (33,0%) ($p < 0,001$), generalizovanu (20,0%) ($p = 0,001$) i separacijsku anksioznost (32,2%) ($p = 0,031$), i izbegavali su školu (18,3%) ($p < 0,001$), nego kontrole (9,5%; 8,6; 4,3%; 19,0%; 2,6%). Između ispitivanih grupa nije bilo značajne razlike u odnosu na socijalnu anksioznost.

Zaključak: Kod dece sa celijačnom bolešću se moraju uzeti u obzir psihološki aspekti bolesti u cilju obezbeđivanja boljeg kvaliteta života. Moguće je postojanje psihološkog stresa i neprijatnosti, jer ih vršnjaci mogu izbegavati zbog drugačije ishrane.

Ključne reči: celijakija, deca, gluten, ishrana, psihičko zdravlje, socijalno funkcionisanje

Uvod

Celijačna bolest se definiše kao imunološka hronična bolest proksimalnog dela tankog creva. Karakteristika ove bolesti je nepodnošljivost na gluten kod osoba koje imaju genetske predispozicije. Lečenje se sastoji od uvođenja bezglutenske ishrane što dovodi do histološke i kliničke remisije (1). Dosadašnja saznanja su ukazivala da je celijakija primarno bolest tankog creva nastala kao rezultat imunološke reakcije sluzokože tankog creva na gluten, zbog čega nastaje zapaljenje i smanjena apsorpcija hranljivih materija. Međutim, najnovija istraživanja ukazuju na činjenice da celijakija nije samo bolest tankog creva već da zahvata i veliki broj drugih organa i sistema (2).

Od ove bolesti dva puta češće oboleva ženska nego muška populacija. Kada bolest počne u detinjstvu, rast, razvoj i mentalno zdravlje mogu biti poremećeni (3,4).

Iskustva pokazuju da pravovremena detekcija celijačne bolesti i nakon toga dosledno lečenje bezglutenskom dijetom, daju dobru prognozu bolesti. Veći broj istraživanja dokazuje da kasno postavljena dijagnoza, kao i nesprovođenje bezglutenske ishrane, dovodi do komplikacija koje mogu biti teške (3,5,6).

Kod dece sa hroničnim poremećajima, a samim tim i kod celijakije, postoji velika verovatnoća da se pojave različiti emocionalni poremećaji i poteškoće u psihičkom prilagođavanju u odnosu na vršnjake bez ove bolesti (7-9).

ORIGINAL ARTICLE

MENTAL HEALTH AND SOCIAL FUNCTIONING OF CHILDREN AND ADOLESCENTS WITH CELIAC DISEASE

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SUMMARY

Introduction/Aim: Celiac disease is a systemic autoimmune disease characterized by persistent gluten intolerance. The condition imposed by the disease, a special gluten-free diet, often causes stress, which in children, especially adolescents, can lead to disturbances in mental health and social functioning. The aim of the study is to examine whether there are significant differences between children and adolescents with celiac disease and their peers without celiac disease in relation to their mental health and social functioning.

Methods: The study included 116 children and adolescents aged 5-18 years with a diagnosis of celiac disease and 116 children and adolescents without celiac disease. The study groups were matched by age and gender. In addition to the general questionnaire, the Screen for Child Anxiety Related Disorder (SCARED) was used to assess the level of anxiety. The chi-squared test was used in the statistical analysis of the data.

Results: Subjects with and without celiac disease did not differ significantly in gender and age. Children and adolescents with celiac disease had significantly more frequent anxiety (33.9%) ($p < 0.001$), panic-somatic disorder (33.0%) ($p < 0.001$), and avoided school (18.3%) ($p < 0.001$), generalized (20.0%) ($p = 0.001$) and separation anxiety (32.2%) ($p = 0.031$) than controls (9.5%; 8.6; 2.6%; 4, 3%; 19.0%). There was no significant difference between social groups in relation to social anxiety.

Conclusion: In children with celiac disease, psychological aspects of the disease must be considered in order to ensure a better quality of life. Psychological stress and discomfort may occur as peers can avoid them because of a different diet.

Keywords: celiac disease, children, gluten, nutrition, mental health, social functioning

Introduction

Celiac disease is defined as an immune chronic disease of the proximal part of the small intestine. It is characterized by gluten intolerance in people who have genetic susceptibility. The treatment includes introducing a gluten-free diet, which leads to histological and clinical remission (1). The existing knowledge has pointed to the fact that celiac disease is primarily a disease of the small intestine, which is a result of an immune reaction of the small intestine mucosa to gluten. This reaction causes inflammation and the reduced absorption of nutrients. However, the recent findings have pointed to the fact that celiac disease can affect not only the small intestine, but also a large number of other organs and systems (2).

Women are diagnosed with celiac disease two times more often than men. When this disease occurs during the childhood, growth, development and mental health can be disturbed (3,4).

Experience shows that timely detection of celiac disease and later the consistent treatment with a gluten-free diet give a good prognosis of this disease. A larger number of research studies prove that a late diagnosis and non-compliance with a gluten-free diet lead to complications, which can be serious (3,5,6).

In children with chronic disorders, and celiac disease as well, there is a great possibility that different emotional disorders and difficulties regarding their psychological adaptation may appear in comparison to their

Doživotna posvećenost striktnoj bezglutenskoj ishrani utiče na emocionalne i kognitivne aspekte i međuljudske odnose (10). Osim osnovne bolesti, kod dece i adolescenata sa celijakijom, beleže se i psihološki problemi. Anksioznost, depresivni simptomi, emotivna preosetljivost i osećanja tuge su česta pojava i pored ostalog negativno utiču na adaptaciju u socijalnoj sredini. Mera u kojoj će dete prihvatiti režim bezglutenske dijeta i pridržavati se zavisi i od stava koji roditelji imaju prema bolesti svog deteta (11,12).

Jako je važno da mladima sa ovim zdravstvenim problemom porodica pruži podršku u meri u kojoj je to potrebno, da bi se postigao uspeh u tretmanu bolesti (11-13).

Cilj istraživanja je da se ispita da li postoje značajne razlike između dece i adolescenata sa celijakijom i njihovih vršnjaka bez celijakije u odnosu na njihovo psihičko zdravlje i socijalno funkcionisanje.

Metode

Studijom slučajeva i kontrola, koja je sprovedena u periodu 1.4.2016-31.12.2016. godine, obuhvaćeno je 116 dece i adolescenata, uzrasta 5-18 godina, sa postavljenom dijagnozom celijakije u Institutu za zdravstvenu zaštitu majke i deteta Srbije „Dr Vukan Čupić“ u Beogradu i Univerzitetnoj dečjoj klinici u Beogradu. Svi ovi ispitanici bili su na bezglutenskoj ishrani najmanje godinu dana. Kontrolnom grupom obuhvaćeno je 116 ispitanika bez celijakije i njih su činila deca koja su pohađala program predškolske ustanove, nastavu osnovne i srednje škole na teritoriji grada Beograda i kod kojih celijačna bolest nije bila dijagnostikovana. Ispitivane grupe su individualno sparivane u odnosu na uzrast i pol.

Podaci su od ispitanika prikupljeni upitnicima tokom redovnih gastroenteroloških kontrola.

U cilju procene anksioznosti kod dece i adolescenata uzrasta od 5 do 18 godina korišćen je Upitnik za pretragu anksioznih poremećaja kod dece (engl. *Screen for Child Anxiety Related Disorder* - SCARED). Pitanja u upitniku su razvrstana u pet skala (Generalizovana anksioznost, Separacijska anksioznost, Socijalna anksioznost, Izbegavanje škole i Panično-

somatski poremećaj) (14,15). Upitnik je kulturološki adaptiran za srpski jezik.

Ispitanicima su davana kratka uputstva o toku i pravilima. Popunjavanje testova je sprovedeno anonimno i bez vremenskog ograničenja pri odgovaranju. Po potrebi su ispitanicima davana dodatna objašnjenja vezana za način popunjavanja upitnika. Pri anketiranju ispitanika uzrasne grupe 5-7 godina aktivno učešće su uzeli i roditelji koji su usmeno postavljali svojoj deci pitanja iz upitnika. Ovo je bilo potrebno zbog poverenja koje dete ima u roditelje.

Istraživanje je razmotreno i odobreno od strane Etičkih odbora Univerzitetne dečje klinike u Beogradu i Instituta za zdravstvenu zaštitu majke i deteta Srbije „Dr Vukan Čupić“, u Beogradu. Za učešće dece u istraživanju dobijena je pisana saglasnost dece i njihovih roditelja. U cilju zadovoljenja etičkih normi, ispitanici su bili informisani o svrsi istraživanja i činjenici da će se dobijeni podaci koristiti u naučne svrhe.

Analiza i obrada podataka vršene su pomoću paketa namenjenog statističkoj obradi podataka (engl. *Statistical Package for the Social Sciences – SPSS for Windows, version 23.0, 2015*). U analizi podataka korišćen je hi-kvadrat (χ^2) test.

Rezultati

Istraživanjem je obuhvaćeno 116 ispitanika sa dijagnozom celijakije uzrasta od 5 do 18 godina i to 77 (66,4 %) devojčica i 39 (33,6%) dečaka (Tabela 1). Uzrasnu grupu 5–7 godina činilo je 22 (19,0 %) ispitanika, uzrasnu grupu 8–12 godina 44 (37,9 %) ispitanika, a uzrasnu grupu 13–18 godina 50 (43,1%) ispitanika. Kontrolnu grupu činilo je 116 zdrave dece i adolescenata čija je distribucija po polu i uzrastu bila identična ispitanicima sa celijakijom, jer su ove dve grupe sparivane u odnosu na pol i uzrast.

Ispitanici sa celijakijom su značajno češće, u odnosu na kontrole, imali prema SCARED upitniku, anksiozni poremećaj (skor ≥ 25) ($p < 0,001$), panično-somatski poremećaj (skor ≥ 7) ($p < 0,001$), generalizovanu (skor ≥ 9) ($p = 0,001$) i separacijsku anksioznost (skor ≥ 5) ($p = 0,031$), a i značajno su češće izbegavali školu (skor ≥ 3) ($p < 0,001$). Između ispitivanih grupa

peers, who are not diagnosed with this disease (7-9).

A life-long adherence to a strict gluten-free diet influences emotional and cognitive aspects and interpersonal relations (10). Beside the basic disease, psychological problems are noticed in children and adolescents with celiac disease. Anxiety, symptoms of depression, emotional hypersensitivity and emotions of sorrow often appear and, among other things, negatively affect adjusting to social surroundings. The extent, to which a child will accept the regime of a gluten-free diet and adhere to it, depends on the parents' attitude towards the disease (11,12).

It is very important that a family supports young people with this health problem, to the extent that success could be achieved in treating the disease (11-13).

The aim of the research was to examine whether there are significant differences between children and adolescents with celiac disease and their peers without this disease regarding their mental health and social functioning.

Methods

A case-control study, that took place in the period from April 1st to December 31st 2016, included 116 children and adolescents, aged 5-18 years, who were diagnosed with celiac disease at The Institute for Health Protection of Mother and Child of Serbia "Dr Vukan Cupic" in Belgrade and University Children's Hospital in Belgrade. All these examinees were on a gluten-free diet for at least one year. The control group included 116 examinees without celiac disease, that is, children, who attended the program of pre-school institution, primary or high school in the territory of Belgrade, and who were not diagnosed with celiac disease. The examined groups were individually matched by age and gender.

The data were collected from the examinees during the regular gastroenterological check-ups. The Screen for Child Anxiety Related Disorder (SCARED) was used in order to estimate the anxiety in children and adolescents aged 5-18 years. The questions in this questionnaire were classified into five domains (Generalized

anxiety, Separation anxiety, Social anxiety, School avoidance and Panic/somatic disorder) (14,15). The questionnaire was culturally adapted for the Serbian language.

Short instructions about the course and rules were given to the examinees. The tests were completed anonymously and there were no time limits for the test completion. If necessary, the examinees were given additional explanation regarding the way in which the tests were filled in. Examinees from the age group 5-7 years were helped by their parents, who actively participated and asked them questions from the questionnaire orally. This was necessary because children have confidence in their parents.

The research was examined and approved by the Ethics Committees of University Children's Hospital in Belgrade and The Institute for Health Protection of Mother and Child "Dr Vukan Cupic" in Belgrade. Written informed consent was obtained from children and their parents prior to enrollment in the study. In order to satisfy the ethical norms, all the examinees were informed about the purpose of the research and the fact that all the obtained data would be used for scientific purposes.

Data were analyzed with the help of Statistical Package for the Social Sciences – SPSS for Windows, version 23.0, 2015. A chi-squared test was used for data analysis.

Results

The study included 116 examinees, who were diagnosed with celiac disease, aged 5 to 18 years, that is, 77 girls (66.4%) and 39 boys (33.6%) (Table 1). There were 22 (19.0%) examinees in the age group 5-7 years, 44 (37.9%) examinees in the age group 8-12 years, and 50 (43.1%) examinees in the age group 13-18 years. The control group consisted of 116 healthy children and adolescents whose distribution by sex and age was identical to the subjects with celiac disease, because these two groups were matched in relation to gender and age.

Examinees with celiac disease had more frequently in comparison to controls, according to the SCARED questionnaire, anxiety disorder (score > 25) ($p < 0.001$), panic-somatic disorder

nije bilo značajne razlike u odnosu na postojanje socijalne anksioznosti (skor ≥ 8) ($p = 0,598$) (Tabela 2).

Diskusija

Specifičnost ovog istraživanja ogleda se u činjenici da je njime procenjavano zdravlje i socijalno funkcionisanje dece i adolescenata istog uzrasta sa i bez celijakije.

Autori mnogobrojnih istraživanja ukazuju da od celijakije češće oboleva ženska nego muška populacija (3,17,18), što je dobijeno i u našem istraživanju.

Svaka hronična bolest, a samim tim i celijakija, ako se javi kod mladih tokom perioda njihovog rasta i razvoja može da utiče na psihosocijalni razvoj i socijalno funkcionisanje. U više studija je utvrđeno da značajno utiče na kvalitet života u vezi sa zdravljem dece i adolescenata (19,20).

U našoj studiji, deca i adolescenti su statistički značajno češće imali anksioznost, panično-somatski poremećaj i značajno su češće izbegavali školu ($p < 0,001$), odnosno češće su

imali generalizovanu ($p < 0,001$) i separacijsku anksioznost ($p < 0,031$) u odnosu na kontrole. Anksioznost se smatra „normalnom“ reakcijom na životne teškoće, stresove i neizvesnosti. Kod dece obolele od celijačne bolesti, kao i od drugih hroničnih bolesti, anksiozna stanja, trajanjem i intenzitetom, mogu da imaju snažan uticaj na svakodnevno funkcionisanje i kvalitet života. Nelagodnost i strepnja su glavna obeležja anksioznosti. Anksioznost može da bude akutna i hronična, ali i primarna (psihološka reakcija na bolest i lečenje), sekundarna, ili kao kombinacija navedenih oblika (21).

Domen socijalnog i emocionalnog funkcionisanja kod dece sa celijakijom je povezan sa fizičkim ograničenjima u ishrani i teškoćama koje prate nabavljanje bezglutenskih proizvoda, jer često nisu lako dostupni (22).

Deca, a posebno adolescenti, sa celijakijom često pokazuju povećan nivo psihološkog stresa nakon dijagnoze i prelaska na bezglutenski način ishrane. Izbegavanje širokog spektra namirnica koje sadrže gluten često zahteva značajne promene u načinu ishrane i načinu života dece

Tabela 1. Distribucija dece i adolescenata sa i bez celijakije po uzrastu i polu

Uzrast/ Age	Pol/ Gender	Deca i adolescenti sa celijakijom/ <i>Children and adolescents with celiac disease</i> N=116 Broj (%) / No (%)	Deca i adolescenti bez celijakije / <i>Children and adolescents without celiac disease</i> N=116 Broj (%) / No (%)	p vrednost* / <i>p value*</i>
5-7	Muški/ Male	9 (40.9)	9 (40.9)	>0.05
	Ženski/ Female	13 (59.1)	13 (59.1)	
	Ukupno/ Total	22 (19.0)	22 (19.0)	
8-12	Muški/ Male	15 (34.1)	15 (34.1)	>0.05
	Ženski/ Female	29 (65.9)	29 (65.9)	
	Ukupno/ Total	44 (37.9)	44 (37.9)	
13-18	Muški/ Male	15 (30.0)	15 (30.0)	>0.05
	Ženski/ Female	35 (70.0)	35 (70.0)	
	Ukupno/ Total	50 (43.1)	50 (43.1)	

*p vrednost za χ^2 test

(score > 7) ($p < 0.001$), generalized anxiety (score > 9) ($p = 0.001$) and separation anxiety (score > 5) ($p = 0.031$), and they avoided school more frequently (score > 3) ($p < 0.001$). There was no significant difference between the examined groups in regard to social anxiety (score > 8) ($p = 0.598$) (Table 2).

Discussion

The specificity of this research is reflected in the fact that it assessed the health and social functioning of children and adolescents of the same age with and without celiac disease. The authors of numerous studies have pointed to the fact that female population is diagnosed more often with celiac disease than male population (3,17,18), which has been confirmed in our research, as well.

Each chronic disease, and therefore celiac disease as well, can influence the psychosocial development and social functioning if it appears in young people during the period of their growth and development. It has been confirmed in a number of studies that they significantly

influence health-related quality of life of children and adolescents (19,20).

In our study, children and adolescents had anxiety, panic-somatic disorder significantly more frequently and they avoided school significantly more often ($p < 0.001$), that is they had generalized ($p = 0.001$) and separation anxiety ($p = 0.031$) more often in comparison to controls. Anxiety is deemed to be a "normal" reaction to life problems, stress and uncertainty. In children with celiac disease, and with other chronic diseases, conditions of anxiety can have a strong influence on everyday functioning and quality of life. Uneasiness and apprehension are the main characteristics of anxiety. Anxiety can be acute and chronic, as well as primary (psychological reaction to disease and treatment), secondary and the combination of these forms (21).

Domain of social and emotional functioning of children with celiac disease is connected with the physical restrictions regarding food and difficulties related to the purchase of the gluten-free products, which are often not easily

Table 1. Distribution of children and adolescents with and without celiac disease by age and gender

Uzrast/ Age	Pol/ Gender	Deca i adolescenti sa celijakijom/ <i>Children and adolescents with celiac disease</i> N=116 Broj (%)/ No (%)	Deca i adolescenti bez celijakije / <i>Children and adolescents without celiac disease</i> N=116 Broj (%)/ No (%)	p vrednost*/ <i>p value*</i>
5-7	Muški/ Male	9 (40.9)	9 (40.9)	>0.05
	Ženski/ Female	13 (59.1)	13 (59.1)	
	Ukupno/ Total	22 (19.0)	22 (19.0)	
8-12	Muški/ Male	15 (34.1)	15 (34.1)	>0.05
	Ženski/ Female	29 (65.9)	29 (65.9)	
	Ukupno/ Total	44 (37.9)	44 (37.9)	
13-18	Muški/ Male	15 (30.0)	15 (30.0)	>0.05
	Ženski/ Female	35 (70.0)	35 (70.0)	
	Ukupno/ Total	50 (43.1)	50 (43.1)	

*p value for chi square test

i njihovih porodica, a redukuje se i socijalna interakcija. Tekući problemi mogu uticati na nivo anksioznosti i depresije (23). Viši rizik za anksiozne poremećaje kod dece po postavljanju dijagnoze povezuje se sa reakcijom deteta na saznanje o hroničnoj bolesti koja zahteva strogu doživotnu bezglutensku ishranu, a koja ga svrstava u kategoriju drugačijih u odnosu na svoje vršnjake.

Studije sprovedene širom Evrope ukazuju da su poremećaji raspoloženja, kao što su anksioznost, depresija i osećaj zamora, povezani sa dijagnozom celijakije, pre i posle postavljana dijagnoze, i stoga mogu da utiču na poštovanje bezglutenske ishrane i kvalitet života pacijenata (24). Za očekivati je da deca i adolescenti koji imaju pogoršanje bolesti, najčešće zbog nepoštovanja dijete, a sa time i viši stepen nesposobnosti, teže učestvuju u socijalnim aktivnostima, što je potvrđeno u nekoliko pedijatrijskih studija (25).

Rezultati većeg broja studija sugerišu da pacijenti sa celijakijom imaju koristi od

bezglutenske ishrane, ali da ona utiče na mnoge dnevne aktivnosti, pogotovo na socijalne aspekte života. Studije sprovedene na velikom uzorku ispitanika sa problemom celijakije potvrđuju da pacijentima bezglutenska ishrana značajno utiče na kvalitet života, uključujući pored socijalnog, ekonomski i psihološki aspekt. Ispitanici su se izjasnili da imaju ograničenja u društvenom životu, uključujući putovanja i zabave, mada ni finansijsko opterećenje njihove porodice, kako ističu, nije zanemarljivo (26,7).

Postoje dokazi koji napominju da kod dece sa hroničnim poremećajima, postoji veća verovatnoća da imaju različite emocionalne poremećaje i poteškoće u psihičkom prilagođavanju u odnosu na zdrave vršnjake (27). Rezultati studije *Addolorato*-a i saradnika su pokazali da pacijenti sa celijakijom imaju značajno veće šanse da dobiju simptome anksioznosti, i to nakon godinu dana na ishrani bez glutena, u odnosu na kontrolnu grupu zdravih (27). Autori opisuju anksiozne poremećaje kao što su socijalna anksioznost i panični poremećaji

Tabela 2. Distribucija dece i adolescenata sa i bez celijakije prema skorovima Upitnika za pretragu anksioznih poremećaja kod dece (SCARED, verzija za dete)

Karakteristike/ <i>Characteristics</i>		Deca i adolescenti sa celijakijom/ <i>Children and adolescents with celiac disease</i> N=116 Broj (%)/ No (%)	Deca i adolescenti bez celijakije/ <i>Children and adolescents without celiac disease</i> N=116 Broj (%)/ No (%)	p vrednost*/ <i>p value*</i>
Anksiozni poremećaj/ <i>Anxiety disorder</i>	Ne/No (< 25) Da/Yes (≥ 25)	76 (66.1) 39 (33.9)	105 (90.5) 11 (9.5)	<0.001
Panično-somatski poremećaj/ <i>Panic-somatic disorder</i>	Ne/No (< 7) Da/Yes (≥ 7)	77 (67.0) 38 (33.0)	106 (91.4) 10 (8.6)	<0.001
Generalizovana anksioznost/ <i>Generalized anxiety</i>	Ne/No (< 9) Da/Yes (≥ 9)	92 (80.0) 23 (20.0)	111 (95.7) 5 (4.3)	0.001
Separacijska anksioznost/ <i>Separation anxiety</i>	Ne/No (< 5) Da/Yes (≥ 5)	78 (67.8) 37 (32.2)	94 (81.0) 22 (19.0)	0.031
Socijalna anksioznost/ <i>Social anxiety</i>	Ne/No (< 8) Da/Yes (≥ 8)	90 (78.3) 25 (21.7)	95 (81.9) 21 (18.1)	0.598
Izbegavanje škole/ <i>School avoiding</i>	Ne/No (< 3) Da/Yes (≥ 3)	94 (81.7) 21 (18.3)	113 (97.4) 3 (2.6)	<0.001

*p vrednost za χ^2 test

available (22).

Children, and especially adolescents with celiac disease, often show the increased level of psychological stress after diagnosis and switching to a gluten-free diet. Avoiding a wide range of products, which contain gluten, often demands significant changes regarding diet and the way of life of children and their families, while social interaction also becomes limited. Current problems can influence the level of anxiety and depression (23). A higher risk of anxiety disorders in children after diagnosis is connected with the reaction to the realization that it is a chronic disease, which demands a strict lifelong gluten-free diet and which categorizes children as "different" from their peers.

Studies, which have been conducted across Europe, have shown that anxiety disorders, such as anxiety, depression, fatigue, are connected with the diagnosis of celiac disease, before and after diagnosis is confirmed, and therefore, they can have influence on the adherence to a gluten-

free diet and patients' quality of life (24). It is expected that children and adolescents, whose condition gets worse due to the non-compliance with a diet and whose level of disability is, therefore, higher, take part in social activities with more difficulties, which has been confirmed in a few pediatric studies (25).

Results of a large number of studies suggest that patients with celiac disease benefit from a gluten-free diet, but that this diet influences numerous daily activities, especially social aspects of life. Studies, which have been conducted on a large sample of examinees with celiac disease, have confirmed that a gluten-free diet has a significant influence on the quality of life, including economic and psychological aspects, beside the social aspect. Examinees claimed that they experienced restrictions regarding social life, including travels and entertainment, and that the financial burden was not negligible, as well (26, 7).

There is evidence which suggests that in children with chronic disorders, there is a

Table 2. Distribution of children and adolescents with and without celiac disease by Screen for Child Anxiety Related Disorder (SCARED, version for children)

Karakteristike/ Characteristics		Deca i adolescenti sa celijakijom/ Children and adolescents with celiac disease N=116 Broj (%)/ No (%)	Deca i adolescenti bez celijakije / Children and adolescents without celiac disease N=116 Broj (%)/ No (%)	p vrednost*/ p value*
Anksiozni poremećaj/ Anxiety disorder	Ne/No (< 25) Da/Yes (≥ 25)	76 (66.1) 39 (33.9)	105 (90.5) 11 (9.5)	<0.001
Panično-somatski poremećaj/ Panic-somatic disorder	Ne/No (< 7) Da/Yes (≥ 7)	77 (67.0) 38 (33.0)	106 (91.4) 10 (8.6)	<0.001
Generalizovana anksioznost/ Generalized anxiety	Ne/No (< 9) Da/Yes (≥ 9)	92 (80.0) 23 (20.0)	111 (95.7) 5 (4.3)	0.001
Separacijska anksioznost/ Separation anxiety	Ne/No (< 5) Da/Yes (≥ 5)	78 (67.8) 37 (32.2)	94 (81.0) 22 (19.0)	0.031
Socijalna anksioznost/ Social anxiety	Ne/No (< 8) Da/Yes (≥ 8)	90 (78.3) 25 (21.7)	95 (81.9) 21 (18.1)	0.598
Izbegavanje škole/ School avoiding	Ne/No (< 3) Da/Yes (≥ 3)	94 (81.7) 21 (18.3)	113 (97.4) 3 (2.6)	<0.001

*p value for chi square test

koji su povezani sa bezglutenskom dijetom. U istoj studiji je uočeno i da znatno veći procenat (70%) pacijenata sa celijakijom ima socijalnu anksioznost i porast paničnih poremećaja u odnosu na kontrolnu grupu (27).

Zaključak

Deca i adolescenti sa celijakijom su skloniji ispoljavanju emocionalnih i socijalnih problema u poređenju sa njihovim vršnjacima koji nemaju celijakiju.

Postoje problemi u svakodnevnoj organizaciji života pa se pored zdravstvenog javlja i socijalni problem. Kod adolescenata, uticaj vršnjaka na ponašanje postaje jači od roditeljskog i tada su spremni da prekrše dijetu i suoče se sa svim opasnostima koji taj postupak donosi.

Redovno sprovođenje procedura sa ciljem detekcije psiholoških problema kod dece i adolescenata sa celijakijom bi doprinelo blagovremenim terapijskim merama, a samim tim i očuvanju kvaliteta života u vezi sa zdravljem.

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greater possibility that they may have different emotional disorders and difficulties regarding psychological adjustment in relation to their healthy peers (27). Study results of Addolorato and associates have shown that patients with celiac disease have significantly greater chances to get the symptoms of anxiety after one year on a gluten-free diet in comparison to the control group without this disease (27). The authors describe anxiety disorders such as social anxiety and panic disorders, which are associated with a gluten-free diet. In the same study, it has been noticed that significantly higher percentage (70%) of patients with celiac disease has social anxiety and the increase in panic disorders in comparison to the control group (27).

Conclusion

Children and adolescents with celiac disease are more prone to experience emotional and social problems in comparison to their peers, who do not have celiac disease.

There are problems regarding daily organization of life, and therefore, beside the health problem, the social problem occurs, as well. In adolescents, the influence of peers is stronger than the influence of parents and then they are ready to break the diet and face the dangers of this behavior. Regular compliance with the procedures, aimed at detecting the psychological problems in children and adolescents with celiac disease, would contribute to timely therapeutic measures, and therefore, to maintaining health-related quality of life.

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KRETANJE OBOLEVANJA OD DIJABETES MELITUSA TIP 1 KOD DEČAKA I DEVOJČICA UZRASTA 0-14 GODINA U BEOGRADU U PERIODU OD 1992. DO 2017. GODINE: *JOINPOINT* REGRESIONA ANALIZA

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SAŽETAK

Uvod/Cilj: Dijabetes melitus tip 1 (DM1) je jedna od najčešćih hroničnih bolesti kod dece i adolescenata, a stope incidencije na svetskom nivou su u porastu. Cilj ovog rada je bio da ispita kretanje obolevanja od DM1 kod dečaka i devojčica uzrasta 0-14 godina na teritoriji Beograda za period 1992-2017. godine.

Metode: Podaci o broju novoobolelih od DM1, uzrasta 0-14 godina, za period 1992-2017. godine, za područje Beograda, dobijeni su iz bolnica u kojima je postavljena dijagnoza DM1, Instituta za majku i dete „Dr Vukan Čupić“ i Univerzitetske dečje klinike, kao i iz registra za dijabetes. Podaci o broju stanovnika uzrasta 0-14 godina za Beograd su dobijeni iz Republičkog zavoda za statistiku. Na osnovu dobijenih podataka izračunate su sirove, standardizovane i uzrasno specifične stope incidencije DM1.

Rezultati: U Beogradu je, u periodu 1992-2017. godina, prosečna standardizovana stopa incidencije (na 100.000) DM1 bila 13,9 za dečake, a 12,3 za devojčice, uzrasta 0-14 godina. Kod oba pola raste uzrasno specifična stopa incidencije DM1 sa godinama starosti i najviša je u uzrastu 10-14 godina. U posmatranom periodu od 26 godina došlo je do značajnog prosečnog godišnjeg porasta standardizovane stope incidencije DM1 za +3,3% kod dečaka, a kod devojčica za +3,1%. Kod dečaka značajan prosečan godišnji porast uzrasno specifične stope incidencije DM1 je bio u uzrastu od 5 do 9 godina (+5,1%), a kod devojčica u uzrasnoj grupi 0-4 godine (+12,9%).

Zaključak: Potrebno je dalje praćenje kretanja obolevanja od DM1 dece uzrasta 0-14 godina u cilju identifikovanja faktora rizika koji doprinose nastanku ovog oboljenja i preduzimanja adekvatnih preventivnih mera i dobre organizacije zdravstvene zaštite.

Ključne reči: dijabetes melitus tip 1, incidencija, trend, joinpoint regresiona analiza

Uvod

Dijabetes melitus je česta metabolička i endokrina bolest koja pogađa decu. Iako pojava dijabetesa melitusa tipa 2 (DM2) kod dece i adolescenata privlači mnogo pažnje, dijabetes melitus tip 1 (DM1) ostaje preovlađujući oblik ove bolesti tokom detinjstva. Rizik od komplikacija dijabetesa i dalje je visok. Dijabetes je vodeći uzrok nefropatije, retinopatije, neuropatije i koronarnih i perifernih vaskularnih bolesti i predstavlja ogroman teret za javno zdravlje. Lečenje je doživotno, bolno, ometa svakodnevni život, zahteva samodisciplinu i uravnoteženu ishranu.

U svetu je, 2019. godine, bilo oko 98.200 novih slučajeva DM1 kod dece uzrasta 0-14 godina, dok je ukupan broj dece koja žive sa ovim

oboljenjem iznosio 600.000 (1). Incidencija DM1 značajno varira u različitim zemljama, ali se globalno povećava (2). Stope incidencije se kreću od 0,1 na 100.000 u regionu Zuni u Kini do više od 40 na 100.000 u Finskoj, što govori da je razlika u stopama incidencije između zemalja i do 400 puta (3). Podaci iz Finske, koja ima jednu od najvećih incidencija DM1 ukazuju na „ubrzavajuću“ epidemiju, sa stopom rasta većom od ranijih procena (4). Sličan trend porasta beleži se i u drugim evropskim zemljama, gde postoje razlike u trendovima, a porast je najveći u zemljama Centralne i Istočne Evrope koje su ranije imale najniže stope incidencije (4,5). Procenjuje se da je u Evropi ukupan godišnji porast incidencije 3% (5). Takođe, postoje dobri dokazi koji ukazuju na to da je najveće povećanje

TREND OF TYPE 1 DIABETES MELLITUS IN BOYS AND GIRLS UNDER 14 YEARS OF AGE IN BELGRADE IN THE PERIOD FROM 1992 TO 2017: JOINPOINT REGRESSION ANALYSIS

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SUMMARY

Introduction/Aim: Type 1 diabetes (DM1) is one of the most common chronic diseases of childhood and adolescence. The incidence of DM1 in children and adolescents has increased worldwide. The aim of this study was to analyze the trend of DM1 in boys and girls aged 0-14 years in Belgrade during period 1992-2017.

Methods: Data on the number of children with diabetes for the period 1992-2017 were obtained from two hospitals, the Institute for Mother and Child Dr Vukan Cupic and the University Children's Hospitals, as well as from the registers. Belgrade population figures are official data from the Statistical Office of The Republic of Serbia. Based on the data obtained, crude, standardized and age-specific incidence rates of DM1 were calculated.

Results: In Belgrade in the period 1992-2017 the average standardized incidence rate (per 100,000) is 13.9 for boys and 12.3 for girls aged 0-14 years. In both sexes, the age-specific incidence rate of DM1 increases with age and is highest at the age of 10-14 years. In the observed period of 26 years, there was a significant average annual increase in the standardized incidence rate of DM1 of + 3.3% in boys and + 3.1% in girls. In boys, a significant average annual increase in the age-specific incidence rate of DM1 was at the age of 5 to 9 years (+ 5.1%), and in girls in the age group 0-4 years (+ 12.9%).

Conclusion: A further follow-up of DM1 in children aged 0-14 years is needed in order to identify risk factors that contribute to the development of this disease and to take adequate preventive measures, as well as to organize the health care.

Key words: type 1 diabetes mellitus, incidence, trend, joinpoint regression analysis

Introduction

Diabetes mellitus is a common metabolic and endocrine disease, which affects children. Although the appearance of diabetes mellitus type 2 (DM2) in children and adolescents attracts a lot of attention, diabetes mellitus type 1 (DM1) remains the predominant type of this disease during childhood. The risk of diabetes complications is still high. Diabetes is a leading cause of nephropathy, retinopathy, neuropathy, coronary and peripheral vascular diseases, and it presents the great public health burden. The treatment is lifelong, painful, and it can disrupt daily life. It requires self-discipline and a balanced diet.

There were around 98,200 new cases of diabetes mellitus in children aged 0-14 in the

world in 2019, whereas the total number of children with this disease amounted to 600,000 (1). The incidence of DM1 significantly varies in different countries, and it has been increasing globally (2). The incidence rates vary from 0.1 per 100.000 in the region Zuni in China to more than 40 per 100.000 in Finland, which means that the rates vary 400-fold between countries (3). Data from Finland, which has one of the highest incidence rates of DM1, point to the "accelerating" epidemic with the rate of increase which is higher than the previous estimates (4). A similar trend of increase has been noted in other European countries, where difference in trends exists, while the highest increase is in the countries of Central and Eastern Europe, which had lower incidence rates before (4,5). The

stope incidencije kod dece uzrasta 0-4 godine (6).

Cilj ovog rada bio je da se ispita kretanje obolevanja od DM1 kod dečaka i devojčica uzrasta 0-14 godina u Beogradu za period 1992. do 2017. godine.

Metode

Podaci o broju obolelih od DM1 za period od 1992. do 2017. godine dobijeni su iz dve beogradske bolnice (Instituta za majku i dete „Dr Vukan Čupić“ i Univerzitetske dečje klinike

Tiršova) u kojima je postavljena dijagnoza DM1, prema kriterijumima Svetske zdravstvene organizacije (6). Dve pedijatrijske bolnice su jedine bolnice u Beogradu u kojima je postavljena konačna dijagnoza DM1 i odluka o terapiji. Takođe, podaci su preuzeti iz registra za dijabetes za period od 2006. do 2017. godine. U ovoj deskriptivnoj studiji prikazani su podaci samo za decu, uzrasta 0-14 godina, čije je prebivalište u Beogradu. Podaci o broju stanovnika Beograda po polu za uzrasne grupe 0-4, 5-9, 10-14 godina dobijeni su od Republičkog zavoda za statistiku

Tabela 1. Broj novoobolelih, sirove i standardizovane stope incidencije (na 100.000) od dijabetesa melitusa tip 1 za dečake i devojčice uzrasta 0-14 godina, Beograd, 1992-2017. godine

Godine/ Years	Dečaci/Boys			Devojčice/Girls		
	Broj obolelih/ No of new cases	Stope incidencije/ Incidence rates	Standardizovane stope/ Standardized rates	Broj obolelih/ No of new cases	Stope incidencije/ Incidence rates	Standardizovane stope/ Standardized rates
1992	15	10.2	9.8	11	7.9	6.9
1993	14	9.5	8.6	14	10.1	9.6
1994	18	12.2	11.7	13	9.4	8.8
1995	19	12.9	12.3	14	10.1	9.2
1996	26	17.7	16.3	19	13.7	12.4
1997	17	11.5	11.2	19	13.7	11.9
1998	16	10.9	9.9	11	7.9	7.3
1999	14	9.5	8.3	19	13.7	12.0
2000	18	12.2	11.8	13	9.4	8.3
2001	18	12.2	11.0	15	10.8	9.4
2002	17	11.6	10.5	14	10.1	8.9
2003	21	14.3	13.5	19	13.7	13.8
2004	24	4.0	3.9	12	8.6	7.6
2005	24	16.4	16.1	12	8.6	7.6
2006	15	10.2	9.0	12	15.8	14.1
2007	16	10.9	9.2	13	9.4	8.4
2008	25	17.1	16.4	24	17.3	17.1
2009	22	15.0	13.2	21	15.1	14.7
2010	18	12.3	13.3	17	12.2	11.7
2011	23	19.2	19.3	16	14.1	14.2
2012	19	15.9	15.4	26	22.9	22.5
2013	22	18.4	18.0	11	9.7	9.3
2014	30	25.0	24.6	24	21.2	20.8
2015	29	24.2	23.8	13	11.5	11.0
2016	32	26.7	26.1	22	19.4	18.5
2017	24	20.0	19.2	29	25.6	24.8
Prosek/ Average	536	14.6	13.9	433	13.1	12.3

overall annual increase in Europe is estimated at 3% (5). Also, there is firm evidence that the highest increase of the incidence rate is among children aged 0-4 years (6).

The aim of this work was to examine the trend of DM1 in boys and girls under 14 years of age in Belgrade in the period from 1992 to 2017.

Methods

Data on the number of patients with DM1 for the period 1992-2017 were obtained

from two hospitals in Belgrade (The Institute for Mother and Child Dr Vukan Cupic and the University Children's Hospital), where DM1 was diagnosed, according to the criteria of the World Health Organization (6). The two pediatric hospitals were the only hospitals in Belgrade, where the final diagnosis of DM1 was confirmed and the decision about therapy was made, as well. Also, data were taken from the register for diabetes for the period 1992-2017. In this descriptive study, data were shown only for children aged 0-14, whose place of residence

Table 1. Number of new cases, crude and standardized incidence rates (per 100,000) of type 1 diabetes mellitus for boys and girls aged 0-14, Belgrade, 1992-2017

Godine/ Years	Dečaci/Boys			Devojčice/Girls		
	Broj obolelih/ No of new cases	Stope incidencije/ Incidence rates	Standardizovane stope/ Standardized rates	Broj obolelih/ No of new cases	Stope incidencije/ Incidence rates	Standardizovane stope/ Standardized rates
1992	15	10.2	9.8	11	7.9	6.9
1993	14	9.5	8.6	14	10.1	9.6
1994	18	12.2	11.7	13	9.4	8.8
1995	19	12.9	12.3	14	10.1	9.2
1996	26	17.7	16.3	19	13.7	12.4
1997	17	11.5	11.2	19	13.7	11.9
1998	16	10.9	9.9	11	7.9	7.3
1999	14	9.5	8.3	19	13.7	12.0
2000	18	12.2	11.8	13	9.4	8.3
2001	18	12.2	11.0	15	10.8	9.4
2002	17	11.6	10.5	14	10.1	8.9
2003	21	14.3	13.5	19	13.7	13.8
2004	24	4.0	3.9	12	8.6	7.6
2005	24	16.4	16.1	12	8.6	7.6
2006	15	10.2	9.0	12	15.8	14.1
2007	16	10.9	9.2	13	9.4	8.4
2008	25	17.1	16.4	24	17.3	17.1
2009	22	15.0	13.2	21	15.1	14.7
2010	18	12.3	13.3	17	12.2	11.7
2011	23	19.2	19.3	16	14.1	14.2
2012	19	15.9	15.4	26	22.9	22.5
2013	22	18.4	18.0	11	9.7	9.3
2014	30	25.0	24.6	24	21.2	20.8
2015	29	24.2	23.8	13	11.5	11.0
2016	32	26.7	26.1	22	19.4	18.5
2017	24	20.0	19.2	29	25.6	24.8
Prosek/ Average	536	14.6	13.9	433	13.1	12.3

Tabela 2. Ukupan i prosečan broj novoobolelih od dijabetesa melitusa tip 1, prosečne uzrasno specifične stope incidencije (na 100.000) i joinpoint regresiona analiza kretanja incidencije, dečaci, Beograd, 1992-2017. godine

Uzrasne grupe/ <i>Age groups</i> (godine/years)	Ukupan broj obolelih od 1992. do 2017. godine/ <i>Total number of cases from 1992 till 2017</i>	Prosečan broj obolelih/ <i>Average number of new cases</i>	Prosečne stope incidencije/ <i>Average incidence rates</i>	AAPC (95% IP) AAPC (95% CI)
0 - 4	102	4	8.9	1.9 (-5.9 do 10.3)
5 - 9	197	8	16.2	5.1^ (2.5 do 7.7)
10 - 14	237	9	18.1	2.1 (-0.2 do 4.4)
0-14	536	21	13.9*	3.3^ (1.4 do 5.2)

AAPC –proseča godišnja promena procenta za period 1992-2017.godina;^-AAPC je značajno različito od 0 za alfa 0,05; 95% IP – 95% interval poverenja; * standardizovana stopa na 100.000

prema popisima 1991, 2002. i 2011. godine. Na osnovu dobijenih podataka izračunate su opšte, uzrasno specifične i standardizovane stope incidencije DM1.

Trendovi stopa incidencije su izračunati korišćenjem joinpoint regresione analize (*Joinpoint Regression Program, Version 4.7.0.0. February, 2019; Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute*), prema metodu Kim et al. (7). Joinpoint regresionom analizom određena je prosečna procentualna godišnja promena (engl. *AAPC – Average annual percent change*). Kao nezavisna varijabla postavljene su godine, dok je zavisna varijabla bila odgovarajuća uzrasno specifična stopa. Korišćen je *Grid Search* metod (8). Pored toga, 95% intervali poverenja računati su za svaku procenu AAPC kako bi se utvrdilo da li je AAPC

različit od 0. Koristili smo test uporedivosti da uporedimo linije regresije. Glavni cilj testa uporedivosti bio je upoređivanje dva niza podataka o trendovima čije su srednje funkcije predstavljene joinpoint regresijom. Poseban interes bio je ispitivanje da li su dve srednje vrednosti regresije paralelne (test paralelizma).

Rezultati

U periodu od 1992. do 2017. godine, u Beogradu je obolelo 536 dečaka i 433 devojčice od DM1 (tabela 1), odnosno prosečno godišnje oboleo je 21 dečak i 17 devojčica. Prosečna standardizovana stopa incidencije bila je neznatno viša za dečake uzasta 0-14 godina (13,9 na 100.000), nego za devojčice (12,3 na 100.000) istog uzrasta. Kod oba pola došlo je porasta standardizovane stope incidencije (na 100.000) i to kod dečaka sa 9,8 u 1992. godini

Tabela 3. Ukupan i prosečan broj novoobolelih od dijabetesa melitusa tip 1, prosečne uzrasno specifične stope incidencije (na 100.000) i joinpoint regresiona analiza kretanja incidencije, devojčice, Beograd, 1992-2017. godine

Uzrasne grupe/ <i>Age groups</i> (godine/years)	Ukupan broj obolelih od 1992. do 2017. godine/ <i>Total number of cases from 1992 till 2017</i>	Prosečan broj obolelih/ <i>Average number of new cases</i>	Prosečne stope incidencije/ <i>Average incidence rates</i>	AAPC (95% IP) AAPC (95% CI)
0 - 4	67	3	6.4	12.9^ (1.3 do 25.8)
5 - 9	160	6	14.0	3.5^ (0.8 do 6.3)
10 - 14	216	8	18.4	2.3 (-0.1 do 4.7)
0-14	433	17	12.3	3.1^ (1.5 do 4.7)

AAPC –proseča godišnja promena procenta za period 1992-2017.godina;^-AAPC je značajno različito od 0 za alfa 0,05; 95% IP – 95% interval poverenja; * standardizovana stopa na 100.000.

Table 2. Total and average number of new cases of type 1 diabetes mellitus, average age-specific incidence rates (per 100,000) and joinpoint regression analysis of incidence trend, boys, Belgrade, 1992-2017

Uzrasne grupe/ Age groups (godine/years)	Ukupan broj obolelih od 1992. do 2017. godine/ Total number of cases from 1992 till 2017	Prosečan broj obolelih/ Average number of new cases	Prosečne stope incidencije/ Average incidence rates	AAPC (95% IP) AAPC (95% CI)
0 - 4	102	4	8.9	1.9 (-5.9 do 10.3)
5 - 9	197	8	16.2	5.1^ (2.5 do 7.7)
10 - 14	237	9	18.1	2.1 (-0.2 do 4.4)
0-14	536	21	13.9*	3.3^ (1.4 do 5.2)

AAPC –Average Annual Percent Change for the period 1992-2017; ^ -AAPC is significantly different from 0 for alpha 0.05; 95% CI– 95% confidence interval; *standardized rate per 100,000.

was in Belgrade. Data on the number of residents of Belgrade for the gender-specific groups aged 0-4, 5-9, 10-14 years were obtained from the Statistical Office of The Republic of Serbia according to the Census from 1991, 2002 and 2011. General, age-specific and standardized incidence rates of DM1 were calculated on the basis of the obtained data.

Trends of the incidence rates were calculated with the help of joinpoint regression analysis (Joinpoint Regression Program, Version 4.7.0.0 February, 2019; Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute), based on the method of Kim et al. (7). The average annual percentage change (AAPC) was determined with the help of joinpoint regression analysis. Age was set as an independent variable, while the corresponding age-specific rate was a dependent variable. Grid Search Method was

used (8). Besides, the 95% confidence interval was calculated for each estimate of AAPC in order to determine whether the AAPC was different from 0. The test of compatibility was used in order to compare regression lines. The main aim of the compatibility test was to compare two sets of trend data, whose mean functions were presented by joinpoint regression. A specific interest was testing whether the two regression mean functions were parallel (test of parallelism).

Results

In Belgrade, during the period 1992-2017, 536 boys and 433 girls were diagnosed with DM1 (Table 1), that is, on average, 21 boys and 17 girls annually. An average standardized incidence rate was slightly higher in boys aged 0-14 years (13.9 per 100,000), than in girls (12.3 per 100,000) of the same age. The standardized

Table 3. Total and average number of new cases of type 1 diabetes mellitus, average age-specific incidence rates (per 100,000) and joinpoint regression analysis of incidence trend, girls, Belgrade, 1992-2017

Uzrasne grupe/ Age groups (godine/years)	Ukupan broj obolelih od 1992. do 2017. godine/ Total number of cases from 1992 till 2017	Prosečan broj obolelih/ Average number of new cases	Prosečne stope incidencije/ Average incidence rates	AAPC (95% IP) AAPC (95% CI)
0 - 4	67	3	6.4	12.9^ (1.3 do 25.8)
5 - 9	160	6	14.0	3.5^ (0.8 do 6.3)
10 - 14	216	8	18.4	2.3 (-0.1 do 4.7)
0-14	433	17	12.3	3.1^ (1.5 do 4.7)

AAAPC –Average Annual Percent Change for the period 1992-2017; ^ -AAPC is significantly different from 0 for alpha 0.05; 95% CI– 95% confidence interval; *standardized rate per 100,000.

na 19,2 u 2017. godini, a kod devojčica sa 6,9 u 1992. godini na 24,8 u 2017. godini.

Kod oba pola sa godinama starosti raste uzrasno specifična stopa incidencije DM1 (grafikoni 2 i 3). Značajan prosečan godišnji porast uzrasno specifičnih stopa incidencije DM1, u posmatranom periodu, je zabeležen kod dečaka u uzrastu 5-9 godina (+ 5,3%), a kod devojčica u uzrastima 0-4 godine (+12,9%) i 5-9 godina (+3,5%).

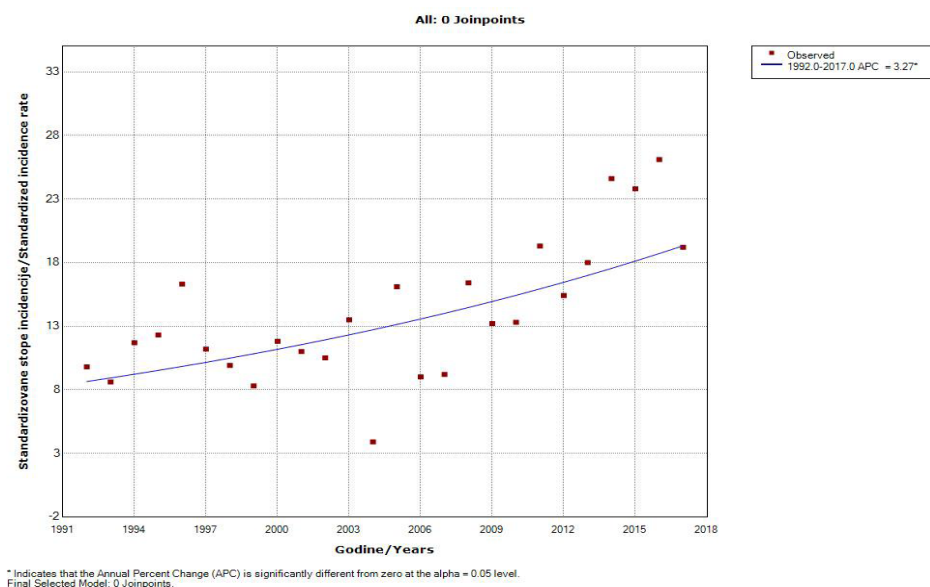
Takođe, kod oba pola uzrasta 0-14 godina dolazi do značajnog prosečnog godišnjeg porasta standardizovanih stopa incidencije DM1 tokom posmatranog dvadesetšestogodišnjeg perioda i to za +3,3% kod dečaka i za +3,1% kod devojčica (grafikon 1).

Prema rezultatima testa uporedivosti (grafikon 2) trendovi standardizovanih stopa incidencije DM1 kod dečaka i devojčica bili su paralelni (*final selected model failed to reject parallelism $p = 0,867$*).

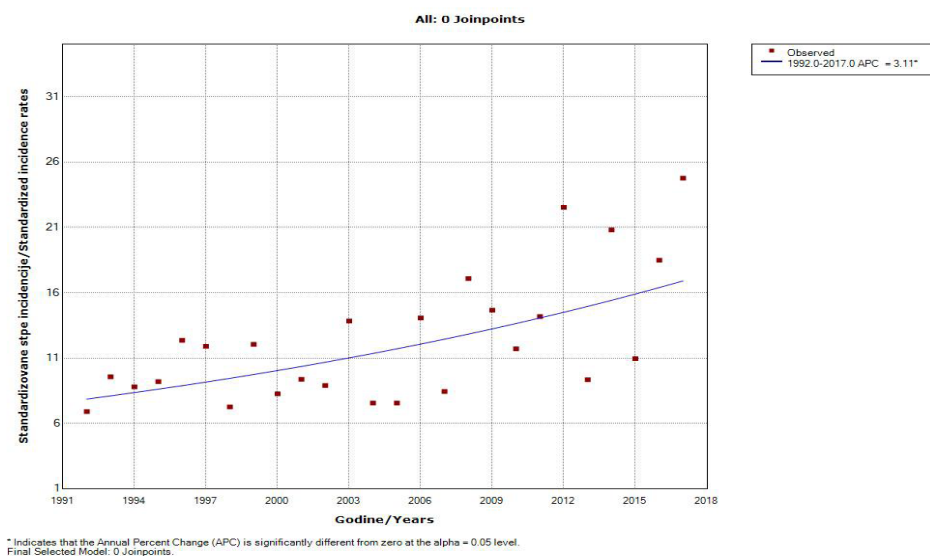
Diskusija

Na globalnom nivou, zemlje se prema vrednostima stopa incidencije DM1 grupišu u zemalje sa vrlo niskim (<1/100.000), niskim (1-4/100.000), srednjim (5-9,9/100.000), visokim (10-19,9/100.000) i vrlo visokim ($\geq 20/100.000$) stopama incidencije (12). Prema ovoj klasifikaciji, Beograd sa prosečnom standardizovanom stopom incidencije za DM1 od 13,9 na 100.000 za dečake i 12,3 na 100.000

a)



b)



Grafikon 1. Jointpoint regresiona analiza: kretanje standardizovanih stopa incidencije dijabetesa melitusa tip 1 kod dečaka (a) i devojčica (b) uzrasta 0-14 godina, Beograd, 1992-2017. godina

incidence rate increased in both sexes (per 100,000), that is, in boys it increased from 9.8 in 1992 to 19.2 in 2017, while in girls it increased from 6.9 in 1992 to 24.8 in 2017.

In both sexes, as they got older, the age-specific incidence rate of DM1 increased (Figures 2 and 3). A significant annual increase of the age-specific incidence rates of DM1 in the observed period was recorded in boys aged 5-9 (+5.3%), and in girls aged 0-4 (+12.9%) and 5-9 (+3.5%).

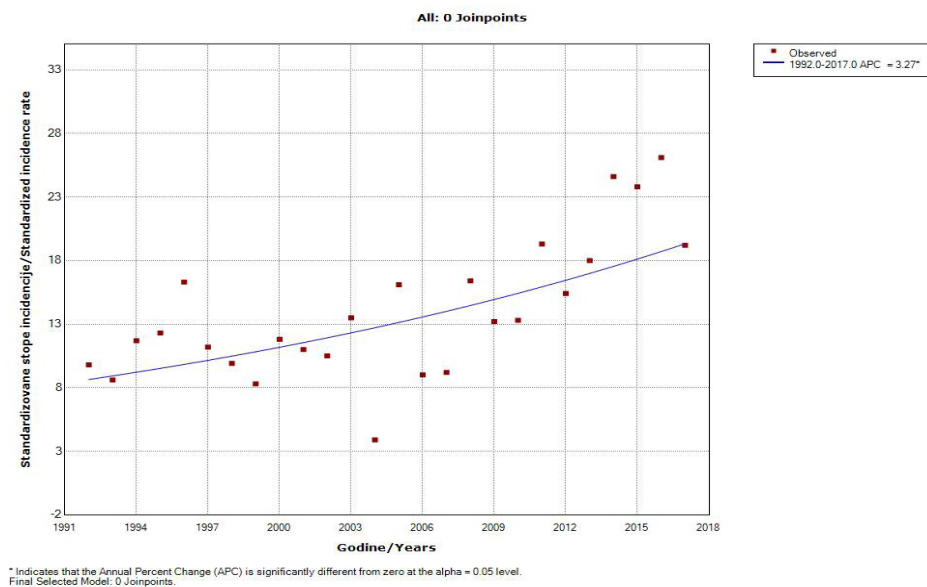
Also, in both sexes aged 0-14 there came to the significant increase in the standardized incidence rates of DM1 during the observed 26 years long period, that is, for 3.3% in boys and for 3.1% in girls (Figure 1).

According to the results of the compatibility test (Figure 2), the trends of standardized incidence rates of DM1 in boys and girls were parallel (final selected model failed to reject parallelism $p = 0.867$).

Discussion

At the global level, countries are, according to the values of incidence rates of DM1, classified into countries with the very low (<1/100,000), low (1-4/100,000), moderate (5-9.9/100,000), high (10-19.9/100,000) and very high (>20/100,000) incidence rates (12). According to this classification, Belgrade with the average standardized incidence rate of DM1, which was 13.9 per 100,000 in boys and 12.3

a)



b)

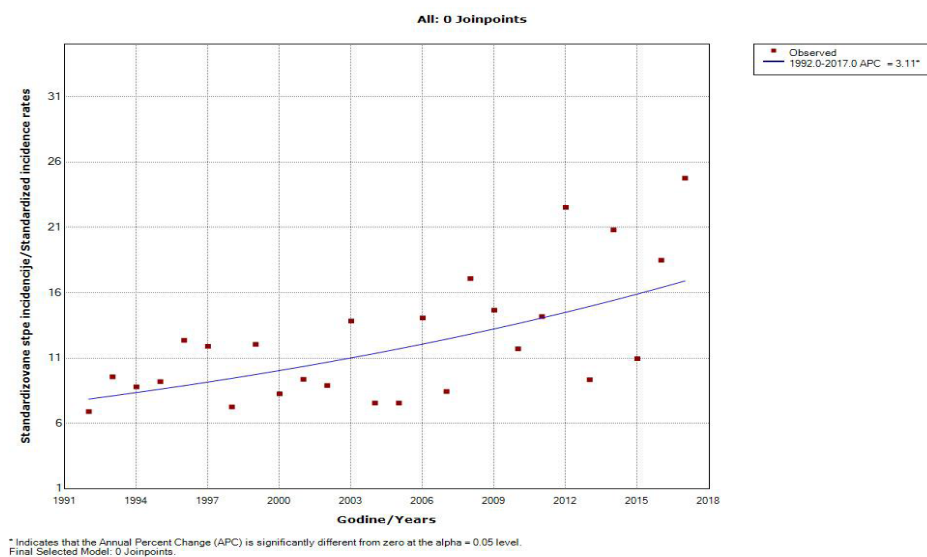


Figure 1. Joinpoint regression analysis: trend of standardized incidence rates of type 1 diabetes mellitus in boys (a) and girls (b) aged 0-14 years, Belgrade, 1992-2007

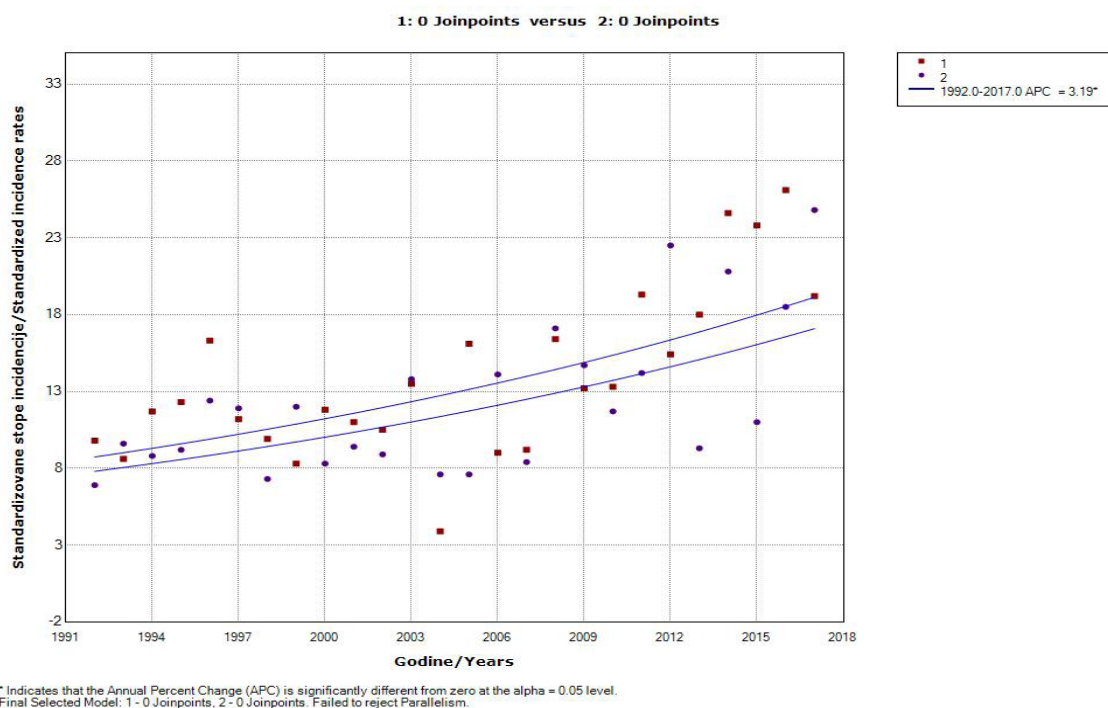
za devojčice pripada području sa visokom stopom incidencije. Takođe, podaci studije o incidenciji DM1 u Beogradu za period 1992-2005. godine, pokazuju da je Beograd sa ukupnom standardizovanom stopom incidencije od 10,4 na 100.000 stanovnika i tada pripadao područjima sa visokom stopom incidencije za DM1 (13).

EURODIAB registrom obuhvaćeno je 29.311 dece sa DM1 mlađe od 15 godina na osnovu podataka 20 populacionih registara iz 17 zemalja za period 1989-2003. godine (4). Prema ovim podacima, stope incidencije su se kretale od 4,7 na 100.000 u Rumuniji do 39,9 na 100.000 u Finskoj. Porast incidencije, tokom petnaestogodišnjeg perioda, je bio najbrži među zemljama koje su u početku imale najniže stope incidencije. Najveći porast incidencije primećen u najmlađoj starosnoj grupi. Ukupni godišnji porast incidencije DM1 za sve centre zajedno je bio za +3,9% (95%IP 3,6-4,2), a za uzrast 0-4 godine +5,4%, 5-9 godina +4,3%, a za uzrast 10-14 godina +2,9%. Ovaj brz porast incidencije DM1 među najmlađima je primećen za regione centralne i istočne Evrope. U Hrvatskoj je, u periodu 2004-2012. godine, došlo do godišnjeg porasta incidencije DM1 za +5,9% kod dece mlađe od 15 godina, a za +7,8% kod dečaka i

+4,8% kod devojčica (14). Kod oba pola porast incidencije je bio najviši u uzrasnoj grupi 10-14 godina.

U Beogradu je, u periodu 1992-2017. godine, došlo do značajnog godišnjeg porasta standardizovane stope incidencije DM1 za +3,3% kod dečaka i +3,1% kod devojčica uzrasta 0-14 godina. Kod dečaka je godišnji porast incidencije bio najveći za uzrast od 5 do 9 godina (+5,1%), a kod devojčica u najmlađoj uzrasnoj grupi 0-4 godine (+12,9%). Međutim, najveće stope incidencije kod oba pola bile su u uzrastu 10-14 godina.

Uprkos porastu incidencije DM1 u velikom broju zemalja, malo je verovatno da se ovaj porast može pripisati izmenama u genetskoj strukturi stanovništva. Najverovatnije su glavni razlozi porasta incidencije izmene u izloženosti faktorima spoljne sredine. U tom kontekstu postavljeno je nekoliko teorija koje objašnjavaju porast incidencije DM1 u detinjstvu u razvijenim zemljama (2). One uključuju povećanu stopu carskih rezova, nutritivne faktore (na primer, nedostatak vitamina D ili ranu izloženost proteinima kravljeg mleka ili cerealijama), smanjenu izloženost dečijim infekcijama i povećanu dečiju gojaznost. Na primer, prema „hipotezi o higijeni“, smatra se da smanjena



Grafikon 2. Jointpoint regresiona analiza: kretanje standardizovanih stopa incidencije dijabetesa melitusa tip 1 kod dečaka i devojčica uzrasta 0-14 godina, Beograd, 1992-2007. godina: test uporedivosti

per 100,000 in girls, belongs to the regions with the high incidence rates. Also, study data on the incidence of DM1 in Belgrade during the period 1992-2005 show that Belgrade with the overall standardized incidence rate of 10.4 per 100,000 residents belonged even then to the regions with the high incidence rates of DM1 (13).

EURODIAB register included 29,311 children with DM1, who were younger than 15 years, on the basis of data from 20 population registers from 17 countries for the period 1989-2003 (4). According to these data, the incidence rates ranged from 4.7 per 100,000 in Romania to 39.9 per 100,000 in Finland. The increase of incidence, during the fifteen year long period, was fastest in countries which had had the lowest incidence rates in the beginning. The highest increase in incidence was noted in the youngest age group. The overall annual increase in DM1 incidence for all groups together was +3.9% (95% IP 3.6-4.2), while for the age group 0-4 it was +5.4%, for the group 5-9 years +4.3%, and for the group 10-14 years +2.9%. This fast increase of DM1 incidence among children was noted in the regions of Central and Eastern Europe. In Croatia, during the period 2004-2012, there came to the annual increase in DM1 incidence for +5.9% in children younger than 15

years, and for +7.8% in boys and +4.8% in girls (14). In both sexes, the increase in incidence was highest in the age group 10-14 years.

In Belgrade, during the period 1992-2017, there came to the significant annual increase in the standardized incidence rate of DM1 of +3.3% in boys and +3.1% in girls aged 0-14 years. In boys, the annual increase in incidence was highest in the age group 5 to 9 years (+5.1%), and in girls in the youngest age group 0-4 years (+12.9%). However, the highest incidence rates for both sexes were in the age group 10-14 years.

Despite the increase in incidence of DM1 in a large number of countries, it is not very likely that this increase may be attributed to the changes in the genetic structure of population. It is quite likely that the main reasons for the incidence increase are changes in exposure to environmental factors. In this context, there are a few theories that explain the increase in DM1 incidence in childhood in developed countries (2). They include the increased rate of Caesarean sections, dietary factors (for example, vitamin D deficiency or early exposure to cow's milk proteins or cereals), less contact with childhood infections and the rise in childhood obesity. For example, according

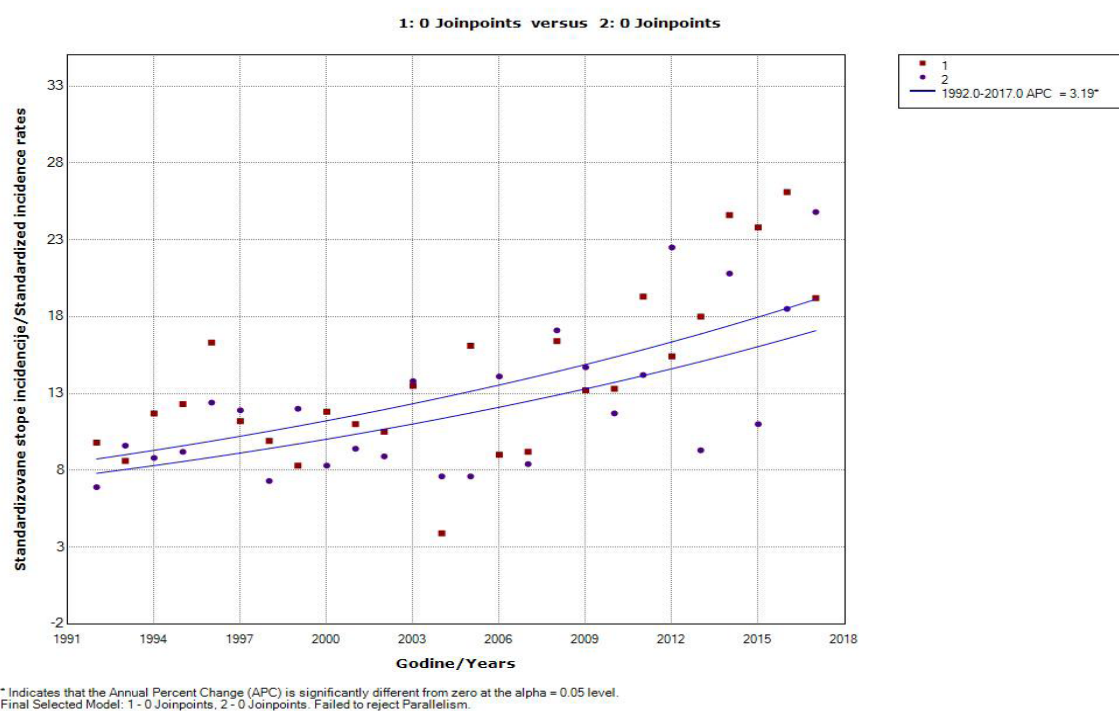


Figure 2. Joinpoint regression analysis: trend of standardized incidence rates of type 1 diabetes mellitus in boys and girls aged 0-14 years, Belgrade, 1992-2007: test of parallelism

izloženost patogenima u detinjstvu može dovesti do povećane atopije, astme i autoimunih bolesti poput DM1 (5). Od posebnog značaja je povezanost DM1 sa visokom telesnom težinom i ranim povećanjem telesne težine (15). Dečija gojaznost, s njom povezana insulinska rezistencija i zapaljenja, mogu dovesti do ubrzane apoptoze β ćelija, a time i ranije manifestacija DM1 kod osoba koje imaju povećanu genetsku sklonost (16). U prilog ovoj teoriji ide i činjenica da ubrzani porast incidencije DM1 prati rastuću prevalenciju dečije gojaznosti u Evropi (17).

Učestalost DM1 kod mlađih odraslih osoba starosti preko 15 godina pokazuje malo dokaza o porastu (18,19), ali zapažene su više stope incidencije kod muškaraca nego kod žena za ovu uzrasnu grupu (20). Ukoliko se javljanje DM1 zaista pomera prema mlađim uzrastima, onda niža stopa incidencije kod žena od 15 i više godina mogla bi objasniti niske stope porasta incidencije kod devojčica u uzrastu od 10 do 14 godina (4).

Predviđeni porast DM1 u detinjstvu i porast proporcije slučajeva dijagnostikovanih u mlađim uzrastima nego što su bili pre, može dovesti do većeg broja slučajeva komplikacija, zbog čega su pravovremena dijagnoza i terapija od presudnog značaja (21). U nedostatku bilo kakvih efikasnih sredstava za prevenciju DM1, mora se obezbediti odgovarajuće planiranje usluga i resursi za obezbeđivanje visokokvalitetne nege za povećan broj dece kojoj će biti dijagnostikovana dijabetes u narednim godinama.

Zaključak

Na osnovu standardizovanih stopa incidencije za DM1 za decu uzrasta 0-14 godina, može se zaključiti da Beograd pripada područjima sa visokom stopom incidencije i da se beleži značajan porast stope incidencije kod oba pola u periodu 1992-2017. godine. Ovaj porast je neznatno veći kod dečaka nego devojčica. Potrebno je dalje praćenje kretanja obolevanja od DM1 dece uzrasta 0-14 godina, kako bi se identifikovali faktori rizika koji doprinose ovom porastu i preduzele adekvatne preventivne mere, kao i da bi se adekvatno organizovala zdravstvena služba.

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to the “hygiene hypothesis”, it is claimed that the reduced exposure to pathogens during childhood can lead to the increased atopy, asthma, and autoimmune diseases such as DM1 (5). An association between DM1 and obesity, as well as early increase in body weight, is of great importance (15). Childhood obesity, as well as insulin resistance and inflammations, which are associated with it, lead to the faster apoptosis of β cells, and therefore, to earlier manifestations of DM1 in people who have increased genetic susceptibility (16). The fact that the faster increase in DM1 follows the growing prevalence of childhood obesity in Europe speaks in favor of this theory (17).

There is little evidence about the increase in incidence of DM1 in younger adolescents older than 15 years (18,19), however, higher incidence rates have been noted in men rather than in women for this age group (20). If the appearance of DM1 actually shifts towards younger age groups, then the lower incidence rate in women aged 15 and older could explain the low increase in incidence rates in girls aged 10 to 14 (4).

The estimated increase in DM1 during childhood and the increase in cases diagnosed in younger age groups than before, could lead to a larger number of complications, due to which the timely diagnosis and therapy are of utmost importance (21). In regard to the fact that there are no efficient means to prevent DM1, the adequate planning of services and the high quality care should be provided for the larger number of children, who will be diagnosed with diabetes in the years to come.

Conclusion

On the basis of standardized incidence rates of DM1 in children aged 0-14 years, conclusion can be made that Belgrade belongs to the regions with the high incidence rates and that the significant increase in incidence rates was registered in both sexes for the period 1992-2017. This increase is slightly higher in boys than in girls. A further follow-up of DM1 in children aged 0-14 years is necessary in order to identify risk factors which contribute to this increase and to take adequate preventive measures, as well as to organize the healthcare service in an adequate way.

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STIL ŽIVOTA, ZNANJE I PERCEPCIJA GOJAZNOSTI PROKOMERNO UHRANJENIH I GOJAZNIH OSOBA

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SAŽETAK

Uvod/Cilj: Istraživanje je imalo za cilj da ispita uticaj sociodemografskih faktora i indeksa telesne mase na stil života, znanje i percepciju gojaznosti prekomerno uhranjenih i gojaznih osoba.

Metode: Studijom preseka obuhvaćeno je 96 prekomerno uhranjenih i gojaznih osoba registrovanih u Domu zdravlja Krupa na Uni u periodu od 01.10.2018. do 01.10.2019. godine. U istraživanju su korišćeni opšti uputnik i upitnik o stilu života, znanju i percepciji gojaznosti (engl. *Knowledge, Attitude, and Practice (KAP) questionnaire about obesity*).

Rezultati: Studijom preseka je obuhvaćeno 96 ispitanika i to 66 (68,8%) sa prekomernom telesnom težinom i 30 (31,3%) sa gojaznošću (gojaznost I stepena 29,2%, gojaznost II stepena 1%, gojaznost III stepena 1%). Muškaraca je bilo neznatno više (54,2%) nego žena (45,8%). Prosečna starost ispitivane populacije je bila 56,0±3,2 godine. Fakultetsko obrazovanje imalo je 5 (5,2%) učesnika u istraživanju, srednju stručnu spremu 61 (63,5%), dok je 30 (31,3%) završilo samo osnovnu školu. Učesnici u istraživanju nisu imali uvid u definiciju i značenje indeksa telesne mase, dok je poznavanje osnovnih principa zdrave ishrane i terapije gojaznosti bilo nisko. Znanje o komorbiditetima gojaznosti pokazalo se kao zadovoljavajuće. Većina ispitanika je bila svesna svoje gojaznosti i smatrali su da im gojaznost ne može ugroziti zdravlje i zbog telesne težine su se osećali depresivno. Učesnici u istraživanju imali su sedentarni način života i nepravilnu ishranu (ekscesivni energetske unos). Ocena znanja i percepcije o gojaznosti je bila značajno ($p < 0,05$) bolja kod osoba sa višim (61,0±1,0 i 68,0±6,1) nego sa nižim (41,0±6,7 i 59,0±2,1) obrazovanjem. Osobe koje su bile gojazne značajno su češće imale nižu ocenu znanja (36,0±3,4) i percepciju (56,0±3,1) o gojaznosti, nego osobe sa prekomernom telesnom težinom (40,0±2,2 i 62,0±1,7) ($p < 0,05$).

Zaključak: U ambulanti porodične medicine je potrebno intenzivirati zdravstveno vaspitni rad sa ciljem edukacije (sa naglaskom na osobe sa nižim obrazovanjem i visokim indeksom telesne mase) i iznalaženja faktora koji bi aktivnije podstakli promenu životnog stila prekomerno uhranjenih i gojaznih osoba.

Ključne riječi: Znanje, percepcija, životni stil, gojaznost, prekomerna uhranjenost

Uvod

Gojaznost se definiše kao abnormalna akumulacija masti u organizmu u meri u kojoj može ugroziti zdravlje (1). Podrazumeva indeks telesne mase (engl. *body mass index*, BMI) ≥ 30 kg/m² (2). Gojaznost predstavlja značajan javnozdravstveni problem (2,3). Prema podacima Svetske zdravstvene organizacije (engl. *World Health Organization*, WHO) oko 600 miliona ljudi u svetu je gojazno (2,3). Zbog gojaznosti svake godine umre 2,8 miliona ljudi (4). Etiopatogeneza gojaznosti je multifaktorijalna (2).

Primarna gojaznost je posledica energetske disbalansa, odnosno unošenja hranljivih materija koje prevazilazi nivo energetske potrošnje (2,5). Sekundarna gojaznost je retka i nastaje kao rezultat endokrinih i genetičkih poremećaja, lezija centralnog nervnog sistema i jatrogenih uzroka (1). Gojaznost, naročito abdominalna, je povezana sa metaboličko-hormonalnim komplikacijama, bolestima organskih sistema, malignim bolestima, mehaničkim i psihosocijalnim komplikacijama (1). Dijagnostička evaluacija gojaznih podrazumeva anamnezu (uključujući

LIFESTYLE, KNOWLEDGE AND ATTITUDE ABOUT OBESITY AMONG OVERWEIGHT AND OBESE PERSONS

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SUMMARY

Introduction/Aim: The aim of the study was to examine the impact of sociodemographic factors and body mass index on knowledge, attitude and perception of obesity in overweight and obese individuals.

Methods: A cross-sectional study included 96 overweight and obese persons registered at the Health Center "Krupa on the Una River" from October 1st, 2018 to October 1st, 2019. A general questionnaire and a questionnaire assessing knowledge, attitude and practice of obesity (KAP) were used in the study.

Results: A cross-sectional study included 96 participants, that is, 66 (68.8%) overweight participants and 30 (31.3%) obese participants (obesity class I 29.2%, obesity class II 1%, obesity class III 1%). 52 (54.2%) men and 44 (45.8%) women participated in the study. The mean age of the study population was 56.0 ± 3.2 years. 5 (5.2%) research participants had university education, 61 (63.5%) had some form of secondary education, while 30 (31.3%) completed only primary school. The study participants had no insight into the definition and meaning of body mass index, while knowledge of the basic principles of healthy eating and obesity therapy was low. Knowledge about the comorbidities of obesity proved to be satisfactory. Most of the respondents were aware of their obesity, felt that it could endanger their health and felt depressed because of their weight. The participants in the study had a sedentary lifestyle and unhealthy nutrition (excessive energy intake). The assessment of knowledge and perception of obesity was significantly ($p < 0.05$) better in persons with a higher level of education (61.0 ± 1.0 and 68.0 ± 6.1) in comparison to persons with a lower level of education (41.0 ± 6.7 and 59.0 ± 2.1). Obese persons significantly more frequently had a lower score of knowledge (36.0 ± 3.4) and perception of obesity (56.0 ± 3.1) in comparison to overweight people (40.0 ± 2.2 and 62.0 ± 1.7) ($p < 0.05$).

Conclusion: In the family medicine clinic, it is necessary to intensify health education (with emphasis on people with lower education and the high body mass index) and to find factors that would more actively encourage the change of lifestyle of overweight and obese people.

Key words: Knowledge, perception, lifestyle, obesity, overweight

Introduction

Obesity is defined as abnormal fat accumulation that presents a risk to health (1). People are considered obese when their body mass index (BMI) is $> 30 \text{ kg/m}^2$ (2). Obesity is a significant public health problem (2,3). According to the data of the World Health Organization, there are around 600 million obese people worldwide (2,3). Each year around 2.8 million people die as a result of being obese (4). The etiopathogenesis of obesity is multifactorial (2).

Primary obesity is a consequence of an

energy imbalance, that is, energy intake which exceeds energy expenditure (2,5). Secondary obesity is rare, and it occurs as a consequence of endocrine and genetic disorders, lesions of the central nervous system and iatrogenesis (1). Obesity, especially abdominal, is associated with metabolic-hormonal complications, diseases of organ systems, malignant diseases, mechanical and psychosocial complications (1). Obesity diagnostics consists of anamnesis (including lifestyle, knowledge and perception of obesity), physical examination, laboratory testing and the electrocardiogram (6). Obesity treatment

stil života, znanje i precepciju gojaznosti), fizikalni pregled, laboratorijsku obradu i elektrokardiogram (6). Terapija gojaznosti obuhvata dijetski režim ishrane, programiranu fizičku aktivnost, medikamentoznu terapiju, hirurško lečenje, biheviornalnu terapiju i psihološku podršku (2).

Veliki broj istraživanja ukazuje na sveprisutnije nepoznavanje osnovnih principa pravilne ishrane, pogrešnu identifikaciju telesne težine i nezdrav profil životnog stila. Ženski pol, starija životna dob i nizak stepen obrazovanja identifikovani su kao najkonstantiji sociodemografski etiološki faktori. Povezanost životnog stila i gojaznosti je dvosmerna, odnosno ne samo da sedentarni način života i nepravilna ishrana uzrokuju gojaznost, već ona rezultuje fizičkom neaktivnošću i ekscesivnim energetske unosom (7-9).

Ovo istraživanje je imalo za cilj da ispita uticaj sociodemografskih faktora i indeksa telesne mase na stil života, znanje i precepciju gojaznosti kod prekomerno uhranjenih i gojaznih osoba.

Metode

Ova studija preseka sprovedena je u Domu zdravlja Krupa na Uni (Republika Srpska, Bosna i Hercegovina) u periodu od 12 meseci, od 01.10.2018. do 01.10.2019. godine. Studijom je obuhvaćeno 96 prekomerno uhranjenih i gojaznih osoba koje su se sukcesivno javljale u ambulantu porodične medicine zbog pregleda ili administrativnih razloga. Istraživanje je sprovedeno u toku redovnog rada sa pacijentima.

Kriterijumi za uključivanje u istraživanje bili su: starost između 20 i 79 godina, završena osnovna škola, indeks telesne mase ≥ 25 kg/m². Iz studije su isključene osobe sa indeksom telesne mase < 25 kg/m², starosti < 20 i > 79 godina, kao i sve osobe sa psihotičnim poremećajem, malignim i uznapredovalim hroničnim oboljenjima (insuficijencija jetre, dekompenzacija srca i hronična bubrežna insuficijencija).

Podaci su prikupljeni fizikalnim pregledom, sociodemografskim upitnikom izrađenim za potrebe istraživanja i specifičnim upitnikom o stilu života, znanju i precepciji gojaznosti (engl. *Knowledge, attitude, and practice questionnaire*

about obesity, KAP). Fizikalnim pregledom je merena telesna težina i visina da bi se izračunao indeks telesne mase (ITM), a koji se dobija kao količnik telesne mase, izražene u kilogramima, i kvadrata visine, izražene u metrima. Telesna visina merena je pomičnim visinometrom sa gradacijom od 1cm. Prilikom merenja ispitanici su stajali na ravnoj podlozi, imali su sastavljene pete, ispravljen kičmeni stub i glavu u položaju „Frankfurtske horizontale“ (vodoravna linija od donje ivice leve orbite do gornje ivice levog spoljašnjeg slušnog kanala). Telesna težina merena je pomoću medicinske decimalne vage. Prilikom merenja učesnici istraživanja su bili bosi, obučeni samo u donji veš. Prema ITM razlikovali smo ispitanike sa: prekomernom uhranjenošću (BMI = 25,0 – 29,99 kg/m²), gojaznošću I stepena (BMI = 30,0 – 34,99 kg/m²), gojaznošću II stepena (BMI = 35,0 – 39,99 kg/m²) i gojaznošću III stepena (BMI ≥ 40 kg/m²) (10). Opštim upitnikom prikupljeni su sociodemografski podaci (pol, uzrast, stepen obrazovanja).

Upitnik o stilu života, znanju i precepciji gojaznosti sastoji se od 42 pitanja podeljenih u tri domena: 14 pitanja o znanju (poznavanje osnova pravilne ishrane, komplikacija gojaznosti i terapije gojaznosti), 15 pitanja o precepciji (precepcija telesne težine i motivacija za terapiju gojaznosti) i 13 pitanja o stilu života (prehrambene navike i nivo fizičke aktivnosti u svakodnevnom životu) (8). Za svako pitanje ispitanici su imali pet ponuđenih odgovora (upitnik je dizajniran po principu petostepene Likertove skale) (8). Najbolji mogući odgovor dobijao je ocenu 5, a pogrešan ocenu 1 (8). Za svakog ispitanika izračunat je zbir ocena za svaki domen upitnika. Upitnik ima zadovoljavajuću validnost i unutrašnju konzistentnost (koeficijent pouzdanosti Kronbah alfa za svaki domen iznosi 0,75, 0,75, i 0,63) (11). U statističkoj analizi podataka korišćen je hi-kvadrat (χ^2) test i studentov t-test.

Rezultati

Istraživanje je obuhvatilo 96 ispitanika, od kojih su 54,2% činili muškarci, a 45,8% žene (tabela 1). Najveći broj ispitanika (63,5%) bili su uzrasta 40-59 godina. Prosečna starost ispitivane populacije je bila 56,0 \pm 3,2 godine.

includes dietary regimen, programmed physical activity, pharmacological treatment, surgical treatment, behavioral therapy and psychological support (2).

A large number of studies point to the ubiquitous lack of understanding of the basic principles of good nutrition, inaccurate body mass index values and unhealthy lifestyle. Female gender, older age and lower level of education have been identified as the constant sociodemographic and etiological factors. The relationship between lifestyle and obesity is a two-way relationship. It means that sedentary lifestyle and unhealthy diet cause obesity, as well as that obesity results in physical inactivity and excessive energy intake (7,9).

The aim of this research was to examine the influence of sociodemographic factors and the body mass index on lifestyle, knowledge and perception of obesity in overweight and obese people.

Methods

A cross-sectional study was conducted at the Health Center "Krupa on the Una River" (The Republic of Srpska, Bosnia and Herzegovina) during the period of twelve months, between October 1st, 2018 and October 1st, 2019. The study included 96 overweight and obese people, who visited their family doctor's office in order to be examined or due to administrative reasons. The research study was conducted during the regular work with patients.

The criteria for the inclusion in the study were the following: age between 20 and 79 years, at least 8 grades of primary education, the body mass index $> 25 \text{ kg/m}^2$. All examinees with the body mass index $< 25 \text{ kg/m}^2$, younger than 20 and older than 79 were excluded from the study, as well as all persons with the psychotic disorder, malignant and advanced chronic diseases (liver failure, cardiac decompensation and chronic renal insufficiency).

Data were collected during the physical examination, using the sociodemographic questionnaire made for the needs of this research and the specific questionnaire assessing knowledge, attitude and practices about obesity. Body weight and height were measured during the physical examination,

aimed at calculating the body mass index, whose formula is weight in kilograms divided by height in meters squared. Height was measured in centimetres with a sliding stadiometer. The participants stood on a horizontal platform with their heels together, stretched their head and back upwards in the position of the "Frankfort horizontal" (horizontal line from the lowest point of the margin of the left orbit to the upper margin of the external opening of the left ear). Weight was measured in decimals using medical weighing scales. During this measurement, the research participants were barefoot, wearing only their underwear. According to the BMI, the participants were: overweight (BMI = 25-29.99 kg/m^2), obese class I (BMI = 30.0-34.99 kg/m^2), obese class II (BMI = 35.0-39.99 kg/m^2), and obese class III (BMI $> 40 \text{ kg/m}^2$) (10). Sociodemographic data were collected with the help of the general questionnaire (gender, age, level of education).

The questionnaire about the lifestyle, knowledge and perception of obesity consists of 42 questions divided into three domains: 14 questions about knowledge (knowledge about the basic principles of a healthy diet, obesity complications, obesity treatment), 15 questions about perception (perception of weight and motivation for obesity treatment), and 13 questions about lifestyle (dietary regimen and the level of daily physical activity) (8). There were five options for each question (the questionnaire was designed according to a five-point Likert scale) (8). The best possible answer got the mark 5, while the incorrect answer got the mark 1 (8). The sum total for each domain of the questionnaire was calculated for each respondent. The questionnaire has satisfactory validity and internal consistency (confidence coefficient - Cronbach's alpha for each domain amounts to 0.75, 0.75 and 0.63) (11). A chi-square test and student's t-test were used in the statistical analysis of data.

Results

The research included 96 participants, that is, 54.2% of men and 45.8% of women (Table 1). The largest number of participants (63.5%) was aged 40-59 years. The mean age of the examined population was 56.0 ± 3.2 years. Women were

Tabela 1. Distribucija ispitanika prema polu, uzrastu i stepenu obrazovanja

Uzrast (godine)/ Age (years)	Muškarci (Men) Broj (%) / No (%)	Žene (Women) Broj (%) / No (%)	Osnovna škola / (Primary school) Broj (%) / No (%)	Srednja škola / (High school) Broj (%) / No (%)	Fakultet/ College Broj (%) / No (%)	Ukupno/ Total
20-59	45 (46.9)	21 (21.8)	2 (2.1)	59 (61.5)	5 (5.2)	66 (68.7)
60-79	7 (7.3)	23 (24.0)	20 (20.8)	10 (10.4)	0 (0.0)	30 (31.3)
Ukupno/ Total	52 (54.2)	44 (45.8)	22 (22.9)	69 (71.9)	5 (5.2)	96 (100)
p vrednost/ p value	> 0.05		< 0.05			

*p vrednost prema hi kvadrat testu

Žene su bile značajno starije od muškaraca. Najveći broj ispitanika (63,5%) je imalo srednje, 31,3% osnovno, a najmanje (5,2%) visoko obrazovanje. Ispitanici životne dobi 60-79 godina imali su značajno niži stepen obrazovanja.

Prekomerno uhranjenih je bilo 68,8% ispitanika, a gojaznih 31,2% (gojaznost I stepena imalo je 29,2%, gojaznost II stepena 1% i gojaznost III stepena 1% ispitanika) (tabela 2).

Definiciju i značaj ITM i potencijalnu opasnost od abdominalne gojaznosti razumelo je 2,1% ispitanika (tabela 3). Veći deo ispitanika sa prekomernom telesnom težinom i gojaznošću smatrao je da postoji veza gojaznosti sa kardiovaskularnim bolestima (72,9%) i dijabetesom (58,3%), ali ne i sa osteoartritisom (5,2%). Svega 8,3% ispitanika je smatralo da je preskakanje obroka štetno. Učesnici u istraživanju su donekle poznavali značaj prekomerne upotrebe šećera (70,8%) i rafinisane hrane (39,6%) za nastanak gojaznosti, dok je svest o negativom uticaju zaslađenih

napitaka (11,4%) i pržene hrane (19,8%) značajno zaostajala. Samo mali procenat ispitanika (14,6%) je smatrao da postoji veza između stresa i gojaznosti, kao i da je moguće značajno redukovati telesnu težinu bez upotrebe lekova (11,4%) i suplemenata (13,5%). Svega 11,4% ispitanika je bilo mišljenja da su redovne aerobne vežbe značajne za gubitak kilograma.

Gojaznim se smatralo 46,9% ispitanika, dok je njih 58,3% postojeću telesnu težinu videlo kao potencijalno štetnu po zdravlje (tabela 4). Probleme sa održavanjem konstantne telesne težine imalo je 22,9% učesnika u istraživanju. Samo 16,7% ispitanika je znalo da se u terapiji gojaznosti preporučuju mali i česti obroci, a 24,0% redovan doručak. Za redukciju telesne težine bilo je motivisano 66,7% ispitanika. Učesnici istraživanja su smatrali da u ishrani mogu redukovati slatkiše (61,5%), prženu hranu (58,3%) i grickalice (72,9%), povećati intenzitet fizičke aktivnosti (36,5%), obim kućnih poslova (57,3), pešačenje (77,1%) i korištenje stepenica (44,8%). Postojećim obimom fizičke aktivnosti

Tabela 2. Stepenu uhranjenosti ispitanika (izražen u kg/m²)

Stepenu uhranjenosti/ Nutritional status	Broj (%) / No (%)	Ukupno/ Total
Prekomerna uhranjenost (BMI 25.0 - 29.99) / Overweight (BMI 25.0 - 29.99)	66 (68.8%)	66 (68.8%)
Gojaznost I stepena (BMI 30.0 - 34.99) / I degree obesity (BMI 30.0 - 34.99)	28 (29.2%)	
Gojaznost II stepena (BMI 35.0 - 39.9) / II degree obesity (BMI 35.0 - 39.99)	1 (1.0%)	30 (31.2%)
Gojaznost III stepena (BMI ≥ 40) / III degree obesity (BMI ≥ 40)	1 (1.0%)	

*p vrednost prema hi kvadrat testu <0.05

Table 1. Distribution of participants by gender, age and level of education

Uzrast (godine)/ Age (years)	Muškarci (Men) Broj (%) / No (%)	Žene (Women) Broj (%) / No (%)	Osnovna škola / (Primary school) Broj (%) / No (%)	Srednja škola / (High school) Broj (%) / No (%)	Fakultet/ College Broj (%) / No (%)	Ukupno/ Total
20-59	45 (46.9)	21 (21.8)	2 (2.1)	59 (61.5)	5 (5.2)	66 (68.7)
60-79	7 (7.3)	23 (24.0)	20 (20.8)	10 (10.4)	0 (0.0)	30 (31.3)
Ukupno/ Total	52 (54.2)	44 (45.8)	22 (22.9)	69 (71.9)	5 (5.2)	96 (100)
p vrednost/ p value	> 0.05		< 0.05			

*p value according to chi square test

significantly older than men. The largest number of respondents (63.5%) had some form of secondary education, 31.3% primary education, and 5.2% university education. The respondents in the age group 60-79 years had a significantly lower level of education.

68.8% of participants were overweight, while 31.2% of them were obese (29.2% had class I obesity, 1% had class II obesity and 1% had class III obesity) (Table 2).

2.1% of participants understood the definition and significance of the BMI and the potential danger of abdominal obesity (Table 3). A larger number of overweight and obese respondents realized the connection between obesity and cardiovascular diseases (72.9%), between obesity and diabetes (58.3%), but they did not realize the connection between obesity and osteoarthritis (5.2%). Only 8.3% of respondents thought that skipping meals was harmful. The research participants realized, to a certain extent, the significance of excessive sugar consumption (70.8%) and refined foods

intake for the appearance of obesity, whereas the awareness of the negative influence of sugar-sweetened beverages (11.4%) and fried food (19.8%) lagged behind. Only a little percentage of respondents (14.6%) thought that there was a connection between stress and obesity, as well as that body weight could be significantly reduced without drugs (11.4%) and supplements (13.5%). Only 11.4% of respondents thought that regular aerobic exercise was an important part of weight loss.

46.9% of respondents were deemed to be obese, while 58.3% of them thought that the present body weight was potentially harmful to their health (Table 4). 22.9% of research participants had problems with maintaining the constant body weight. Only 16.7% of respondents knew that small and frequent meals were recommended in obesity treatment, while 24.0% of them knew that regular breakfast was recommended, as well. 66.7% of respondents were motivated to lose weight. The research participants thought that they could reduce

Table 2. Participants nutritional status (kg/m²)

Stepen uhranjenosti/ Nutritional status	Broj (%) / No (%)	Ukupno/ Total
Prekomerna uhranjenost (BMI 25.0 - 29.99) / Overweight (BMI 25.0 - 29.99)	66 (68.8%)	66 (68.8%)
Gojaznost I stepena (BMI 30.0 - 34.99) / I degree obesity (BMI 30.0 - 34.99)	28 (29.2%)	
Gojaznost II stepena (BMI 35.0- 39.9) / II degree obesity (BMI 35.0 - 39.99)	1 (1.0%)	30 (31.2%)
Gojaznost III stepena (BMI ≥ 40) / III degree obesity (BMI ≥ 40)	1 (1.0%)	

p value according to chi square test <0.05

bilo je zadovoljno 27,1% ispitanika. Telesna težina je bila uzrok depresije kod 56,2% ispitanika.

Na tabeli 5 prikazan je stil života ispitanika. Značajan broj ispitanika je naveo da uvek jede slatkiše nakon obroka (62,5%), da stavlja u kafu dodatni šećer (46,9%), više od tri puta sedmično

pije zaslađene napitke (65,6%) i konzumira prženu hranu (86,5%) i pojede jedno pakovanje grickalica u toku dana (61,5%). S druge strane voće su konzumirali veoma retko (jednom u petnaest dana, 60,4%). Većinom su imali tri glavna obroka i dve užine (59,4%), ali i dodatne obroke kada su pod stresom (68,8%).

Tabela 3. Znanje ispitanika o gojznosti (N=96)

Znanje/ <i>Knowledge</i>	Tačan odgovor/ <i>Correct answer</i>	Verovatno tačan odgovor/ <i>Probably the correct answer</i>	Netačan odgovor/ <i>Incorrect answer</i>	Verovatno netačan odgovor/ <i>Probably incorrect answer</i>	Ne znam/ <i>I do not know</i>
Poznavanje indeksa telesne mase/ <i>Knowledge of body mass index</i>	2 (2.1%)	2 (2.1%)	4 (4.2%)	14 (14.6%)	74 (77.0%)
Posledice abdominalne gojznosti/ <i>Consequences of abdominal obesity</i>	2 (2.1 %)	2 (2.1%)	10 (10.4%)	12 (12.5%)	70 (72.9%)
Gojznost doprinosi razvoju kardiovaskularnih bolesti/ <i>Obesity predisposes to cardiovascular disease</i>	70 (72.9%)	16 (16.7%)	3 (3.1%)	2 (2.1%)	5 (5.2%)
Gojznost doprinosi razvoju dijabetesa/ <i>Obesity predisposes to diabetes</i>	56 (58.3%)	9 (9.4%)	16 (16.7%)	6 (6.2%)	9 (9.4%)
Gojznost doprinosi razvoju osteoartritisa/ <i>Obesity predisposes to osteoarthritis</i>	5 (5.2%)	11 (11.4%)	19 (19.8%)	9 (9.4%)	52 (54.2%)
Preskakanje obroka je štetno za zdravlje/ <i>Skipping meals is bad for health</i>	8 (8.3%)	7 (7.3%)	45 (46.9%)	12 (12.5%)	24 (25.0%)
Prekomerna upotreba šećera dovodi do gojznosti/ <i>Excessive use of sugar leads to obesity</i>	68 (70.8%)	9 (9.4%)	7 (7.3%)	4 (4.2%)	8 (8.3%)
Konzumiranje zaslađenih napitaka dovodi do gojznosti/ <i>Consuming sweetened drinks leads to obesity</i>	11 (11.4%)	7 (7.3%)	54 (56.3%)	2 (2.1%)	22 (22.9%)
Konzumiranje pržene hrane dovodi do gojznosti/ <i>Consumption of fried foods leads to obesity</i>	19 (19.8%)	10 (10.4%)	41 (42.7%)	4 (4.2%)	22 (22.9%)
Konzumiranje rafinisane hrane dovodi do gojznosti/ <i>Consuming refined foods leads to obesity</i>	38 (39.6%)	21 (21.9%)	12 (12.5%)	8 (8.3%)	17 (17.7%)
Konstantan stres dovodi do gojznosti/ <i>Constant stress leads to obesity</i>	14 (14.6%)	12 (12.5%)	10 (10.4%)	16 (16.7%)	44 (45.8%)
Aerobne vežbe imaju značajnu ulogu u redukciji telesne težine/ <i>Aerobic exercise plays a significant role in weight reduction</i>	11 (11.4%)	14 (14.6%)	43 (44.8%)	16 (15.7%)	12 (12.5%)
Lekovi imaju značajnu ulogu u redukciji telesne težine/ <i>Drugs play a significant role in weight reduction</i>	13 (13.5%)	6 (6.2%)	23 (24.0%)	3 (3.1%)	51 (53.1%)
Redukcija telesne težine zahteva upotrebu suplemenata/ <i>Weight reduction requires the use of supplements</i>	11 (11.4%)	9 (9.4%)	24 (25.0%)	2 (2.1%)	60 (52.1%)

sweets (61.5%), fried food (58.3%) and snacks (72.9%), increase the intensity of physical activity (36.5%), the bulk of house chores (57.3%), walking (77.1%) and using stairs (44.8%). 27.1% of respondents were satisfied with the existing level of physical activity. Body

weight was a cause of depression in 56.2% of respondents.

Respondents' lifestyle is presented in Table 5. A significant number of respondents stated that they ate sweets after the meal (62.5%), put extra sugar in their coffee (46.9%), drank sugar-

Table 3. Knowledge regarding obesity among the participants (N=96)

Znanje/ Knowledge	Tačan odgovor/ Correct answer	Verovatno tačan odgovor/ Probably the correct answer	Netačan odgovor/ Incorrect answer	Verovatno netačan odgovor/ Probably incorrect answer	Ne znam/ I do not know
Poznavanje indeksa telesne mase/ Knowledge of body mass index	2 (2.1%)	2 (2.1%)	4 (4.2%)	14 (14.6%)	74 (77.0%)
Posledice abdominalne gojaznosti/ Consequences of abdominal obesity	2 (2.1 %)	2 (2.1%)	10 (10.4%)	12 (12.5%)	70 (72.9%)
Gojaznost doprinosi razvoju kardiovaskularnih bolesti/ Obesity predisposes to cardiovascular disease	70 (72.9%)	16 (16.7%)	3 (3.1%)	2 (2.1%)	5 (5.2%)
Gojaznost doprinosi razvoju dijabetesa/ Obesity predisposes to diabetes	56 (58.3%)	9 (9.4%)	16 (16.7%)	6 (6.2%)	9 (9.4%)
Gojaznost doprinosi razvoju osteoartritisa/ Obesity predisposes to osteoarthritis	5 (5.2%)	11 (11.4%)	19 (19.8%)	9 (9.4%)	52 (54.2%)
Preskakanje obroka je štetno za zdravlje/ Skipping meals is bad for health	8 (8.3%)	7 (7.3%)	45 (46.9%)	12 (12.5%)	24 (25.0%)
Prekomerna upotreba šećera dovodi do gojaznosti/ Excessive use of sugar leads to obesity	68 (70.8%)	9 (9.4%)	7 (7.3%)	4 (4.2%)	8 (8.3%)
Konzumiranje zaslađenih napitaka dovodi do gojaznosti/ Consuming sweetened drinks leads to obesity	11 (11.4%)	7 (7.3%)	54 (56.3%)	2 (2.1%)	22 (22.9%)
Konzumiranje pržene hrane dovodi do gojaznosti/ Consumption of fried foods leads to obesity	19 (19.8%)	10 (10.4%)	41 (42.7%)	4 (4.2%)	22 (22.9%)
Konzumiranje rafinisane hrane dovodi do gojaznosti/ Consuming refined foods leads to obesity	38 (39.6%)	21 (21.9%)	12 (12.5%)	8 (8.3%)	17 (17.7%)
Konstantan stres dovodi do gojaznosti/ Constant stress leads to obesity	14 (14.6%)	12 (12.5%)	10 (10.4%)	16 (16.7%)	44 (45.8%)
Aerobne vežbe imaju značajnu ulogu u redukciji telesne težine/ Aerobic exercise plays a significant role in weight reduction	11 (11.4%)	14 (14.6%)	43 (44.8%)	16 (15.7%)	12 (12.5%)
Lekovi imaju značajnu ulogu u redukciji telesne težine/ Drugs play a significant role in weight reduction	13 (13.5%)	6 (6.2%)	23 (24.0%)	3 (3.1%)	51 (53.1%)
Redukcija telesne težine zahteva upotrebu suplemenata/ Weight reduction requires the use of supplements	11 (11.4%)	9 (9.4%)	24 (25.0%)	2 (2.1%)	60 (52.1%)

Tabela 4. Percepcija gojaznosti ispitanika (N=96)

Percepcija/ <i>Attitude</i>	Definitivno/ <i>Definitely</i>	Verovatno/ <i>Probably</i>	Verovatno da/ <i>Probably yes</i>	Definitivno ne/ <i>Probably not</i>	Ne znam/ <i>I do not know</i>
Smatram se gojaznim/ <i>I consider myself obese</i>	45 (46.9%)	18 (18.8%)	15 (15.6%)	8 (8.3%)	10 (10.4%)
Moja težina je štetna za moje zdravlje/ <i>My weight is bad for my health</i>	56 (58.3%)	17(17.7%)	9 (9.4%)	7 (7.3%)	7 (7.3%)
Motivisan sam za gubitak kilograma/ <i>I am motivated to lose weight</i>	64 (66.7%)	6 (6.2%)	21 (21.9%)	2 (2.1%)	3 (3.1%)
Teško mi je održavati težinu stalnom/ <i>It's hard for me to keep my weight constant</i>	22 (22.9%)	6 (6.2%)	59 (61.5%)	5 (5.2%)	4 (4.2%)
Redovan doručak je važan deo ishrane/ <i>Regular breakfast is an important part of your diet</i>	23 (24.0%)	5 (5.2%)	63 (65.6%)	3 (3.1%)	2(2.1%)
Mali i česti obroci su važni za mršavljenje/ <i>Small and frequent meals are important for weight loss</i>	16 (16.7%)	12 (12.5%)	45 (46.9%)	8 (8.3%)	15 (15.6%)
Spreman sam da redukujem slatkiše u ishrani/ <i>I am ready to reduce sweets in my diet</i>	59 (61.5%)	18 (18.8%)	11 (11.4%)	3 (3.1%)	5 (5.2%)
Spreman sam da prestanem konzumirati prženu hranu/ <i>I am ready to stop consuming fried foods</i>	56 (58.3%)	14 (14.6%)	10 (10.4%)	12 (12.5%)	4 (4.2%)
Spremam sam da grickalice zamenem salatam/ <i>I am ready to replace the snacks with a salad</i>	70 (72.9%)	17 (17.7%)	3 (3.1%)	2 (2.1%)	4 (4.2%)
Zadovoljan sam nivoom fizičke aktivnosti/ <i>I am satisfied with the level of physical activity</i>	26 (27.1%)	13 (13.5%)	42 (43.8%)	7 (7.3%)	8 (8.3%)
Spreman sam da se više bavim sportom/ <i>I am ready to do more sports</i>	35 (36.5%)	26 (27.1%)	26 (27.1%)	6 (6.2%)	3 (3.1%)
Spreman sam da obavljam više kućnih poslova/ <i>I am ready to do more housework</i>	55 (57.3%)	17 (17.7%)	10 (10.4%)	7 (7.3%)	7 (7.3%)
Spreman sam da umesto lifta koristim stepenice/ <i>I am ready to use the stairs instead of the elevator</i>	43 (44.8%)	11 (11.4%)	31 (32.3%)	7 (7.3%)	4 (4.2%)
Spreman sam da hodam do obližnjih mesta/ <i>I am ready to walk to nearby places</i>	74 (77.1%)	4 (4.2%)	14 (14.6%)	3 (3.1%)	1 (1.0%)
Depresivan sam zbog svoje težine/ <i>I am depressed because of my weight</i>	54 (56.2%)	7 (7.3%)	22 (22.9%)	9 (9.4%)	4 (4.2%)

Table 4. Attitude regarding obesity among the participants (N=96)

Percepcija/ <i>Attitude</i>	Definitivno/ <i>Definitely</i>	Verovatno/ <i>Probably</i>	Verovatno da/ <i>Probably yes</i>	Definitivno ne/ <i>Probably not</i>	Ne znam/ <i>I do not know</i>
Smatram se gojaznim/ <i>I consider myself obese</i>	45 (46.9%)	18 (18.8%)	15 (15.6%)	8 (8.3%)	10 (10.4%)
Moja težina je štetna za moje zdravlje/ <i>My weight is bad for my health</i>	56 (58.3%)	17(17.7%)	9 (9.4%)	7 (7.3%)	7 (7.3%)
Motivisan sam za gubitak kilograma/ <i>I am motivated to lose weight</i>	64 (66.7%)	6 (6.2%)	21 (21.9%)	2 (2.1%)	3 (3.1%)
Teško mi je održavati težinu stalnom/ <i>It's hard for me to keep my weight constant</i>	22 (22.9%)	6 (6.2%)	59 (61.5%)	5 (5.2%)	4 (4.2%)
Redovan doručak je važan deo ishrane/ <i>Regular breakfast is an important part of your diet</i>	23 (24.0%)	5 (5.2%)	63 (65.6%)	3 (3.1%)	2(2.1%)
Mali i česti obroci su važni za mršavljenje/ <i>Small and frequent meals are important for weight loss</i>	16 (16.7%)	12 (12.5%)	45 (46.9%)	8 (8.3%)	15 (15.6%)
Spreman sam da redukujem slatkiše u ishrani/ <i>I am ready to reduce sweets in my diet</i>	59 (61.5%)	18 (18.8%)	11 (11.4%)	3 (3.1%)	5 (5.2%)
Spreman sam da prestanem konzumirati prženu hranu/ <i>I am ready to stop consuming fried foods</i>	56 (58.3%)	14 (14.6%)	10 (10.4%)	12 (12.5%)	4 (4.2%)
Spremam sam da grickalice zamenem salatam/ <i>I am ready to replace the snacks with a salad</i>	70 (72.9%)	17 (17.7%)	3 (3.1%)	2 (2.1%)	4 (4.2%)
Zadovoljan sam nivoom fizičke aktivnosti/ <i>I am satisfied with the level of physical activity</i>	26 (27.1%)	13 (13.5%)	42 (43.8%)	7 (7.3%)	8 (8.3%)
Spreman sam da se više bavim sportom/ <i>I am ready to do more sports</i>	35 (36.5%)	26 (27.1%)	26 (27.1%)	6 (6.2%)	3 (3.1%)
Spreman sam da obavljam više kućnih poslova/ <i>I am ready to do more housework</i>	55 (57.3%)	17 (17.7%)	10 (10.4%)	7 (7.3%)	7 (7.3%)
Spreman sam da umesto lifta koristim stepenice/ <i>I am ready to use the stairs instead of the elevator</i>	43 (44.8%)	11 (11.4%)	31 (32.3%)	7 (7.3%)	4 (4.2%)
Spreman sam da hodam do obližnjih mesta/ <i>I am ready to walk to nearby places</i>	74 (77.1%)	4 (4.2%)	14 (14.6%)	3 (3.1%)	1 (1.0%)
Depresivan sam zbog svoje težine/ <i>I am depressed because of my weight</i>	54 (56.2%)	7 (7.3%)	22 (22.9%)	9 (9.4%)	4 (4.2%)

Ponekad im je bila potrebna pomoć u obavljanju kućnih poslova (58,3%). Veoma retko su vežbali, jednom u petnaest dana (84,4%), kraće od 15 minuta (87,5%). Sa intenzivnim treningom su planirali početi u narednih 6 meseci (84,4%). Učesnici u istraživanju nisu razgovarali sa lekarom o terapiji gojaznosti (88,5%).

Ocena znanja i percepcije o gojaznosti je bila značajno ($p < 0,05$) bolja kod osoba sa višim ($61,0 \pm 1,0$ i $68,0 \pm 6,1$) nego sa nižim ($41,0 \pm 6,7$ i $59,0 \pm 2,1$) obrazovanjem. Osobe koje su bile gojazne značajno su češće imale nižu ocenu znanja ($36,0 \pm 3,4$) i percepciju ($56,0 \pm 3,1$)

o gojaznosti, nego osobe sa prekomernom telesnom težinom ($40,0 \pm 2,2$ i $62,0 \pm 1,7$) ($p < 0,05$). Nije postojala značajna razlika u znanju i percepciji gojaznosti u odnosu na uzrast i pol ispitanika ($p > 0,05$). Sociodemografski faktori nisu značajno uticali na životni stil ispitanika ($p > 0,05$).

Diskusija

U našoj studiji ispitanici sa prekomernom telesnom težinom i gojaznošću nisu imali adekvatno znanje o gojaznosti. Gotovo da nisu imali uvid u definiciju i značenje indeksa telesne mase, dok je poznavanje osnovnih principa

Tabela 5. Stil života ispitanika (N=96)

<i>Stil života/ Lifestyle</i>	<i>Uvek/ Always</i>	<i>Vrlo često/ Very often</i>	<i>Ponekad/ Sometimes</i>	<i>Retko/ Rarely</i>	<i>Nikada/ Never</i>
<i>U kafu ili čaj stavljam dodatni šećer/ I put extra sugar in coffee or tea</i>	45 (46.9%)	5 (5.2%)	38 (39.6%)	6 (6.2%)	2 (2.1%)
<i>Jedem slatkiše nakon obroka/ I eat sweets after meals</i>	60 (62.5%)	17 (17.7%)	16 (16.7%)	2 (2.1%)	1 (1.0%)
<i>Drugi mi pomažu u obavljanju kućnih poslova/ Others help me with houseworks</i>	4 (4.2%)	23 (24.0%)	56 (58.3%)	10 (10.4%)	3 (3.1%)
<i>Jedem više kad sam pod stresom/ I eat more when I am stressed</i>	66 (68.8%)	13 (13.5%)	9 (9.4%)	6 (6.2%)	2 (2.1%)
<i>Konzumiram napitke zaslađene šećerom/ I consume sweetened drinks</i>	63 (65.6%)	8 (8.3%)	13 (13.5%)	9 (9.4%)	5 (5.2%)
<i>Konzumiram prženu hranu/ I consume fried foods</i>	83 (86.5%)	5 (5.2%)	4 (4.2%)	3 (3.1%)	1 (1.0%)
<i>Koliko često imam tri glavna obroka i dve užine/ How often do I have three main meals and two snacks</i>	57 (59.4%)	20 (20.8%)	15 (15.6%)	2 (2.1%)	2 (2.1%)
<i>Savetujem se sa svojim lekarom o mršavljenju/ I consult with my doctor about losing weight</i>	1 (1.0%)	4 (4.2%)	4 (4.2%)	2 (2.1%)	85 (88.5%)
<i>Koliko često vežbam/ How often do I exercise</i>	5 (5.2%)	2 (2.1%)	5 (5.2%)	3 (3.1%)	81 (84.4%)
<i>Koliko dugo vežbam/ How long do I exercise</i>	3 (3.1%)	2 (2.1%)	4 (4.2%)	3 (3.1%)	84 (87.5%)
<i>Koliko često konzumiram voće / How often do I consume fruit</i>	11 (11.4%)	9 (9.4%)	12 (12.5%)	58 (60.4%)	6 (6.2%)
<i>Koliko često konzumiram grickalice/ How often do I consume snacks</i>	8 (8.3%)	11 (11.4%)	14 (14.6%)	59 (61.5%)	4 (4.2%)
<i>Redovno vežbam ili planiram početi za 6 meseci/ Exercise regularly or plan to start in 6 months</i>	3 (3.1%)	3 (3.1%)	7 (7.3%)	81 (84.4%)	2 (2.1%)

sweetened beverages more than three times a week (65.6%), ate fried food (86.5%), and ate one packet of snacks daily (61.5%). On the other hand, they ate fruit rarely (once in fifteen days, 60.4%). Most of them had three main meals and two light meals (59.4%), but also some additional meals when they were under stress (68.8%).

They sometimes needed help in doing the housework (58.3%). They exercised very rarely, once in fifteen days (84.4%), shorter than 15 minutes (87.5%). They planned to start the intense exercise program in the following 6 months (84.4%). The research participants

did not talk about obesity treatment with their doctor (88.5%).

The assessment of knowledge and perception of obesity was significantly better ($p < 0.05$) in persons with higher education (61.0 ± 1.0 and 68.0 ± 6.1) than in persons with lower education (41.0 ± 6.7 and 59.0 ± 2.1). Obese people had significantly more frequently a lower score regarding knowledge (36.0 ± 3.4) and perception (56.0 ± 3.1) of obesity than people who were overweight (40.0 ± 2.2 and 62.0 ± 1.7) ($p < 0.05$). There was no significant difference regarding knowledge and perception of obesity in relation to respondents' age and

Table 5. Participants lifestyle (N = 96)

<i>Stil života/ Lifestyle</i>	<i>Uvek/ Always</i>	<i>Vrlo često/ Very often</i>	<i>Ponekad/ Sometimes</i>	<i>Retko/ Rarely</i>	<i>Nikada/ Never</i>
<i>U kafu ili čaj stavljam dodatni šećer/ I put extra sugar in coffee or tea</i>	45 (46.9%)	5 (5.2%)	38 (39.6%)	6 (6.2%)	2 (2.1%)
<i>Jedem slatkiše nakon obroka/ I eat sweets after meals</i>	60 (62.5%)	17 (17.7%)	16 (16.7%)	2 (2.1%)	1 (1.0%)
<i>Drugi mi pomažu u obavljanju kućnih poslova/ Others help me with houseworks</i>	4 (4.2%)	23 (24.0%)	56 (58.3%)	10 (10.4%)	3 (3.1%)
<i>Jedem više kad sam pod stresom/ I eat more when I am stressed</i>	66 (68.8%)	13 (13.5%)	9 (9.4%)	6 (6.2%)	2 (2.1%)
<i>Konzumiram napitke zaslađene šećerom/ I consume sweetened drinks</i>	63 (65.6%)	8 (8.3%)	13 (13.5%)	9 (9.4%)	5 (5.2%)
<i>Konzumiram prženu hranu/ I consume fried foods</i>	83 (86.5%)	5 (5.2%)	4 (4.2%)	3 (3.1%)	1 (1.0%)
<i>Koliko često imam tri glavna obroka i dve užine/ How often do I have three main meals and two snacks</i>	57 (59.4%)	20 (20.8%)	15 (15.6%)	2 (2.1%)	2 (2.1%)
<i>Savetujem se sa svojim lekarom o mršavljenju/ I consult with my doctor about losing weight</i>	1 (1.0%)	4 (4.2%)	4 (4.2%)	2 (2.1%)	85 (88.5%)
<i>Koliko često vežbam/ How often do I exercise</i>	5 (5.2%)	2 (2.1%)	5 (5.2%)	3 (3.1%)	81 (84.4%)
<i>Koliko dugo vežbam/ wHow long do I exercise</i>	3 (3.1%)	2 (2.1%)	4 (4.2%)	3 (3.1%)	84 (87.5%)
<i>Koliko često konzumiram voće / How often do I consume fruit</i>	11 (11.4%)	9 (9.4%)	12 (12.5%)	58 (60.4%)	6 (6.2%)
<i>Koliko često konzumiram grickalice/ How often do I consume snacks</i>	8 (8.3%)	11 (11.4%)	14 (14.6%)	59 (61.5%)	4 (4.2%)
<i>Redovno vežbam ili planiram početi za 6 meseci/ Exercise regularly or plan to start in 6 months</i>	3 (3.1%)	3 (3.1%)	7 (7.3%)	81 (84.4%)	2 (2.1%)

Tabela 6. Životni stil, znanje i percepcija gojaznosti ispitanika u odnosu na različite sociodemografske karakteristike i indeks telesne mase

<i>Karakteristike/ Characteristics</i>	<i>Ocena znanja o gojaznosti/ Knowledge score</i> $\bar{X} \pm SD$	<i>Ocena o percepciji gojaznosti/ Attitude score</i> $\bar{X} \pm SD$	<i>Ocena o životnom stilu/ Practice score</i> $\bar{X} \pm SD$
Muškarci/ Men	41.0±2.0	62.0±1.8	27.0±1.4
Žene/ Women	43.0±1.7	60,0±2.4	28.0±1.7
p vrednost/ p value	>0.05	>0.05	>0.05
Uzrast 20-59 godina/ 20-59 years of age	43.0±8.8	59.0±4.1	27.0±3.2
Uzrast 60-79 godina/ 60-79 years of age	40.0±2.4	64.0±0.98	28.0±1.2
p vrednost/ p value	>0.05	>0.05	>0.05
Osnovna škola/ Primary school	41.0±6.7	59.0±2.1	27.0±0.9
Srednja škola i fakultet / High school and college	61.0±1.0	68.0±6.1	28.0±7.8
p vrednost/ p value	<0.05	<0.05	>0.05
Prekomerna uhranjenost/ Overweight	40.0±2.2	62.0±1.7	28.0±1.3
Gojaznost / Obesity	36.0±3.4	56.0±3.1	25.0±1.7
p vrednost/ p value	<0.05	<0.05	>0.05

p vrednost prema t-testu

zdrave ishrane i terapije gojaznosti bilo nisko. Znanje o komorbiditetima gojaznosti pokazalo se kao zadovoljavajuće. U istraživanju grupe američkih autora svega 14,5% pacijenata u primarnoj zdravstvenoj zaštiti je poznavalo kategorije uhranjenosti definisane ITM (12). Četvorogodišnja studija provedena u Zapadnoj Virdžiniji (Sjedinjene Američke Države) koja je obuhvatila 33 ruralne ambulante porodične medicine utvrdila je skromno povećanje znanja pacijenata o ITM uprkos intenzivnom radu lekara specijalista porodične medicine na prevenciji gojaznosti (13). Studije sprovedene u Gani i Bangladešu o stilu života, znanju i percepciji gojaznosti pacijenata obolelih od dijabetesa melitusa tipa 2, hospitalizovanih na Klinici za endokrinologiju, imale su slične rezultate kada je u pitanju poznavanje komorbiditeta gojaznosti i osnovnih principa zdrave ishrane (većina ispitanika je smatrala da bezalkoholna pića i brza hrana spadaju u zdravu hranu) (14,15). Navedene studije pokazale su

značajno bolje poznavanje terapije gojaznosti kod ispitanika (tj. većina ispitanika smatrala je da redukovanje ishrane ima presudnu ulogu u terapiji gojaznosti) (14,15). Činjenica da se radi o hospitalizovanim pacijentima koji su imali priliku za edukaciju o prevenciji i lečenju gojaznosti mogla bi objasniti navedene razlike (14,15).

U našem istraživanju osobe sa višim stepenom obrazovanja imale su značajno više skorove za znanje i percepciju o gojaznosti, a gojazne osobe značajno niže skorove za znanje i percepciju o gojaznosti. Studija grupe američkih autora o poznavanju komplikacija gojaznosti kod afroameričkog stanovništva verifikovala je značajno veće poznavanje komorbiditeta kod fakultetski obrazovanih učesnika istraživanja (16). Fakultetsko obrazovanje autori su povezali sa višim socioekonomskim statusom i boljim pristupom zdravstvenim informacijama (16). Istraživanje sprovedeno među prekomerno uhranjenim adolescentima u Americi naglašava

Table 6. Knowledge, attitude and practice score of the participants according to different socio demographic characteristics and body mass index

<i>Karakteristike/ Characteristics</i>	Ocena znanja o gojaznosti/ Knowledge score $\bar{X} \pm SD$	Ocena o percepciji gojaznosti/ Attitude score $\bar{X} \pm SD$	Ocena o životnom stilu/ Practice score $\bar{X} \pm SD$
Muškarci/ Men	41.0±2.0	62.0±1.8	27.0±1.4
Žene/ Women	43.0±1.7	60,0±2.4	28.0±1.7
p vrednost/ p value	>0.05	>0.05	>0.05
Uzrast 20-59 godina/ 20-59 years of age	43.0±8.8	59.0±4.1	27.0±3.2
Uzrast 60-79 godina/ 60-79 years of age	40.0±2.4	64.0±0.98	28.0±1.2
p vrednost/ p value	>0.05	>0.05	>0.05
Osnovna škola/ Primary school	41.0±6.7	59.0±2.1	27.0±0.9
Srednja škola i fakultet / High school and college	61.0±1.0	68.0±6.1	28.0±7.8
p vrednost/ p value	<0.05	<0.05	>0.05
Prekomerna uhranjenost/ Overweight	40.0±2.2	62.0±1.7	28.0±1.3
Gojaznost / Obesity	36.0±3.4	56.0±3.1	25.0±1.7
p vrednost/ p value	<0.05	<0.05	>0.05

p value according to t-test

gender ($p > 0.05$). Sociodemographic factors influenced significantly the respondents' lifestyle ($p > 0.05$).

Discussion

In our study, obese and overweight people did not have adequate knowledge of obesity. They almost did not have insight into the definition and meaning of the body mass index, while their understanding of basic principles of good nutrition and obesity treatment was low. It was found that knowledge about comorbidities of obesity was satisfactory.

In the research of the group of American authors, only 14.5% of patients in the primary health care knew the categories of obesity, defined by the BMI (12). It was found in a four-year study, which was conducted in West Virginia (United States of America) and which included 33 rural family medicine clinics, that patients' knowledge about BMI increased modestly, although primary care physicians worked on

preventing obesity. Studies conducted in Ghana and Bangladesh about lifestyle, knowledge and perception of obesity among patients with diabetes mellitus type 2, who were hospitalized in the Endocrinology Clinic, had similar results regarding knowledge about obesity comorbidities and basic principles of a healthy diet (most respondents thought that soft drinks and fast food were healthy) (14,15). The above mentioned studies showed a significantly better understanding of obesity treatment among respondents (most of the respondents thought that reducing the intake of food had a pivotal role in obesity treatment) (14,15). The stated difference could be explained by the fact that the hospitalized patients had an opportunity to be educated about the prevention and obesity treatment (14,15).

In our research, persons with a higher level of education had significantly higher scores regarding knowledge and perception of obesity, while obese persons had significantly

značaj sociokulturnih faktora u poznavanju gojaznosti (17).

U našem istraživanju, gotovo polovina učesnika bila je svesna svoje gojaznost, smatrali su da im gojaznost može ugroziti zdravlje i da se zbog gojaznosti osećaju depresivno. Među ispitanicima je postojala visoka motivacija za terapijom gojaznosti. Pogrešna percepcija telesne težine u istraživanju je bila povezana sa nižim stepenom obrazovanja i visokim ITM.

Desetogodišnja studija američkih autora o percepciji gojaznosti došla je do zaključka da je pogrešna percepcija gojaznosti češća kod pripadnika etničkih manjina, muškaraca i osoba nižeg obrazovnog statusa (14,18). Među afroameričkim ženama još uvek vlada percepcija da je gojaznost znak dobrog življenja (18,19). Stoga je i stepen obrazovanja kod pripadnika etničkih manjina snažnije povezan sa percepcijom gojaznosti kod osoba ženskog pola (18,19). Novije studije ukazuju na značajno pogoršanje percepcije gojaznosti među muškarcima (18,19). Statistički značajno povećanje gojaznosti među muškarcima u poslednjih 50 godina navodi se kao potencijalno objašnjenje (18,19). Longitudinalne studije u trajanju od deset godina utvrdile su da gojazne žene imaju za 38% veću mogućnost za nastanak depresije u odnosu na opštu populaciju (20). Pored endokrinoloških (poremećaj u funkcionisanju osovine hipotalamus-hipofizadubreg), sigurno je da i psihološki faktori (poremećaji u telesnoj estetici) doprinose nastanku depresije kod gojaznih osoba (20).

Većina učesnika u našem istraživanju imala je sedentarni način života i nepravilnu ishranu (ekscesivni energetske unos). Sociodemografski faktori i ITM nisu pokazali statistički značajan uticaj na stil života ispitanika.

Studije sprovedene u Gani i Bangladešu koje su ispitivale režim ishrane hospitalizovanih pacijenata obolelih od dijabetesa melitusa tipa 2 došle su do sličnih rezultata (većina ispitanika preferira prženu i brzu hranu) (14,15). Na sveprisutniji trend sedentarnog ponašanja ukazuje istraživanje sprovedeno na Tajvanu koje je utvrdilo da mlađe osobe provode 450 minuta dnevno u sedentarnim aktivnostima (gledanje televizora, korišćenje kompjutera, mobilnog telefona i sl.) (21). Studija o sedentarnom ponašanju gojazne dece i omladine u Srbiji

došla je do sličnih zaključaka, prosečno vreme uz kompjuter i televizor je bilo 4,9 sati (21).

Zaključak

Znanje i percepcija gojaznosti su značajno niži kod osoba nižeg stepena obrazovanja i gojaznih. Sociodemografske karakteristike i vrednost ITM ne pokazuju značajan uticaj na životni stil prekomerno uhranjenih i gojaznih osoba. Potrebno je intenzivirati zdravstveno vaspitni rad u ambulanti porodične medicine s ciljem edukacije (sa naglaskom na osobe sa nižim obrazovanjem i visokim ITM) i iznalaženja faktora koji bi aktivnije podstakli promenu životnog stila prekomerno uhranjenih i gojaznih osoba.

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lower scores regarding knowledge and perception of obesity. A study of the group of American authors about obesity complications among the African American population verified a significantly higher understanding of comorbidities among the participants with university education (16). The authors associated the university education with the higher socioeconomic status and better access to health information (16). The research was conducted among the overweight adolescents in America and it pointed to the significance of socio-cultural factors for understanding obesity (on the basis of simulation, it was shown that at the same level of socioeconomic status there was a significant difference depending on the ethnic affiliation) (17).

In our research, almost a half of the respondents were aware of their obesity. They realized that obesity could harm their health and that they were depressed due to obesity. The respondents were highly motivated to treat obesity. A wrong perception of body weight in the research was associated with the lower level of education and the high body mass index.

A ten-year study of American authors about the perception of obesity came to a conclusion that a wrong perception of obesity was more frequent among the members of ethnic minorities, men and people with a lower level of education (14,18). A perception of obesity as a sign of good health was still present among the African American women. Therefore, the level of education among the members of ethnic minorities was strongly associated with the perception of obesity among women (18,19). The recent studies have pointed to the significant worsening of the perception of obesity among men (18,19). It has been claimed that a statistically significant increase in obesity among men during the last 50 years could be a potential explanation (18,19). Longitudinal studies, lasting ten years, found that obese women had a 38% increased risk of depression in comparison to the general population (20). Beside the endocrinological factors (disorders of hypothalamic-pituitary-adrenal axis), psychological factors (body dysmorphic disorders) certainly contributed to depression in obese people (20).

Most of the respondents in our research

had a sedentary lifestyle and an unhealthy diet (excessive energy intake). Sociodemographic factors and the BMI did not show a statistically significant influence on respondents' lifestyle.

The studies, which were conducted in Ghana and Bangladesh and which examined dietary regimen of hospitalized patients with type 2 diabetes mellitus, came to similar results (most respondents preferred fried and fast food) (14,15). The research conducted in Taiwan, which found that young people spent 450 minutes daily engaged in sedentary activities (watching television, using the computer and mobile phone, etc.), pointed to the ubiquitous trend of sedentary behavior (21). A study about the sedentary behavior of obese children and adolescents in Serbia came to a similar conclusion. The average time spent in front of TV or computer was 4.9 hours (21).

Conclusion

Knowledge and perception of obesity are significantly lower in people with a lower level of education and in obese people. Sociodemographic characteristics and the body mass index value do not have the significant influence on lifestyle of overweight and obese people. It is necessary to intensify the health education work in the family medicine clinic aimed at educating (with the emphasis on people with the lower level of education and high body mass index) and finding factors, which would more actively support the change of lifestyle of overweight and obese people.

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ZNAČAJ EDUKACIJE ZDRAVSTVENIH RADNIKA U OTKRIVANJU ŽENA KOJE SU PREŽIVELE RODNO ZASNOVANO NASILJE

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SAŽETAK

Uvod/cilj: Nasilje nad ženama je svaki vid rodno zasnovanog nasilja koje može da ima za posledicu fizičku, psihičku ili seksualnu povredu žene. Cilj istraživanja je bio da se utvrdi da li postoji razlika u stavovima između zdravstvenih radnika i radnica edukovanih o važnosti otkrivanja žena koje su preživele rodno zasnovano nasilje.

Metode: U okviru ove studije preseka prikupljeni su podaci anonimnim, on-line upitnikom, od 78 zdravstvenih radnika (stopa odgovora 72,9%) koji su edukovani o važnosti otkrivanja žena koje su preživele rodno zasnovano nasilje.

Rezultati: Od 78 zdravstvenih radnika 14,1% su činili muškarci, a 85,9% žene. Između muškaraca i žena nije bilo značajne razlike u odnosu na njihove demografske karakteristike (uzrast, bračni status, dužina radnog staža i stručnu spremu). Muškarci su jedino značajno češće, u poređenju sa ženama, smatrali nedostatak osoblja kao ključni razlog zašto postoje institucione barijere koje onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja. Oba pola od socijalnih barijera za prijavu nasilja izdvajaju: nizak socio-ekonomski status pacijenata (74,4%), kulturološko shvatanje sredine gde živi osoba koja preživljava nasilje (60,2%) i društveni stereotip i predrasude (59,0%), od institucionalnih barijera: preopterećenost poslom (69,2%), a od ličnih barijera: ograničenost vremenom pri obavljanju svakodnevnog posla (70,5%) i mala ovlašćenja zdravstvenih radnika (52,6%). Muškarci češće smatraju da se nasilje ne prijavljuje, jer žene koje su preživele nasilje moraju da se vrate u isto okruženje i jer se stide i boje osude okoline, a žene jer se nasilje može ponoviti.

Zaključak: Edukacija zdravstvenih radnika/ca je presudna u sticanju znanja i veština o rodno zasnovanom nasilju u cilju pomoći ženama koje su ga preživele. Takođe, potrebno je uključiti veći broj muškaraca u ove vrste edukacija.

Ključne reči: Edukacija, rodno zasnovano nasilje, zdravstvena zaštita

Uvod

Nasilje nad ženama je svaki vid rodno zasnovanog nasilja koje može da ima za posledicu fizičku, psihičku ili seksualnu povredu ili patnju žene, uključujući i pretnje takvim radnjama, ograničenje ili proizvoljno lišavanje slobode, bez obzira da li se dešava u sferi javnog ili privatnog života (1). Globalni podaci pokazuju da svaka treća žena je iskusila nasilje od strane svog partnera tokom života (2). Najčešći oblik nasilja je psihološko nasilje, zatim fizičko i ekonomsko (1,3,4). Zdravstveni sektor često je prva i jedina instanca kojoj se žene izložene rodno zasnovanom nasilju

obraćaju, zbog čega su zdravstveni radnici/ce, u okviru svoje profesionalne delatnosti, u obavezi da doprinesu prevenciji, ranom otkrivanju, dokumentovanju i prijavljivanju nasilja nad ženama. Zdravstveni radnici treba da prednjače u zagovaranju nulte tolerancije nasilja. Da bi u tome bili uspešni, neophodno je da ovladaju odgovarajućim znanjem o rodno zasnovanom nasilju, pruže doprinos u primarnoj prevenciji, da se redovno edukuju, kao i da svoje znanje prenose kako na druge zdravstvene radnike, tako i na pacijente (1,5).

Edukacija zdravstvenih radnika u Srbiji je podrazumevala osnovne i napredne treninge

THE IMPORTANCE OF HEALTHCARE WORKERS' EDUCATION FOR THE DETECTION OF WOMEN SURVIVORS OF GENDER-BASED VIOLENCE

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SUMMARY

Introduction/Aim: Domestic violence is any form of gender-based violence that may result in the physical, psychological or sexual injury of a woman. The aim of the study was to determine whether there is a difference in attitudes between male and female healthcare workers about the importance of detecting women who have survived gender-based violence.

Methods: Within this cross-sectional study, data were collected with the help of an anonymous, online questionnaire, from 78 healthcare providers (response rate 72.9) who were educated about the importance of identifying women survivors of gender-based violence.

Results: Of 78 health workers, 14.1% were men and 85.9% were women. There was no significant difference between men and women in relation to their demographic characteristics (age, marital status, length of service and level of education). Men claimed significantly more often, compared to women, that the lack of staff was a key reason why institutional barriers made it impossible to provide assistance in the situation of gender-based violence. There was no significant difference between men and female professionals in relation to their attitudes towards other institutional, as well as social and personal barriers that made it impossible to provide assistance. Both men and women pointed out the following social barriers: low socio-economic status of patients (74.4%), understanding of the cultural environment, where the person who experienced the violence lived (60.2%), and social stereotypes and prejudice (59.0%), whereas the institutional barrier was the heavy workload (69.2%), and personal barriers were the time constraint in performing daily work (70.5%) and the limited authority of healthcare professionals (52.6%). Male healthcare workers claimed more often that violence was not reported because women who had suffered it had to return to the same environment and because women were ashamed and afraid of being condemned by the environment, while female health professionals believed that women were afraid of violence recurrence (68.7%).

Conclusion: Education of health workers is crucial for acquiring knowledge and skills about gender-based violence that will enable them to help women who have survived it. Also, it is necessary to include more male professionals in this kind of education.

Key words: Education, gender-based violence, health care

Introduction

Violence against women is defined as all acts of gender-based violence that result in physical, sexual, psychological harm or suffering to women, including threats of such acts, coercion, or arbitrary deprivation of liberty, whether occurring in public or private life (1). Global estimates indicate that almost one third of all women have experienced violence by their intimate partner in their lifetime (2). Psychological violence is the most common type of violence, followed by physical and then economic violence (1,3,4). The healthcare sector is often the first and only point of access

for women who have experienced gender-based violence. Therefore, the healthcare workers are, within the scope of their profession, obliged to report acts of domestic violence, complete the medical documentation, and contribute to the early detection and prevention of violence. Healthcare workers should be the first to promote zero tolerance of violence. In order to be successful, they need to acquire knowledge about gender-based violence, to contribute to primary prevention, to participate in continuing medical education, and to share their knowledge with other healthcare workers and patients, as well (1,5).

pod nazivom „Izgradnja kapaciteta zdravstvenih radnika/ca za planiranje, organizaciju i edukaciju u oblasti rodno zasnovanog nasilja u zdravstvenom sektoru“, koje je, u period 2016-2019. godine, organizovala kancelarija Populacionog fonda Ujedinjenih nacija (UNFPA), u saradnji sa Centrom za promociju zdravlja žena (CPZŽ) i Ministarstvom zdravlja Republike Srbije, a uz podršku vlade Švedske (šved. *Sida - Styrelsen för Internationellt Utvecklingssamarbete*). Obuke su se sprovodile u Vrnjačkoj Banji, Zlatiboru, Beogradu i Kragujevcu. Profesionalce iz zdravstvenih ustanova širom Srbije menadžment je selektovao za edukaciju nakon zvaničnog pozivnog pisma koje je organizator treninga upućivao na službene kontakt adrese (6,7). Glavne teme treninga sadržane su u priručniku pod nazivom „Odgovor zdravstvenog sektora na rodno zasnovano nasilje, Vodič za zdravstvene radnike/ce“ (6). Priručnik sadrži materijal obrađen tokom treninga za potrebe edukacije zdravstvenog sektora u oblasti rodno zasnovanog nasilja, a koji je rađen prema poslednjim međunarodnim standardima i vodičima dobre prakse u ovoj oblasti (6). Cilj treninga bio je da se zdravstvenim radnicima pruže neophodna znanja i veštine da budu organizatori, predavači i treneri kolegama u svojim radnim sredinama, kako bi se rodno zasnovano nasilje smanjilo, preveniralo i sankcionisalo, kao i da se zdravstveni radnici osposobe za prepoznavanje i primenu komponenti efikasnog treninga, korišćenjem participativne metodologije, komunikacionih tehnika i modela dobre međusektorske saradnje u zaštiti žena koje su preživele nasilje, zainteresovani da budu edukatori i da dalje organizuju (i akredituju ako žele) obuke za svoje kolege o rodno zasnovanom nasilje.

Cilj ovog rada je bio da se utvrdi da li postoji razlika u stavovima između zdravstvenih radnika i radnica edukovanih o važnosti otkrivanja žena koje su preživele rodno zasnovano nasilje.

Metode

U okviru ove studije preseka obuhvaćeno je 107 zdravstvenih radnika koji su prošli osnovnu i naprednu edukaciju pod nazivom „Izgradnja kapaciteta zdravstvenih radnika/

ca za planiranje, organizaciju i edukaciju u oblasti rodno zasnovanog nasilja u zdravstvenom sektoru“. Učešće u studiji je prihvatilo 78 zdravstvenih radnika. Svi ispitanici su kontaktirani *on-line* da popune anonimni upitnik, na imejl adrese dostupne organizatorima edukacija, kancelariji UNFPA i CPZŽ, sa objašnjenjem svrhe anketiranja, učešćem na dobrovoljnoj bazi i izjavom da se njihove imejl adrese neće koristiti u promotivne svrhe. Istraživanje je sprovedeno u periodu od 6. do 12. septembra 2019. godine. Za ovo istraživanje pribavljena je saglasnost tima organizatora edukacije, koji su posedovali bazu podataka učesnika navedenih treninga.

Upitnik se sastojao od 11 pitanja. Prvi deo upitnika se odnosio na socio-demografske karakteristike zdravstvenih radnika (pol, uzrast, bračni status, dužinu radnog staža i stručnu spremu), a drugi je bio sastavljen iz 4 dela. Prvi deo odnosio se na stavove zdravstvenih radnika o socijalnim (7 pitanja), drugi institucionalnim (6 pitanja) i treći ličnim barijerama (6 pitanja), koje onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja. Četvrti deo obuhvatio je stavove zdravstvenih radnika o tome zašto žene ne prijavljuju nasilje koje su preživele. Odgovori ispitanika su sakupljeni u *docs.google.com*, tabela Excel programa, verzija 2010, u kojoj su i analizirani.

U statističkoj analizi rezultata korišćeni su prebrojavanje, minimalna i maksimalna vrednost, aritmetička sredina, standardna devijacija, procenti, χ^2 test i Yates-ova korekcija.

Rezultati

U studiju je bilo uključeno 67 (85,9%) žena i 11 (14,1%) muškaraca. Dve trećine ispitanika imalo je 41 i više godina, svaki drugi je bio u braku, 4/5 je imalo radni staž duži od deset godina, a 72,7% ispitanika činili su lekari (tabela 1). Prosečna starost ispitanika je bila $43,7 \pm 6,4$, a raspon godina se kretao od 30 do 60. Prosečna dužina radnog staža je bila $20,1 \pm 6,5$ godina.

Između muškaraca i žena nije uočena značajna razlika u odnosu na socijalne barijere koje onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja žena (tabela 2). Oba pola su u preko 50% slučajeva smatrali da su glavni razlozi za socijalne barijere koje

The education of healthcare workers in Serbia consisted of basic and advance training programs titled “Building the healthcare providers’ capacities for planning, organization and education in the field of gender-based violence in the health sector”, which were organized in 2019 by the United Nations Population Fund (UNPF) in cooperation with the Centre for the Promotion of Women’s Health and the Ministry of Health of the Republic of Serbia, with the support of the Government of Sweden (*Sida – Styrelsen för Internationellt Utvecklingssamarbete*). Trainings were held in Vrnjacka banja, Zlatibor, Belgrade and Kragujevac. The professionals from the healthcare institutions in Serbia were selected for this education after the organizer of trainings had sent the letter of invitation to official contact addresses (6,7). The main topics of trainings were included in the handbook titled “The Response of the Health Sector to Gender-based Violence, Guidelines for Health Professionals” (6). The handbook, which was developed on the basis of the latest international standards and guidelines of good practice, contained the material that was analyzed during the training for the needs of education of the health sector in the field of gender-based violence (6). The aim of this training was to offer the necessary knowledge and skills to health workers so that they could be organizers, lecturers and instructors to their colleagues in their work environment in order to reduce, prevent and punish gender-based violence. Also, the aim was to enable the healthcare workers to recognize and apply the components of efficient training, using the participatory methodology, communication techniques and models of good inter-sectoral cooperation, in protecting the survivors of violence. Interested health workers could become educators, organize and possibly accredit the training programs about gender-based violence for their colleagues.

The aim of our study was to determine the difference in attitudes between male and female healthcare workers, educated about the significance of detecting women who have survived gender-based violence.

Methods

A cross-sectional study included 107 health workers, who attended the basic and advance educational training titled “Building health workers’ capacities for planning, organization and education in the field of gender-based violence in the health sector”. 78 health workers accepted to participate in the study. All respondents were asked via e-mail to complete an anonymous questionnaire sent by The United Nations Population Fund and the Center for the Promotion of Women’s Health. The respondents participated voluntarily. The purpose of this survey was explained to them and they were informed that e-mail addresses would not be used for promotional purposes. The research was conducted from September 6th to September 12th, 2019. This research was approved by the organizer, who had the database of all participants of the mentioned trainings.

The questionnaire consisted of 11 questions. The first part of the questionnaire referred to socio-demographic characteristics of health workers (gender, age, marital status, length of service, qualifications), while the second part consisted of 4 domains. The first referred to the attitude of health workers to social barriers (7 questions), the second referred to institutional barriers (6 questions) and the third to personal barriers (6 questions), which made it impossible to provide help in case of gender-based violence. The fourth domain included attitudes of health workers towards the reasons why women did not report violence. The respondents’ answers were collected using docs.google.com, Excel table, version 2010, and analyzed.

Counting, minimum and maximum value, arithmetical mean value, standard deviation, percentage, χ^2 test and Yates’s correction were used in the statistical analysis of results.

Results

The study included 67 (85.9%) women and 11 (14.1%) men. Two thirds of respondents were 41 and older, half of them were married, 4/5 had 10 years of service and more, and 72.7% of them were doctors (Table 1). The mean age of respondents was 43.7 ± 6.4 , and they were between 30 and 60 years old. The mean length

Tabela 1. Distribucija ispitanika prema polu, uzrastu i stepenu obrazovanja

	Muškarci/ Men N=11	Žene/ Women N=67	
Demografske karakteristike/ <i>Demographic characteristics</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Uzrast (godine)/Age (years)			
≤40	2 (18.2)	26 (28.8)	0.326*
>40	9 (81.8)	41 (61.2)	
Bračni status/ Marital status			
U bračnoj zajednici/Married	5 (45.4)	35 (52.2)	0.676
Van bračne zajednice/Not married	6 (54.6)	32 (47.8)	
Dužina radnog staža (godina)/ Years of service			
≤10	1 (9.1)	15 (22.4)	0.542*
>10	10 (90.9)	52 (77.6)	
Stručna sprema/Qualifications			
Lekari/Doctors	8 (72.7)	32 (47.8)	0.226*
Zdravstveni saradnici/ Health associates	3 (27.3)	35 (52.2)	

*Yates korekcija; ** p vrednost prema χ^2 testu

onemogućavaju pružanje pomoći: nizak socio-ekonomski status žrtava nasilja (74,4%), kulturološko shvatanje sredine (60,3%) i društveni stereotipi i predrasude (59,0%).

Muškarci (54,6%) su značajno češće, u odnosu na žene (6,0%), smatrali da je institucionalna barijera koja onemogućava

pružanje pomoći u slučaju rodno zasnovanog nasilja nedostatak osoblja zaposlenog u zdravstvenom sektoru ($p < 0,001$) (tabela 3). Između muškaraca i žena nije bilo značajne razlike u odnosu na sve druge navedene institucionalne barijere. Oba pola su smatrala da su ključne institucionalne barijere koje

Tabela 2. Distribucija edukovanih zdravstvenih radnika prema njihovim stavovima koje socijalne barijere onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja

	Muškarci/ Men N=11	Žene/ Women N=67	
Socijalne barijere koje onemogućavaju pružanje pomoći/ <i>Social barriers make it impossible to provide assistance</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Nedostatak jasnih smernica za postupanje/ Lack of clear guidelines	1 (9.1)	17 (25.4)	0.235*
Kulturološko shvatanje sredine/ Cultural environment	6 (54.6)	41 (61.2)	0.676
Nizak socio-ekonomski status/ Low socio-economic status	6 (54.6)	52 (77.6)	0.104
Starosne razlike između zdravstvenih radnika i žrtava/ Age differences of health workers and victims	0 (0.0)	1 (1.5)	0.398*
Društveni stereotipi i predrasude/ Social stereotypes and prejudices	8 (72.7)	38 (56.7)	0.317*
Religiozna uverenja/ Religious factors	1 (9.1)	7 (10.4)	0.159*

*Yates korekcija; ** p vrednost prema χ^2 testu

Table 1. Distribution of healthcare professionals in terms of their demographic characteristics

	Muškarci/ Men N=11	Žene/ Women N=67	
Demografske karakteristike/ Demographic characteristics	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Uzrast (godine)/Age (years)			
≤40	2 (18.2)	26 (28.8)	
>40	9 (81.8)	41 (61.2)	0.326*
Bračni status/ Marital status			
U bračnoj zajednici/Married	5 (45.4)	35 (52.2)	
Van bračne zajednice/Not married	6 (54.6)	32 (47.8)	0.676
Dužina radnog staža (godina)/ Years of service			
≤10	1 (9.1)	15 (22.4)	
>10	10 (90.9)	52 (77.6)	0.542*
Stručna sprema/Qualifications			
Lekari/Doctors	8 (72.7)	32 (47.8)	
Zdravstveni saradnici/ Health associates	3 (27.3)	35 (52.2)	0.226*

*Yates correction; ** p value according to chi square test

of service was 20.1±6.5.

There was no significant difference between men and women regarding social barriers that made it impossible to help women in case of gender-based violence (Table 2). Both men and women stated that the main reasons for social barriers, which made it

impossible to provide help, were the following: low socio-economic status of victims (74.4%), understanding the cultural environment (60.3%) and social stereotypes and prejudice (59.0%).

Men (54.6%) significantly more often, in comparison to women, stated that the

Table 2. Distribution of educated healthcare professionals in terms of their attitudes which social barriers make it impossible to provide assistance in case of domestic violence

	Muškarci/ Men N=11	Žene/ Women N=67	
Socijalne barijere koje onemogućavaju pružanje pomoći/ Social barriers make it impossible to provide assistance	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Nedostatak jasnih smernica za postupanje/ Lack of clear guidelines	1 (9.1)	17 (25.4)	0.235*
Kulturološko shvatanje sredine/ Cultural environment	6 (54.6)	41 (61.2)	0.676
Nizak socio-ekonomski status/ Low socio-economic status	6 (54.6)	52 (77.6)	0.104
Starosne razlike između zdravstvenih radnika i žrtava/ Age differences of health workers and victims	0 (0.0)	1 (1.5)	0.398*
Društveni stereotipi i predrasude/ Social stereotypes and prejudices	8 (72.7)	38 (56.7)	0.317*
Religiozna uverenja/ Religious factors	1 (9.1)	7 (10.4)	0.159*

*Yates correction; ** p value according to chi square test

Tabela 3. Distribucija edukovanih zdravstvenih radnika prema njihovim stavovima koje institucionalne barijere onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja

	Muškarci/ Men N=11	Žene/ Women N=67	
Institucionalne barijere koje onemogućavaju pružanje pomoći/ <i>Institutional barriers make impossible to provide assistance</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Nedostatak prostora za privatnost/ <i>Lack of privacy</i>	6 (54.6)	23 (34.3)	0.198
Strah za sopstvenu bezbednost/ <i>Fear for own safety</i>	1 (9,1)	18 (26.9)	0.371*
Preopterećenost poslom zdravstvenih radnika/ <i>Overwork of health workers</i>	6 (54.6)	48 (74.4)	0.255
Neinformisanost o procedurama/ <i>Lack of information about procedures</i>	3 (27.3)	20 (29.8)	0.855*
Nedostatak osoblja/ <i>Lack of staff</i>	6 (54.6)	4 (6.0)	<0.001

*Yates korekcija; ** p vrednost prema χ^2 testu

onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja: preopterećenost poslom zdravstvenih radnika (69,2%) i nedostatak prostora za privatnost lekara i pacijenta (44,6%).

Između muškaraca i žena nije bilo značajne razlike u odnosu na sve lične barijere koje onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja (tabela 4). Oba pola su smatrala da su ključne lične barijere koje onemogućavaju pružanje pomoći u slučaju rodno zasnovanog nasilja: ograničenost radnog

vremena (70,5%) i mala ovlašćenja zdravstvenih radnika (52,6%).

Takođe, između muškaraca i žena nije bilo značajne razlike u odnosu na njihove stavove zašto žene koje su preživele nasilje ne prijavljuju dato nasilje (tabela 5). Muškarci (63,6%) su više u odnosu na žene (40,3%) smatrali da je razlog neprijavljanju nasilja stid i nerazumevanje okoline, ali razlika nije bila značajna. Muškarci i žene su kao glavne uzroke neprijavljanja nasilja naveli: da se žene boje ponovnog nasilja (67,9%), povratka u isto

Tabela 4. Distribucija edukovanih zdravstvenih radnika prema ličnim barijerama koje ih onemogućavaju da pružaju pomoć u slučaj rodno zasnovanog nasilja

	Muškarci/ Men N=11	Žene/ Women N=67	
Lične barijere koje onemogućavaju pružanje pomoći/ <i>Personal barriers to providing assistance</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Nedostatak znanja o nasilju/ <i>Lack of knowledge</i>	1 (9.1)	8 (11.9)	0.814*
Nedostatak treninga/ <i>Lack of training</i>	0 (0.0)	10 (14.9)	0.731*
Ograničenost vremenom/ <i>Time constraints</i>	9 (81.8)	46 (68.7)	0.596*
Zdravstveni radnici u tome ne mogu pomoći/ <i>Healthcare staff can not help</i>	0 (0.0)	6 (9,0)	0.109*
I sam/a sam žrtva nasilja/ <i>Personal experience</i>	0 (0.0)	5 (7.5)	0.178*
Dati veća ovlašćenja zdravstvenim radnicima/ <i>Need of increased authorization</i>	5 (45.4)	36 (53.7)	0.610

*Yates korekcija; ** p vrednost prema χ^2 testu

Table 3. Distribution of educated healthcare professionals according to attitudes which institutional barriers make it impossible to provide assistance in case of gender-based violence

	Muškarci/ Men N=11	Žene/ Women N=67	
Institucionalne barijere koje onemogućavaju pružanje pomoći/ <i>Institutional barriers make impossible to provide assistance</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Nedostatak prostora za privatnost/ <i>Lack of privacy</i>	6 (54.6)	23 (34.3)	0.198
Strah za sopstvenu bezbednost/ <i>Fear for own safety</i>	1 (9,1)	18 (26.9)	0.371*
Preopterećenost poslom zdravstvenih radnika/ <i>Overwork of health workers</i>	6 (54.6)	48 (74.4)	0.255
Neinformisanost o procedurama/ <i>Lack of information about procedures</i>	3 (27.3)	20 (29.8)	0.855*
Nedostatak osoblja/ <i>Lack of staff</i>	6 (54.6)	4 (6.0)	<0.001

*Yates correction; ** p value according to chi square test

institutional barrier that made it impossible to provide help in case of gender-based violence was the lack of professional staff employed in the health sector ($p < 0.001$) (Table 3). There was no significant difference between men and women regarding all the other institutional barriers. Both men and women thought that the key institutional barriers that made it impossible to provide help were: the heavy workload of health workers (69.2%), the lack of private space for doctors and patients (44.6%).

There was no significant difference

between men and women regarding all personal barriers which made it impossible to provide help in case of gender-based violence (Table 4). Both men and women thought that key personal barriers, which made it impossible to provide help in case of gender-based violence, were the following: the time constraint (70.5%), the limited authority of health workers (52.6%).

Also, there was no significant difference between men and women regarding their attitudes to the reasons why women, who survived violence, did not report it (Table 5).

Table 4. Distribution of educated healthcare professional workers in terms of personal barriers to providing assistance in case of domestic violence

	Muškarci/ Men N=11	Žene/ Women N=67	
Lične barijere koje onemogućavaju pružanje pomoći/ <i>Personal barriers to providing assistance</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Nedostatak znanja o nasilju/ <i>Lack of knowledge</i>	1 (9.1)	8 (11.9)	0.814*
Nedostatak treninga/ <i>Lack of training</i>	0 (0.0)	10 (14.9)	0.731*
Ograničenost vremenom/ <i>Time constraints</i>	9 (81.8)	46 (68.7)	0.596*
Zdravstveni radnici u tome ne mogu pomoći/ <i>Healthcare staff can not help</i>	0 (0.0)	6 (9,0)	0.109*
I sam/a sam žrtva nasilja/ <i>Personal experience</i>	0 (0.0)	5 (7.5)	0.178*
Dati veća ovlašćenja zdravstvenim radnicima/ <i>Need of increased authorization</i>	5 (45.4)	36 (53.7)	0.610

*Yates correction; ** p value according to chi square test

Tabela 5. Distribucija edukovanih zdravstvenih radnika prema njihovim stavovima šta je uzrok da žene koje su pretrpele naselje to ne prijavljuju

	Muškarci/ Men N=11	Žene/ Women N=67	
Zašto se ne prijavljuje nasilje kod žena koje su ga preživele/ <i>Barriers related to the battered woman</i>	Broj (%)/ No (%)	Broj (%)/ No (%)	**p vrednost/ p value
Uporno kriju nasilno ponašanje partnera/ <i>Hide and endure abuse despairingly</i>	5 (45.4)	29 (43.3)	0.893
Moraju da se vrate u isto okruženje/ <i>Turning back to the same environment</i>	7 (63.6)	43 (64.2)	0.761*
Boje se ponavljanja nasilja/ <i>Afraid of the repeat of abuse</i>	7 (63.6)	46 (68.7)	0.986*
Ne znaju dovoljno o svojim zakonskim pravima/ <i>Lack of knowledge on legal rights</i>	6 (54.6)	38 (56.7)	0.893
Stide se i boje nerazumevanja okoline/ <i>Shame and afraid</i>	7 (63.6)	27 (40.3)	0.263*
Lakše im je da trpe nego da o tome pričaju/ <i>It is easier to suffer than to talk</i>	5 (45.4)	25 (37.3)	0.607
Očekuju da budu pitane o nasilju/ <i>Expect a question about violence</i>	3 (27.3)	25 (37.3)	0.761*
Drugo/Other	0 (0.0)	0 (0.0)	-

*Yates korekcija; ** p vrednost prema χ^2 testu

okruženje (64,0%), nepoznavanje zakonskih prava (58,9%), prikrivanje nasilnog ponašanja partnera (38,5%) i stida i straha zbog osude okoline (43,6%).

Diskusija

Ovo istraživanje je sprovedeno da bi se definisale prepreke za otkrivanje većeg broja žena koje su preživele rodno zasnovano nasilje, promenili stavovi o nasilju nakon sprovedenih edukacija, prepoznali izazove sa kojima se susreću zdravstveni radnici/e tokom svog svakodnevnog profesionalnog rada i da bi se donele preporuke za dalji rad na jačanju uloge zdravstvenog sistema u odgovoru na rodno zasnovano nasilje.

Dugo se smatralo da je nasilje u porodici socijalna i privatna kategorija i tek u poslednje dve decenije ono poprima sve veće razmere i predstavlja važan problem u okviru javnog zdravlja. Rodno zasnovano nasilje je faktor rizika za zdravlje poput zloupotrebe alkohola, pušenja, nepravilne ishrane i fizičke neaktivnosti. Predominantno se odnosi na žene i decu, dok su muškarci ređe žrtva rodno zasnovanog nasilja (5-8).

Procenat ispitanika koji su želeli da učestvuju u našem istraživanju je 72,9% i, u poređenju sa dostupnim istraživanjima gde je učešće ispitanika bilo 20-90% (9-13), može se objasniti relativnom željom ispitanika da znaju više i participiraju u ovoj temi.

U poređenju sa sličnim istraživanjem u Domu zdravlja Kraljevo, sprovedenom 2017. godine, kada su neselektivno anketirani pružaoci zdravstvenih usluga, bilo da su edukovani ili ne, na temu rodno zasnovanog nasilja, procenat ispitanika koji se uključio u istraživanje je bio znatno viši (91,3%) (14). U datom istraživanju procenat ispitanika muškog pola je bio nešto viši (26,7%) i koristili su se upitnici u papirnoj formi.

Rezultati našeg istraživanja vezani za demografske karakteristike ispitanika su u skladu sa nalazima drugih autora, osim dužine radnog staža (13-15). Naši ispitanici imaju u većem procentu (79,5%) više od deset godina radnog iskustva u odnosu na istraživanje u Kuvajtu (55,2%) (10) i u Švedskoj (57%) (13).

Socijalne prepreke

U našoj studiji, zdravstveni radnici (54,6%

Table 5. Distribution of educated healthcare professional workers in terms of personal barriers to providing assistance in case of domestic violence

	Muškarci/ Men N=11	Žene/ Women N=67	**p vrednost/ p value
Zašto se ne prijavljuje nasilje kod žena koje su ga preživjele/ Barriers related to the battered woman	Broj (%)/ No (%)	Broj (%)/ No (%)	
Uporno kriju nasilno ponašanje partnera/ <i>Hide and endure abuse despairingly</i>	5 (45.4)	29 (43.3)	0.893
Moraju da se vrate u isto okruženje/ <i>Turning back to the same environment</i>	7 (63.6)	43 (64.2)	0.761*
Boje se ponavljanja nasilja/ <i>Afraid of the repeat of abuse</i>	7 (63.6)	46 (68.7)	0.986*
Ne znaju dovoljno o svojim zakonskim pravima/ <i>Lack of knowledge on legal rights</i>	6 (54.6)	38 (56.7)	0.893
Stide se i boje nerazumevanja okoline/ <i>Shame and afraid</i>	7 (63.6)	27 (40.3)	0.263*
Lakše im je da trpe nego da o tome pričaju/ <i>It is easier to suffer than to talk</i>	5 (45.4)	25 (37.3)	0.607
Očekuju da budu pitane o nasilju/ <i>Expect a question about violence</i>	3 (27.3)	25 (37.3)	0.761*
Drugo/Other	0 (0.0)	0 (0.0)	-

*Yates correction; ** p value according to chi square test

Men (63.6%) claimed more often than women that the reasons for not reporting violence were shame and the lack of understanding of the environment, but the difference was not significant. Both men and women stated that the main reasons for not reporting violence were the following: women were afraid of the recurrence of violence (67.0%), they were afraid to return to the same environment (64.0%), ignorance of legal rights (58.9%), hiding the partner's violent behavior (38.5%), shame and fear of being condemned by the environment (43.6%).

Discussion

This research was conducted in order to define barriers to identifying a larger number of women who survived violence, to change attitudes towards violence after the conducted educational programs, to recognize challenges which the health workers face during their daily professional work, and to bring recommendations for further work aimed at strengthening the role of the healthcare system in response to gender-based violence.

Domestic violence was deemed to be a

social and private category for a long time, but during the last two decades it has been on the rise and it has become an important public health problem. Gender-based violence is a health risk factor like alcohol abuse, smoking, unhealthy diet and physical inactivity. It is predominantly related to women and children, whereas men are more rarely the victims of gender-based violence (5-8).

The percentage of respondents, who wanted to participate in the research, was 72.9%. Compared to available research studies, in which 20-90% of respondents participated, this could be explained by the fact that respondents' wish to know more and to take part in this topic was relative.

In comparison to the similar research, which was conducted at the Health Center Kraljevo in 2017, when healthcare providers were interviewed randomly, no matter whether they were educated or not in relation to gender-based violence, the percentage of respondents who participated was significantly higher (91.3%) (14). In the mentioned research, the percentage of male respondents was somewhat higher (26.7%) and questionnaires were in the paper form.

muškaraca i 77,6% žena) su nakon treninga smatrali da je najčešći razlog u neotkrivanju žena koje su preživjele nasilje nizak socio-ekonomski status tih žena. Ovaj uzrok je nešto ređe identifikovan od strane ispitanika u studiji Kneževića i sar. (14). Takođe, u našoj studiji 54,6% muškaraca i 61,2% žena zdravstvene struke smatralo je da je barijera u prijavljivanju rodnog nasilja zbog kulturološkog shvatanja sredine, a 72,7% muškaraca i 56,7% žena usled društvenog stereotipa i predrasuda. Međutim, zdravstveni radnici bez treninga (njih 57,4%) ukazivali su na nedostatak smernica za postupanje kao ključnim za neprijavlivanje rodnog nasilja (14), dok je u našoj studiji taj procenat iznosio 9,1% za muškarce i 25,4% za žene. Samo jedan ispitanik naše studije smatrao je da su starosne razlike između zdravstvenih radnika i žena koje su preživjele nasilje prepreka. Religiozna uverenja predstavljaju kod 9,1% muškaraca i 10,4% ispitanika ženskog pola prepreku u našoj studiji, što je niži procenat nego u studiji sprovedenoj u Kraljevu (14).

Institucionalne prepreke

U našoj studiji 74,4% žena izdvaja od institucionalnih prepreka preopterećenost poslom, kao što je to u studiji Beynon-a sar. (17). Takođe, zdravstveni radnici ženskog pola to češće navode kao prepreku u našoj studiji, nego što je to zabeleženo u sličnim istraživanjima (14,17). U kuvajtskim studijama ovaj procenat je znatno viši (10,16). U našoj studiji čak 54,6% muškaraca smatra da je prepreka nedostatak zdravstvenog kadra, dok je u istraživanju sprovedenom u Kraljevu to navelo 27,8% anketiranih muškaraca (14). Na nedostatak prostora za privatnost ukazuje 54,6% muškaraca i 34,3% žena našeg istraživanja, dok u finskoj studiji (18) to uopšte ne predstavlja problem, a u kanadskoj ovaj problem uočava tek 8,2% ispitanika (17).

Sledeća prepoznata institucionalna prepreka među našim ispitanicima bila je neinformisanost o procedurama (27,3% muškarci i 29,8% žene). U poređenju sa rezultatima istraživanja sprovedenog u Kanadi, gde se 13% ispitanika izjasnilo za ovu vrstu prepreke, naši ispitanici uprkos sprovedenim edukacijama i dalje imaju visok procenat odgovora na ovu vrstu barijere

(17). Rezultat implicira da edukacije treba da se sadržajno obogaćuju sadržajem i u određenim vremenskim intervalima ponavljaju. Sistem obrazovanja zdravstvenih radnika je podrazumevao minimalno sticanje znanja iz oblasti nasilja nad ženama. U praktičnom radu nedostaju raznovrsni načini za edukaciju o tome. Nedostaje i odgovarajuća domaća literatura, ali ukoliko postoji lična motivacija dostupna je strana literatura, seminari i mnoštvo informacija na internetu. Kada se neki fenomen ne poznaje dovoljno, očekivano je da se ne prepozna rutinski u svakodnevnom radu (5). Najmanju prepreku u radu zdravstvenih radnika predstavlja strah za sopstvenu bezbednost (24,4%), što je manje nego u drugim studijama (10,16). Kod zdravstvenih radnika koji nisu edukovani strah se češće javlja (čak kod 46,3% ispitanika) (14).

Lične prepreke zdravstvenih radnika

Zdravstveni radnici najčešće navode da ograničenost vremenom (81,8% muškaraca i 68,7% žena) i nepostojanje većih ovlašćenja (45,4% muškaraca i 53,7% žena) predstavljaju ključne prepreke za pružanje pomoći u slučaju rodno zasnovanog nasilja. Ograničenost vremenom navodi se kao važna prepreka, ali u nešto manjem procentu (58,1%), u istraživanju Kneževića i sar. (14), a mnogo je većeg značaja u studijama sprovedenim u Kuvajtu (kod čak 90,6% i 85% ispitanika) (10,19). Nedostatak treninga je prepoznata prepreka u pružanju pomoći od strane 44,9% ispitanika u istraživanju Kneževića i sar. (14), a u našem istraživanju kod nešto manjeg broja (14,9%) zdravstvenih radnika i to isključivo žena. Ovakva situacija ohrabruje, jer najznačajnije aktivnosti na imenovanju, prepoznavanju, identifikovanju i adekvatnom reagovanju na nasilje treba da se odvijaju prvenstveno na nivou zdravstvenih ustanova (5). Trening značajno u tim aktivnostima može da pomogne. Pet ispitanica (7,5%) naše studije je navelo da su i same žrtve porodičnog nasilja, što može biti prepreka u svakodnevnom radu, jer zdravstveni radnik ponovno preživljava sopstveno iskustvo nasilja.

Prepreke u vezi sa samim ženama koje su preživjele nasilje

U našoj studiji preko 60% zdravstvenih radnika, odnosno 68,7% žena i 63,6% muška-

The results of our research related to the demographic characteristics of respondents were in accordance with other authors' findings, except the length of service (13-15). Our respondents had more than ten years of service (79.5%), which is a higher percentage in comparison to the research conducted in Kuwait (55.2%) and Sweden (57%) (13).

Social barriers

In our study, health workers (54.6% of men and 77.6% of women) thought that the low socio-economic status of women was the most common reason for not identifying the women who survived violence. The respondents pointed to this cause more rarely in the study of Knezevic and associates (14). Also, in our study 54.6% of male and 61.2% of female health professionals thought that the barrier to reporting domestic violence was cultural understanding of environment, while 72.7% of men and 56.7% of women thought that this barrier referred to social stereotypes and prejudice. However, health workers without training (57.4%) pointed to the lack of guidelines as a key factor for not reporting domestic violence (14), whereas in our study that percentage amounted to 9.1% for men and 25.4% for women. Only one respondent thought that difference in age between health workers and women who survived violence was the barrier. In our study, religious beliefs presented a barrier for 9.1% of male and 10.4% of female respondents, which was a lower percentage in comparison to the study conducted in Kraljevo (14).

Institutional barriers

In our study, 74.4% of women pointed to the heavy workload as one of the institutional barriers, like in the study of Beynon and associates (17). Also, female health workers cited this barrier more frequently in our study than in similar research studies (14,17). In Kuwait studies, this percentage was significantly higher (10,16). In our study, 54.6% of men cited the lack of professional health staff as a barrier, whereas in the study conducted in Kraljevo 27.8% of interviewed men cited this as a barrier (14). The lack of private space was mentioned by 54.6% of men and 34.3% of women, whereas in

the study from Finland (18) it was not perceived as a problem, and in the Canadian study only 8.2% of respondents noticed this problem (17).

The next institutional barrier, which was recognized among our respondents, was the lack of information about procedures (27.3% of men and 29.8% of women). In comparison to the results of one research conducted in Canada, where 13% of respondents opted for this barrier, our respondents still had a high percentage of responses to this barrier, despite the conducted educational trainings (17). The result implies that educational trainings should be enriched with contents and repeated at certain intervals. The system of health workers' education included very little contents regarding the field of gender-based violence. Different ways of acquiring knowledge about this field are needed in practical work. There is no appropriate domestic literature, but if personal motivation exists, foreign literature, seminars and a lot of information on the Internet are available. When we do not know enough about a phenomenon, we cannot expect to recognize it routinely in everyday practice (5). The fear for their own security is the smallest barrier to health professionals' work (24.4%), which is less in comparison to other studies (10,16). In health workers, who were not educated about this field, this fear occurs more frequently (in 46.3% of respondents) (14).

Personal barriers of health workers

Health workers state most frequently that the time constraint (81.8% of men and 68.7% of women) and limited authority (45.4% of men and 53.7% of women) present key barriers to providing help in case of gender-based violence. The time constraint is cited as an important barrier, but to a lesser extent (58.1%) in the research of Knezevic et al (14). However, it had a greater significance in the studies conducted in Kuwait (90.6% and 85% of respondents) (10,19). The lack of training is a barrier to providing help, which was recognized by 44.9% of respondents in the research of Knezevic et al. (14), and in our study by 14.9% of solely female health workers. This situation is encouraging because the most important activities regarding defining, recognizing, identifying and reacting to violence should be done at the level of healthcare

raca, smatra da se žene koje su preživele nasilje boje ponavljanja nasilja, dok je u istraživanju Kneževića i sar. ovaj problem identifikovan kod 55,8% svih ispitanika (14). Oko 64% naših ispitanika smatra da je prepreka to što se žene vraćaju u isto okruženje, što je nešto više nego što je zabeleženo u studiji Kneževića i sar. (53,7%) (14) i znatno više nego u studiji sprovedenoj u Britaniji (11%) (20). To ne treba da bude značajna prepreka zbog kompleksnih mehanizama i teškoća izlaska iz nasilne veze/braka. Činjenica je da mnoge žene ostaju u nasilnim vezama. Porodica, prijatelji, susedi, pa čak i stručnjaci, često ne razumeju zašto žene trpe nasilje. Istraživanja i iskustvo pokazali su da žene kao najčešće razloge prihvatanja života u nasilnom odnosu navode one koji se uklapaju u opšte društveno prihvaćene predrasude o nasilju (7,8). Preživljavanje nasilja određeno je kako društvenim shvatanjem tako i brojnim psihološkim/ličnim razlozima. Objašnjenje se, delimično, može naći u dinamici nasilnog odnosa u kojem se smenjuju faze nasilja – kada celokupnu moć poseduje nasilnik, i faza kajanja, „medeni mesec“, u kojoj žena ima privid sopstvene moći i kontrole situacije (7,8).

U našem istraživanju 54,6% muškaraca i 56,7% žena je smatralo da žene koje su pretrpele rodno nasilje ne znaju dovoljno o svojim zakonskim pravima, što je skoro 3 puta više u odnosu na rezultate studije sprovedene u Velikoj Britaniji (20). Naši rezultati, kao i rezultati drugih studija (19,21), pokazuju da žene koje su preživele nasilje ne prijavljuju ga zbog stida i straha da ih okolina neće rezumeti. Svaki drugi ispitanik naše studije smatrao je da žene uporno kriju nasilno ponašanje partnera i da zato ne prijavljuju nasilje. Iako je žena preživela nasilje, ona će to iskustvo često negirati. Postoje brojni razlozi za to i profesionalci treba da budu svesni toga i da imaju razumevanje (1). Neki smatraju da je ženama teško da o tome pričaju i da očekuju da o tome budu pitane. Tokom svakodnevnog rada zdravstveni radnici treba da iskoriste terapijski potencijal i identifikuju nasilje, jasno ga osude, vode empatičan razgovor, ponude kontinuitet u nezi, budu svesni toga da nije njihov zadatak rešavanje tog problema već veština da upute na resurse (1,7,22).

Pitati žene o preživljenom nasilju nije nimalo lak zadatak. Needukovani zdravstveni

radnici/ce to često ne rade, jer se boje da će pitanjima uvrediti ženu. Lewis i sar. su, u svom radu, 2017. godine, predlagali intersektorske treninge obzirom da je nasilje u porodici multidisciplinarni problem (23). Istovremeno, postaviti pitanje o rodno zasnovanom nasilju je veoma važno, pošto žene čak i kada ne govore same o svom iskustvu očekuju da budu pitane i prihvataju razgovor (7,8). U okviru zdravstvenih ustanova važno je ohrabriti žene da govore o nasilju koje prežive. Ovo se može postići štampanim materijalima koje je potrebno postaviti u čekaonicama, ordinacijama ili na šalterima u zdravstvenim ustanovama. To mogu biti posteri, pamfleti, lifleti i sličan materijal namenjen ohrabrenju žena da govore o nasilju (24,25).

Zaključak

Edukacija zdravstvenih radnika o rodno zasnovanom nasilju značajno smanjuje njihov nedostatak znanja o ovom problemu. Nakon što se upoznaju sa smernicama za postupanje mogu da promene stav i mogu da pomognu ženama koje su pretrpele nasilje. Takođe, smanjuje se njihov strah za sopstvenu bezbednost. Nedostatak kadra i prostora za privatnost, kao i preopterećenost poslom su ključne prepreke. Zdravstveni radnici očekuju veća ovlašćenja (status službenog lica).

U treninge/edukaciju treba uključiti više profesionalaca muškog pola, svih starosnih dobi i zaposlene u seoskim sredinama. Zdravstvene ustanove treba da naprave plan stalnog i sistematskog obučavanja zaposlenih sa što većim obuhvatom kroz specijalizovane akreditovane kurseve i treninge. Neophodna je implementacija znanja u svakodnevnu praksu, ali i praćenje njihovih rezultata.

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institutions (5). Training can significantly assist in these activities. Five female respondents (7.5%) of our study stated that they were the victims of domestic violence, which could be a barrier in everyday work, because the health workers go through their own experience of violence repeatedly.

Barriers related to women who experienced violence

In our study, more than 60% of health workers, that is 68.7% of women and 63.6% of men, think that women, who have experienced violence, fear the recurrence of violence, whereas in the research of Knezevic and associates, this problem was identified by 55.8% of all respondents (14). About 64% of our respondents think that one of the barriers is the fact that women return to the same environment, which is, to a certain extent, higher in comparison to the study of Knezevic et al. (53.7%), and significantly higher in comparison to a study conducted in Britain (11%) (20). It should not be a significant barrier due to complex mechanisms and difficulties in relation to coming out of the violent relationship/marriage. The fact is that a lot of women stay in violent relationships. Family, friends, neighbors and even professionals frequently do not understand why women endure violence. The research and experience show that the most common reasons for accepting life in a violent relationship are those which fit into the socially accepted prejudice about violence (7,8). Experiencing violence is determined by social, as well as psychological/personal reasons. The explanation may be found in the dynamics of a violent relationship, in which partners go through different phases – when the perpetrator of violence has all the power, and the phase of regret, “the honey moon”, when the woman has the illusion of her own power and control over the situation (7,8).

In our research, 54.6% of men and 56.7% of women think that women, who have experienced gender-based violence, do not know enough about their legal rights, which is almost three times more in comparison to the results of one study conducted in Britain (20). Our results, as well as the results of other studies (19, 21) show that women, who have survived

violence, do not report it due to shame and fear that the environment will not understand them. Around one half of respondents think that women persistently hide the violent behavior of their partner and therefore, do not report it. Women often deny that they have experienced violence. There are numerous reasons for that, and therefore, professionals should be aware of that and show understanding (1).

Some of them think that it is hard for women to talk about violence and that they expect to be asked about it. During their everyday work, health workers should use the therapeutic potential and identify violence, condemn it clearly, be empathetic listeners, offer continuing care, and be aware of the fact that their task is not to solve the problem but to direct women skillfully to existing resources (1,7,22). Asking women about the experienced violence is not an easy task. Uneducated health workers often do not do that, because they fear that they would insult the woman with such questions. In 2017, Lewis and associates proposed the inter-sectoral trainings because domestic violence was deemed to be a multidisciplinary problem (23). At the same time, it is important to ask questions about gender-based violence because women expect to be asked and they accept the conversation, even when they do not speak about it on their own (7,8). Women who have experienced violence should be encouraged to speak about it within healthcare institutions. This can be achieved with printed materials, which should be placed in waiting rooms, doctors' offices or at the reception desks of healthcare institutions. These can be posters, pamphlets, leaflets and similar materials intended to encourage women to speak about violence (24,25).

Conclusion

The education of healthcare workers about gender-based violence significantly reduces the lack of knowledge about this problem. After the health workers get acquainted with the guidelines they can change their attitude and help women who have experienced violence. Also, the fear for their own safety decreases. The lack of staff and private space, as well as the heavy workload present the key barriers. Health workers expect greater authority (the

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More male professionals from all age groups should be included in trainings/educational courses, as well as all those employed in rural environments. Healthcare institutions should make a plan of constant and systematic educations of employees through specialized accredited courses and trainings. The implementation of knowledge into the everyday practice is necessary, as well as the supervision of results.

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ZNAČAJ MOLEKULARNE GENETIKE ZA SKRINING KANCERA

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SAŽETAK

Uprkos napretku medicine, kancer je i dalje jedan od glavnih uzroka smrti u svetu. Ovo je pre svega posledica odsustva simptoma u toku progresije tumora, tako da je često u trenutku pojave simptoma bolest već u fazi kada je lečenje nemoguće. Zbog toga je razvoj specifičnih i senzitivnih metoda koje će omogućiti ranu detekciju tumora od izuzetne važnosti. Unapređenje postojećih i razvoj novih metoda molekularne genetike, uz snižavanje cene analiza, moglo bi predstavljati rešenje ovog problema. Prilikom razvoja metoda za ranu detekciju tumora treba praviti razliku da li je metoda namenjena detekciji naslednih kancerskih sindroma ili sporadičnih tumora. U slučaju naslednih kancerskih sindroma, molekularno genetičke metode se koriste da bi se detektovalo prisustvo germinativne mutacije gena za koju je poznato da je odgovorna za nastanak datog naslednog kancerskog sindroma, u cilju određivanja predispozicije za obolevanje pacijenta koji je član porodice pod rizikom. Mutacija je prisutna u svim ćelijama organizma, pa se može detektovati analizom DNK izolovane iz telesnih tečnosti ili bukalne sluzokože. Nasuprot ovome, kod sporadičnih tumora je neophodan skrining zdrave populacije u odsustvu bilo kakvih informacija o lokalizaciji tumora ili genetičkim promenama. Metodu izbora u ovom slučaju bi mogle predstavljati tačne biopsije, gde se molekularno genetičkim metodama analiziraju promene u genetičkom materijalu prisutnom u telesnim tečnostima ispitanika. Ovom metodom se tumor kod pacijenta otkriva, na primer, na osnovu promene u koncentraciji slobodne cirkulišuće DNK u krvi (cfDNA) ili na osnovu prisustva cirkulišuće tumorske DNK (ctDNA). Takođe, u skriningu za kancer se, pored genetičkih, moraju uzeti u obzir i epigenetičke promene.

Ključne reči: molekularno genetičke metode, skrining metode, nasledni kancerski sindromi, sporadični tumori

Uvod

Procenjuje se da su jedna polovina muškaraca i jedna trećina žena u riziku od dobijanja neke vrste kancera tokom života (1). Prema Svetskoj zdravstvenoj organizaciji, 30-50% svih slučajeva kancera su rezultat izloženosti poznatim faktorima rizika (UV zračenju, pušenju, zloupotrebi alkohola, gojaznosti, virusnim infekcijama itd.) i mogu se prevenirati eliminisanjem ovih faktora (2). Međutim, uprkos aktivnom pristupu koji obuhvata obrazovanje i vakcinaciju stanovništva, napredak u eliminaciji faktora rizika za nastanak kancera je spor. Čak i kada bi ovaj cilj mogao da bude postignut, veliki procenat stanovnika ostaje pod rizikom da oboli od ove bolesti. Većina smrtnih slučajeva izazvanih kancerom je posledica kasne dijagnoze bolesti

(3). Rano otkrivanje bolesti, pre pojave kliničkih simptoma ili barem pre pojave metastaza, može značajno da poboljša dijagnozu i smanji troškove lečenja. Nažalost, zbog heterogenosti i složene, multifaktorske prirode kancera, metode skrininga za rano otkrivanje kancera još uvek nisu dostigle zadovoljavajuće efekte. Metode molekularne genetike, koje su moćno sredstvo za rano otkrivanje kancera, razvijaju se u dva pravca: skrining za nosioce naslednih kancerskih sindroma i skrining za pojavu sporadičnih kancera u zdravoj populaciji.

Nasledni sindromi kancera

Približno 5 do 10% svih kancera su rezultat naslednih kancerskih sindroma (4). Pacijenti sa ovim sindromima su nosioci mutacija u tumor supresorskim genima, genima koji su odgovorni

ACTUAL TOPIC

THE IMPORTANCE OF MOLECULAR GENETICS FOR CANCER SCREENING

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SUMMARY

Despite the advance of medicine, cancer remains among the leading causes of deaths worldwide. The main reason is the progression of the disease without the symptoms until the untreatable stages are achieved. To prevent this, the development of new, more sensitive and specific screening methods for early detection of cancer is necessary. Molecular genetics, through the improvement of existing and development of new methods and analysis cost reduction, could provide tools for the achievement of this goal. There are essential differences in approach regarding the purpose of screening methods: screening for hereditary cancer syndromes or sporadic cancers. In the case of hereditary cancer syndromes, molecular genetics methods are used to search for germline mutations in defined genes, to establish a final diagnosis or to estimate the risk of cancer for the patient that is identified as a member of a family in risk. The mutation is present in all cells of the organism and can be detected through non-invasive analysis of DNA from body fluids or the buccal swab. Development of molecular genetics method for screening for sporadic cancers in a healthy population, without any knowledge of cancer location or genetic change, could rely on the search of tumor genetic material in body liquids (liquid biopsies). In this case, the search for change in circulating cell-free DNA (cfDNA) concentration or genetic and epigenetic changes in circulating tumor DNA (ctDNA) in a blood sample could reveal development of a tumour. Additionally, epigenetic changes should also be considered in screening for cancers.

Keywords: molecular genetics method, screening methods, hereditary cancer syndromes, sporadic cancers

Introduction

It has been estimated that one-half of men and one-third of women are at risk throughout life from developing some type of cancer (1). According to the World Health Organization, 30-50% of all cancer cases are the result of exposition to known risk factors (UV radiation, tobacco smoking, alcohol misuse, obesity, viral infections etc.) and can be prevented through the exclusion of these factors (2). Nevertheless, despite active approach that includes education and vaccination of populations, the progress of elimination of cancer risk factors from the human populations is slow. Even if this goal could be achieved, the huge percent of the population remains at risk of developing the disease. The majority of deaths due to cancer are the result of late diagnosis of the disease

(3). Early detection of disease, before clinical appearance of symptoms or at least before metastasis, can significantly improve diagnosis and reduce treatment costs. Unfortunately, because of heterogeneity and complex, multi-factorial nature of cancer, screening for cancer has not reached satisfying effects yet. Molecular genetics methods, as powerful tools for early cancer detection, are developing in two directions: screening for carriers of hereditary cancer syndromes and screening for occurrence of sporadic cancers in healthy population.

Hereditary cancer syndromes

Approximately 5% to 10% of all cancers are the result of hereditary cancer syndromes (4). Patients with these syndromes are carriers of mutations in tumor suppressor genes, genes

za ispravljanje oštećenja molekula DNK, ili ređe u protoonkogenima. Nasledni kancerski sindromi imaju mendelijanski tip nasleđivanja, sa 50% verovatnoće prenosa mutiranog gena na potomstvo pacijenta koji nosi mutaciju. Takođe, u najvećem broju slučajeva se mutacije ispoljavaju po dominantnom tipu sa visokom penetrantnošću mutiranog gena, iako postoje primeri recesivnog nasleđivanja, kao što je MAP (engl. *MUTYH-associated polyposis*) što je rezultat recesivne mutacije u *MUTYH* genu. Poznavanje načina nasleđivanja i molekularnih promena koje su u osnovi određenog kancerskog sindroma omogućava identifikaciju članova porodice koji su nosioci mutacije povezane sa kancerom. Iako su ovi pacijenti pod visokim rizikom od razvijanja kancera u ranoj dobi, njihov nadzor nakon dijagnoze značajno poboljšava njihovu prognozu.

Pored toga, s obzirom da je mutacija koja izaziva bolest prisutna u svim ćelijama organizma, može se otkriti uz pomoć neinvazivne analize DNK koja se izoluje iz telesnih tečnosti ili bukalne sluzokože. Tako, na primer, iako je svega 5% svih slučajeva raka dojke rezultat mutacije *BRCA1* i *BRCA2* gena (nasledni rak dojke), većina naslednih kancera dojke je rezultat mutacija ova dva gena (5). *BRCA1* i *BRCA2* geni se klasifikuju kao tumor supresorski geni, sa proteinskim produktima koji su uključeni u odgovor na oštećenje DNK (6). Šansa da ženski nosilac mutacije dobije rak dojke je otprilike pet puta veća u odnosu na osobu koja ne nosi datu mutaciju (5). Verovatnoća da ženski nosioci dobiju rak jajnika je povećana do 40% (7,8) u poređenju sa osobama koje nisu nosioci. Zbog germinativne prirode mutacije, ove osobe su u riziku, iako manjem, od pojave kancera na drugim organima (rak pankreasa, želuca, debelog creva, bubrega, melanoma) (9). Pored toga, muški nosioci mutacije *BRCA1* gena imaju povećan rizik da obole od raka prostate (9), a nosioci *BRCA2* mutacije od raka dojke (4). Na osnovu dobro postavljenih kriterijuma, članovi porodice sa rizikom mogu lako biti prepoznati, potvrđeni uz pomoć analize *BRCA1/2* mutacija i uključeni u definisane protokole za praćenje.

U slučaju Linčovog sindroma (nasledni nepolipozni kolorektalni kancer – HNPCC), najčešće su uzrok nastanka kancera germinativne mutacije gena koji su uključeni u

popravke oštećenja na molekulu DNK (obično *MLH1*, *MSH2*, *MSH6* i *PMS2*). Mutacije ovih gena su česte i prisutne su kod jedne od 5000 osoba (10). Takođe, penetrantnost mutiranih gena je izuzetno visoka, sa verovatnoćom od 80% da se kod nosioca razvije bolest (11). Jedna od posledica mutacija *MMR* gena je genetička nestabilnost koja se ogleda u mikrosatelitnoj nestabilnosti kod nosioca mutacije. Pre analize sva četiri gena da bi se potvrdio Linčov sindrom, jednostavan genetski test može da otkrije prisustvo (ili odsustvo) mikrosatelitne nestabilnosti, što obezbeđujući brzo, jednostavno i jeftino uključivanje (ili isključivanje) pacijenta iz daljeg protokola.

Sporadični kancer

Rano otkrivanje bolesti predstavlja najveći izazov u uspešnom lečenju kancera. Skrining testovi za otkrivanje različitih tipova tumora su od ključne važnosti za postizanje ovog cilja. Nažalost, za mnoge vrste kancera, razvoj takvih testova je zahtevan zbog inter i intra-tumorske heterogenosti, asimptomatske prirode bolesti u ranim fazama, potrebe za čestim testiranjem cele populacije i mnogih drugih faktora (epidemioloških itd.) (12,13). Da bi bio široko prihvaćen, od novog skrining testa se očekuje da ima veću specifičnost i senzitivnost i da bude manje invazivan i skup u odnosu na dostupne testove.

Razvojem tehnika molekularne genetike i sticanjem znanja o različitim tumorima (npr. *Cancer Genome Atlas project*, *International Cancer Genome Consortium*), tačne biopsije bi mogle da postanu testovi izbora. Tačna biopsija je test koji se radi na uzorku krvi da bi se otkrile specifične promene u slobodnoj cirkulišućoj DNK, ćelije kancera koje cirkulišu u krvi ili delovi DNK iz tumorskih ćelija u krvi (14). Delovi DNK koji cirkulišu u krvi zovu se slobodno cirkulišuća DNK (cfDNA). cfDNA potiče od ćelija koje prolaze kroz apoptozu ili nekrozu (15,16) i nalazi se u obliku DNK fragmenata veličine od 180 do 200bp (17). Iako postoje dokazi da je nivo cfDNA povećan kod nekih kancera (18-20), zbog širokog opsega cfDNA koncentracije kod pacijenata, koji može da varira od nekoliko jedinica do više hiljada jedinica ng/ml, često se detektuje preklapanje koncentracija cfDNA kod pacijenata sa tumorom i zdrave populacije

responsible for DNA repair or, less often, in proto-oncogenes. Cancer syndromes have the Mendelian type of inheritance, with a 50% transmission probability of a mutated gene on the offspring of a patient carrying mutation. The pattern of inheritance is usually dominant with high penetrance of the mutated gene, although there are also examples of recessive inheritance, like MAP (MUTYH-associated polyposis) that is the result of a recessive mutation in MUTYH gene. Knowledge about the pattern of inheritance and molecular changes underlying specific cancer syndrome provides tools for the identification of family members that are carriers of a cancer-related mutation. Although these patients are at a high risk of developing cancer from an early age, their surveillance after diagnosis significantly improves their prognosis.

Additionally, because the disease-causing mutation is present in all cells of the organism it can be detected through non-invasive analysis of DNA isolated from body fluids or the buccal swab. For example, 5% of all breast cancer cases are the result of a mutation in BRCA1 or BRCA2 gene (hereditary breast cancer) and additionally, the majority of hereditary breast cancers are the result of mutations in these two genes (5). These genes are classified as tumour suppressor genes, with protein products involved in response to DNA damage (6). A chance for developing breast cancer for a female carrier of mutation is approximately five times higher compared with non-carrier (5). Female carriers have up to 40% raised probability to develop ovarian cancer, compared to non-carriers (7,8), and, because of germline nature of the mutation, less often in some other organs (pancreatic cancer, stomach cancer, colon, kidneys, melanoma) (9). Additionally, males BRCA1 mutation carriers are in risk of developing prostate cancer (9), and BRCA2 mutation carriers of breast cancer (4). According to well-established inclusion criteria, family members at risk can easily be recognized, confirmed through analysis of BRCA1/2 mutations and included in defined follow-up protocols.

In the case of Lynch syndrome (hereditary nonpolyposis colorectal cancer – HNPCC), germline mutations in mismatch repair genes (usually MLH1, MSH2, MSH6 and PMS2) result in the development of the disease. Mutations

of these genes are common, with the incidence of one in 5000 people (10), and penetrance of the mutated gene is extremely high, with a probability of 80% for the carrier to develop the disease, compared to non-carriers (11). One of the consequences of mutations in MMR genes is genetic instability that is reflected in the form of microsatellite instability in the carrier of the mutation. Before sequencing of all four genes to confirm Lynch syndrome, a simple genetic test can reveal the presence (or absence) of microsatellite instability thus enabling quick, simple and cheap inclusion (or exclusion) of the patient in the further protocol.

Sporadic cancers

The main challenge in the successful treatment of cancer is the early detection of disease. For the achievement of this goal, screening tests for the detection of different types of tumours are pivotal. Unfortunately, for many types of cancer the development of such a test is demanding, because of inter and intra-tumour heterogeneity, asymptomatic nature of the early disease, the necessity for frequent assessment of the screening group, and many others factors (epidemiological etc.) (12,13). To be widely accepted, the new screening test is expected to have higher specificity and sensitivity and to be less invasive and expensive in comparison with available tests.

With the development of molecular genetics techniques and accumulation of knowledge about different tumours (e.g. Cancer Genome Atlas project, International Cancer Genome Consortium) liquid biopsies could become the tests of choice. Liquid biopsy is a test done on a sample of blood to look for cancer cells from a tumour that are circulating in the blood or for pieces of DNA from tumour cells that are in the blood (14). Pieces of DNA circulating in the blood are termed circulating cell-free DNA (cfDNA). cfDNA originates from cells that are undergoing apoptosis or necrosis (15,16) and is presented in the form of 180-200bp long DNA fragments (17). Although there is evidence that level of cfDNA is elevated in some cancers (18-20), overlapping between the concentration of cfDNA in patients with tumour and healthy population has been often reported, due to wide range of cfDNA concentration in

(21,22). Stoga su potrebna dalja istraživanja kako bi se omogućila primena ovih nalaza u skrining testovima.

Kod pacijenata sa kancerom deo cfDNA potiče iz tumorskih ćelija i ova frakcija se zove slobodno cirkulišuća tumorska DNK (ctDNA). Nasuprot cfDNA, ctDNA može biti oslobođena iz živih tumorskih ćelija (23). Jedna od najvećih prednosti analize ctDNA je da se uz pomoć ove tehnike postiže slučajno uzorkovanje različitih ćelijskih populacija u tumoru. Analizom ctDNK mogu se detektovati genetičke i epigenetičke promene specifične za tumor i na taj način može se otkriti prisustvo bolesti mnogo pre njenog ispoljavanja. Fragmenti ctDNA su obično kraći u poređenju sa cfDNA (24). ctDNA predstavlja samo malu frakciju cfDNA (koncentracija varira od 0,1 do 10% svih cfDNA) (25), ali zbog razvoja tehnika molekularne genetike, sada je moguće analizirati i tako male količine materijala.

U skriningu zdrave populacije neophodno je tražiti dokazane, tumor-specifične promene u genomu, ili promene koje mogu biti povezane sa razvojem tumora, na primer varijacije u broju kopija (engl. *copy number variation* – CNV). Zbog potrebe da se analizira ceo genom, ove tehnike su i dalje skupe za stalno praćenje cele populacije. Zbog toga, praćenje epigenetskih promena u genomu je atraktivan pristup skrininga genoma za potencijalnu malignu transformaciju. Epigenetska promena predstavlja reverzibilnu promenu u metilaciji DNK ili hemijskoj modifikaciji proteina hromatina. Dokazano je da je hipermetilacija DNK česta u tumorima i da se javlja rano u tumorigenezi. Različiti testovi koji analiziraju epigenetske promene, kao na primer skrining za kolorektalni kancer uz pomoć detekcije metilacije gena *Septin 9* (26) se već koriste.

Zaključak

Iako rano otkrivanje kancera značajno poboljšava dijagnozu i smanjuje troškove lečenja, heterogenost i složena, multifaktorska priroda kancera i dalje ostaju prepreka u razvoju pouzdanih i široko primenjivih metoda za skrining kancera. Očekuje se da će razvoj tehnika molekularne genetike i sticanje znanja o različitim tumorima obezbediti nove, visoko specifične i senzitivne, neinvazivne i jeftinije skrining testove u bliskoj budućnosti.

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patients that can vary from a few to thousands of ng/ml (21,22). Hence, further researches are necessary to enable the application of these findings in the screening tests.

In patients with cancer part of cfDNA originates from a tumour cell, and this fraction is termed the circulating tumour DNA (ctDNA). In contrast to cfDNA, ctDNA can be released from living tumour cells (23). One of the major advantages of ctDNA is that through this technique random sampling of different cell populations in the tumour is achieved. ctDNA fragments are usually shorter compared to cfDNA (24). The search for genetic and epigenetic changes in ctDNA that could point to the development of a tumour is a promising approach. ctDNA represents only small fraction of cfDNA (concentration varies from 0.1 to 10% of all cfDNA (25), but because of development of molecular genetics techniques, it is now possible to analyze such a small amount of material.

In the screening of healthy population, it is necessary to search for proven, tumour specific changes in genome, or for change that could be related with the development of tumour, for example copy number variation (CNV). These techniques are still expensive for continuous, whole population monitoring because of the requirement of coverage of the whole genome. Because of this, follow up of the epigenetic changes in the genome is an attractive approach of genomic screening for potential malignant transformation. Epigenetic change refers to the reversible change in DNA methylation status or chemical modifications of chromatin proteins. Hypermethylation of DNA has been proven as a common event in tumours and occurs early in tumorigenesis. Different tests that utilize this change, for example screening for colorectal carcinoma through detection of methylated Septin 9 (26), are already in use.

Conclusion

Although an early detection of cancer significantly improves diagnosis and reduces treatment costs, heterogeneity and complex, multifactorial nature of cancer still remains an obstacle in the development of reliable and widely applicable cancer screening methods. It is expected that development of molecular genetics techniques and accumulation of

knowledge about different tumours will provide new, highly specific and sensitive, non-invasive and less expensive screening tests in near future.

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STRATEGIJA PAMETNIH SPECIJALIZACIJA I MOGUĆNOSTI ZA NJIHOVU PRIMENU U SISTEMU ZDRAVSTVENE ZAŠTITE REPUBLIKE SRBIJE

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SAŽETAK

Cilj ovog rada je da prikaže koncept pametnih specijalizacija prema Strategiji istraživanja i inovacija za pametne specijalizacije (engl. *Research and innovation strategies for smart specialisation, RIS3* ili skraćeno S3), Zajedničkog istraživačkog centra Evropske unije, kao mogućnosti za njihovu implementaciju u zdravstvenu zaštitu Republike Srbije na bazi iskustava zemalja iz okruženja, kao i u okviru određenih oblasti. Potrebno je da privredna društva, visokoobrazovne ustanove, individualni inventori i inovatori uoče potencijal za primenu ovog koncepta u zdravstveni sistem Republike Srbije, da utvrde u kojoj meri zdravstvo spada u prioritetne oblasti, zatim da uspostave regionalnu saradnju sa zemljama iz okruženja zbog sličnosti, i postanu konkurentni inovacijama na evropskom tržištu.

Ključne reči: strategija, pametne specijalizacije, zdravstvena zaštita

Uvod

Strategija pametnih specijalizacija (S3) u Republici Srbiji (RS) je usvojena početkom marta 2020. godine, na osnovu Zakona o planskom sistemu RS i definisana je za period od 2020. do 2027. godine. Sama strategija generisana je inicijativom Zajedničkog istraživačkog centra Evropske unije (engl. *Joint Research Centre European Union*), a RS je postala jedna od pet pilot zemalja za praćenje procesa njene implementacije (1-3).

Osnovni cilj strategije je da podigne konkurentnost ekonomije u RS, doprinese privrednom rastu i društvenom napretku povezivanjem istraživačkih i inovativnih resursa sa prioritetnim oblastima privrede (1).

U cilju strategije sadržano je obrazloženje njenog značaja na nacionalnom, ali i na regionalnom nivou. Sa istorijskog aspekta posmatrano, unapređenje društva u celini uvek je postignuto utemeljenjem u istraživačkim i inovativnim resursima. S obzirom da su u realizaciji strategije resursi vezani za prioritetne

oblasti privrede, na bazi istraživanja, rezultati i napredak se očekuju u tim oblastima privrede, posebno u vidu inovacija (1,3).

Pripreme za usvajanje strategije pametnih specijalizacija

Usvajanju strategije prethodio je skoro trogodišnji set pripremnih aktivnosti među kojima su značajnu ulogu imale pripreme radionice, a ulogu koordinatora imalo je Ministarstvo prosvete, nauke i tehnološkog razvoja. U proces svih aktivnosti su bili uključeni Srpska akademija nauka i umetnosti, Privredna komora Srbije, Ministarstvo privrede i druge relevantne institucije.

Kroz pripreme radionice, strategija je na najbolji način objašnjena kao moderan pristup ekonomskom razvoju koji se bazira na znanju, ali i na kontinuiranoj komunikaciji između javnog i privatnog sektora. Relevantne institucije uključene u donošenje strategije su kroz aktivnosti istraživale potrebe zainteresovanih strana, što jeste suština same speci-

ACTUAL TOPIC**SMART SPECIALISATION STRATEGY AND POSSIBILITIES FOR ITS IMPLEMENTATION IN THE HEALTHCARE SYSTEM OF THE REPUBLIC OF SERBIA****Marijana Curcic¹**¹ Department of Toxicology "Akademik Danilo Soldatovic", Faculty of Pharmacy University of Belgrade, Belgrade, Serbia**SUMMARY**

The aim of this paper is to present the concept of smart specialization strategy according to Research and innovation strategies for smart specialisation RIS3 (S3) of Joint Research Centre European Union as well as some considerations related to its implementation in health care in the Republic of Serbia based on the experiences of neighboring countries, as well as within certain areas. It is necessary that companies, higher education institutions, individual inventors and innovators see the potential for the application of this concept in the health care system of the Republic of Serbia, to determine the extent to which health is a priority area, then to establish regional cooperation with neighboring countries due to similarities, and to become competitive with innovations in the European market.

Key words: strategy, smart specialisation, healthcare

Introduction

The smart specialisation strategy (S3) was adopted in the Republic of Serbia (RS) at the beginning of March 2020, on the basis of the Law on the Planning System of The Republic of Serbia, and it was defined for the period 2020-2027. The strategy itself was generated by the initiative of the Joint Research Centre European Union, while the Republic of Serbia became one of the five pilot countries for observing the process of its implementation (1-3).

The main aim of the strategy is to increase the competitiveness of economy in the Republic of Serbia, to contribute to the economic growth and social progress by conjoining research and innovation resources with priority fields of economy (1).

The aim of the strategy contains the explanation of its significance at the national and regional level, as well. From the historical perspective, the progress of society as a whole is always achieved on the basis of research and innovation resources. Taking into consideration that the aim of the strategy contains resources related to the priority fields of economy, based

on research, results and progress may be expected in these fields of economy, especially in the form of innovations (1,3).

Preparations for the adoption of smart specialisation strategy

The adoption of strategy was preceded by the three year set of preparatory activities, among which preparatory workshops had a significant role, while The Ministry of Education, Science and Technological Development had the role of a coordinator, and the Serbian Academy of Sciences and Arts, the Chamber of Commerce of Serbia, the Ministry of Economy and other relevant institutions were included in the process.

Through preparatory workshops, the strategy is in the best way explained as a modern approach to economic development, which is based on knowledge, as well as on the continuing communication between public and private sector. Relevant institutions, which participated in the adoption of strategy, examined the needs of the interested parties through activities, which is the essence of specialisation, as well as

jalizacije, i način kako doći do prioriternih oblasti za investiranje. Primenom strategije i njenom implementacijom očekuje se postizanje regionalne, a zatim i globalne konkurentnosti srpske privrede i društva (1).

U evropskim zemljama je analizom strategija pametnih specijalizacija utvrđeno da identifikovani prioriteti doprinose dostizanju ciljeva održivog razvoja, što je dovelo do toga da RS bude pozvana i uvrštena u jednu od pet pilot zemalja u ovom programu. Nakon usvajanja strategije sledi Akcioni plan koji će prerasti u Mapu puta za nauku, tehnologije i inovacije za dostizanje ciljeva održivog razvoja (1,3).

Iskustva drugih zemalja

Jedan od prvih autora, koji je 2011. godine govorio o pametnoj specijalizaciji bio je *Foray*. On je u procesu implementacije strategije pametnih specijalizacija u Bugarskoj istakao da pametna specijalizacija kao akademska ideja polako prerasta u politički instrument, zbog čega je kao koncept naišla na poteškoće u implementaciji (4). Kasnije, *Foray* ukazuje da je potrebno da se država ili region fokusira na razvoj prepoznatljive i originalne oblasti specijalizacije, ne imitirajući druge. U svom objašnjenju on je pametne specijalizacije nazvao strateškim procesom kojim se selektuje prioritarna oblast u kojoj je potrebno razviti određen klaster aktivnosti iako to predstavlja određeni rizik za donosioce odluka. Naime, privreda i poslovna politika se najčešće vode tako da pri postavljanju prioriteta rizici budu svedeni na minimum, međutim strategija pametnih specijalizacija sugerise drugačiji pristup: dozvoliti preduzetnicima da otkriju pravi domen buduće specijalizacije.

U jednom momentu svog razvojnog ciklusa S3 predstavlja stepen lokalnog razvoja koji je postignut zahvaljujući podršci lokalne samouprave. Takođe, smatra se da je ovakva vrsta aktivnosti već dovoljno osnažena i da pokazuje obećavajuće rezultate za ceo region. Potrebno je jačanje aktera koji će najviše doprineti realizaciji uočenog potencijala poput stanja snabdevanja (posebno u ljudstvu), koordinacije (pružaoци usluga), povezivanja sa resursima van regiona i aglomeracije. Najmanji doprinos strategije može biti u transformisanju manje naprednih regiona u dobre pratioce

naprednih. Posebno je naglašeno da pametna specijalizacija nije uniformizacija i nije nužno da zavisi od prethodno postojeće sektorske strukture, upravo zato ona uvodi preduzetnika da bi otkrio poslovni domen, što je esencijalna dobit modela pametnih specijalizacija (3).

Oblasti zdravstvenog sistema sa iskustvom primene strategije pametnih specijalizacija

Blažević, 2016. godine, opisuje zdravstveni turizam u svojoj kompleksnosti, interdisciplinarnosti i sistemskom pristupu problemima kao idealan model pametne specijalizacije (5). Ovaj autor uočava da zdravstveni turizam nije nužno vezan za turističke regione, već za bilo koji lokalitet od nacionalnog interesa. Iako iznosi nekoliko različitih definicija zdravstvenog turizma, najpribližnije ga objašnjava kao turizam u kom su združeni putovanje i mogućnost dobijanja specifičnih medicinskih usluga, često brže i mnogo jeftinije nego u sopstvenoj državi. Autor jasno razlikuje *welness* od zdravstvenog turizma, a kao najčešće pružene medicinske usluge po njegovom istraživanju navodi: estetsku hirurgiju 25-34%, stomatološke intervencije 30-50%, ortopedske intervencije 7%, tretmane gojaznosti 7%, postupke *in vitro* fertilizacije 3-6% i oftalmološke intervencije 3% (5).

Iskustva iz Evrope, koje su predstavili *Borg* i saradnici, ukazuju da je savremena struktura zdravstvene zaštite u uspostavljanju centara medicinske izvrsnosti uporedo sa klasterima biomedicinskih inovacija (5). Autori zaključuju da su pametna specijalizacija i inovacije u medicini bez obzira da li se posmatraju kao usluga ili na organizacionom nivou, povezane sa povećanjem međunarodne konkurentnosti zdravstvenog turizma (6).

Baier i saradnici se, između ostalog, bave inovacijama u oblasti biotehnologije u medicini, s ciljem da inovacije budu prepoznate od strane preduzetnika, kao i primenom koncepta pametne specijalizacije za biotehnološke procese i proizvode (7). Ljudske resurse u oblastima zdravstva obradio je *Morgan*, prepoznavši obrazovne institucije u kojima se školuje kadar za rad u zdravstvenim ustanovama kao resurs za inovacije i konkurentnost na tržištu (8). Kao resurs uočava veoma širok spektar institucija, univerziteta, laboratorija, medicinskih škola itd.

the way in which it is possible to come to the priority fields for investment. The regional, and then global competitiveness of Serbian economy and society are expected to be achieved with the help of this strategy and its application (1).

In European countries, the analysis of smart specialisation strategies showed that the identified priorities contributed to reaching the aims of sustainable development, which led to the fact that the Republic of Serbia was invited and included in the pilot countries in this programme. After the strategy had been adopted, the Action plan was made and it developed into the roadmap for science, technology and innovations for achieving the aims of sustainable development (1,3).

The experience of other countries

One of the first authors to talk about smart specialisation in 2011 was Foray. In the process of implementing the strategy of smart specialisations in Bulgaria, he pointed out that smart specialisation as an academic idea is slowly growing into a political instrument, which is why, as a concept, it encountered difficulties in implementation (4). Later, Foray pointed to the necessity that a state or region should be focused on the development of recognizable and original field of specialisation, not imitating others. In his explanation of smart specialisation, it is referred to as a strategic process, with the help of which one could select a priority field, in which it is necessary to develop a certain cluster of activities, although it presents a risk for decision makers. Namely, economy and business policies are most frequently managed to reduce risks to a minimum when setting priorities, however, the smart specialisation strategy suggests a different approach: to allow the entrepreneurs to find the actual domain of future specialisation.

At one point in its development cycle, S3 represents the degree of local development that has been achieved thanks to the support of local self-government. Also, it is considered that this type of activity is already sufficiently strengthened and that it shows promising results for the entire region. It is necessary to make the actors stronger, which would contribute most to the realization of the noticed potential such as the state of supply (especially

regarding manpower), coordination (providers of services), connections with resources outside the region and agglomeration. The strategy will transform less developed regions into good followers of developed ones to the least extent. It is especially emphasized that smart specialisation is not the uniformisation and it does not necessarily depend on the previously existent sector structure, due to which it introduces an entrepreneur, who discovers the business domain, which is the essential benefit of the smart specialisation model (3).

Domains of the health system with the experience of the application of smart specialisations

Blažević (2016) describes health tourism in all its complexity, interdisciplinarity and a systematic approach to problems as an ideal model of smart specialisation (5). This author notices that health tourism does not necessarily relate to touristic regions, but to any locality of national interest. Although he provides a few definitions of health tourism, which are different, it may be described most precisely as a type of tourism, in which travelling and the possibility of obtaining specific medical services are conjoined, often in a faster and much cheaper way than in one's own country. The author clearly differentiates wellness from health tourism, and medical services which are provided most frequently, according to his research, are the following: cosmetic surgery 25-34%, dentistry 30-50%, orthopaedic surgery 7%, obesity treatments 7%, procedures of in vitro fertilization 3-6% and ophthalmic surgery 3% (5).

Borg and associates present the experience from Europe, which shows that a modern healthcare infrastructure has been established by incorporating centres of medical excellence along with clusters of medical innovations (5). The authors conclude that smart specialisation and innovation in medicine, no matter whether they are observed at the service or organizational level, are related to the increased international competitiveness of medical tourism (6).

Baier and associates, among other things, deal with the innovations in the field of biotechnology in medicine, the need to recognize innovations in entrepreneurship,

Vizija pametnih specijalizacija u Republici Srbiji

Opšta vizija Strategije pametne specijalizacije RS je da RS, pametna i kreativna, visokokonkurentna u svetu i prepoznata po inovacijama zasnovanim na znanju, partnerstvima iz domaćeg ekosistema i kreativnosti pojedinaca, stvara inovacije u oblastima:

– održive visokotehnološke proizvodnje hrane za budućnost sa visokom dodatom vrednošću,

– sofisticiranih softverskih rešenja za globalno tržište, i

– međusektorskih utemeljenih industrijskih inovacija (1).

Sve tri oblasti su usko povezane sa istraživanjima i inovacijama u oblasti medicine, te otvaraju mogućnosti za prepoznavanje sektora zdravstvene zaštite od preduzetnika i aktivacije koncepta pametnih specijalizacija.

Zaključak

Da bi se jasno definisala strategija pametne specijalizacije, potreban je adekvatan pregled razvoja regiona ili države, praćen pregledom razvoja sistema upravljanja, identifikacijom oblasti od najvećeg strateškog potencijala od strane preduzetnika i primena politike pametnih specijalizacija radi povećanja potencijala zasnovanog na znanju. Strategija pametnih specijalizacija, kao osnova za buduće inovacije bi trebalo da se bazira na dostupnim resursima i potencijalima, tehnološkim specijalizacijama i identifikaciji konkurentskih prednosti. Kroz strategiju pametnih specijalizacija, stimulišu se

investicije u oblasti istraživanja, tehnološkog razvoja i inovacija, sa ciljem povećanja konkurentnosti na nivou regiona države, ali i šire. Još jedan od ciljeva startegije pametne specijalizacije je racionalno korišćenje resursa limitiranih u Evropskoj uniji, što bi praktično značilo da ne moraju svi regionu sprovesti istraživanja i osmišljavati inovacije u svim sferama.

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as well as the application of the concept of smart specialisation for the biotechnological processes and products (7). Human resources in healthcare have been analyzed by Morgan, who recognizes educational institutions, in which healthcare workers are educated, as a resource for innovations and competitiveness in the market (8). He perceives a wide range of institutions, universities, laboratories and medical schools as a resource.

The vision of smart specialisations in the Republic of Serbia

A general vision of the smart specialisation strategy is that the Republic of Serbia, which is smart, creative, highly competitive in the world and recognized for its innovations based on knowledge, partnership with the domestic ecosystem and creativity of individuals, creates innovations in the following domains:

- sustainable high technological production of food for the future with high added value,
- sophisticated software solutions for the global market, and
- intersectoral industrial innovations (1).

All three domains are tightly connected with the research and innovations in the field of medicine, and therefore, they open up the possibilities for the healthcare sector to be recognized by entrepreneurs and the activation of the smart specialisations concept.

Conclusion

In order to define the smart specialisation strategy clearly, an adequate survey of the regional or state development is necessary, followed by the survey of the management systems development, the identification of the field with the largest strategic potential recognized by entrepreneurs and the application of the policy of smart specialisations aimed at

increasing the potential based on knowledge. The smart specialisation strategy, as a basis for future innovations, should be based on available resources and potentials, technological specialisations and the identification of competitive advantages. With the help of smart specialisations strategy, investments are stimulated in the field of research, technological development and innovations, with the aim of increasing the competitiveness at the regional, national level, and wider. One of the aims of the smart specialisation strategy is also the rational usage of resources limited in the European Union, which would practically mean that not all regions have to conduct research and introduce innovations in all domains.

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