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KSEROSTOMIJA KOD OSOBA SA DIJABETES MELITUSOM TIPA 2

XEROSTOMIA IN PEOPLE WITH DIABETES MELLITUS TYPE 2

Snežana Radišić[1]

SAŽETAK

Uvod/Cilj: U svetu je, 2017. godine, živelo 46 miliona ljudi sa dijabetesom uzrasta 20-79 godina, a očekuje se da će ovaj broj 2045. godine iznositi 62 miliona, odnosno da će doći do porasta broja obolelih za čak 35%. To ukazuje da šećerna bolest predstavlja veliki javnozdravstveni problem u svetu, pa i u Srbiji. Neke studije, ali ne sve, su pokazale da se sindrom suvih usta (kserostomija) značajno češće javlja kod osoba sa nego bez dijabetesa melitusa tipa 2. Cilj rada je bio da se ispita učestalost javljanja kserostomije nakon protetske rehabilitacije kod osoba sa i bez dijabetesa melitusa tip 2.

Metode: Ovom studijom preseka obuhvaćeno je 58 osoba koje su se, u periodu od 1. septembra 2018. godine do 1. decembra 2018. godine, sukcesivno javljale u ordinaciju stomatološke protetike Doma zdravlja Rakovica radi izrade novih zubnih nadoknada. Svi ispitanici su imali akrilne proteze i bili su obučeni na isti način da održavaju oralnu higijenu. Od svih osoba podaci su prikupljeni upitnom i kliničkim pregledom. Za procenu glikoregulacije određene su vrednosti glikoziliranog hemoglobina (HbA1c). U statističkoj analizi podataka korišćen je Yatesov Hi kvadrat test.

Rezultati: Od 58 osoba sa akrilnim protezama dijabetes tip 2 je imalo 16 (27,5%) ispitanika. Kod 87,5% osoba sa dijabetesom tip 2 vrednosti HbA1C su bile ispod 7%, odnosno imale su regulisanu osnovnu bolest. Svaka treća osoba (37,5%) sa dijabetesom imala je kserostomiju i većinu (83,3%) su činile žene. U grupi osoba bez dijabetesa samo 5% osoba je imalo kserostomiju i sve su bile žene. Između osoba sa i bez dijabetesa tipa 2 postojala je značajna razlika (Yatesov Hi kvadrat test=7,872; p=0,005) u odnosu na učestalost javljanja kserostomije, ali ne u odnosu na osećaj žarenja i/ili pečenja u ustima (Yatesov Hi kvadrat=0,345; p=0,557).

Zaključak: Neophodna je edukacija stanovništva, a posebno osoba sa šećernom bolešću i osoba koje imaju protetske nadoknade, o značaju kontrole dijabetesa i važnosti održavanja oralne higijene.

Ključne reči: *Diabetes mellitus, suva usta, protetska nadoknada, kserostomija*

SUMMARY

Introduction/Aim: In 2017, 46 million people aged 20 to 79, suffering from diabetes mellitus, were reported worldwide. Some estimates show that by the 2045 this number rise to 62 million – an increase in the disease level is expected by 35%. Diabetes represents an important public health issue both globally and in Serbia. Some studies, but not all, reported that patients with diabetes mellitus type 2 suffer more frequently from xerostomia than non-diabetes mellitus type 2 patients. The aim of this study was to determine the rate of xerostomia after prosthetic rehabilitation in patients with and without diabetes type 2.

Methods: This cross sectional study included 58 patients who were referred to Prosthodontic Department of Primary Health Care Center Rakovica during period from 1st September 2018 to 1st December 2018 due to prosthodontic rehabilitation. All subjects had acrylic dentures and were trained in the same manner to maintain oral hygiene. Data were collected through the questionnaire and intraoral clinical examination. Glycemia level was assessed measuring level of glycated hemoglobin (HbA1c). Yates's chi-squared test was used for statistical analysis.

Results: Total of 58 patients wearing acrylic resin dentures, 16 (27.5%) presented with diabetes type 2. HbA1c levels below 7% (within normal range) were found in 87.5% of patients with the disease. In patients with diabetes mellitus type 2 xerostomia was significantly more frequent (37.5%) compared to non-diabetes mellitus patients (5%) (Yates's chi-squared test=7.872; p=0.005). There was no statistically significant difference between the two groups in respect of a sense of burning and/or baking (Yates's chi-squared test=0,345; p=0,557).

Conclusion: There is necessity to educate the population, especially those with diabetes and those with prosthetic dentures, about the importance of proper glycemia level regulaton and the importance of maintaining oral hygiene.

Keywords: *Diabetes mellitus, dry mouth, prosthetics dentures, xerostomia*

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Uvod

Procenjuje se da je u svetu 2017. godine sa dijabetesom živelo 46 miliona ljudi uzrasta 20-79 godina, kao i da će ovaj broj do 2045. godine iznositi 62 miliona, odnosno da će doći do porasta broja obolelih za čak 35% (1). Još veći problem predstavlja činjenica da tek svaka druga osoba zna da boluje od dijabetesa (1). Prema podacima Instituta za javno zdravlje Srbije, u Republici Srbiji od dijabetesa tip 2 boluje približno 750.000 osoba ili 13,2% odraslog stanovništva (2,3). Tokom poslednjih dekada dolazi do porasta prevalencije dijabetesa kako u razvijenim tako i u zemljama u razvoju (4). Sve ovo ukazuje da dijabetes predstavalja veliki javnozdravstveni problem u Srbiji i u svim zemljama sveta. To je multikauzalna bolest koja nastaje kao rezultat interakcije faktora sredine (gojaznost, sedentarni način života, nepravilna ishrana) i genetskih faktora.

Šećerna bolest se manifestuje na skoro svim organima i tkivima, pa tako ne zaobilazi ni usnu duplju. Iako primarno ne zahvata područje usne duplje, dovodi do komplikacija koje uzrokuju promene u ustima. Promene u usnoj duplji uzrokovane dijabetesom ogledaju se promenama na krvnim sudovima, pljuvačnim žlezdama, sluzokoži i na potpornom aparatu zuba (5-7). Posebno su izražene kod osoba sa neregulisanom glikemijom. Uočene su i promene u sastavu pljuvačke, kao i sklonost prema gljivičnim infekcijama. Neregulisana glikemija kod osoba sa šećernom bolešću je praćena slatkim zadahom ili mirisom acetona, relativno brzim gubitkom alveolarnog grebena koji je značajan za retenciju proteze, suvoćom usta, osećajem pečenja i žarenja, zapaljenjem sluzokože usne duplje, zapaljenjem gingiva i slabljenjem potpornog aparata zuba s mogućim parodontalnim apscesima.

Cilj rada je bio da se ispita učestalost javljanja kserostomije (sindroma suvih usta) nakon protetske rehabilitacije kod osoba sa i bez dijabetesa melitusa tip 2.

Metode

Ovom studijom preseka obuhvaćeno je 58 osoba koje su se, u periodu od 1. septembra 2018. godine do 1. decembra 2018. godine, sukcesivno javile u ordinaciju stomatološke protetike Doma zdravlja Rakovica radi izrade novih nadoknada. Svi ispitanici su imali akrilne proteze i bili su obučeni na isti način da održavaju oralnu higijenu.

Od svih osoba, koje su se javile stomatologu protetičaru, uzeti su podaci o polu, uzrastu, kserostomiji (subjektivnom osećaju suvih usta), osećaju žarenja i pečenja, kao i lična anemneza o dijabetesu melitusu tip 1 i tip 2. Potom je izvršen redovan stomatološki pregled usne duplje u cilju detektovanja patoloških promena. Za procenu glikoregulacije određene su vrednosti glikoziliranog hemoglobina (HbA1c). On pokazuje prosečnu vrednost glukoze u krvi tokom poslednja tri meseca. Na osnovu HbA1c prati se bolest kod osoba sa dijagnostikovanim dijabetesom i procenjuje se efikasnost terapije. Dobra kontrole šećerne bolesti određivanjem HbA1c (%) podrazumeva vrednosti $< 7,0\%$ (2).

Svi prikupljeni podaci prikazani su korišćenjem apsolutnih brojeva i proporcija. U statističkoj analizi podataka korišćen je Yatesov Hi kvadrat test.

Rezultati

Studijom preseka bilo je obuhvaćeno 58 osoba (29 žena i 29 muškaraca) sa akrilnim protezama. Manje od 65 godina je imalo 17 (29,3%) muškaraca i 13 (22,4%) žena, a 65 i više godina 12 (20,7%) muškaraca i 16 (27,6%) žena.

Nijedna osoba nije imala dijabetes tip 1. Dijabetes melitus tip 2 je imalo 16 pacijenata (5 muškaraca i 11 žena) u trajanju od najmanje jedne godine odnosno 27,5% svih ispitanika. Kod 14 pacijenata (87,5%) šećerna bolest je bila regulisana, i oni su se sami izjasnili da su na redovnoj terapiji i da redovno kontrolišu šećer u krvi, što je potvrđeno određivanjem HbA1c čije su vrednosti bile ispod 7%. Samo dve osobe su imale vrednosti HbA1c iznad 7% što je ukazivalo na neregulisan dijabetes. Od 16 pacijenata sa dijabetesom, njih 6 tj. 37,5% (2 sa neregulisanim i 4 sa regulisanim) se žalilo na suva usta (xerostomia) i 14 (87,5%) je imalo osećaj žarenja i pečenja. Od 6 pacijenata koji su imali suva usta, 5 su činile žene. Od 42 ispitanika bez dijabetesa samo dva (5%) su se žalila na pojavu suvoće usta (i to dve žene), a 32 (76,2%) su imala osećaj žarenja i pečenja.

Između osoba sa (37,5%) i bez (0,5%) dijabetesa tipa 2 postojala je značajna razlika (Yatesov Hi kvadrat=7,872; p=0,005) u odnosu na učestalost javljanja kserostomije, ali ne u odnosu na osećaj žarenja i pečenja (Yatesov Hi kvadrat=0,345; p=0,557).

Diskusija

Kserostomija ili osećaj suvoće u ustima, usko je povezana sa smanjenom količinom

pljuvačke. Šećerna bolest je jedan od mogućih uzroka koji dovodi do smanjenja količine izlučene pljuvačke i svih materija koje se u njoj nalaze (8). Pljuvačka ima baktericidna svojstva, tako da kada je nema dovoljno izostaje njeno zaštitno dejstvo. Ona je takođe pufer, odgovorna je za pH vrednost u usnoj duplji. Veoma je bitna i gustina pljuvačke, i ona je kod osoba sa dijabetesom povećana, a time i koncentracija enzima što ima za posledicu acidozu koja doprinosi nastanku karijesa i parodontopatije, kao i gljivičnih infekcija. Sluzokoža usne duplje je lepljiva, otežano je gutanje i govor, a i lošija je retencija proteze. Posledica suvih usta je i pojava stomatopiroze (9), a to je osećaj žarenja i pečenja u ustima, posebno na jeziku. Stomatopirozu uzrokuje relativno slaba prokrvljenost tkiva usled promena na krvnim sudovima i poremećaja senzorne funkcije zbog neuropatije. Smanjen je lumen krvnih sudova što uzrokuje smanjenje protoka krvi i vodi nagomilavanju štetnih materija u zidove kapilara, što vodi pojavi edema oko krvnog suda, kapilarnim krvarenjima, i zajedno sa prisutnim mikroorganizmima razvoju infekcije. Može doći do atrofije papila na jeziku pa jezik postaje crven, otečen i mlitav (6). Utrnulost jezika je posledica neuropatije, a daljim napredovanjem bolesti dolazi do gubitka čula ukusa.

Pri planiranju rada s ovim pacijentima potrebno je voditi računa o dnevnom ritmu sekrecije pljuvačke. Spontano lučenje nestimulisane pljuvačke odvija se po jednom, dosta ustaljenom ritmu (10). Najniži obim sekrecije je od ponoći do šest ujutru. Posle toga, tokom prepodneva, sekrecija se spontano povećava, tako da oko 18 časova dostiže maksimum, a zatim se postepeno smanjuje do najnižeg, ponoćnog nivoa. Smanjeno lučenje pljuvačke tokom noći zahteva bolju higijenu usta, jer noću izostaje njeno pufersko i antibakterijsko dejstvo (11). Važnost higijene usta i zuba dobija još više na svom značaju zbog činjenice da postoji bitna razlika između nestimulisane sekrecije pljuvačke u budnom stanju i za vreme dubokog sna. Za vreme sna sekrecija skoro prestaje. Zato je bitno osobi sa dijabetesom ukazati na važnost večernje higijene i zato im preporučujemo da noću skidaju proteze i time spreče razmnožavanje mikroorganizama u toploj i vlažnoj sredini, jer kao što se zna, akrilat je dobar izolator. Zbog smanjene sekrecije pljuvačke kod osoba sa dijabetesom, naglašavamo pacijentima potrebu za toaletom usne šupljine i same proteze.

Sekrecija se može stimulisati žvakanjem, a najintenzivnija sekrecija postiže se gustativnom stimulacijom, pri čemu su kisele supstance najbolji stimulans. Normalna dnevna sekrecija je oko 800 ml pljuvačke. Zahvaljujući svojim mukusnim supstancama, pljuvačka doprinosi nekoj vrsti biološke impregnacije sluzokože, čime se onemogućava njena maceracija, a time se postiže veća efikasnost sluzokože u barijernoj funkciji, u odnosu na brojne sastojke hrane. Prisutne su i supstance kao što su: enzim lizozim, neki imunoglobulini, a i druge slične supstance, koje sprečavaju akumulaciju plaka (11,12).

U cilju bolje epitelizacije i bržeg zarastanja rana, pacijentu se mogu prepisati kapi vitamina A, vitamina B, kao i rastvor pantenola (13). Dobri su i čajevi od žalfije i belog sleza. Postoje i preparati za nadoknadu pljuvačke - veštačka pljuvačka. Za povećanje količine pljuvačke mogu pomoći i žvakaće gume, ili sok od limuna, s obzirom da stimulišu lučenje pljuvačke. Dodatni saveti pacijentima su: prestanak pušenja, izbegavanje alkohola i jako začinjenih jela.

Najčešće infekcije su gljivične, posebno je česta infekcija gljivicom Candida albicans (14). Postoje tri vrste kandidijaze: hipertrofična, hiperplastična i atrofična (6). Ukoliko pacijent duže nosi totalnu protezu, ne održava dobro higijenu a uz to ima dijabetes melitus, neminovno će se javiti gljivična infekcija. Materijal od kojeg je izrađena proteza je termoizolator tako da pacijentima treba savetovati skidanje proteze noću da bi se sluzokoža malo odmorila. Infekcija uglova usana ili Angularni hejlitis ili žvale, su veoma česte kod dijabetičara, a osim infekcije veoma je bitna i smanjena visina zagrižaja koja se javlja usled nedostatka zuba. Pored lečenja infekcije neophodno je i protetsko saniranje radi uspostavljanja boljeg međuviličnog odnosa što će smanjiti naboranost kože u uglovima usana.

Zbog povećane gustine i smanjene količine pljuvačke povećana je sklonost ka stvaranju plaka i zubnog kamenca koji su glavni faktori za nastanak parodontopatije (oštećenje parodontalnog aparata) (7). Parodontalne lezije i stvaranje džepova su kod dijabetičara jače izražene i sa težom prognozom nego kod ostalih pacijenata. Posledica je rasklaćivanje zuba i gubitak zuba tako da su pacijenti sa dijabetesom česti posetioci ordinacije za stomatološku protetiku. Potrebno je dobro ih upoznati sa procesom rada, mogućim problemima tokom nošenja da bi se sprečila najčešća komplikacija, a to je dekubit na oralnoj sluzokoži. Dekubiti su veoma česti jer je sluzokoža zbog smanjenog protoka krvi,

manje otporna na biomehanička opterećenja (15). Zbog već pomenute suvoće usta otežana je retencija proteze, a na lošu retenciju utiče i resorbovan alveolarni greben, posebno donje vilice, koji nastaje zbog progresivne parodontopatije. Poželjne su česte kontrole, a jedna od mogućnosti je i oblaganje proteze mekim akrilatom. Takođe, postoje i gotovi iskrojeni mekani papirni umeci koji mogu ublažiti pritisak proteze na alveolarni greben.

Zbog svih navedenih komplikacija oboleli od dijabetesa treba da održavaju besprekornu oralnu higijenu i svojih zuba i protetskih nadoknada (5). Potrebno je da se javljaju stomatologu svaka tri meseca, a nosioci proteza u dogovoru sa lekarom i češće. U početku po dobijanju proteza su potrebne česte kontrole dok se pacijent ne navikne i ne nauči da prepozna simptome dekubita. Poseban problem predstavljaju pacijenti kod kojih šećerna bolest nije dijagnostikovana ili je dijagnostikovana, a nije ostvarena glikoregulacija, jer se kod njih češće javljaju različite promene i infekcije usne duplje nego kod osoba bez šećerne bolesti ili onih sa šećernom bolešću gde postoji glikoregulacija (16).

Zaključak

U ordinaciji stomatološke protetike obično je svaki treći pacijent sa dijabetesom, a čak kod 12,5% ispitanika sa dijabetesom bolest nije adekvatno regulisana. Sindrom suvih usta se značajno češće javljala kod osoba sa dijabetesom tip 2 (37,5%) nego kod osoba bez dijabetesa (5,0%). Neophodna je edukacija stanovništva, a posebno osoba sa šećernom bolešću, o značaju održavanja lične higijene usne duplje pogotovo ukoliko imaju proteze.

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VALIDACIJA SRPSKE VERZIJE UPITNIKA O BOLU I OGRANIČENOJ POKRETLJIVOSTI RAMENA (SPADI)

VALIDATION OF SERBIAN SHOULDER PAIN AND DISABILITY INDEX (SPADI)

Aleksandra Nikolić[1], Sonja Čejović[2], Milan Bjekić[3], Sandra Šipetić Grujičić[1]

SAŽETAK

Uvod/Cilj: Indeks bola i oganičene pokretljivosti ramena (SPADI) se preporučuje i često koristi za merenje trenutnog bola i nesposobnosti u ambulantnom okruženju. Međutim, validnost i pouzdanost srpskog SPADI upitnika nisu do sada proučavani. Cilj ove studije je bio da se proceni pouzdanost i validnost SPADI upitnika na srpskom jeziku.

Metode: Istraživanje je sprovedeno kao panel studija na Institutu za ortopedsko hirurške bolesti „Banjica“ (IOHB) u Beogradu. Obuhvaćeno je 33 pacijenata sa sindromom bolnog ramena, koji su bili upućeni na pregled kod lekara na IOHB tokom 2016. i 2017. godine. Srpska verzija SPADI upitnika prevedena je u skladu sa međunarodnim smernicama. Unutrašnja validnost je procenjena određivanjem Cronbach-ovog alfa koeficijenta. Interklasni koeficijent korelacije (ICC) je primenjen za procenu test-retest pouzdanosti. Faktorska analiza je korišćena za ispitivanje konačne strukture upitnika.

Rezultati: SPADI upitnik ima odličan nivo unutrašnje konzistentnosti (Cronbach alfa =0,946). Pouzdanost posle ponovonog testiranja SPADI upitnika bila je veoma visoka (ICC =0, 997). Pomoću eksploratorne faktorske analize izdvojen je jedan faktor koji objašnjava 50,1% varijanse.

Zaključak: Srpska verzija SPADI upitnika ima visok nivo unutrašnje konzistentnosti i pouzdanosti. Međutim, naši rezultati ukazuju da, iako konceptualno upitnik ima dva domena, naši ispitanici ne prave razliku između bola i ograničenosti pokreta, te se preporučuje samo upotreba ukupnog skora SPADI upitnika.

Ključne reči: *bolno rame, nesposobnost, SPADI, validnost, pouzdanost*

SUMMARY

Introduction/Aim: The Shoulder Pain and Disability Index (SPADI) is recommended and frequently used instrument for measuring current shoulder pain and disability in an outpatient setting. However, the validity and reliability of the Serbian SPADI are unknown. Aim of this study was to evaluate the reliability and validity of the Serbian version of SPADI.

Methods: The research was conducted as a panel study at the Institute for Orthopedic Surgery “Banjica” (IOSB) on 33 patients with shoulder pain syndrome who were referred to a physician at IOSB during 2016 and 2017. Cross-cultural adaptation was performed according to the international guidelines. Internal validity was assessed by determining the Cronbach’s alpha coefficient. Intraclass correlation coefficient (ICC) was used for test-retest reliability. Factor analysis was used to examine the structure of the questionnaire.

Results: The SPADI questionnaire in our sample had an adequate level of internal consistency (Cronbach alpha = 0.946). The test-retest reliability of the SPADI questionnaire was very high (ICC = 0.997). Using exploratory factor analysis, one factor solution explained 50,1% of the variance.

Conclusion: The Serbian version of SPADI questionnaire has a high level of internal consistency and the test-retest reliability but our results suggest that pain and disability, although distinguishable conceptually, may not be distinguished by patients. Since there was no support for separation into two dimensions we recommend the use of total SPADI score only as a measure of the impact impaired shoulder.

Keywords: *shoulder pain, disability, SPADI, validity, reliability*

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Introduction

Shoulder pain is a common and disabling medical problem. The pain and disability associated with shoulder pain can have a large impact on individuals leading to an inability to work or to carry out household and leisure-time activities. It is the third most common cause of musculoskeletal consultation in primary care, after back and knee (1). Prevalence figures differed from 6.9 to 26% for point prevalence, 18.6-31%, for 1-month prevalence, 4.7-46.7% for 1-year prevalence and 6.7-66.7% for lifetime prevalence (2). There are differences in case definitions, diagnostic procedures, and response rates that may be responsible for these large ranges.

The etiology of shoulder pain is diverse, and may be due to problems with the neck, glenohumeral joint, acromioclavicular joint, rotator cuff, or other soft tissues around the shoulder (3). Rotator cuff problems are the most common source of shoulder pain (3-5), accounting for more than two-thirds of cases (4). Recovery from shoulder pain can be slow. In a prospective study 25% of people with shoulder pain reported previous episodes, while many patients (41%) reported persistent symptoms one year after the initial presentation of their complaints to the general practitioner (6). According to Swedish study physiotherapy treatments accounted for 60% and the costs for sick leave contributed to 84% of the total costs of painful shoulder (7). Shoulder pain is widespread medical problem and presents a considerable burden on the affected person and the society.

Pain is the most common reason for consulting a practitioner, regardless of the disorder that caused shoulder pain (3). Treatment of shoulder pain is commonly aimed at pain reduction and improvement of functional disabilities (8). That's why outcome measurements should include an instrument (e.g. questionnaire) for the evaluation of functional disabilities (9). There are several self-administered shoulder pain and disability questionnaires. The Shoulder Pain and Disability Index (SPADI) was originally developed in English (10). It has been translated and validated in several languages and showed excellent reliability and responsiveness (11–13).

Serbian Shoulder Pain and Disability Index has not been validated and tested for reliability. Aim of this study was to evaluate the reliability and validity of the Serbian Shoulder Pain and Disability Index for patients with shoulder pain.

Methods

The research was conducted at the Institute for Orthopedic Surgery "Banjica" (IOSB) in Belgrade. The research was designed as a panel study. Thirty-three patients with shoulder pain syndrome who were referred to a physician at the Institute for Orthopedic Surgery Banjica in Belgrade during 2016 and 2017 were included in the study. The criteria for inclusion of the respondents in the study were: age 18-75 years, persons suffering from some shoulder pain entity for shorter or longer period, acute and chronic form of pain. Exclusion criteria were: patients with diabetes, malignant and autoimmune diseases, mental disorders and those who were not motivated to take part in the study.

This research was approved by the Ethics Committee of IOSB.

Final orthopedic diagnosis was made by clinical examination (medical history and physical examination, which also includes some specific tests), shoulder X-ray and ultrasound examination of the diseased region. In some cases, additional magnetic resonance imaging (MRI) and laboratory analyzes were performed.

Specific SPADI questionnaire was used to assess pain and disability (10). For the purpose of this paper, a Serbian version of the SPADI questionnaire was created (Appendix 1). Translation, cultural adaptation and validation of this specific questionnaire according to a standardized procedure were performed (14).

The original SPADI questionnaire was firstly translated from English into Serbian by two independent translators. By comparing their two translations and synthesizing them into one by a group of experts in Serbian, English, and specific medical issues, the consensus was made for the first Serbian version of the questionnaire. According to the algorithm, the first Serbian version of the questionnaire was then back translated by the other two independent translators who had not previously seen the original version of the questionnaire. The two translations obtained were compared to the original English version by a group of experts who formed the second Serbian version. Any inconsistencies were resolved. Terms and expressions that are common in everyday Serbian language were used. For better understanding, some expressions were adapted for the local population.

In order to test psychometric characteristics of Serbian version of SPADI question-

naire 33 respondents completed questionnaire two times within three days. In the meantime patients were not given any form of therapy that could affect their symptoms.

Shoulder Pain and Disability index – SPADI was developed to provide a self-administered instrument that would reflect the disability and pain associated with the clinical syndrome of painful shoulder (10). It consists of 13 items divided into two domains. The first domain is related to pain in the shoulder area, and the second one is about mobility or degree of activity limitation. The pain-related part consists of five questions in which the respondent subjectively rates their pain during the week from 0 to 10. The second part of the test consists of eight questions referring to subjective ability to perform individual daily activities, and are also rated 0 to 10. It takes 5-10 minutes for the SPADI questionnaire to be completed. A pain rating of «0» corresponds to «the absence of every possible pain» and «10» is «the strongest possible pain imaginable.» In the second part of the test, «0» corresponds to «no difficulties» in performing daily activities, and «10» is a measure of «absolutely difficult and necessary assistance» in performing them. The subscale scores were calculated by adding the item scores for that subscale and dividing this number by the maximum score possible for the items that were deemed applicable by the subject. This number was then multiplied by 100. Therefore, scores could theoretically range from 0 to 100 with higher scores indicating greater impairment. The total SPADI score was calculated by averaging the pain and disability subscale scores. Thus, the total SPADI score could also range from 0 to 100.

SPSS 21.0 (SPSS Inc., Chicago, IL, USA) was used for statistical data analysis. Internal consistency was assessed by determining the Cronbach's alpha coefficient. Satisfactory validity was present if the Cronbach's alpha coefficient is higher than 0.7 (15). Intraclass correlation coefficient (ICC) was used for test-retest reliability. By convention, reliability is satisfactory if ICC > 0.7 (16). Factor analysis was used to examine the internal structure of the questionnaire (17). Factor extraction was performed by principal component analysis with Varimax rotation. The Kaiser-Meyer-Olkin Measure and Bartlett's Test of Sphericity (18) were computed to determine whether the data were suitable for factor analysis. A varimax rotation method was used to obtain independent factors and an item was considered to be loaded on a factor if the matrix coefficient was 0.50 or larger. The difference was marked as significant if $p < 0.05$.

Results

Total of 33 respondents (28 men and 15 women) of average age 53.4±11.1 were included in the validation of the questionnaire. The majority of subjects were diagnosed with rotator cuff syndrome (9), calcifying tendinitis of the shoulder (9), and adhesive capsulitis of the shoulder (6) (Table 1).

Table 1. Characteristics of patients included in the study

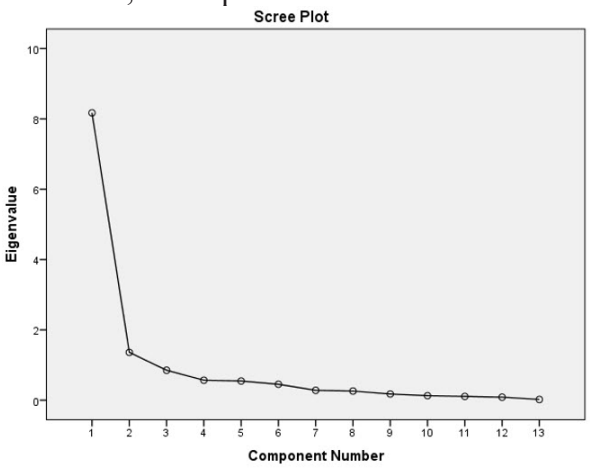
Characteristics	Number (%)
Sex	
Male	18 (54.5)
Female	15 (45.5)
Age ($\bar{x} \pm$ SD)	53.4±11.1
Diagnosis	
1. Tendinitis m.biceps brachii caput longum GH	1 (3.0)
2. Syndroma armillae rotatoriae	9 (27.3)
3. Tendinitis humeroscapularis calcificata	9 (27.3)
4. Capsulitis humeroscapularis adhesive	6 (18.2)
5. Luxatio articuli humeroscapularis	2 (6.1)
6. Contusio regionis deltoideae et brachii	1 (3.0)
7. Periarthritis humeroscapularis	1 (3.0)
8. Laesio traumatica tendinis musculi rotatoris articuli humeri	1 (3.0)
9. Arthrosis glenohumeralis incipiens	1 (3.0)
10. Bursitis regionis humeroscapularis	1 (3.0)
11. Arthralgia art. glenohumeralis	1 (3.0)

$\bar{x}$ - mean, SD-standard deviation

Internal consistency was assessed by determining the Cronbach's alpha coefficient. The SPADI questionnaire had high level of internal consistency (Cronbach alpha = 0.946). The "pain" domain (Cronbach alpha = 0.888) and the "disability" domain (Cronbach alpha = 0.917) had both an adequate level of internal consistency. The test-retest reliability of the SPADI was examined to determine whether the scores derived were relatively stable over period of time which was short enough that little real clinical change could be expected. ICCs and their 95% confidence intervals were calculated as level of agreement between the initial and three days follow-up scores. The test-retest reliability of the SPADI questionnaire was excellent (ICC = 0.997, $p<0.001$).

Exploratory factor analysis was used to examine the structure of the questionnaire. Factor extraction was performed by principal component analysis with Varimax rotation. Calculated Kaiser-Meyer-Olkin Measure of Sampling Adequacy 0.851 and highly significant ($p < 0.001$) Bartlett's Sphericity Test indicated that factor analysis was appropriate. According to factor analysis, two factors had eigenvalues greater than one (initial eigenvalues 8.17 and 1.36) (Figure 1).

Figure 1. Factor analysis for Serbian version of SPADI, Scree plot



These two factors together explain 73.3% of the total variance (first factor explains 50,1% of the variance, while the other explains 23,2% of the variance). Since a one factor solution explains 50,1% of the variance, and scree plot indicates that there is one factor that extracts predominately, the resulting structure corresponds to the structure of the one-domain questionnaire. Rotated factor matrix did not separate clearly between the pain and disability items, with a significant cross-loading for pain and disability subscale questions 4, 5, 7, 8, 12 i 13. In order to examine all possibilities correctly, and to evaluate according to common rule of extracting all eigenvalues above 1.0, we examined the possibility of extracting two factors on our data. In the rotated matrix, the first 8 items and the items 11 and 13 had the highest correlation with the first extracted component, while the items 9, 10, 12 with the second (Table 2). According to our results, ten items correspond to the 'disability' domain, while three items correspond to the 'pain' domain.

Table 2. Factor analysis for Serbian version of SPADI, Rotated Component Matrix

	Component	
	1	2
Q1	**0.705**	0.001
Q2	**0.814**	0.289
Q3	**0.885**	0.261
Q4	**0.776**	0.327
Q5	**0.633**	0.416
Q6	**0.828**	0.265
Q7	**0.824**	0.326
Q8	**0.802**	0.418
Q9	0.180	**0.909**
Q10	0.205	**0.929**
Q11	**0.870**	0.236
Q12	0.458	**0.568**
Q13	**0.723**	0.406

Extraction method: Principal component analysis, Rotation Method: Varimax with Kaiser Normalization

Discussion

The painful shoulder or shoulder pain syndrome comprises a large number of pathological entities of the shoulder joint itself and associated anatomical structures, primarily the muscles of the rotator cuff. This condition is very common. The syndrome is characterized by the onset of pain and limited mobility in the shoulder joint, resulting in limited working capacity and impaired quality of life. The cumulative incidence of shoulder complaints in general practice was estimated to be 11.2/1000 patients/year (8) with a lifetime prevalence up to 66.7% (2).

The Shoulder Pain and Disability Index (SPADI) is a specific questionnaire used for shoulder disease. This study shows that the Serbian SPADI consists of one factor and can be considered as a valid and reliable questionnaire. Internal consistency and test–retest reliability were high. The SPADI questionnaire had Cronbach alpha of 0.946. The Cronbach's

alpha found in other studies ranged between 0.90 and 0.95 (10,19-23) and ICC values ranged between 0.88 and 0.96 (11,22-27), which was consistent with our results. These findings indicated excellent internal consistency and high reproducibility of the questionnaire.

Using exploratory factor analysis, one factor that explained 50,1% of the total variance was extracted. Principal component analysis with varimax rotation did not separate clearly between the pain and disability items, with a mixture of pain and disability subscale questions distributing into each factor. There was significant cross-loading for questions 4, 5, 7, 8, 12 i 13. Even though eigenvalues suggest that there could be two-factors, 4 questions have significant cross-loading between factors. With one factor structure only 3 questions shift. The factor analysis we conducted in this population demonstrated that the SPADI had a predominantly one-dimensional structure in this study setting which is not in accordance with the initial conceptualization by Roach et al (10). Even though authors suggest two domain questionnaire there were a number of items in their original validation study that did not follow that pattern (10). Principal components factor analysis without rotation produced one factor but the results of the varimax rotation provided limited support for maintaining two separate subscales. A number of the disability items loaded strongly onto both factors (10). A study by Hill et al (19) reported a two factor structure as originally described. Other validity studies could not confirm the same pattern or have found the SPADI is unidimensional (20-22,25). It appears likely that shoulder pain and shoulder disability are highly associated. In a study by Roddey et al (22) they concluded that people do not distinguish between pain and disability and a possible explanation for that could be the wording of the SPADI items. The disability scale items ask respondents to indicate the amount of difficulty they have with specified functions. Authors suggest it is possible that when people report their difficulty in performing an activity, they consider pain to be part of what makes the activity difficult. In a study by Faucher et al. they have proposed that pain and disability items in questionnaires may correlate because pain and disability items address similar tasks (28).

Since the Serbian version of SPADI questionnaire has an excellent level of internal consistency and test-retest reliability, but as well as number of other studies didn't confirm the structure of two-domain questionnaire, we could say that according to our results the SPADI scale measures the impact of impaired shoulder as a one construct.

The main limitation of this study is the size of the obtained sample. Because of small number of participants, it cannot be definitely claimed that original two factor structure of questionnaire wouldn't be approved if the sample was bigger. Further research is needed to examine the longitudinal data on other psychometric properties including sensitivity to change and error scores as a representation of a minimal clinically important difference. The great reliability observed in our study may be attributable to the shorter interval between tests (3 days) which could induce an artificial inflation of correlation coefficients due to recall bias.

Conclusion

The Serbian version of SPADI questionnaire has an excellent level of internal consistency. The test-retest reliability of the SPADI questionnaire is very high (ICC = 0.997) but precision for documenting the status of individual patients. Our results suggest that pain and disability, although distinguishable conceptually, may not be distinguished by patients. Since there were no support for separation into two dimensions, we recommend the use of total SPADI score only as a measure of the impact of impaired shoulder.

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Appendix 1

Skala bola i ograničenosti pokreta ramena

Molimo Vas da označite **broj** koji najbliže odgovara Vašem iskustvu tokom protekle nedelje u vezi problema koji imate sa ramenom.

Skala bola

Koliko je jak Vaš bol...

Zaokružite **broj** koji najbolje opisuje koliki Vam je **bol**, pri čemu je **0 = nema bola, a 10 = najjači mogući bol**

...kada je najjači?	0	1	2	3	4	5	6	7	8	9	10
...kada ležite na strani koja Vas boli?	0	1	2	3	4	5	6	7	8	9	10
...kada pokušavate da dohvatite nešto sa visoke police?	0	1	2	3	4	5	6	7	8	9	10
...kada pokušavate da dodirnete zadnju stranu svog vrata?	0	1	2	3	4	5	6	7	8	9	10
...kada nešto gurate rukom koja je zahvaćena bolom?	0	1	2	3	4	5	6	7	8	9	10

Skala ograničenosti pokreta ramena

Koliko Vam je teško...

Zaokružite **broj** koji najbolje opisuje koliko Vam je **teško**, pri čemu je **0 = nema poteškoća, a 10 = toliko teško da je neophodna pomoć**

...kada perete kosu?	0	1	2	3	4	5	6	7	8	9	10
...kada perete leđa?	0	1	2	3	4	5	6	7	8	9	10
...kada oblačite potkošulju ili džemper koji se navlači preko glave?	0	1	2	3	4	5	6	7	8	9	10
...kada oblačite košulju koja se zakopčava spreda?	0	1	2	3	4	5	6	7	8	9	10
...kada oblačite pantalone?	0	1	2	3	4	5	6	7	8	9	10
...kada stavljate neki predmet na visoku policu?	0	1	2	3	4	5	6	7	8	9	10
...kada nosite težak predmet od 4,5 kg?	0	1	2	3	4	5	6	7	8	9	10
...kada nešto vadite iz zadnjeg džepa?	0	1	2	3	4	5	6	7	8	9	10

Shoulder pain and disability index

Please place a mark on the line that best represents your experience during the last week attributable to your shoulder problem.

Pain scale

How severe is your pain?

Circle the number that best describes your pain where: **0** = no pain and **10** = the worst pain imaginable.

At its worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Touching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

Disability scale

How much difficulty do you have?

Circle the number that best describes your experience where: **0** = no difficulty and **10** = so difficult it requires help

Washing your hair?	0	1	2	3	4	5	6	7	8	9	10
Washing your back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an undershirt or jumper?	0	1	2	3	4	5	6	7	8	9	10
Putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
Putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy object of 10 pounds (4.5 kilograms)	0	1	2	3	4	5	6	7	8	9	10
Removing something from your back pocket?	0	1	2	3	4	5	6	7	8	9	10

Source: Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder pain and disability index. Arthritis Care Res 1991;4(4):143-9.

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OCCURRENCES OF INFECTIONS CAUSED BY THE BACTERIA *CLOSTRIDIUM DIFFICILE* ON THE TERRITORY OF BELGRADE

OBOLEVANJE I UMIRANJE OD INFEKCIJA UZROKOVANIH BAKTERIJOM *CLOSTRIDIUM DIFFICILE* NA TERITORIJI BEOGRADA

Andrea Uzelac Škorić[1], Mila Uzelac[1], Milan Škorić[1], Dušan Durlević[1], Slavica Maris[1], Marija Milić[1]

SUMMARY

Introduction/Aim: The aim of the study was to show the characteristics of infections caused by the bacteria *Clostridium difficile (C. difficile)* originating in the territory of Belgrade in the period between 2013 and 2017.

Methods: Data for this report was collected from the reports of infectious diseases and hospital infections, as well as surveys of the patients, medical documentation, and from annual reports on the prevention, treatment and elimination of infectious diseases. Results of epidemiological and laboratory testing were also included. Incidence rates, mortality rates and proportions were used in analysis.

Results: In the observed 5 year period the incidence rate was between 34.0/100,000 (2013) and 75.1/100,000 (2016). The mortality rate ranged between 1.1/100,000 (2013) and 2.1/100,000 (2016). The highest average incidence rates were observed in the elderly. Most cases of mortality belonged to the age category 70 and more years of age (11.3/100,000) and were the smallest in the age group 30-39 years (0.1/100,000). Infections with *C. difficile* were most common in the month of March (608 affected, with an incidence rate of 11.3/100,000). In the observed period there were 12 registered epidemics with 51 cases.

Conclusion: The effective prevention and control of the *C. difficile* infection is predicated upon the continuation of active implementation of disease management in accordance with the incidence rate.

Keywords: *Clostridium difficile, incidence, mortality*

SAŽETAK

Uvod/Cilj: Cilj ove deskriptivne studije je da se analizira kretanje obolevanja i umiranja od infekcija uzrokovanih bakterijom *Clostridium difficile (C. difficile)* nastalih na području Beograda u periodu od 2013. do 2017. godine.

Metode: Za prikaz ovog rada, korišćeni su podaci iz prijava zaraznih bolesti i prijava bolničkih infekcija, kao i ankete obolelih, medicinska dokumentacija, godišnji izveštaji o radu na sprečavanju, suzbijanju i eliminaciji zaraznih bolesti i rezultati epidemioloških i laboratorijskih ispitivanja. U analizi podataka korišćene su stope incidencije, stope mortaliteta i proporcije.

Rezultati: U Beogradu stopa incidencije za infekcije uzrokovane *C. difficile* se kretala od 34,0/100.000 u 2013. godini do 75,2/100.000 u 2016. godini, a stopa mortaliteta od 1,1/100.000 u 2013. godini do 2,1/100.000 u 2016. godini. Kod najstarijih zabeležene su najveće prosečne stope incidencije. Najviša prosečna stopa mortaliteta je bila u uzrastu 70 i više godina (11,3/100.000), a najniža u uzrastu 30-39 godina (0,07/100.000). Infekcije *C. difficile* su pokazale sezonski karakter sa pikom u martu mesecu (608 obolelih, stopa incidencije 36,6/100.000). U periodu 2013-2016. godine registrovano je 12 epidemija sa 51 obolelom osobom.

Zaključak: Nastavak aktivnog sprovođenja nadzora praćenjem incidencije, preduslov je za prevenciju i suzbijanje infekcija uzrokovanih bakterijom *C. difficile.*

Ključne reči: *Clostridium difficile, incidencija, mortalitet*

Uvod

Infekcije uzrokovane bakterijom *Clostridium difficile* predstavljaju veliki javnozdravstveni problem kako svuda u svetu, tako i u Srbiji (1). *Clostridium difficile* je sporogena, gram pozitivna anaerobna bakterija, koja je prvi put izolovana 1935. godine iz stolice novorođenčadi, a 1978. godine je povezana sa nastankom pseudomembranoznog enterokolitisa. Sposobnost stvaranja spora omogućava bakteriji da preživi u sredinama (npr. na suvim površinama) gde ne postoje uslovi za njen aktivan rast duži vremenski

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period (2).

Dva najvažnija faktora rizika za obolevanje jesu izloženost pacijenata prekomernoj upotrebi (zloupotrebi) antibiotika, posebno antibiotika širokog spektra dejstva i boravak osoba u bolničkim ustanovama radi lečenja (3,4). Drugi autori navode da ogroman značaj za nastanak ove infekcije imaju: starija životna dob, hirurška intervencija na gastrointestinalnom traktu, plasiranje nazogastričnih tubusa, primena terapije za redukciju želudačne kiseline (najčešće inhibitori protonske pumpe), kao i pridružena tj. komorbiditetna stanja, posebno inflamatorne bolesti creva (5-11).

Kao odgovor na porast obolevanja i umiranja od ovih infekcija, Evropski centar za prevenciju i kontrolu bolesti (engl. Eureopean Center for Disease prevention and Control-ECDC) u saradnji sa Centrima za kontrolu i prevenciju bolesti (engl. Centers for Disease prevention and Control – CDC) u Sjedinjenim Američkim Državama (SAD), sačinili su preporuke za nadzor nad infekcijama uzrokovanim *C. difficile* (1). Standardizovan periodičan ili kontinuiran nadzor nad novoobolelima od infekcija prouzrokovanih *C. difficile* u cilju praćenja incidencije je preduslov za prevenciju i suzbijanje ovih infekcija. Mikrobiološki podaci unapređuju kvalitet nadzora nad ovim infekcijama i omogućavaju uvid u promene epidemioloških karakteristika infekcija prouzrokovanih *C. difficile* (1).

Po metodologiji i preporukama ECDC, u Srbiji se po prvi put zajedno sa ostalim evropskim zemljama, u periodu od 01.10.2018. do 31.03.2019. godine, sprovodio nadzor nad infekcijama uzrokovanim *C. difficile* i utvrđivanje ribotipa toksigenih sojeva u referentnoj mikrobiološkoj laboratoriji Instituta za javno zdravlje u Nišu.

Cilj ovog rada je bio da se analizira kretanje obolevanja i umiranja od infekcija uzrokovanih C. difficile na teritoriji Beograda u periodu 2013 – 2017. godine.

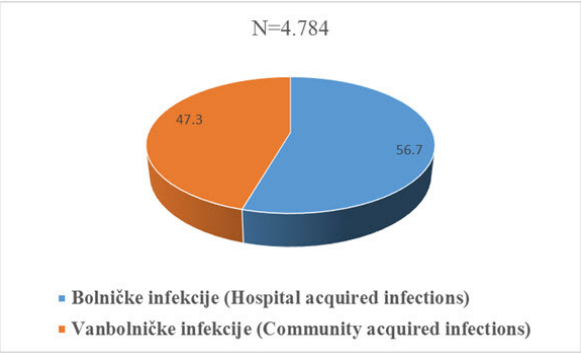
Metode

U okviru ove deskriptivne studije, podaci o obolevanju od infekcija uzrokovanih *C. difficile* na teritoriji Beograda su dobijeni iz prijava zaraznih bolesti i prijava bolničkih infekcija Gradskog zavoda za javno zdravlje (GZZJZ), kao i iz godišnjih izveštaja o radu na sprečavanju, suzbijanju i eliminaciji zaraznih bolesti GZZJZ. Takođe su korišćeni podaci epidemioloških i laboratorijskih ispitivanja GZZJZ za period 2013–2017. godine. U cilju sagledavanja kretanja obolevanja od infekcija uzrokovanih *C. difficile* izračunate su stope incidencije. Za izračunavanje stopa incidencije, kao brojilac korišćen je broj novoobolelih od infekcije pruzrokovane *C. difficile* za posmatranu godinu, a za imenilac broj stanovnika sredinom 2011. godine (1.659.440), jer je to poslednja godina popisa stanovništva za grad Beograd. U cilju sagledavanja strukture obolevanja od bolničkih i vanbolničkih infekcija među svim infekcijama uzrokovanim *C. difficile* korišćene su proporcije.

Mortalitetni podaci dobijeni su iz prijava smrti od zaraznih bolesti GZZJZ. Za izračunavanje stope mortaliteta, kao brojilac korišćen je broj umrlih od infekcije pruzrokovane C. difficile za posmatranu godinu, a za imenilac broj stanovnika Beograda sredinom 2011. godine.

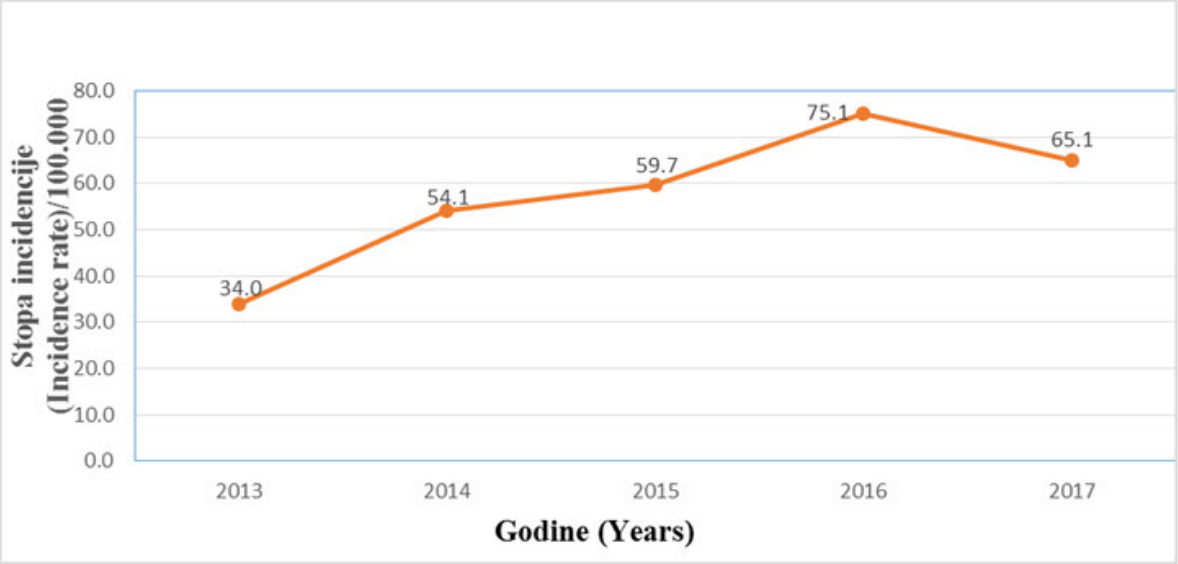
Rezultati

U periodu od 2013. do 2017. godine, na teritoriji Beograda prijavljeno je 4.784 obolelih od infekcija uzrokovanih bakterijom *C. difficile*, od kojih 56,7% (2.714) činile su bolničke, a 47,3% (2.070) vanbolničke infekcije (Grafikon 1).



Grafikon 1. Učestalost bolničkih i vanbolničkih infekcija uzrokovanih bakterijom *C. difficile* među svim infekcijama uzrokovanim bakterijom *C. difficile*, Beograd, 2013 – 2017. godine
Figure 1. Frequency of hospital and community acquired infections caused by C. difficile as part of total C. difficile infections, Belgrade, 2013 – 2017

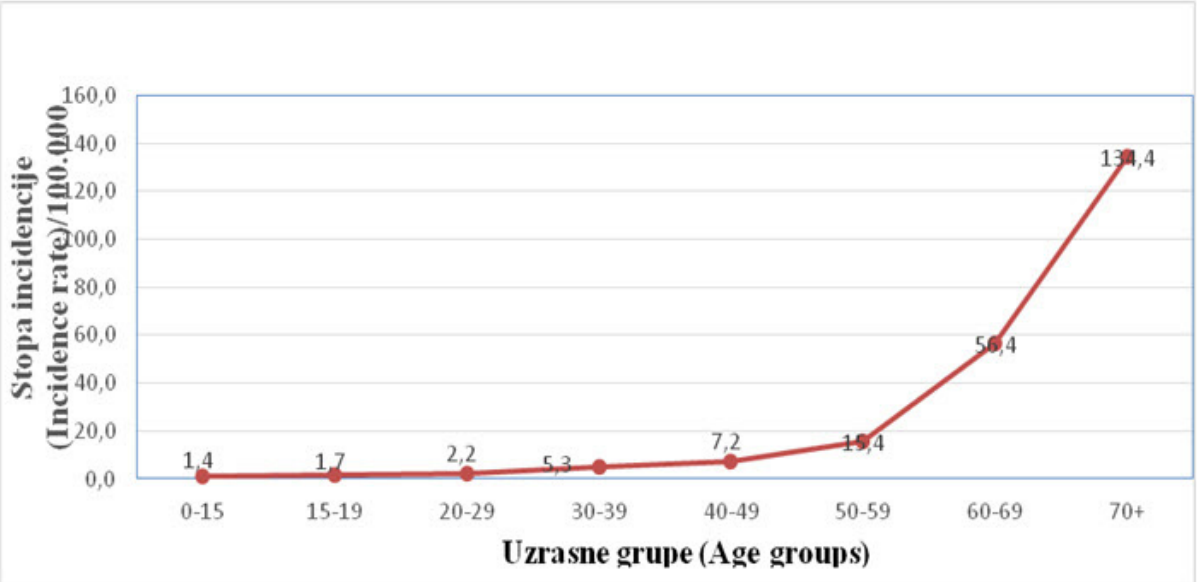
U istom periodu stopa incidencije infekcija uzrokovanih *C. difficile* se kretala od 34.0/100.000 (2013. godine) do 75.1/100.000 (2016. godine), dok je prosečna stopa iznosila 57.7/100.000. (Grafikon 2).



Grafikon 2. Stope incidencije (na 100.000) za infekcije uzrokovane *C. difficile,* Beograd, 2013–2017. godine

Figure 2. Incidence rates (per 100.000) of infections caused by C. difficile, Belgrade, 2013-2017

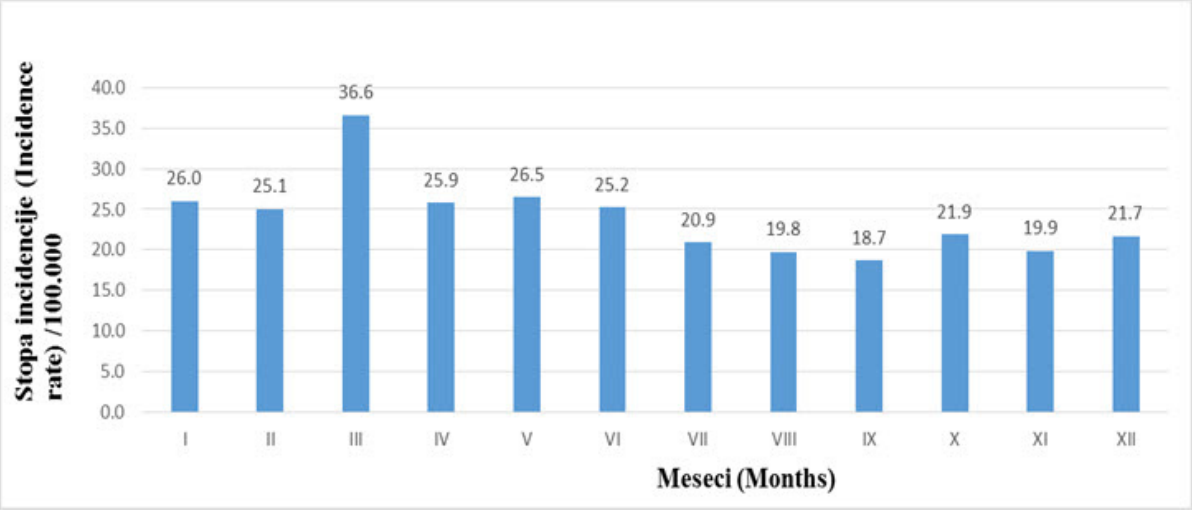
Najviše prosečne stope incidencije infekcija C. difficile su bile u uzrasnim grupama 70 i više godina (134,4/100.000) i 60-69 godina (56,4/100.000), a najniže u uzrasnim grupama 0-15 (1,4/100.000) i 15-19 (1,7/100.000) (Grafikon 3).



Grafikon 3. Prosečne uzrasno specifične stope incidencije (na 100.000) infekcija uzrokovanih *C. difficile* u Beogradu, 2013-2017. godine

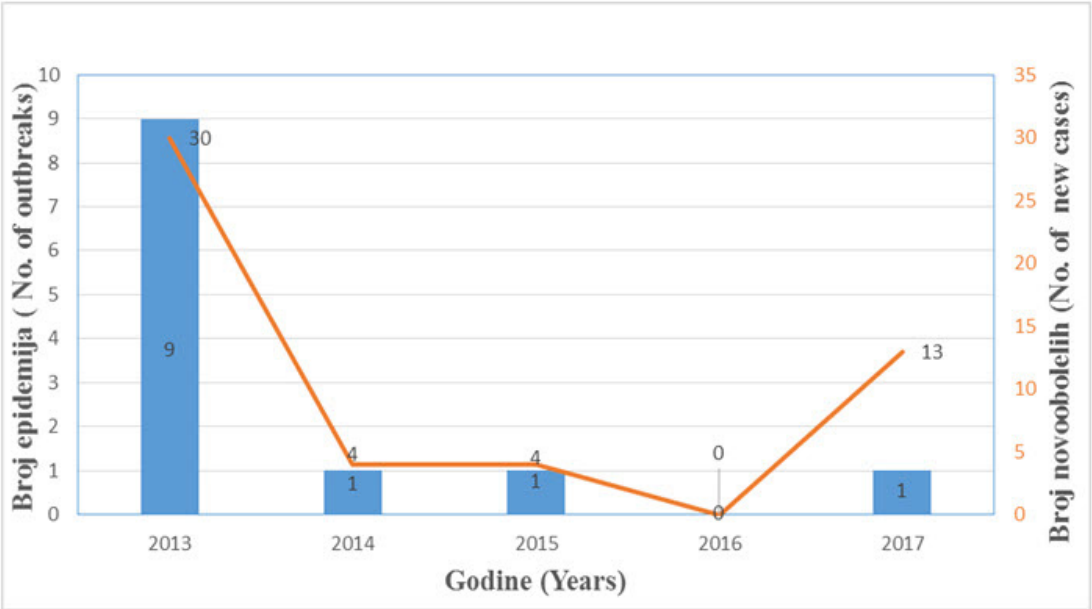
Figure 3. Average age-specific incidence rates (per 100.000) for infections caused by C. difficile, Belgrade 2013-2017

U odnosu na sezonu javljanja, u poslednjih pet godina, najveća prosečna stopa incidencije je zabeležena u martu mesecu i iznosila je 36.6/100.000 (Grafikon 4).



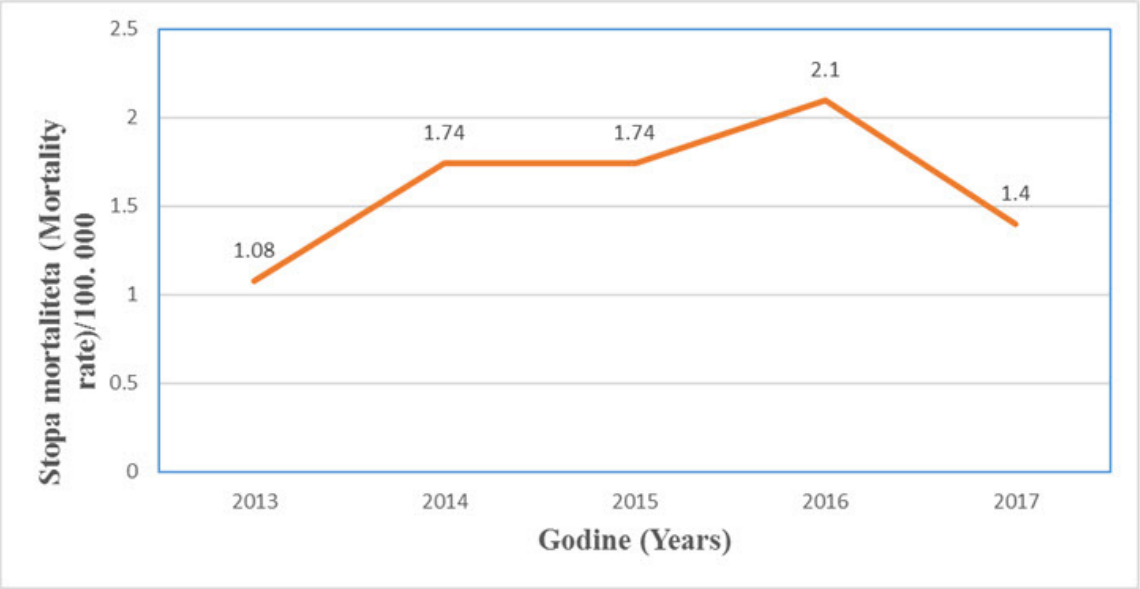
Grafikon 4. Prosečne stope incidencije (na 100.000) za infekcije uzrokovane *C. difficile* po mesecima, Beograd, 2013–2017. godine
Figure 4. Average incidence rates (per 100.000) for C. difficile infections by months, Belgrade, 2013-2017

U poslednjih pet godina sa dijagnozom Enterocolitis per *C. difficile*, ukupno je registrovano 12 epidemija u zdravstvenim ustanovama na teritoriji Beograda i 51 obolela osoba (Grafikon 5).



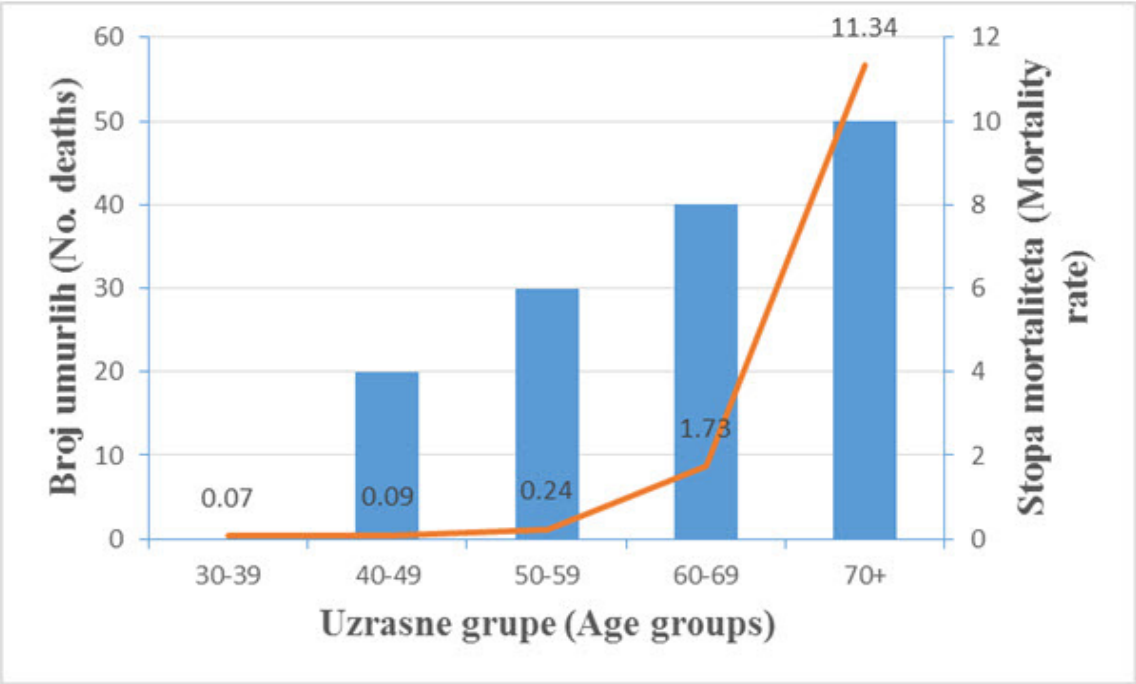
Grafikon 5. Broj epidemija i novoobolelih u epidemijama uzrokovanim *C. difficile*, Beograd, 2013–2017. godine
Figure 5. Number of epidemics and new cases of infections caused by C. difficile, Belgrade, 2013-2017

Usled infekcija prouzrokovanih *C. difficile* umrlo je, u petogodišnjem period, 135 osoba, a stopa mortaliteta se kretala od 1,1/100.000 (2013. godine), do 2,1/100.000 (2016. godine) (Grafikon 6). Prosečna stopa mortaliteta za posmatrani period je iznosila 1,6/100.000.



Grafikon 6. Stope mortaliteta (na 100.000) od infekcija izrokovanih *C. difficile*, Beograd, 2013–2017. godine
Figure 6. Mortality rates (per 100.000) of infections caused by C. difficile, Belgrade, 2013-2017

U periodu 2013 – 2017. godine, najviša prosečna uzrasno-specifična stopa mortaliteta je iznosila 11,3/100.000 u uzrasnoj grupi 70 i više godina, a najniža u uzrasnoj grupi 30-39 (0,07/100.000) (Grafikon 7).



Grafikon 7. Prosečan broj umrlih i prosečne uzrasno–specifične stope mortaliteta (na 100.000) za infekcije uzrokovane *C. difficile,* Beograd, 2013– 2017. godine
Figure 7. Average number of deaths and average age-specific mortality rates (per 100.000) for infections caused by C. difficile, Belgrade, 2013-2017

Diskusija

U periodu 2013–2017. godine, na teritoriji Beograda registrovano je 4.784 obolelih od infekcija uzrokovanih bakterijom *C. difficile* (prosečna stopa incidencije 57,6/100.000), a svaka druga je bila bolnička infekcija. U studiji rađenoj 2011. godine u SAD, registrovano je 15.461 slučajeva infekcija uzrokovanih *C. difficile*. Većinu infekcija (65,8%) činile su bolničke, a manji deo (24,2%) vanbolničke infekcije (12). Prosečna stopa incidencije je iznosila 48,2/100.000 (12). U Nemačkoj, 2012. godine, stopa incidencije infekcija uzrokovanih *C. difficile* je bila 83/100.000 (13), a u Švedskoj u periodu 2012-2016. godine, 85/100.000 (14). Realnu učestalost C. difficile u zemljama u razvoju teško je proceniti, pošto je svest o značaju problema obolevanja od *C. difficile* u tim zemljama na niskom nivou, a sprovođenje nadzora i dijagnostičke procedure su ograničeni. U 2018. godini, sprovedena je studija kako bi se utvrdila prevalencija i incidencija obolevanja od C. difficile u zemaljama u razvoju srednje i istočne Afike, Azije, Latinske Amerike i Kine i dobijeni rezultati pokazuju da je prevalencija iznosila 15%, a stopa incidencije 8,5/10.000 pacijenata-dana (15).

U Beogradu najveći broj osoba sa infekcijom *C. difficile* je bio u uzrasnoj grupi 70 i više godina (prosečna stopa incidencije 134,4/100.000), a zatim u uzrastu 60-69 godina (56,4/100.000). Druge studije, takođe, pokazuju da su ove infekcije najčešće kod starijih. U studiji rađenoj 2010-2013. godine obuhvaćeno je 11.751 pacijenta sa *C. difficile* u istočnoj Evropi. Većina pacijenata sa *C. difficile* je imala 60 i više godina (83,4%), a svega 11,9% je bilo uzrasta 40-60 godina i 4,7% manje od 40 godina (16).

Povećan rizik za nastanak infekcija uzrokovanih *C. difficile* je kod starijih osoba, što je povezano sa slabljenjem imunog sistema, promenama u crevnoj flori koja se javlja u toj starosnoj dobi (17), i sa većim brojem komorbiditetnih oboljenja (18), produženom hospitalizacijom, kao i sa povećanom upotrebom antibiotika (19) i drugih lekova (20).

U posmatranom petogodišnjem periodu na teritoriji Beograda, najviše obolelih prijavljeno je u mesecu martu i stopa incidencije u tom mesecu je iznosila 36,6/100.000. U SAD, u periodu 2001–2010. godine bilo je 2,3 miliona pacijenata sa infekcijom uzrokovanom *C. difficile*, a najveći broj obolelih bio je u toku zimskih meseci (1,5/1000 pacijenata-dana) (21). Međutim, u studiji koja je obuhvatila Severnu Ameriku, Evropu i Okeaniju, infekcije C. difficile su imale sezonski karakter i najčešće su bile u proleće, a najređe tokom leta i jeseni (22). Smatra se da je razlog za takvo sezonsko javljanje *C. difficile* povezano sa povećanom upotrebom antibiotika u periodu kada se javljaju pikovi infekcija uzrokovanih *C. difficle* (23).

U našoj studiji, u posmatranom periodu u zdravstvenim ustanovama na teritoriji Beograda, prijavljeno je 12 epidemija i 51 obolela osoba. U studiji koja je rađena u Americi 2013. godine opisana je intrahospitalna epidemija sa 11 obolelih i konstatovano je da su epidemije verovatno nastale zbog propusta u održavanju higijene u bolničkoj sredini i ne sprovođenju pravilne higijene ruku (24).

U Beogradu, u posmatranom petogodišnjem periodu, prosečna uzrasno-specifična stopa mortaliteta je iznosila 11,3/100.000 u uzrasnoj grupi starijoj od 70 godina, a svega 0,07/100.000 kod osoba uzrasta 30-39 godina (0.07/100.000). U studiji sprovedenoj u Americi dobijeni su slični rezultati. Najveće vrednosti mortaliteta su bile kod najstarijih (8,8%), zatim kod odraslih (6,9%), a najmanje kod dece (3,1%). Najčešći komorbiditeti umrlih pacijenata su bili septikemija, akutna bubrežna insuficijencija, pneumonija i urinarna infekcija (25).

Zaključak

Bolničke infekcije prouzrokovane *C. difficile* predstavljaju i dalje veliki problem u sekundarnim i tercijarnim zdravstvenim ustanovama širom sveta, pa i na teritoriji Beograda.

U cilju redukcije broja ovih infekcija neophodno je kontinuirano raditi na sprovođenju mera prevencije i suzbijanja *C. difficile* infekcija. Neophodna je racionalna upotreba antibiotika, sprečavanje horizontalnog širenja *C. difficile* sa pacijenta na pacijenta u zdravstvenim ustanovama i redovno sprovođenje nadzora nad ovim infekcijama.

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SUPPLY OF PRIMARY PHYSICIANS AND THEIR WORKLOAD IN THE PRIMARY HEALTH CARE INSTITUTIONS AND BY DISTRICTS IN THE REPUBLIC OF SERBIA

OBEZBEĐENOST IZABRANIM LEKARIMA I NJIHOVA OPTEREĆENOST U USTANOVAMA PRIMARNE ZDRAVSTVENE ZAŠTITE I PO OKRUZIMA U REPUBLICI SRBIJI

Zdenka Janković[1], Anđelija Nešković[1]

SUMMARY

Introduction/Aim: Determination and planning of a sufficient number of primary physicians is a prerequisite for high-quality primary health care. The aim of this paper was to determine the supply of primary physicians in the primary health care institutions and by districs in the Republic of Serbia in 2017, to analyze their workload and to compare the obtained values with the prescribed supply and workload.

Methods: A secondary analysis of the supply and the workload of primary physicians in the health care services for adults, small and pre-school children, school children and women for 2017 was carried out in the public primary health care institutions (health centers and institutions) in the Republic of Serbia. The assessment of the supply and the workload of the primary physicians was made in relation to the values prescribed by the legislation.

Results: In 2017, the supply of primary physicians in Serbia in the health care service for adults was higher than the prescribed one by 2% (1564 inhabitants per a physician), and higher by 13% (735 children per a physician) in the health care service for small and preschool children. There was a shortage of physicians, i.e. the supply of physicians in the health care service for women was lower than the prescribed one by 3% (6706 women per a physician) and by 9% (1630 school children per a physician) for the health care of school children. The supply that was more unfavorable than the prescribed one existed in 13 districts in the health care services for adults and women, in 7 districts in the health care service for small and pre-school children, and in 17 districts in the health care service for school children. The average daily workload of physicians was higher than the prescribed execution measures in the health care services for adults (36,5) and for children (30,6), and it was lower in the health care service for women (26,2), but it was at the prescribed level in the health care service for school children (30,0). The workload of physicians (expressed as the average number of visits per a physician) was higher

SAŽETAK

Uvod/Cilj: Određivanje i planiranje dovoljnog broja izabranih lekara je preduslov za kvalitetnu primarnu zaštitu. Cilj rada je bio da se utvrdi obezbeđenost izabranim lekarima po ustanovama primarne zaštite i okruzima u Republici Srbiji u 2017. godini, kao i da se analizira njihova opterećenost.

Metod rada: Izvršena je sekundarna analiza podataka o obezbeđenosti i opterećenosti izabranih lekara u službama za zdravstvenu zaštitu odraslih, male i predškolske dece, školske dece i žena, u zdravstvenim ustanovama primarne zaštite (domovi zdravlja i zavodi) koje su u javnoj svojini u Republici Srbiji u 2017. godini. Ocena obezbeđenosti i opterećenosti izabranih lekara izvršena je u odnosu na vrednosti propisane zakonskom regulativom.

Rezultati: U 2017. godini u Srbiji je obezbeđenost izabranim lekarima bila veća od propisane u službi za zdravstvenu zaštitu odraslih za 2% (1564 stanovnika po lekaru), a u službi za zdravstvenu zaštitu male i predškolske dece za 13% (735 dece po lekaru). U službi za zdravstvenu zaštitu žena obezbeđenost lekarima je bila manja za 3% (6706 žena po lekaru), a u službi za zdravstvenu zaštitu školske dece za 9% (1630 školske dece po lekaru) u odnosu od propisanu. Obezbeđenost lekarima je manja od propisane u 13 okruga u službi za zdravstvenu zaštitu odraslih i zdravstvenu zaštitu žena, u 7 okruga u službi za zdravstvenu zaštitu male i predškolske dece i u 17 okruga u službi za zdravstvenu zaštitu školske dece. Prosečna dnevna opterećenost lekara (iskazana kao prosečan broj poseta po izabranom lekaru) je veća od propisanih mera izvršenja u službama za zaštitu odraslih (36,5) i dece (30,6), a manja u službi za zdravstvenu zaštitu žena (26,2), dok je u službi za zdravstvenu zaštitu školske dece (30,0) na nivou propisane. Opterećenost lekara je veća od propisane u 17 okruga u službi za zdravstvenu zaštitu odraslih, 10 okruga u službi za zdravstvenu zaštitu male i predškolske dece, 13 okruga u službi za zdravstvenu zaštitu školske dece i u 6 okruga u službi za zdravstvenu zaštitu žena.

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than the prescribed one in 17 districts in the health service for adults, in 10 districts in the health care service for small and pre-school children, in 13 districts in the health care service for school children, in 6 districts in the health care service for women.

Conclusion: There are great differences in the supply and workload of primary physicians by districts. It is necessary to ensure adequate human resource planning that takes into account both of these parameters and which will contribute to the advancement of personnel policies to reduce district disparities.

Keywords: *district, primary health care, primary physicians, supply, workload*

Zaključak: Postoje velike razlike po okruzima u obezbeđenosti i u opterećenosti izabranih lekara. Neophodno je obezbediti adekvatno planiranje humanih resursa koje će uzeti u obzir oba navedena parametra i koje će doprineti unapređenju kadrovske politike u cilju smanjivanja razlika između okruga.

Ključne reči: *primarna zdravstvena zaštita, izabrani lekari, obezbeđenost, opterećenost*

Uvod

Istraživanja su pokazala da zemlje sa dobro razvijenom primarnom zdravstvenom zaštitom imaju bolje ishode po zdravlje stanovništva, manje su socio-ekonomske nejednakosti u samoproceni zdravlja, kao i stope nepotrebnih hospitalizacija (1,2).

U Srbiji građani primarnu zdravstvenu zaštitu ostvaruju preko izabranog lekara. Izabrani lekar je: doktor medicine ili doktor medicine specijalista za oblast opšte medicine, odnosno specijalista medicine rada; doktor medicine specijalista pedijatrije; i doktor medicine specijalista ginekologije (3).

Određivanje i planiranje dovoljnog broja izabranih lekara je preduslov za kvalitetnu primarnu zdravstvenu zaštitu. Poznato je da nedovoljan broj lekara dovodi do nemogućnosti da se zadovolje zdravstvene potrebe korisnika, stvaranja lista čekanja, razvijanja nejednakosti u zdravlju, kao i nezadovoljstva korisnika, a kod davalaca zdravstvenih usluga prouzrokuje preopterećenost i nezadovoljstvo poslom. S druge strane, neadekvatno veliki broj lekara dovodi do povećanja troškova u zdravstvenom sistemu (4-6).

Nedostatak zdravstvenih radnika i njihova neravnomerna zaposlenost po regionima, beleži se u svim zemljama sveta bez obzira na njihov društveno-ekonomski razvoj (7). Upravo zbog navedenog, cilj ovog rada je da se utvrdi obezbeđenost i opterećenost izabranih lekara u ustanovama primarne zdravstvene zaštite i po okruzima u Republici Srbiji u 2017. godini.

Metode

Izvršena je sekundarna analiza podataka o broju izabranih lekara, broju stanovnika i obimu rada izabranih lekara za 2017. godinu u zdravstvenim ustanovama primarne zdravstvene zaštite (domovima zdravlja i zavodima) koje su u državnoj svojini u Republici Srbiji (bez zdravstvenih ustanova sa područja Kosova i Metohije).

Kao izvor podataka o broju izabranih lekara i obavljenim posetama, korišćen je Zdravstveno-statistički godišnjak za 2017. godinu Instituta za javno zdravlje Srbije (IZJZ) „Dr Milan Jovanović-Batut“ (8). Iz Zdravstveno-statističkog godišnjaka Republičkog zavoda za statistiku za 2017. godinu preuzeti su podaci o broju i starosnoj strukturi stanovnika (8). Procenjeni broj stanovnika grupisan je prema starosnim grupama u skladu sa organizacijom primarne zdravstvene zaštite: deca predškolskog uzrasta od 0 do navršenih 6 godina; deca školskog uzrasta od 7 do 19 godina; odrasli od 20 i više godina; i, žene od 15 i više godina.

U analizi su posmatrane sledeće četiri organizacione jedinice, odnosno službe za: zdravstvenu zaštitu odraslih, zdravstvenu zaštitu male i predškolske dece, zdravstvenu zaštitu školske dece i zdravstvenu zaštitu žena.

Broj izabranih lekara u službi obuhvata doktore medicine i doktore medicine specijaliste koji rade u toj službi, ali ne i lekare na specijalizaciji. Za izračunavanje opterećenosti izabranih lekara korišćeni su podaci o ostvarenim posetama u ordinaciji lekara, kao i obavljeni sistematski i kontrolni pregledi, dok kućne posete nisu uračunate. Podaci o obavljenim sistematskim pregledima školske dece i pregledima koje su obavili izabrani ginekolozi u savetovalištima za trudnice i za planiranje porodice su dobijeni na zahtev od Instituta za javno zdravlje Srbije „Dr Milan Jovanović-Batut“, s obzirom da navedeni podaci nisu publikovani u Zdravstveno-statističkom godišnjaku.

Obezbeđenost izabranim lekarima izračunata je kao odnos broja stanovnika određenog uzrasta i broja izabranih lekara. Ona je analizirana u odnosu na nivo obezbeđenosti

koja je propisana zakonskom regulativom, i to: 1600 odraslih stanovnika u službi opšte medicine po jednom doktoru medicine ili doktoru medicine specijalisti, 850 dece uzrasta 0-6 godina u službi za zdravstvenu zaštitu male i predškolske dece po jednom lekaru specijalisti pedijatrije, 1500 dece uzrasta 7-19 godina u službi za zdravstvenu zaštitu školske dece po jednom lekaru specijalisti pedijatrije ili doktoru medicine i 6500 žena starosti 15 i više godina u službi za zdravstvenu zaštitu žena po jednom lekaru specijalisti ginekologije (9).

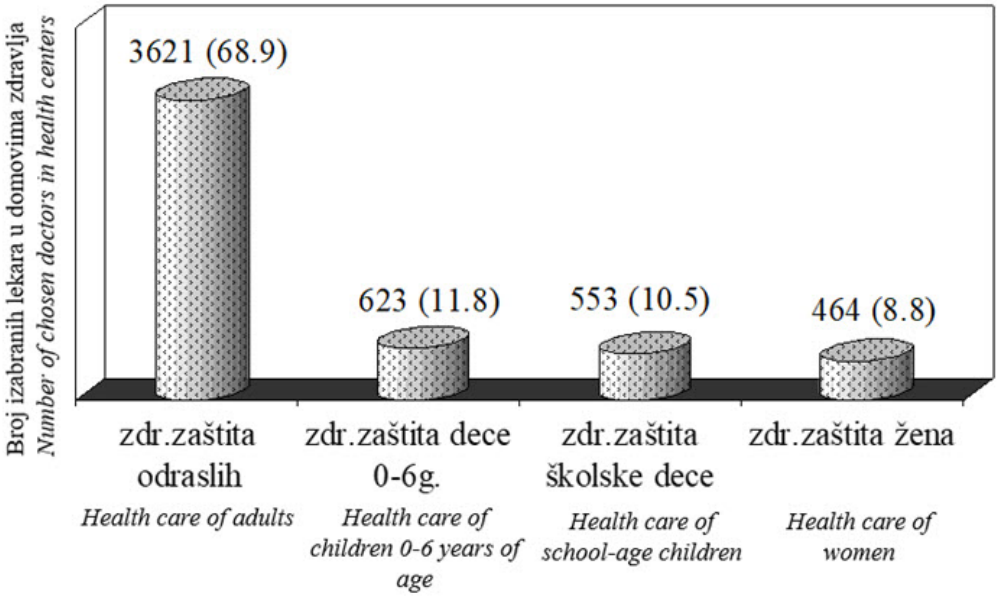
Dnevno opterećenje izabranih lekara dobijeno je deljenjem ukupnog broja poseta sa ukupnim brojem izabranih lekara (bez lekara na specijalizaciji) u navedenim službama i brojem radnih dana na godišnjem nivou (210). Ocena opterećenosti izabranih lekara analizirana je u odnosu na mere izvršenja propisane zakonskom regulativom (u službama za zdravstvenu zaštitu male i predškolske dece, zdravstvenu zaštitu školske dece i zdravstvenu zaštitu žena: 6300 pregleda po lekaru godišnje ili 30 pregleda dnevno, a u službi za zdravstvenu zaštitu odraslih: 7350 pregleda godišnje ili 35 pregleda dnevno) (9).

Rezultati

U Srbiji je u 2017. godini živelo 7.020.858 stanovnika, od kojih je bilo: 458.199 (6.5%) dece uzrasta 0-6 godina, 901.152 (12.8%) dece uzrasta 7-19 godina, i 5.666.507 (80.7%) odraslih (20+ godina).

Stanovnici Srbije su u 2017. godini ostvarili blizu 38 miliona poseta kod 5261 izabranog lekara u domovima zdravlja i zavodima koji obavljaju zdravstvenu delatnost na primarnom nivou. U proseku na 100.000 stanovnika, zdravstvenu zaštitu je obezbeđivalo 75 izabranih lekara.

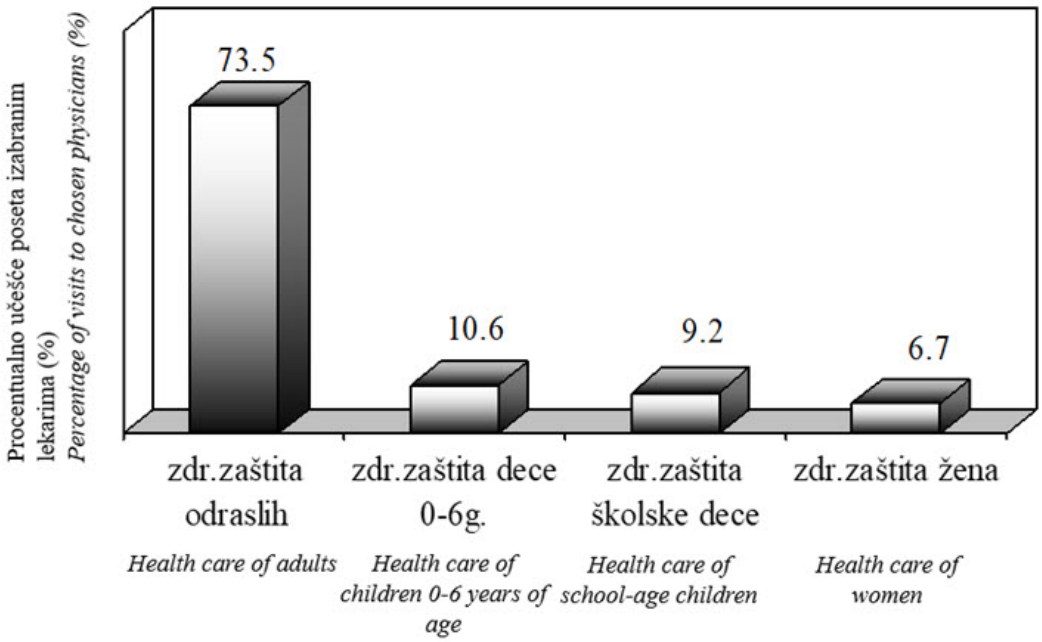
Najveći broj izabranih lekara (3621 ili 68,9% od ukupnog broja lekara) je radilo u službi za zdravstvenu zaštitu odraslih (Grafikon 1).



Grafikon 1. Broj izabranih lekara u domovima zdravlja i zavodima na primarnom nivou u Srbiji po različitim službama, kao i njihovo procentualno učešće među svim izabranim lekarima, Srbija, 2017. godina

Figure 1. Number of primary doctors in health centers and institutions at primary level in Serbia by different services, as well as their percentage participation among all selected doctors, Serbia, 2017

U odnosu na ukupan broj poseta u 2017, najveće učešće imaju posete izabranom lekaru u službi za zdravstvenu zaštitu odraslih, oko 3/4 (oko 27,7 miliona poseta), a zatim slede posete male i predškolske dece (oko 4,5 miliona ili 10,6% od svih poseta), školske dece (oko 3,5 miliona ili 9,2%) i posete izabranom ginekologu u službi za zdravstvenu zaštitu žena, oko 2,5 miliona ili 6,7% (Grafikon 2).



Grafikon 2. Procentualno učešće poseta izabranim lekarima u određenim zdravstvenim službama u zdravstvenim ustanovama na primarnom nivou u u odnosu na ukupan broj poseta izabranim lekarima, Srbija, 2017. godina

Figure 2. Percentage of visits to primary physicians in certain health services in health facilities at primary level in relation to the total number of visits to selected physicians, Serbia, 2017

Služba za zdravstvenu zaštitu odraslih stanovnika

U 2017. godini u zdravstvenim ustanovama primarne zdravstvene zaštite u Srbiji, 3621 izabrani lekar (1862 lekara opšte medicine i 1759 lekara specijalista opšte medicine) u službi za zdravstvenu zaštitu odraslih je pružao zdravstvenu zaštitu za 5.661.507 odraslih stanovnika. To znači da je u proseku, svaki izabrani lekar u ovoj službi obezbeđivao zdravstvenu zaštitu za 1564 stanovnika. Obezbeđenost lekarskim kadrom bila je za 2% bolja od one koju je propisalo Ministarstvo zdravlja (1600 odraslih stanovnika po doktoru medicine i doktoru medicine specijalisti opšte medicine) (9).

Posmatrano po okruzima, uočavaju se velike razlike, tako da je obezbeđenost lekarskim kadrom u Pirotskom (1178 stanovnika po lekaru) i Zaječarskom okrugu (1183), dvostruko veća nego u Podunavskom okrugu, gde jedan lekar pruža zdravstvenu zaštitu za 2494 odrasla stanovnika (Tabela 1). Lošija obezbeđenost od propisane prisutna je u čak 13 okruga. Uočava se da u Vojvodini svi okruzi, izuzev Srednjebanatskog, imaju lošiju obezbeđenost od propisane.

Na 100.000 odraslih stanovnika Srbije zdravstvenu zaštitu je obezbeđivalo 64 izabranih lekara u službi za zdravstvenu zaštitu odraslih.

Stanovnici Srbije ostvarili su 27.746.116 poseta kod izabranih lekara u ovoj službi, od kojih 317.809 sistematskih i 64.029 kontrolnih pregleda, odnosno 7663 posete po lekaru (36,5 poseta dnevno po lekaru), što je za 4% više od propisane opterećenosti (7350 poseta godišnje po lekaru ili 35 dnevno). Najmanja prosečna opterećenost lekara po danu je u Zaječarskom (27 poseta dnevno), Beogradskom (28) i Braničevskom okrugu (31), a najveća u Podunavskom (čak skoro 58 poseta dnevno) i Sremskom okrugu (54). Iako 12 okruga ima povoljniju obezbeđenost od propisane, samo u 8 okruga je opterećenost lekara ista ili manja od propisane. Obezbeđenost lekarskim kadrom (1 lekar na 1600 stanovnika) koja je bolja od propisane je u Zlatiborskom, Jablaničkom, Pomoravskom, Srednjebanatskom i Mačvanskom okrugu, ali je opterećenost lekara veća od propisanih mera izvršenja, dok je suprotna situacija u Braničevskom okrugu. U ostalim okruzima opterećenost lekara je veća od propisane ukoliko je obezbeđenost lošija od propisane, i obrnuto.

Treba istaći da su izabrani lekari u službi za zdravstvenu zaštitu odraslih (ako je tako organizovana zdravstvena zaštita), u svim zdravstvenim ustanovama tokom 2017. godine, obavili i 251.607 kućnih poseta, što povećava njihovu opterećenost (tabela 1).

Tabela 1. Broj lekara i poseta, obezbeđenost i opterećenost izabranih lekara u službi za zdravstvenu zaštitu odraslih u Srbiji u 2017. godini
Table 1. Number of physicians and visits, supply and workload of primary physicians in Adult Health Service in Serbia, 2017

Region/ *Region*	Broj lekara/ *Number of physicians*	Broj poseta/ *Number of visits*	Broj poseta po lekaru godišnje/ *Number of visits per a physician yearly*	Broj poseta po lekaru u toku dana/ *Number of visits per a physician daily*	Broj stanovnika 20+ godina/ *Number of people 20 years and older*	Broj stanovnika po lekaru/ *Number of people per a physician*	Broj kućnih poseta/ *Number of home visits*
R. Srbija	3621	27.746.116	7.663	36,5	5.661.507	1.564	251.607
Beogradski	1020	6.041.981	5923	28,2	1.360.875	1334	60.748
Mačvanski	145	1.075.787	7419	35,3	228.103	1573	14.056
Kolubarski	97	643.084	6630	31,6	135.438	1396	15.629
Podunavski	61	739.794	12.128	57,8	152.151	2494	3633
Braničevski	78	514.255	6593	31,4	139.144	1784	2464
Šumadijski	164	1.185.969	7231	34,5	231.617	1412	19.349
Pomoravski	104	768.717	7391	35,2	165.306	1589	16.388
Borski	68	499.807	7350	35,0	95.071	1398	8268
Zaječarski	78	453.850	5818	27,7	92.241	1183	7428
Zlatiborski	150	1.343.097	8954	42,6	218.800	1458	6028
Moravički	89	780.791	8773	41,8	164.705	1851	268
Raški	134	1.156.922	8634	41,1	230.281	1719	566
Rasinski	109	1.095.600	10.051	47,9	185.627	1703	1790
Nišavski	169	1.509.795	8934	42,5	297.574	1761	3162
Toplički	50	356.056	7121	33,9	68.592	1372	1657
Pirotski	61	438.454	7188	34,2	71.847	1178	1152
Jablanički	131	1.043.779	7968	37,9	163.798	1250	14.668
Pčinjski	83	656.399	7908	37,7	152.889	1842	586
Severnobački	79	786.096	9950	47,4	145.928	1847	5431
Srednjebanatski	105	829.578	7900	37,6	143.468	1366	6324
Severnobanatski	60	560.336	9339	44,5	112.553	1876	3798
Južnobanatski	129	1.100.423	8530	40,6	226.407	1755	25.559
Zapadnobački	85	750.264	8826	42,0	143.939	1693	9416
Južnobački	251	2.033.314	8101	38,6	491.427	1958	12.675
Sremski	121	1.381.968	11.421	54,4	243.726	2014	10.564

Napomena: u zatamnjenim poljima su okruzi koji imaju nepovoljnu obezbeđenost i opterećenost u odnosu na zakonski propisanu.

Služba za zdravstvenu zaštitu male i predškolske dece

U službi za zdravstvenu zaštitu male i predškolske dece u 2017. godini na primarnom nivou u Srbiji, 623 izabrana lekara (604 specijalista pedijatrije i 19 lekara opšte medicine) su pružala zdravstvenu zaštitu za 458.199 dece uzrasta 0-6 godina. To znači, da je u proseku svaki lekar obezbeđivao zdravstvenu zaštitu za 735 dece. Obezbeđenost lekarskim kadrom u ovoj službi na nivou Srbije bila je znatno bolja (za 13,5%) od one koju je propisalo Ministarstvo zdravlja (850 dece po lekaru specijalisti pedijatrije) (9).

I u ovoj službi postoje velike regionalne razlike: obezbeđenost lekarskim kadrom u Pirotskom (496 dece po lekaru) i Kolubarskom okrugu (526), dvostruko je veća nego u Severnobačkom okrugu (1015). Lošija obezbeđenost od propisane prisutna je u 7 okruga (Beogradski okrug i svi okruzi u Vojvodini, sem Severnobanatskog).

Na 100.000 dece uzrasta 0-6 godina u Srbiji, zdravstvenu zaštitu je obezbeđivalo

136 izabranih lekara u službi za zdravstvenu zaštitu male i predškolske dece. Mala i predškolska deca su ostvarila 4.008.446 poseta izabranim lekarima u ovoj službi (od kojih 452.421 sistematski i 131.180 kontrolni pregled), odnosno 6.434 posete po lekaru (30,6 poseta dnevno po lekaru), što je za 2% više od propisane opterećenosti (6300 poseta godišnje po lekaru ili 30 poseta dnevno po lekaru).

Najmanja prosečna opterećenost izabranog lekara (broj poseta dnevno po lekaru) je u Kolubarskom okrugu (20,0) i Srednjebanatskom okrugu (21,5), a najveća u Topličkom (39,0), Jablaničkom i Sremskom okrugu (preko 36). Prosečna opterećenost lekara veća od propisane, je u 10 okruga. U Moravičkom, Nišavskom, Jablaničkom, Šumadijskom i Topličkom okrugu, obezbeđenost lekarskim kadrom je bolja od propisane, ali je opterećenost lekara veća od propisanih mera izvršenja, dok je situacija suprotna u Severnobačkom i Srednjebanatskom okrugu. U ostalim okruzima opterećenost izabranih lekara je veća od propisane ukoliko je obezbeđenost lošija od propisane, i obrnuto.

Broj kućnih poseta koje su obavili lekari iz službi za zdravstvenu zaštitu male i predškolske dece je samo 933 u 2017. godini u celoj Srbiji (Tabela 2).

Tabela 2. Broj lekara i poseta, obezbeđenost i opterećenost izabranih lekara u službi za zdravstvenu zaštitu dece (0-6g.) u Srbiji u 2017. godini

Table 2. Number of doctors and visits, supply and workload of primary physicians in the Child Health Service (0-6g) in Serbia, 2017

Region/ ***Region***	**Broj lekara/** ***Number of physicians***	**Broj poseta/** ***Number of visits***	**Broj poseta po lekaru godišnje/** ***Number of visits per a physician yearly***	**Broj poseta po lekaru u toku dana/** ***Number of visits per a physician daily***	**Broj dece 0-6 godina/** ***Number of children 0-6 years old***	**Broj dece po lekaru/** ***Number of children per a physician***
R. Srbija	623	4.008.446	6.434	30,6	458.199	735
Beogradski	142	1.052.975	7415	35,3	124.467	876
Mačvanski	33	172.170	5218	24,8	17.520	531
Kolubarski	18	75.628	4202	20,0	9464	526
Podunavski	20	99.693	4984	23,8	11.315	566
Braničevski	15	84.274	5619	26,8	9152	611
Šumadijski	28	183.078	6538	31,2	17.802	636
Pomoravski	20	116.524	5826	27,7	11.490	574
Borski	9	48.377	5376	25,6	6121	681
Zaječarski	8	46.263	5783	27,5	5434	679
Zlatiborski	29	144.240	4974	23,7	16.481	568
Moravički	21	137.992	6571	31,3	12.166	580
Raški	29	168.124	5797	27,6	24.120	832
Rasinski	20	121.369	6068	28,9	12.542	627
Nišavski	32	230.569	7205	34,3	22.275	696
Topličkі	8	65.619	8202	39,0	5186	648
Pirotski	9	56.190	6244	29,8	4461	496
Jablanički	18	136.894	7606	36,2	12.019	668
Pčinjski	25	135.776	5431	25,9	13.415	536
Severnobački	11	59.022	5366	25,6	11.157	1015
Srednjebanatski	12	54.187	4516	21,5	11.055	921
Severnobanatski	12	67.599	5633	26,8	8111	676
Južnobanatski	20	142.870	7143	34,0	17.874	894
Zapadnobački	11	78.060	7097	33,8	9814	893
Južnobački	50	354.322	7086	33,7	45.515	910
Sremski	23	176.631	7680	36,6	19.243	837

Napomena: u zatamnjenim poljima su okruzi koji imaju nepovoljnu obezbeđenost i opterećenost u odnosu na propisanu.

Služba za zdravstvenu zaštitu školske dece

U službi za zdravstvenu zaštitu školske dece u 2017. godini u zdravstvenim ustanovama primarne zaštite u Srbiji, 553 izabrana lekara (427 specijalista i 126 lekara opšte medicine) su pružala zdravstvenu zaštitu za 901.152 dece uzrasta 7-19 godina. To znači, da je u proseku svaki lekar obezbeđivao zdravstvenu zaštitu za 1630 školske dece. Obezbeđenost lekarskim kadrom u ovoj službi u 2017. na nivou Srbije bila je za 9% lošija od one koju je propisalo Ministarstvo zdravlja (1500 školske dece po lekaru) (9).

Regionalne razlike u ovoj službi su najizraženije. Obezbeđenost lekarskim kadrom u Borskom (801 školsko dete po lekaru) i Pirotskom okrugu (965), je tri puta veća, nego u Mačvanskom (2670) i Srednjebanatskom okrugu (2532). Lošija obezbeđenost od propisane prisutna je u čak 17 okruga (Tabela 3). Uočava se da u Vojvodini svi okruzi, izuzev Sremskog, imaju lošiju obezbeđenost lekarima od propisane.

Tabela 3. Broj lekara i poseta, obezbeđenost i opterećenost izabranih lekara u službi za zdravstvenu zaštitu školske dece u 2017. godini u Srbiji
Table 3. Number of physicians and visits, supply and workload of primary physicians at the School Children Health Service in Serbia, 2017

Region/ *Region*	Broj lekara/ *Number of physicians*	Broj poseta/ *Number of visits*	Broj poseta po lekaru godišnje/ *Number of visits per a physician yearly*	Broj poseta po lekaru u toku dana/ *Number of visits per a chosen physician daily*	Broj dece 7-19 godina/ *Number of children 7-19 years old*	Broj dece po lekaru/ *Number of children per a physician*
R. Srbija	553	3.486.222	6.304	30,0	901.152	1.630
Beogradski	120	808.088	6.734	32,1	201.790	1682
Mačvanski	14	133.488	9.535	45,4	37.384	2670
Kolubarski	9	70.933	7.881	37,5	20.371	2264
Podunavski	17	91.659	5.392	25,7	25.625	1507
Braničevski	18	89.739	4.986	23,7	21.911	1218
Šumadijski	23	181.857	7.907	37,6	35.538	1545
Pomoravski	19	133.349	7.018	33,4	25.229	1328
Borski	17	62.098	3.653	17,4	13.624	801
Zaječarski	8	46.456	5.807	27,6	11.959	1495
Zlatiborski	22	127.677	5.804	27,6	35.799	1628
Moravički	16	90.325	5.645	26,9	25.155	1572
Raški	26	138.997	5.346	25,5	51.553	1983
Rasinski	19	122.037	6.423	30,6	28.639	1507
Nišavski	28	162.890	5.818	27,7	44.308	1582
Toplički	10	59.945	5.995	28,5	11.509	1151
Pirotski	10	53.252	5.325	25,3	9.656	965
Jablanički	18	122.426	6.801	32,4	27.437	1525
Pčinjski	22	121.832	5.538	26,4	32.367	1472
Severnobački	12	77.984	6.499	30,9	23.264	1939
Srednjebanatski	9	64.790	7.199	34,3	22.785	2532
Severnobanatski	9	58.333	6.481	30,9	17.707	1968
Južnobanatski	22	160.145	7.279	34,7	36.922	1679
Zapadnobački	11	77.141	7.013	33,4	21.594	1964
Južnobački	46	292.628	6.361	30,3	81.007	1761
Sremski	28	138.153	4.934	23,5	38.019	1358

Napomena: u zatamnjenim poljima su okruzi koji imaju nepovoljnu obezbeđenost i opterećenost u odnosu na propisanu.

Na 100.000 dece uzrasta 7-19 godina u Srbiji, zdravstvenu zaštitu je obezbeđivao 61 izabrani lekar u službi za zdravstvenu zaštitu školske dece.

Školska deca su ostvarila 3.486.222 posete izabranim lekarima u ovoj službi u 2017. godini na nivou Srbije (uključujući i 312.330 sistematskih pregleda), odnosno 6.304 posete po lekaru (30 poseta dnevno po lekaru), što je na nivou propisane opterećenosti (6300 poseta godišnje po lekaru ili 30 poseta dnevno). Najmanja prosečna dnevna opterećenost posetama izabranog lekara je u Borskom (17,4) i Sremskom okrugu (23,5), a najveća u Mačvanskom (45,4), a zatim u Šumadijskom i Kolubarskom okrugu (skoro 38). Iako 17 okruga ima lošiju obezbeđenost od propisane, u 12 okruga je opterećenost lekara veća od propisane, a u Podunavskom, Zlatiborskom, Moravičkom, Raškom i Nišavskom okrugu je opterećenost manja od propisane. Jedino je u Pomoravskom okrugu opterećenost veća, a obezbeđenost lekarima povoljnija od propisane, dok je u ostalim okruzima povoljna obezbeđenost praćena manjim opterećenjem lekara od propisanih mera izvršenja.

Broj kućnih poseta koje su obavili lekari u službama za zdravstvenu zaštitu školske dece je samo 328 u 2017. godini u celoj Srbiji.

Služba za zdravstvenu zaštitu žena

U službi za zdravstvenu zaštitu žena u 2017. godini u domovima zdravlja i zavodima na primarnom nivou u Srbiji, 464 izabranih lekara specijalista ginekologije su pružala zdravstvenu zaštitu za 3.111.802 žene starosti 15 i više godina. U proseku, svaki lekar obezbeđivao je zdravstvenu zaštitu za 6.706 žena. Obezbeđenost lekarskim kadrom u ovoj službi na nivou Srbije, bila je za 3% lošija od one koju je propisalo Ministarstvo zdravlja (6500 žena preko 15 godina po lekaru) (9).

I u ovoj službi su izražene regionalne razlike. Obezbeđenost lekarskim kadrom u Pirotskom (4157 žena po lekaru) i Pčinjskom okrugu (4875), je dvostruko veća u odnosu na Šumadijski (12.609) i Severnobački okrug (10.126). Lošija obezbeđenost od propisane prisutna je u 13 okruga, među kojima su svi okruzi u Vojvodini, sem Sremskog (Tabela 4).

Na 100.000 žena starih 15 i više godina u Srbiji, zdravstvenu zaštitu je obezbeđivalo 15 izabranih ginekologa u službi za zdravstvenu zaštitu žena.

U službi za zdravstvenu zaštitu žena u 2017. godini je registrovano 1.752.145 poseta izabranim ginekolozima u ordinaciji (od kojih je 389.425 sistematskih pregleda), 645.871 prvih poseta savetovalištu za trudnice i 150.552 posete savetovalištu za planiranje porodice. Ukupno je obavljeno 2.548.568 poseta kod izabranih ginekologa, odnosno 5.493 posete godišnje po lekaru (26,2 posete dnevno po lekaru), što je za 11,5% manje od propisane opterećenosti (6300 poseta godišnje po lekaru ili 30 poseta dnevno). Najmanja prosečna dnevna opterećenost lekara je u Mačvanskom (11,0), Pirotskom (15,1), Braničevskom (16,3) i Podunavskom (17,0), a najveća u Šumadijskom (43,1) i Rasinskom okrugu (39,5). Pored Šumadijskog i Rasinskog, u još četiri okruga je prosečna dnevna opterećenost lekara veća od propisanih mera izvršenja (Zapadnobački, Južnobanatski, Nišavski i Jablanički). U Nišavskom i Jablaničkom okrugu obezbeđenost izabranim ginekolozima je povoljnija od propisane, a u preostala 4 okruga je nepovoljnija. Iako je u još 9 okruga obezbeđenost lekarskim kadrom lošije od propisane, opterećenost lekara je manja od propisanih mera izvršenja.

Lekari specijalisti ginekologije i akušerstva su obavili 179 kućnih poseta u 2017. godini, i to 177 u Nišavskom i 2 kućne

Tabela 4. Broj lekara i poseta, obezbeđenost i opterećenost izabranih lekara u službi za zdravstvenu zaštitu žena u 2017. godini u Srbiji
Table 4. Number of doctors and visits, supply and workload of primary doctors at the Women's Health Service in Serbia, 2017

Region/ ***Region***	**Broj lekara/** ***Number of physicians***	**Broj poseta/** ***Number of visits***	**Broj poseta po lekaru godišnje/** ***Number of visits per a physician yearly***	**Broj poseta po lekaru u toku dana/** ***Number of visits per a physician daily***	**Broj žena (15 i više godina)/** ***Number of women (15 years of age and older)***	**Broj žena po lekaru/** ***Number of women per a physician***
R. Srbija	464	2.548.568	5.493	26,2	3.111.802	6.706
Beogradski	119	717.580	6.030	28,7	768.211	6456
Mačvanski	20	46.074	2.304	11,0	123.163	6158
Kolubarski	9	46.672	5.186	24,7	72.617	8069
Podunavski	13	46.320	3.563	17,0	82.675	6360
Braničevski	13	44.605	3.431	16,3	76.560	5889
Šumadijski	10	90.547	9.055	43,1	126.087	12.609
Pomoravski	17	78.070	4.592	21,9	91.103	5359
Borski	7	27.655	3.951	18,8	51.765	7395
Zaječarski	5	23.729	4.746	22,6	49.911	9982
Zlatiborski	18	105.367	5.854	27,9	118.222	6568
Moravički	15	62.602	4.173	19,9	89.559	5970
Raški	20	84.236	4.212	20,1	126.974	6349
Rasinski	14	116.117	8.294	39,5	100.682	7191
Nišavski	26	173.816	6.685	31,8	161.597	6215
Toplički	7	30.139	4.306	20,5	36.461	5209
Pirotski	9	28.536	3.171	15,1	37.408	4157
Jablanički	14	88.580	6.327	30,1	87.955	6282
Pčinjski	17	89.232	5.249	25,0	82.872	4875
Severnobački	8	41.260	5.158	24,6	81.005	10.126
Srednjebanatski	10	52.294	5.229	24,9	78.399	7840
Severnobanatski	8	39.174	4.897	23,3	61.539	7692
Južnobanatski	16	102.829	6.427	30,6	123.115	7695
Zapadnobački	8	53.882	6.735	32,1	78.535	9817
Južnobački	40	228.827	5.721	27,2	273.297	6832
Sremski	21	130.425	6.211	29,6	132.090	6290

Napomena: u zatamnjenim poljima su okruzi koji imaju nepovoljnu obezbeđenost i opterećenost u odnosu na propisanu.

posete u Južnobanatskom okrugu.

Diskusija

U Srbiji u 2017. godini zdravstvenu zaštitu je obezbeđivalo 75 izabranih lekara na 100.000 stanovnika, od kojih 64 izabrana lekara u službi za zdravstvenu zaštitu odraslih. Podaci za Evropu pokazuju da je u proseku 68 lekara opšte prakse/porodičnih lekara na 100.000 stanovnika, sa velikim razlikama između država (od 47 u Holandiji do 115 u Belgiji) (10). Međutim, sistemi primarne zdravstvene zaštite se razlikuju kako po strukturnim elementima (regulativa, finansiranje, kadar), tako i po pristupačnosti, kontinuitetu zdravstvene zaštite i zdravstvenim uslugama koje pružaju (10). Pored porodičnog lekara, u mnogim državama su i različiti specijalisti deo sistema primarne zdravstvene zaštite (ginekolozi, pedijatri, internisti, oftalmolozi, neurolozi i dr.) (11).

Zbog navedenih razlika u sistemima primarne zdravstvene zaštite, u ovom radu obezbeđenost izabranim lekarima nije upoređivana sa drugim državama, već samo sa vrednostima propisanim za R. Srbiju (9). U 2017. godini u Srbiji je obezbeđenost izabranim lekarima bila veća od propisane u službi za zdravstvenu zaštitu odraslih za 2%, a u službi za zdravstvenu zaštitu male i predškolske dece za 13,5% (odnosno, za 8% kada ne bi računali lekare opšte medicine, koji nisu predviđeni regulativom u ovoj službi). Nedostatak lekara, odnosno obezbeđenost manja od propisane, prisutna je u službi za zdravstvenu zaštitu školske dece za 9% i za zdravstvenu zaštitu žena za 3%. Prilikom izračunavanja nivoa obezbeđenosti nisu uzimani u obzir lekari na specijalizaciji, jer smo smatrali da su oni u procesu stručnog usavršavanja i da u nekim službama ne učestvuju u pružanju zdravstvene zaštite ili učestvuju samo jednim delom vremena, koje nije moguće proceniti zbog različitih praksi u zdravstvenim ustanovama. Takođe, ovi lekari su upućeni na specijalizaciju najčešće da bi se omogućila pravovremena zamena kadra, za koji se planira odlazak u penziju, ali tako da se posle njihovog završetka specijalizacije neće povećati broj izabranih lekara. Ni u propisima koji uređuju kadrovsku obezbeđenost, ne spominju se lekari na specijalizaciji.

Međutim, kada bi se uračunali i lekari na specijalizaciji, obezbeđenost izabranim lekarima bila bi značajno promenjena i čak veća od propisane i u službi za zdravstvenu zaštitu žena (sa 6706 smanjila bi se na 5849 žena starih 15 i više godina po lekaru) i u službi za zdravstvenu zaštitu školske dece (sa 1630 na 1412 školske dece po lekaru).

Iako dobijeni rezultati ukazuju da postoji višak lekara u službama za zdravstvenu zaštitu odraslih i zdravstvenu zaštitu male i predškolske dece, kada se u analizu uključi i parametar opterećenost, uočava se da je u obe službe opterećenost izabranih lekara veća od propisanih mera izvršenja (9). U službi za zdravstvenu zaštitu odraslih u 2017. godini u Srbiji je ostvareno u proseku po 36,5 poseta po lekaru (za 4% više od propisanih 35 dnevno), a u službi za zdravstvenu zaštitu male i predškolske dece 30,6 poseta po lekaru (za 2% više od propisanih 30 poseta dnevno). Prilikom analiziranja opterećenosti izabranih lekara nisu uzete u obzir kućne posete koje su obavili lekari, s obzirom da zahtevaju znatno više vremena od poseta u ordinaciji, što usložnjava izračunavanje opterećenosti. Sem toga, postoji i različita organizacija u domovima zdravlja za obavljanje kućnih poseta: od posebnih organizacionih jedinica, do toga da izabrani lekar koji radi u ordinaciji, odlazi u kućnu posetu. Kućne posete dodatno povećavaju opterećenost izabranih lekara, posebno u službama za zdravstvenu zaštitu odraslih, gde je u 2017. godini obavljeno preko 250.000 kućnih poseta.

Imajući u vidu starenje stanovnika Srbije i povećanje broja novoobolelih (incidencije, sledstveno tome i prevalencije) od hroničnih nezaraznih bolesti, može se očekivati dalje povećanje opterećenosti izabranih lekara u službi za zdravstvenu zaštitu odraslih.

Treba naglasiti da je u Srbiji u 2017. godini radilo još 263 lekara u službi medicine rada (83 lekara opšte medicine, 11 na specijalizaciji i 169 specijalista), kod kojih je ostvareno 1.554.016 poseta odraslih stanovnika. Iz rutinskih statističkih podataka nije moguće sagledati u kom obimu su lekari ove službe bili angažovani kao izabrani lekari. Međutim, kada bi se oni svi uračunali u izabrane lekare u službi za zdravstvenu zaštitu odraslih, opet bi prosečna opterećenost bila veća od propisane.

U službi za zdravstvenu zaštitu školske dece opterećenost izabranih lekara je u skladu sa propisanim merama izvršenja, iako je obezbeđenost manja od propisane. U službi za zdravstvenu zaštitu žena, prosečna opterećenost lekara specijalista ginekologije (26,2 poseta dnevno) je za 3.8% manja od propisanih mera izvršenja (30 poseta dnevno), a i obezbeđenost ginekolozima je manja od propisane. Treba naglasiti da, prilikom izračunavanja opterećenosti izabranih

ginekologa nisu uračunati kontrolni pregledi u savetovalištu za trudnice, s obzirom da ih nije bilo moguće dobiti od Instituta za javno zdravlje Srbije.

Ukoliko se obezbeđenost i opterećenost izabranih lekara posmatraju po okruzima, uočavaju se izrazite regionalne razlike u svim službama. Tako je u službi za zdravstvenu zaštitu odraslih obezbeđenost nepovoljnija od propisane u 13 okruga, a opterećenost u čak 17 okruga. Obezbeđenost lekarskim kadrom u Pirotskom (1178 stanovnika po lekaru) i Zaječarskom okrugu (1183), dvostruko je veća nego u Podunavskom okrugu (2494). Najmanja prosečna dnevna opterećenost izabranog lekara je u Zaječarskom okrugu (27,7 poseta dnevno) i Beogradskom okrugu (28,2), a najveća u Podunavskom (čak 57,8) i Sremskom okrugu (54,4). Zbog ovako visoke opterećenosti u ova dva okruga potrebno je dodatno istraživanje da se ustanovi da li je uzrok nedostatak lekara ili postoji i drugi pridruženi faktori, kao što je način evidentiranja i izveštavanja broja poseta i dr.

U službi za zdravstvenu zaštitu male i predškolske dece obezbeđenost je manja od propisane u 7, a opterećenost je veća u 10 okruga. Obezbeđenost lekarskim kadrom u Pirotskom (496 dece po lekaru) i Kolubarskom okrugu (526), je dvostruko veća nego u Severnobačkom okrugu (1014). Najmanja prosečna opterećenost izabranog lekara je u Kolubarskom okrugu (20,0 poseta dnevno) i Srednjebanatskom okrugu (21,5), a najveća u Topličkom (39,0 poseta dnevno), Jablaničkom i Sremskom okrugu (preko 36 poseta).

U službi za zdravstvenu zaštitu školske dece obezbeđenost je nepovoljna u čak 17, a opterećenost veća od propisane u 13 okruga. Obezbeđenost lekarskim kadrom u Borskom (801 dete po lekaru) i Pirotskom (965), je tri puta veća nego u Mačvanskom (2670) i Srednjebanatskom okrugu (2532). Najmanja prosečna opterećenost izabranog lekara je u Borskom (17,4 poseta dnevno) i Sremskom okrugu (23,5), a najveća u Mačvanskom (45,4 posete dnevno), a zatim u Šumadijskom i Kolubarskom okrugu (oko 38 poseta dnevno).

U službi za zdravstvenu zaštitu žena obezbeđenost je nepovoljna u 11, a opterećenost veća od propisane u 6 okruga. Obezbeđenost lekarskim kadrom u Pirotskom (4157 žena po lekaru) i Pčinjskom okrugu (4875), je više nego dvostruko je veća u odnosu na Šumadijski (12.609) i Severnobački okrug (10.126). Najmanja prosečna opterećenost izabranog ginekologa je u Mačvanskom (11,0 poseta dnevno), a najveća u Šumadijskom (43,1) i Rasinskom okrugu (39,5 poseta dnevno).

Dobijeni rezultati pokazuju da se Pirotski okrug izdvaja po dobroj obezbeđenosti izabranim lekarima, koja je znatno povoljnija od propisane u svim službama, dok okruzi u Vojvodini imaju manju obezbeđenost od propisane.

Neravnomernost u stepenu ekonomske razvijenosti regiona u Republici Srbiji predstavlja jedno od najkompleksnijih razvojnih problema države utičući i na različit demografski razvoj regiona u Srbiji (12). Različita privredna razvijenost regiona povlači za sobom i neravnomernu raspodelu zdravstvenog osoblja između i unutar zemalja, što je dugotrajan i ozbiljan problem, prisutan kako u bogatim, tako i u siromašnim zemljama. Prema podacima OECD iz 2012. godine, od ukupno 34 zemlje, samo Holandija nije smatrala da je regionalna raspodela lekara problem (13).

Posebno treba istaći da, korišćenje rutinskih statističkih podataka za izračunavanje opterećenosti izabranih lekara zahteva oprez i dobro poznavanje sistema izveštavanja, s obzirom da publikovani podaci u zdravstveno-statističkom godišnjaku Instituta za javno zdravlje Srbije „Dr Milan Jovanović-Batut“ ne sadrže sistematske i kontrolne preglede školske dece, kao ni posete savetovalištu za trudnice i savetovalištu za planiranje porodice, zbog čega se dobija lažna slika opterećenosti izabranih lekara. Za potrebe ovog rada navedeni podaci su dobijeni od Instituta za javno zdravlje Srbije na zahtev autora.

Zaključak

Obezbeđenost izabranim lekarima u Srbiji u službama za zdravstvenu zaštitu odraslih i zdravstvenu zaštitu male i predškolske dece je manja od propisane, dok je u službama za zdravstvenu zaštitu školske dece i zdravstvenu zaštitu žena, veća od propisane. Međutim, opterećenost izabranih lekara je veća od propisanih mera izvršenja u službi za zdravstvenu zaštitu odraslih, dok je u službama za zdravstvenu zaštitu male i predškolske dece i zdravstvenu zaštitu školske dece, na nivou propisanih mera izvršenja. Opterećenost ginekologa je ispod propisanih mera izvršenja.

Postoje velike razlike po okruzima i u obezbeđenosti i u opterećenosti izabranih lekara. Pirotski okrug se izdvaja po dobroj obezbeđenosti izabranim lekarima, koja je znatno povoljnija od propisane u svim službama, dok okruzi u Vojvodini imaju manju obezbeđenost od propisane.

Prilikom planiranja humanih resursa, potrebno je uključiti oba parametra, i obezbeđenost i opterećenost, a mere kadrovske politike treba da omoguće smanjenje razlika između okruga.

Iako izračunavanje obezbeđenosti, kao i opterećenosti lekarskog kadra deluje jednostavno, postoje brojna ograničenja i poteškoće prilikom korišćenja rutinskih statističkih podataka za izračunavanje ovih parametara, a različiti pristupi, poput uključivanja ili isključivanja lekara na specijalizaciji, ili sistematskih i kontrolnih pregleda i poseta u savetovalištima, mogu uticati na dobijanje potpuno različitih i suprotnih rezultata. Potrebno je definisati jasna pravila i smernice na nacionalnom nivou kako bi se omogućilo dobijanje realne slike i preduzele mere za smanjenje razlika u obezbeđenosti izabranim lekarima i u njihovoj opterećenosti po okruzima.

Propisane mere izvršenja za izabrane lekare treba preispitati u kontekstu promena nastalih u sistemu primarne zdravstvene zaštite (uvođenje integrisanog zdravstvenog informacionog sistema, elektronskog kartona, elektronskog recepta i sl.), kao i većih očekivanja u segmentu preventivne zaštite i promocije zdravlja.

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TRENDS IN MORTALITY RATES OF COLORECTAL CANCER IN CENTRAL SERBIA DURING THE PERIOD 1999–2014: A JOINPOINT REGRESSION ANALYSIS

UMIRANJE USLED KOLOREKTALNOG RAKA U CENTRALNOJ SRBIJI U PERIODU 1999–2014: "JOINPOINT" REGRESIONA ANALIZA

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SUMMARY

Introduction/Aim: Colorectal cancer is the third most common cancer in men and the second most common cancer in women worldwide and one of the major causes of cancer-related mortality. The aim of this study was to analyze the trends in mortality rates of colorectal cancer in central Serbia in the period 1999-2014.

Methods: Mortality data for colorectal cancer, for the period 1999 - 2014, were taken from the of the Institute of Public Health of Serbia " Dr Milan Jovanović – Batut". Joinpoint regression analysis was used to estimate annual percent changes (APCs) in mortality and to identify critical stages in time where significant changes in trend occurred.

Results: In central Serbia, in the period between 1999 and 2014, colorectal cancer was the second most common cause of mortality in both men and women. The average standardized mortality rate was 18.2 in men (per 100,000) and 10.5 in women (per 100,000). Rates were 1.7 times higher in men, with a remarkable annual increase of colorectal cancer mortality rate of 1.3% in the period 1999-2014, while in women the mortality rates were steady. In men, a significant increase in mortality rates was present in colon (APC 1.8%) as well as in rectosigmoidal junction cancer (APC 3.3%). Rise of 1.7% was present in colon carcinoma in men 35-74 years of age as well as an increase both in men and women 75 years of age and older in the period 1999-2014.

Conclusion: Findings of present study revealed increasing mortality rates of colorectal cancer in Serbia. The implementation of nationally organized screening programmes is of paramount importance and should be conducted with higher efficacy in Serbia. Primary prevention measures should mainly focus on maintaining

SAŽETAK

Uvod/Cilj: U svetu, rak kolorektuma je treći vodeći uzrok umiranja kod muškaraca i drugi kod žena, i predstavlja jedan od vodećih uzroka umiranja među svim malignim tumorima. Cilj ovog rada je da se analizira trend mortaliteta usled raka kolorektuma u centralnoj Srbiji u periodu 1999-2014. godine.

Metode: Od Instituta za javno zdravlje Srbije „Dr Milan Jovanović – Batut" preuzeti su podaci o mortalitetu za rak kolorektuma za period 1999-2014. godine. U cilju određivanja godišnje procentualne promene (APCs) umiranja i za identifikovanje kritičnih perioda kada su se dogodile značajne promene umiranja korišćena je joinpoint regresiona analiza.

Rezultati: U centralnoj Srbiji, u periodu između 1999. i 2014. godine, rak kolorektuma je bio drugi vodeći uzrok umiranja, među svim malignim tumorima, kako za muškarce tako i za žene. Prosečna standardizovana stopa mortaliteta je bila 18,2 na 100.000 za muškarce i 10,5 na 100.000 za žene. Stope su bile 1,7 puta više kod muškaraca nego žena. U periodu 1999-2014, dolazi do značajnog porasta stope mortaliteta od raka kolorektuma od 1,3% godišnje kod muškaraca, dok je kod žena trend umiranja bio stabilan. Kod muškaraca je uočen značajan porast stope mortaliteta za rak kolona (APC – 1,8%) i rak rektosigmoidalnog prelaza (APC – 3,3%). Takođe, značajan porast umiranja beleži se kod muškaraca u uzrasta 35-74 godina, kao i kod muškaraca i žena uzrasta 75 i više godina.

Zaključak: Rezultati ovog istraživanja ukazuju na porast mortaliteta usled kolorektalnog raka u Srbiji. Rad na boljoj primeni nacionalnog organizovanog skrininga mora biti od najvećeg značaja u Srbiji. Mere primarne prevencije treba uglavnom usredsrediti na održavanje

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healthy body weight and a balanced diet as well as smoking and alcohol cessation.

Keywords: *colorectal cancer, colon cancer, rectal cancer, mortality, trend, joinpoint regression*

optimalne telesne težine i uravnoteženu ishranu, kao i na prestanak pušenja i konzumiranja alkohola.

Ključne reči: *rak kolorektuma, rak kolona, rak rektuma, mortalitet, trend, jointpoint regresiona analiza*

Introduction

Colorectal cancer is one of the major causes of cancer-related mortality. It is the most common malignant disease of the gastrointestinal tract, the third most common cancer in men and the second most common cancer in women (1). Highest mortality rates for colorectal cancer both in men and women are determined in Central and Eastern Europe and the lowest in Middle Africa (1). Data shows a decline of colorectal cancer mortality rates in high income/high-risk countries such as the United States and European countries, as well as countries of the Western Pacific region (2,3). This marked decrease in mortality rates is a result of colorectal prevention, earlier diagnosis using screening, decreased prevalence of risk factors and improved treatment (1,3,4). However, mortality rates are still on the rise in low-income countries of South America such as Mexico, Brazil, Chile and Eastern Europe such as Romania and Russia (2,3,5,6).

Mortality differs significantly by sex and race (7). Rates are 30% to 40% greater in men than in women altogether, though this disproportion varies by age (8). Smoking, high consumption of alcohol, diabetes, obesity, physical inactivity, high intake of red and processed meat and lack of dietary fiber intake all represent risk factors for colorectal cancer (3,9). Colorectal cancer is mostly curable if detected at an early stage, therefore, screening and early detection are excellent measures for the secondary prevention, in contrast with most of the other cancers (10).

The aim of this study was to analyze the trends in mortality rates of colorectal cancer in central Serbia in the period 1999-2014. For the assessment of the efficacy of screening implementation in Serbia and access to effective treatment, it is essential to know the data regarding the colorectal cancer mortality trends. Also changes in mortality over time could be due to demographic characteristics, lifestyle, disease awareness and some other factors. This is the first study in which we wanted to assess whether mortality of colon, rectosigmoid junction and rectal cancers shared the same trends in order to suggest better preventive measures.

Methods

Mortality data for colorectal cancer (colon cancer code – C18, rectosigmoid junction cancer code – C19 and rectum cancer code – C20, according to the X International Classification of Diseases), and other leading malignant tumors (lung and bronchus cancer – C34, breast cancer – C50, prostate cancer – C61, stomach cancer – C16, pancreas cancer – C25, cervical cancer – C53 and all cancers except non-melanoma skin cancer – C44) as well as the population data, regarding sex and age for the period between 1999-2014, were collected from the Public Health Institute of Serbia "Dr Milan Jovanović Batut". Crude, age-specific and standardized mortality rates of colorectal cancer were calculated, as well as those of colon, rectosigmoid junction, and rectum cancer. Standardized rates of mortality were calculated with the direct standardization method, by using the world population for standard population (11).

The trends in age-specific and standardized mortality rates were calculated by using joinpoint regression analysis (Joinpoint Regression Program, Version 4.5.0.1. June, 2017; Statistical Research and Applications Branch, National Cancer Institute), according to the method of Kim et al (12). The annual percent change (APC) was determined by joinpoint regression analysis, as well as points in which comes to significant changes in trends. The maximum number of joinpoints was adjusted to two. Grid Search method was used. The minimum number of data from the beginning of the series was adjusted to three, whereas the smallest number of data between two joinpoints was 4. Permutation test was used for the selection of the best model of joinpoints with the general level of significance from 0.05 and 4499 accidentally arranged sets. Moreover, 95% confidence intervals were measured for each APC estimate in order to determine whether APC for each segment is different from 0.

Results

In Central Serbia, during the period 1999-2014, 128,197 men and 97,277 women died because of cancer. The average number of cancer deaths was 8,013 per year in male

population and 6,080 per year in female population. The average number of cancer deaths of colorectal cancer was 952 (11.9% of all men with cancer) in males and 675 in females (11.1% of all women with cancer) (Table 1).

Table 1. Average number of deaths due to the most common cancers and their percentage among all new cases of cancers in Central Serbia by sex, 1999-2014

The most common cancers	Males		The most common cancers	Females	
Most common cancers (ICD 10)	Average number of deaths	% of new cases among all cases	Most common cancers (ICD 10)	Average number of deaths	% of new cases among all cases
Lung and Bronchus cancer (C34)	2395	29.9	Breast cancer (C50)	1103	18.1
Colorectal cancer (C18-C20)	952	11.9	Lung and Bronchus cancer (C34)	775	12.7
Prostate cancer (C61)	634	7.9	Colorectal cancer (C18-C20)	675	11.1
Stomach cancer (C16)	530	6.6	Cervical cancer (C53)	353	5.8
Pancreas (C25)	387	4.8	Stomach cancer (C16)	301	5.0
Others	3117	38.9	Others	2874	47.3
All cancers except non-melanoma skin cancer (C44)	8013	100.0	All cancers except non-melanoma skin cancer (C44)	6080	100.0

ICD 10 – International Classification of Diseases-10 codes

During the observed period, colorectal cancer was the second leading cause of mortality in male (behind lung and bronchus cancer) and third in female (behind breast cancer and lung and bronchus cancer) populations.

In male population between 1999-2014, the average annual number of deaths was 473 for colon cancer (the average crude rate – 18.0/100,000, and the standardized rate – 9.0/100,000), 43 for rectosigmoid junction cancer (the average crude rate – 1.6/100,000, and standardized rate – 0.8/100,000) and 437 for rectal cancer (the average crude rate – 16.7/100,000, and standardized rate – 8.4/100,000) (Table 2).

Table 2. Number of cancer deaths, crude and standardized (World population) mortality rates (per 100,000) of colon, rectosigmoid junction, rectal and colorectal cancer, males, Central Serbia, 1999-2014

Cancer	Colon			Rectosigmoid junction			Rectal			Colorectal cancer		
Years	No	CR	SR	No	CR	SR	No	CR	SR	No	CR	SR
1999	348	13	7.3	37	1.4	0.8	366	13.6	7.6	751	28	15.8
2000	400	15	8.5	44	1.6	0.9	390	14.6	8	834	31.1	17.4
2001	371	13.9	7.7	33	1.2	0.7	376	14.1	7.6	780	29.3	15.9
2002	429	16.1	8.5	29	1.1	0.6	421	15.8	8.2	879	33	17.2
2003	405	15.3	8.2	32	1.2	0.7	418	15.8	8.4	855	32.2	17.2
2004	443	16.7	8.7	36	1.4	0.7	408	15.4	8.1	887	33.5	17.5
2005	458	17.3	9	32	1.2	0.7	467	17.7	9.1	957	36.2	18.7
2006	466	17.7	9.2	41	1.6	0.8	418	15.9	8	925	35.2	18
2007	494	18.1	9.1	20	0.8	0.4	436	16.6	8.4	950	36.2	17.9
2008	533	20.4	10.1	34	1.3	0.6	428	16.4	8.3	995	38.1	19
2009	517	19.9	9.4	39	1.5	0.8	498	19.1	9.5	1054	40.5	19.8
2010	517	19.9	9.7	43	1.7	0.8	506	19.5	9.5	1066	41.1	20.1
2011	494	19.1	9.3	63	2.4	1.1	437	16.9	8.2	994	38.5	18.6
2012	569	22.1	10.1	67	2.6	1.2	498	19.4	8.9	1134	44.1	20.1
2013	564	22.1	9.8	62	2.4	1.1	505	19.7	9	1131	44.2	19.9
2014	551	21.6	9.8	69	2.7	1.2	408	16	7.3	1028	40.4	18.3
Average	473	18.0	9.0	43	1.6	0.8	437	16.7	8.4	952	36.4	18.2

No – Number of new cases, CR – Crude mortality rate, SR – Standardized mortality rate

In female population in the same period of time, annually the average number of deaths was 360 for colon cancer (the average crude rate – 13.1/100,000, and the standardized rate 5.6/100,000), 32 for rectosigmoid junction cancer (the average crude rate – 1.2/100,000, and the standardized rate – 0.5/100,000) and 283 for rectal cancer (the average crude rate – 10.3/100,000, and the standardized rate – 4.4/100,000) (Table 3).

In Central Serbia, in the period between 1999-2014, there were 952 deaths of colorectal cancer annually in male population and 675 deaths of colorectal cancer annually in female population. The average standardized mortality rate (per 100,000) for colorectal cancer (C18-C20) was 18.2 for males and was 1.7 times higher for males than for females (10.5) (Tables 2 and 3).

Table 3. Number of cancer deaths, crude and standardized (World population) mortality rates (per 100,000) of colon, rectosigmoid junction, rectal and colorectal cancer, females, Central Serbia, 1999-2014

Cancer	Colon			Rectosigmoid junction			Rectal			Colorectal		
Years	No	CR	SR	No	CR	SR	No	CR	SR	No	CR	SR
1999	285	10.6	6.1	32	1.2	0.7	244	9.1	5.2	561	19.9	9.7
2000	286	10.2	4.6	24	0.9	0.3	278	9.9	4.7	588	20.8	9.6
2001	270	9.6	4.5	23	0.8	0.4	273	9.7	4.4	566	20.2	9.2
2002	313	11.2	4.8	23	0.8	0.4	266	9.5	4.1	602	21.5	9.2
2003	326	11.7	5.2	27	1	0.4	301	10.8	4.8	654	24.7	12.9
2004	364	13	5.7	19	0.7	0.3	264	9.5	4.2	647	23.2	10.2
2005	442	15.9	6.8	30	1.1	0.4	287	10.3	4.4	759	27.2	12.6
2006	373	13.4	5.8	47	1.7	0.6	292	10.5	4.5	712	25.6	11
2007	363	13.1	5.6	20	0.7	0.2	284	10.3	4	667	24.1	9.8
2008	426	15.4	6.5	32	1.2	0.5	295	10.7	4.4	753	27.3	11.4
2009	400	14.5	5.9	26	0.9	0.5	317	11.5	4.6	743	27	11
2010	391	14.3	5.8	27	1	0.4	293	10.7	4.3	711	25.9	10.5
2011	415	15.2	6.4	46	1.7	0.7	257	9.4	4	718	26.3	11.1
2012	379	14	5.4	47	1.7	0.7	306	11.3	4.4	732	27	10.5
2013	356	13.2	5	38	1.4	0.5	286	10.6	4.1	680	25.2	9.7
2014	371	13.8	5.3	45	1.7	0.7	280	10.4	4.1	696	25.9	10.1
Average	360	13.1	5.6	32	1.2	0.5	283	10.3	4.4	675	24.5	10.5

No – Number of new cases, CR – Crude mortality rate, SR – Standardized mortality rate

According to the results of the joinpoint regression analysis in the period between 1999-2014, there was a remarkable increase in men of colon carcinoma mortality rates of 1.8 % as well as rectosigmoidal junction carcinoma of 3.3 % annually (1999-2007 drop of 4.4 %, 2007-2014 increase of 12.9%) Mortality rates for rectal carcinoma were sustainable. In female population, the mortality rates for colon carcinoma and carcinoma of rectosigmoidal junction were steady during the period of 1999-2014, while a significant annual drop of 0.9% was observed in the mortality rates of rectal carcinoma. In men, when all localizations were observed together, during the period 1999-2014 a notable increase in mortality rates of 1.3% annually in colorectal carcinoma was detected, while in females' the mortality rates of colorectal carcinoma were steady (table 4).

Table 4. Joinpoint regression analysis: trends in standardized mortality rates of colorectal cancer by site and sex, Central Serbia, 1999-2014

	Males		Females	
Cancer sites (ICD 10)	Period	APC (95%CI)	Period	APC (95%CI)
Colon (C18)	1999-2014	1.8^ (1.2 to 2.3)	1999-2001	-14.1 (-32.1 to 8.7)
			2001-2005	10.3 (-1.9 to 24.1)
			2005-2014	-2.0 (-4.1 to 0.1)
			1999-2014	-0.6 (-4.5 to 3.3)
Rectosigmoid junction (C19)	1999-2007	-4.4^ (-8.4 to -0.2)	1999-2014	3.0 (-1.1 to 7.2)
	2007-2014	12.9^ (7.1 to 18.9)		
	1999-2014	3.3^ (0.3 to 6.4)		
Rectum (C20)	1999-2014	0.6 (-0.3 to 1.5)	1999-2014	-0.9^ (-1.6 to -0.2)
Colorectal (C18-C20)	1999-2014	1.3^ (0.8 to 1.8)	1999-2014	0.4 (-0.8 to 1.6)

APC – Annual Percent Change, 95%CI – 95% Confidence interval, ^The Annual Percent Change (APC) is significantly different from 0 at alpha=0.05, ICD 10 – International Classification of Diseases-10 codes

As stated in the results of the joinpoint regression analysis, when analyzed age-specific rates, there was a remarkable rise in colon carcinoma mortality rates of 1.7% annually between 1999 and 2014 in men age between 35-74 as well as 2.5% rise annually in men 75 years of age and older. Mortality rates were stable for rectosigmoidal junction and rectal carcinoma in all age-specific groups in the observed period (Table 5).

Table 5. Joinpoint regression analysis: trends in age-specific mortality rates of colorectal cancer by site and age groups, males, Central Serbia, 1999-2014

Males	<35		35-74		75+	
Cancer sites (ICD-10)	Average age-specific rate/ 100,000*	AAPC* (95%CI)	Average age-specific rate/ 100,000*	AAPC* (95%CI)	Average age-specific rate/ 100,000*	AAPC* (95%CI)
Colon (C18)	0.3	-15.1 (-33.8 to 8.9)	23.0	1.7^ (1.1 to 2.3)	109.3	2.5^ (1.4 to 3.6)
Rectosigmoid junction (C19)	0.0	-**	2.0	3.1 (-0.7 to 6.9)	10.1	8.4 (-4.4 to 22.8)
Rectum (C20)	0.2	0.5 (-11.4 to 14.1)	21.1	0.0 (-1.2 to 1.1)	99.9	0.8 (-0.2 to 1.9)
Colorectal (C18-C20)	0.4	-0.9 (-5.5 to 4.0)	46.7	1.2^ (0.6 to 1.7)	219.3	1.8^ (1.1 to 2.6)

ICD 10 – International Classification of Diseases-10 codes, AAPC – Averge annual percent change, 95%CI – 95% Confidence interval, ^The Average Annual Percent Change (AAPC) is significantly different from 0 at alpha=0.05, *period 1999-2014, **values of the most rates are zero

Age-specific rates, when analyzed, were stable and without any significant alterations for colon carcinoma mortality rates in females age younger than 35 years and 35 to 74 years. In female population 75 years of age and older during the period 1999-2014 occurs a remarkable rise of 1.4% annually in colon carcinoma mortality rates. In women, there were no notable changes in any age group in rectosigmoidal junction and rectal carcinoma mortality rates (Table 6).

Table 6. Joinpoint regression analysis: trends in age-specific mortality rates of colorectal cancer by site and age groups, females, Central Serbia, 1999-2014

Females	<35		35-74		75+	
Cancer sites (ICD-10)	Average age-specific rate/ 100,000*	AAPC* (95%CI)	Average age-specific rate/ 100,000*	AAPC* (95%CI)	Average age-specific rate/ 100,000*	AAPC* (95%CI)
Colon (C18)	0.2	-3.7 (-16.1 to 10.5)	14.8	0.4 (-3.8 to 4.7)	65.4	1.4^ (0.0 to 2.8)
Rectosigmoid junction (C19)	0.0	-**	1.3	2.3 (-1.8 to 6.7)	5.7	1.7 (-4.2 to 7.9)
Rectum (C20)	0.1	-**	12.0	-1.3 (-2.7 to 0.1)	52.1	-0.4 (-1.7 to 0.8)
Colorectal (C18-C20)	0.3	2.3 (-5.5 to 10.8)	27.7	0.5 (-0.8 to 1.7)	123.2	0.6 (-0.3 to 1.5)

ICD 10 – International Classification of Diseases -10 codes, AAPC – Average annual percent change, 95%CI – 95% Confidence interval, ^The Average Annual Percent Change (AAPC) is significantly different from 0 at alpha=0.05, *period 1999-2014, **values of the most rates are zero

Average age-specific rates for colorectal carcinoma in males younger than 35 years were 0.4/100,000, in males 35-74 years 46.7/100,000 and in males of 75 and more were 219.3/100,000 Age-specific rates for colorectal carcinoma in males are stable for males younger than 35 years but show significant increase of 1.2% in males age 35-74 years and 1.8% in males of 75 years and above. Average age-specific rates for colorectal carcinoma (C18-C20) in males younger than 35 years were 0.3/100.000, in males 35-74 years 26.7/100.000 and in males of 75 and older were 123.2/100.000. In females, colorectal carcinoma (C18-C20) age-specific rates were stable in all three age groups.

Discussion

Approximate total number of cancer deaths in Europe in 2012 was 1.75 million, 56% of which in men (976,000) and 44% in women (779,000) (13). In Central Serbia, during the period from 1999 to 2014, the annual average number of cancer deaths was 8,013 in male population and 6,080 in female population, with 57 % being males and 43% being females. European data from 2012 shows that lung cancer was the most common cause of death from cancer in men (254,000; 26.1%), with colorectal cancer in the second place (113,000; 11.6 %) and prostate (92,000; 9.5%) (13). In central Serbia the percentages were very similar in men regarding lung cancer (2395; 29,9 %) colorectal cancer (952; 11.9%) and prostate cancer (634, 7,9%). In female population in Europe, breast cancer was the leading cause of death in 2012 (131,000; 16,8%), the second most common cause was colorectal cancer (102,000; 13,0%) and lung cancer was the third (almost 100,000; 12,7%)(13). In central Serbia breast cancer was the most common cause of death in female population (1103; 18,1%), lung cancer (775, 12,7%) was second and colorectal cancer (675, 11,1%) the third.

A significant variation in the mortality rates across Europe exists, with the high-

est rates in Hungary (30.1/100,000) Slovakia (26.9/100,000), Croatia (26.7/100,000), and Slovenia (22.9/100,000) in men, and in Hungary (14.5/100,000), Denmark (13.0/100,000), Russian Federation (12.6/100,000) and Republic of Moldova (12.6/100,000) in women, while the lowest rates are observed in Greece (9.2/100,000 in men 6.1/100.000 in women) Cyprus (8.6/100.000in men 5.3/100.000 in women) and Albania (4.8/100.000 in men 3.9/100.000 in women)(14). Mortality rates for both sexes in Central Serbia were similar to those in Eastern European countries (Latvia, Lithuania, Ukraine, and Belarus) (14). It is clear that there is a great variation in mortality rates worldwide, as well as between countries of Europe, which points to variability in the national health system policies (e.g. organized screening for colorectal cancers), availability and quality of treatment, regional variations in the prevalence of major risk factors, disparities in human development and age structure (15). When observing specific regions, highest standardized mortality rates worldwide both in men and women were estimated in Central and Eastern Europe (14.9/100.000 for both sexes) while lowest were in Middle Africa (3.9/100.000 for both sexes) (15).

Mortality rates in Central Serbia observed in present study were 1.7 times higher in male than in female population. This trend is equivalent to almost all countries with exceptions such as Kuwait, Cuba, and Qatar (14). Findings from clinical and preclinical studies indicate that there are sex- and gender-associated differences in colorectal cancer development with both genetic and environmental factors playing roles in sex and gender differences in colon cancer (8). Biological and pathophysiological differences in colorectal cancer development are not clearly investigated according to sex (15). It will be important to improve colorectal cancer screening guidelines which should consider special importance to gender-specific points for colorectal cancer screening.

Our results from Central Serbia show a significant increase in mortality rates in males of 1.3% annually while in female population mortality rates were steady. Comparing to the data from Italy between 1999 and 2016 where mortality rates have been decreasing, 0.6 % per year in males and 1.2% per year in females, data from our study is worrisome (16). Also, in the United States, between 2001 and 2010, colorectal carcinoma mortality rates decreased by approximately 3% annually both in men and women (17). Worldwide data shows that during the last 15 years mortality rates significantly decreased in developed countries such as the United States and countries of Western and Northern Europe (18,19). On the contrary, continuous rise was present in Eastern and Central European countries, such as Russia (by 0.6% per year)(19). Additionally, increased trends were present in Central and South American countries such as Mexico and Brazil, while in Slovenia and Slovakia rates were high but remained constant for both gender (2,4). These enormous differences in the global distribution of colorectal cancer are largely attributed to diverse risk factor exposure as well as strength of each individual health system. Positive lifestyle changes must be encouraged as well as the promotion of screening tests. Socioeconomic circumstances also affect the ability to save lives due to the fact that countries have limited resources and thus cancer-preventing measures and treatment options are limited (17). As in the United States, Canada, Australia and Norway, there was a significant increase in mortality rates in people younger than 50 years of age in Central Serbia since the early 2000s (4,8).

There are numerous factors that affect the risk for colorectal carcinoma. Decrease in behavioral risk factors and more frequent promotion of positive factors is crucial in lowering the risk and mortality of colorectal carcinoma. Physical inactivity is one of the most reported behavioral factors related to colon cancer. Scientific literature shows that physically active people have a 25% lower risk of colon cancer than the least active people (20). Only every other person in Serbia (50.2%) take at least 30 minutes to walk (21). Being overweight or obese is connected with a higher risk of colorectal carcinoma both in men and women, although more importantly observed in men (22). A number of people that were overweight in Serbia in 2013 was alarmingly high at 56.3% (pre-obese and obese) while the percentage of obesity was a lot higher in men (41.4%) than in women (29.1%) which can justify higher mortality rates in man21. More important than overall obesity is the abdominal obesity (23,24). Waist circumference as an estimate of abdominal obesity is growing, with values being 94cm in men and 80cm in women in central Serbia (21). Moderate daily fruit and vegetable intake is protective against colon but not rectal cancer (25). In central Serbia, every second person (54.4 %) does not eat or rarely eats fruits (21) which can also be one of the reasons why colon cancer mortality rates increased. There is a lot of research

data which indicate that tobacco smoking can cause colorectal cancer (26). In Serbia, tobacco smoking has been one of the highest prevailing risk factors for a number of years (21). In the age group from 18-64 years of age 43.6 % of men smoke and 38.8 % of women (21). Comparing to the data from 2006 prevalence of daily smokers increased by 3% while in the European Union there was a decrease of 1% (21). Alcohol also, as one of the behavioral factors, is associated with colorectal cancer (3,8). It is estimated that alcohol consumption increases the chance of developing colorectal cancer by 60% (27). Even small doses can increase the risk, but the relationship between alcohol and colorectal cancer is dose-dependent (27). Daily alcohol consumption is present in 8.3% of male and 1.3 % of female population in central Serbia (6) which can also be an indicator of why rates were higher in men (21).

Screening can prevent cancer by the detection and removal of precancerous growths and decrease cancer mortality by detecting cancer at an early stage when treatment is more successful (28). Numerous cost-effective tests can be performed. Randomized clinical trial in the United Kingdom reported that a single sigmoidoscopy in people with age between 55 and 65, decreases colorectal incidence by 33% and mortality by 43% (29). Colonoscopy like sigmoidoscopy allows direct visual examination of the colon and rectum but it has its own limitations such as bowel bleeding especially when a polyp is removed (29). Colonoscopy was found to be an appropriate test in high-risk individuals or as second procedure following a noninvasive test (28). A fecal occult blood test can also detect blood in stool due to the fact that polyps and cancerous tumors bleed from time to time into the intestine. In the United States screening prevalence has been increasing. Data from 2010 reveal that 9% of people older than 50 reported screening with a fecal occult blood test and 56.4 % reported doing sigmoidoscopy or colonoscopy in the past 10 years (30). In Serbia, in 2013 7.6% of the population aged 50-74 performed a fecal occult blood test and only 7.4% of the population has done a colonoscopy in the past 10 years (21,30).

Conclusion

Serbia belongs to the group of countries with high mortality rates of colorectal cancer. In men, when all localizations observed together (colon, rectosigmoid junction, rectum), the mortality rates increased by 1.3% in the period from 1999-2014, while in women no significant changes in mortality rates occurred. Absence of decrease in colorectal mortality rate in Central Serbia indicates poor effect of national prevention and screening strategies. Working towards improving diet, physical activity, body weight as well as alcohol and smoking cessation are the most important preventive measures. Better implementation of nationally organized screening programmes in Serbia is of the greatest importance.

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THE APPROPRIATE USE OF THE VANCOUVER REFERENCING STYLE IN SCIENTIFIC PAPERS PUBLISHED IN BIOMEDICAL JOURNALS

PRAVILNA UPOTREBA VANKUVERSKOG CITATNOG STILA U NAUČNIM RADOVIMA OBJAVLjENIM U BIOMEDICINSKIM ČASOPISIMA

Dejan Živanović[1], Jovan Javorac[2]

SUMMARY

Appropriate literature citation in scientific articles is a necessary and extremely important segment in the writing of any scientific paper. In modern science, referencing is accepted as a standardized method for displaying sources of scientific information and ideas which made the basis for author's scientific work, accomplishing that in a unique way that must identify their scientific origin, without any potential doubt. Since its establishment in 1978, Vancouver referencing style has become one of the most commonly used uniform methods for citing literature in scientific papers in the field of biomedicine, also known as the "author-number system". Considering all the advantages of Vancouver citing method and its presence in biomedical scientific journals, the aim of this paper is to provide readers with precise and clear instructions for its correct use in the writing of the scientific text intended for publication.

Keywords: *citing, Vancouver referencing style, scientific paper, biomedicine*

SAŽETAK

Pravilno navođenje literature u naučnim člancima predstavlja neophodan i izuzetno važan segment u pisanju svakog naučnog rada. U savremenoj nauci, citiranje je prihvaćeno kao standardizovani metod prikazivanja izvora naučnih informacija i ideja koje su autoru poslužile kao osnova za naučnoistraživački rad, i to na jedinstveni način koji mora nedvosmisleno da identifikuje njihovo originalno naučno poreklo. Vankuverski citatni stil, od njegovog usvajanja 1978. godine do danas, jedan je od najčešće primenjivanih uniformnih načina za citiranje literature u naučnim radovima iz oblasti biomedicine, poznat i pod nazivom "sistem autor-broj". Imajući u vidu sve prednosti i zastupljenost Vankuverskih pravila za citiranje u biomedicinskim naučnim časopisima, cilj ovog rada je da čitaocima pruži precizna i jasna uputstva za njihovu pravilnu primenu u naučnim tekstovima koji su namenjeni za publikovanje.

Ključne reči: *citiranje, Vankuverski citatni stil, naučni rad, biomedicina*

Uvod

Osnovna svrha bavljenja naukom i naučno-istraživačkim radom jeste rešavanje uočenog naučnog problema objektivnim, preciznim, pouzdanim i proverenim naučnim metodama, u cilju dodavanja novih, ili proširivanja već postojeće sume sistematizovanih naučnih saznanja iz određene naučne oblasti (1,2). Međutim, nova naučna saznanja sama po sebi suštinski ne bi imala nikakvu vrednost, ukoliko ne bi bila prezentovana široj naučnoj javnosti, što je jedna od osnovnih i podrazumevanih etičkih dužnosti svakog naučnog radnika (3,4). U današnje vreme, objavljivanje rezultata naučno-istraživačkog rada i drugih naučnih informacija, značajno je pojednostavljeno globalnom upotrebom savremenih informatičkih tehnologija, koje u velikoj meri olakšavaju prezentovanje naučnog rada u naučnim publikacijama različitog tipa i formata. Objavljivanjem radova prati se rad naučnog radnika, ali se ujedno sprečava plagijarizam i širenje kvazinauke, neželjenih posledica savremene trke za prestižom u naučnim krugovima, koje mogu imati dalekosežne negativne posledice za nauku u celini. Upravo zbog pomenutog razloga, pri pisanju naučnih radova, neophodno je da se autori uvek pozivaju na literaturu koja je bila osnova za naučno-istraživački rad, kako u samom tekstu rada, tako i u datom popisu korišćenih liter-

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aturnih izvora. Primenom doslovnog citiranja ili pozivanja na misli, ideje i naučne rezultate drugih autora, istraživač ispunjava jedan od najvažnijih formalnih preduslova bavljenja naučnim radom, a to je intelektualno poštenje (5). Doslednim citiranjem korišćenih naučnih izvora u radu koji objavljujemo, ne samo da odajemo počast i zahvalnost autorima radova koje smo koristili pri izradi i pisanju sopstvenog naučnog rada, već neposredno indikujemo i stepen naučnog kvaliteta korišćenih publikacija (6,7). Suštinski, citiranje korišćene literature treba jasno da navede čitaoca naučne publikacije na moguće načine provere opisanih metoda rada i rezultata istraživanja, kao i na sve dodatne neophodne informacije koje mogu da unaprede naše istraživanje. Jedino nije neophodno citirati tzv. „opšte poznate naučne informacije“ koje ne zahtevaju dodatno naučno tumačenje od strane drugih stručnjaka koji se bave naznačenom oblašću nauke (8). Danas je u upotrebi više stilova citiranja u biomedicinskim naukama, u zavisnosti od naučne oblasti ili zahteva i uputstava različitih naučnih časopisa, a jedan od najčešće korišćenih načina citiranja i navođenja literature u medicinskim publikacijama je svakako numerički, odnosno Vankuverski stil citiranja. Cilj ovog rada je da pruži relevantne informacije budućim autorima naučnih radova kako da citiraju literaturu korišćenjem Vankuverskog stila citiranja.

Opšte karakteristike i specifičnosti primene Vakuverskog citatnog stila

Potreba za citiranjem se javila kao logičan rezultat primene pravila koja vladaju u svetu savremene nauke. Zaštita autorstva je jedini način čuvanja intelektualne svojine i pravni mehanizam garancije intelektualnog poštenja. Svaki istraživač koji je objavio naučni rad treba da snosi odgovornost za sadržinu rada i rezultate koje je publikovao, bez obzira da li će mu oni doneti kritike ili priznanja naučne javnosti. Upravo zbog toga, citiranje je danas prihvaćeno kao „standardizovani metod prikazivanja izvora informacija i ideja koje se koriste u pisanju naučnog rada, i to na jedinstveni način koji identifikuje njihove izvore” (8). Pravilnim citiranjem, odnosno navođenjem korišćenih zaštićenih izvora informacija, autor publikovanog rada izbegava mogućnost da bude optužen za plagijarizam – krađu tuđeg intelektualnog vlasništva, koje se u kvazinaučnim radovima najčešće može sresti u obliku simulacije parafraziranja, krađe teksta, ili krađe ideja i metoda (9). Navođenje korišćene literature obavezno treba koristiti u uvodu, metodologiji i diskusiji naučnog rada, ali ne u poglavlju u kom se iznose rezultati istraživanja, kao i u sažetku, odnosno apstraktu rada, i zaključku (6).

Jedan od prvih uniformnih stilova citiranja koji je prihvaćen u naučnoj javnosti je Vankuverski citatni stil. Čak i nakon niza revizija, ovaj numerički postupak bibliografskog opisa korišćenih dokumenata je danas jedan od najčešće korišćenih, i to ne samo u biomedicinskim, već i u drugim prirodnim naukama, naročito u fizici. Ovaj citatni stil je dobio naziv po istoimenom gradu u kome je 1978. godine kreiran od strane radne grupe za unifikaciju načina citiranja u biomedicinskim časopisima, a koja je u međuvremenu prerasla u Međunarodni komitet urednika medicinskih časopisa (eng. International Committee of Medical Journal Editors, ICMJE). Iako je osnovna svrha njihovog kreiranja bila stvaranje uniformnih pravila citiranja i navođenja izvora literature, Vankuverska pravila su od samog početka definisala i kriterijume za uređivanje naučnih radova, ali i podrazumevane etičke norme kojih treba da se pridržavaju svi istraživači prilikom pisanja i publikovanja istih (10,11). Ubrzo nakon usvajanja Vankuverskih pravila citiranja, i srpski časopisi iz oblasti biomedicine su ih prihvatili kao standard uređivanja naučnog rada za objavljivanje, prvo „Medicinski pregled” Društva lekara Vojvodine Srpskog lekarskog društva (1985), a nedugo zatim „Srpski arhiv za celokupno lekarstvo” i drugi časopisi iz oblasti medicinskih nauka (6).

Vankuverski stil citiranja podrazumeva da se korišćena literatura navodi u radu najmanje dva puta – u tekstu rada i u popisu referenci (1,6). Citati se prvo označavaju u samom tekstu rada arapskom cifrom u zagradi ili superskriptom, od jedan pa nadalje, a zatim se na kraju rada daje detaljan bibliografski opis korišćene literature (tzv. „sistem autor - broj”). Ukoliko se navedeni literaturni izvor u daljem tekstu ponovo koristi, citat uvek treba označiti istim brojem pod kojim je prvi put označen. Obaveza autora je da na kraju rada navede popis korišćene literature, i to onim redosledom kojim su se one pojavljivale u tekstu (6,9). Važno je naglasiti da citiranje uvek treba jasno da uputi čitaoca u korišćenu literaturnu građu, a nikako da ga dovede u zabludu, odnosno „pravilno citiranje treba da otkrije autorove izvore, ne da ih sakrije” (8).

Primena Vankuverskog citatnog stila u naučnom radu pripremljenom za objavljivanje

Prema Vankuverskim pravilima, navođenje literature u radu treba da ukaže na snagu novih naučnih saznanja, ističući ranija saznanja o navedenom naučnom problemu i dovodeći ih u korelaciju sa rezultatima novog istraživanja (10). Navodi iz citirane literature mogu se koristiti na dva načina – parafraziranjem ili doslovnim navođenjem rečenice, odnosno dela teksta. Parafraziranje je uvek poželjniji način navođenja u naučnim radovima, i podrazumeva prenošenje suštinskog smisla neke naučne informacije, odnosno informacijskog sadržaja iz korišćenog literaturnog izvora, uz neophodno zadovoljavanje uslova verodostojnosti, i u skladu sa ciljem sopstvenog teksta i korišćenjem sopstvenih stilističkih sredstava (12). Parafrazirani navodi su obično slične dužine kao i originalni tekst ili kraći, ne obeležavaju se navodnicima, ali to i dalje obavezuje autora da citiranjem literature uputi čitaoca na originalan izvor informacija, pisanjem arapske cifre u malu zagradu (četvrtastu ili uglastu, u zavisnosti od zahteva časopisa) na kraju parafraziranog dela teksta. Nepravilno izvedeno parafraziranje naučnog teksta i dalje predstavlja jedan od najčešćih vidova plagijarizma u naučnim radovima, bilo namernog ili nenamernog, zbog čega većina časopisa u svojim uputstvima za autore jasno ističe da se parafrazirani tekst mora dovoljno razlikovati od originalnog, a istovremeno i jasno ukazivati na njegovo poreklo (12,13).

U tekstu rada se mogu koristiti i doslovna navođenja rečenica ili delova teksta iz drugih naučnih radova. Doslovno prenošenje zaštićenog izvora informacija predstavlja standardizovan postupak u naučnim radovima kojim se u neizmenjenom obliku u sopstveni rad unosi tekst ili neki drugi oblik intelektualne svojine drugog autora (12). Upotreba do šest reči iz originalnog teksta u nizu ne mora biti označena navodnicima, ali se citati duži od šest reči, a kraći od 40, obavezno moraju označiti znacima navoda. Vankuverska pravila nalažu da citate koji su duži od 40 reči uvek treba izdvojiti u radu kao poseban deo teksta koji je jasno odvojen kurzivom ili uvlačenjem pasusa od ostatka rukopisa (12,14). Ukoliko je autor rada naišao na neku identičnu tvrdnju ili identične rezultate istraživanja u više radova, iste navodi u zagradi kao reference u nizu, odvojene zarezom (6,15). Jedna od najčešćih (početničkih) grešaka istraživača je izbegavanje citiranja publikacija čiji su rezultati suprotni rezultatima koje je dobio sam istraživač. Navođenje ovih naučnih radova ne umanjuje vrednost realizovanog istraživanja, naprotiv, u naučnim krugovima ovakav postupak se smatra znakom kritičkog razmišljanja i intelektualnog poštenja istraživača.

Prevođenje originalnog teksta napisanog na stranom jeziku treba primenjivati obazrivo. Preporuka je da se prevod uvek prepusti profesionalnom prevodiocu, jer postoji objektivna opasnost da prevedeni naučni tekst dobije drugačiji naučni smisao od originalnog. Korišćenje prevoda originalnog teksta u pisanju naučnog rada bez označavanja literaturnog izvora se takođe smatra plagiranjem. Štaviše, ukoliko pravila časopisa to dozvoljavaju, prevedeni deo teksta uvek treba navesti i na originalnom jeziku u fusnoti (15).

Osim doslovnog citiranja, danas je često u upotrebi i tzv. „sekundarno citiranje“, odnosno navođenje informacija iz radova kojima autor nema direktan pristup, već je do njih došao posredstvom drugih publikacija u kojima su ti radovi korišćeni kao literaturni izvor. Ovakav način korišćenja naučnih informacija treba izbegavati kad god je to moguće. Preporučuje se traženje originalnog rada, a kada to nije moguće, treba citirati publikaciju iz koje je informacija u tom obliku preuzeta (12). Treba napomenuti da citiranju ne podležu samo parafrazirani ili doslovno i sekundarno preuzeti delovi akademske građe korišćenih izvora, već i svi drugi oblici publikovanih zaštićenih informacija (tabele, grafikoni, sheme, crteži, fotografije i sl.), uključujući i elektronske izvore informacija. Takođe, navođenje podataka ili teksta iz sopstvenih, prethodno publikovanih radova u izvodu ili celini, bez navođenja literaturnog izvora, takođe se smatra (auto) plagijarizmom. Ukoliko autor citira svoj prethodni rad (autocitat), dužan je da to označi na isti način kao i radove drugih autora.

Sastavljanje liste korišćene literature prema Vankuverskim pravilima

Prikaz korišćenih literaturnih izvora se uvek navodi na kraju rada u posebnom poglavlju označenom podnaslovom, a arapski broj koji je naveden ispred literature u ovom poglavlju mora odgovarati broju literature koji je naveden u tekstu rada. Literatura se obavezno numeriše na osnovu redosleda pojavljivanja u tekstu (14). Navod naučnog izvora koji je korišćen prilikom izrade rada treba da sadrži potpuni bibliografski opis korišćenog zaštićenog informacijskog sadržaja koji će čitaoca jasno uputiti na prikazani izvor:

prezime i prvo slovo imena autora (ili više njih), tačno naveden naziv publikovanog rada (članak u časopisu, knjiga, monografija i sl.), kao i podatak gde, kada i koji izdavač je publikovao citirano delo. Prikaz korišćene literature takođe može biti predmet plagiranja. Popis literature treba da bude autentičan za svaki rad. Korišćenje popisa literature iz drugih radova ne samo da nije u skladu sa etičkim pravilima koje svaki autor mora da poštuje pri izradi i publikovanju naučnog rada, već u biomedicinskim naučnim krugovima može i direktno ili indirektno uticati na zdravlje ljudi, širenjem neistinitih ili neproverenih, kvazinaučnih informacija (6,10). Osnovna pravila za citiranje bibliografskih jedinica Vankuverskim stilom uključuju:

•pravilno korišćenje punktuacije u navođenju reference,

•primenu preporučenog redosleda u prikazu detalja bibliografske jedinice,

•navođenje prezimena i početnog slova imena svih autora; ukoliko je u pisanju publikacije učestvovalo više od šest autora, navodi se prvih šest i dodaje skraćenica "et al", odnosno „i dr" („i dr"),

•bibliografsku jedinicu treba prikazati latiničnim pismom kad god je to moguće,

•navođenje skraćenog naziva časopisa prema Listi indeksiranih časopisa u Medline-u (List of Journals Indexed for Medline, Index Medicus),

•navođenje potpunog naziva časopisa, ukoliko nije indeksiran u Medline-u,

•navođenje abrevacija naziva domaćih časopisa koji nisu indeksirani u gore pomenutoj listi, a na osnovu Liste skraćenih naziva srpskih serijskih publikacija (Srpski citatni indeks/Srpski citatni indeks, SCIe indeks),

•ukoliko se aktuelni rad objavljuje u časopisu na engleskom jeziku, poželjno je prilikom citiranja onih radova koji nisu objavljeni na tom jeziku, u popisu literature koristiti naslov rada na engleskom jeziku pod kojim je isti dostupan, pored koga u maloj zagradi treba napisati na kom jeziku je rad izvorno objavljen (npr. Serbian),

•kod pisanja broja stranica ne treba ponavljati iste cifre za iste dekadne jedinice (npr. ne treba pisati 216-223, već 216-23),

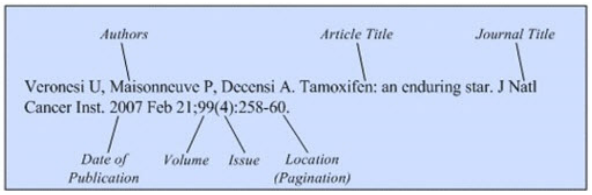
•na kraju navođenja literature uvek treba staviti tačku, i

•za navođenje radova koji su prihvaćeni za publikovanje, ali još nisu objavljeni, treba koristiti naznaku „In press" ili „Forthcoming" (6,8).

Na kraju, svakako treba pomenuti da danas postoje i različiti, specijalno dizajnirani softveri za uvođenje novih i uređivanje već postojećih izvora koji su citirani u tekstu, čime je autorima značajno olakšana korekcija citirane literature u naučnom radu - Reference Manager, Refworks, Mendeley, EndNote (16).

Pravilno navođenje različitih bibliografskih jedinica Vankuverskim stilom u radovima iz oblasti biomedicine (17), može se naći na sledećim adresama:

1) **Citiranje standardnog rada u časopisu:**



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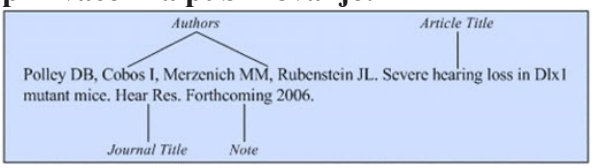
2) **Citiranje neobjavljenog rada koji je prihvaćen za publikovanje:**



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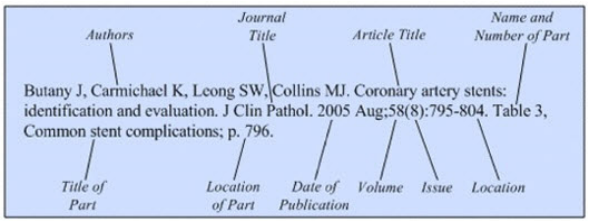
3) **Citiranje tabele iz objavljenog rada u časopisu:**



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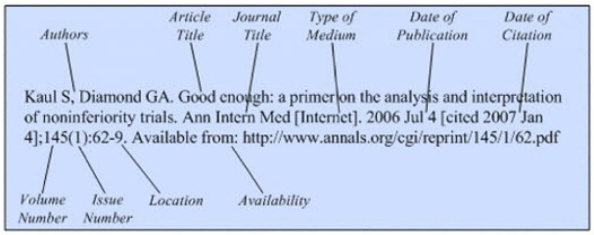
4) **Citiranje rada objavljenog u elektronskom časopisu:**



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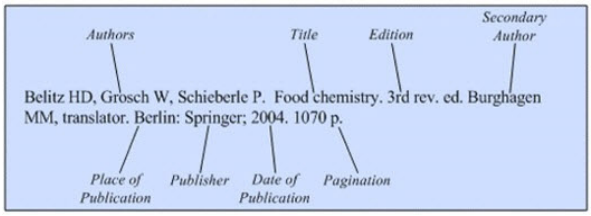
5) **Citiranje knjige u celini:**



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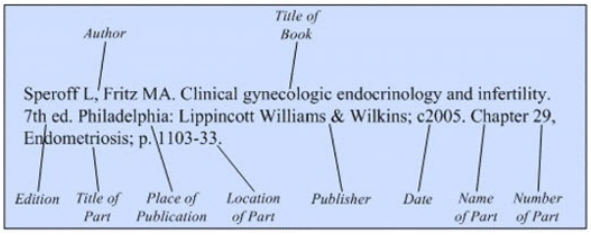
6) **Citiranje dela knjige:**



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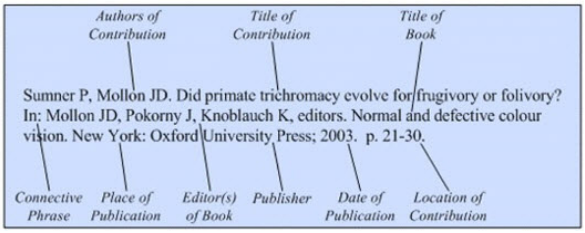
7) **Citiranje poglavlja u knjizi:**



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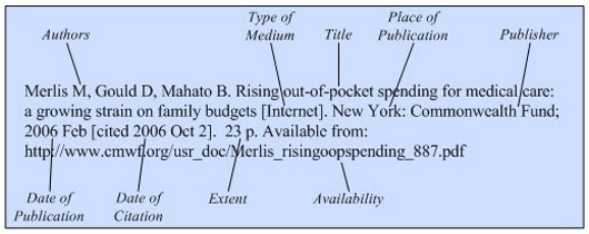
8) **Citiranje cele knjige koja je objavljena na Internetu:**



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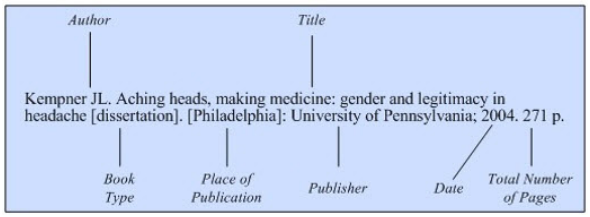
9) **Citiranje objavljene disertacije:**



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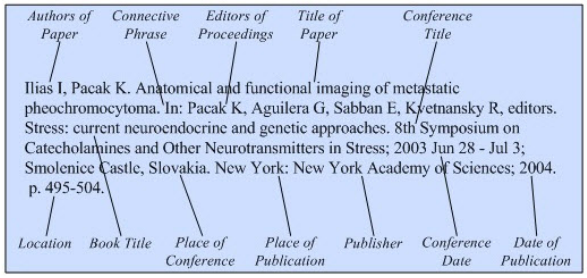
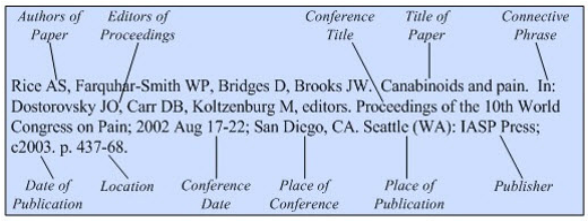
10) **Citiranje rada sa održanog naučnog skupa u zborniku sa i bez posebnog naziva:**





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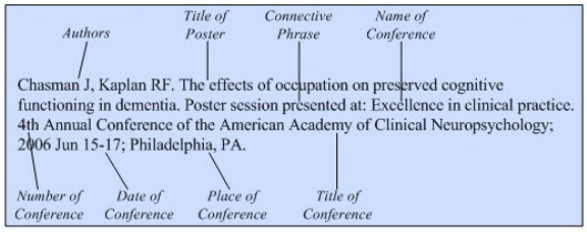
11) **Citiranje poster prezentacije sa naučnog skupa:**



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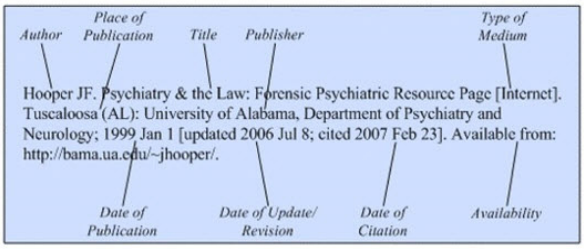
12) **Citiranje web stranice na Internetu:**



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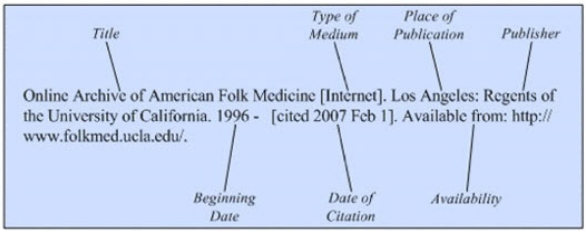

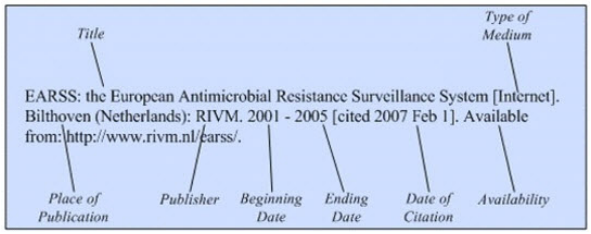

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Zaključak

Navođenje tuđih radova prilikom pisanja naučnog rada realizuje se prema standardizovanim postupcima sa ciljem jasnog, poštenog i naučno prihvatljivog upućivanja čitalačke publike na izvore informacija, kao i sprečavanja plagijarizma i štetnih efekata širenja kvazinaučnih informacija. Jednostavnost upotrebe i mogućnost detaljnog sprovođenja citatne analize naučnih tekstova koji su napisani primenom sistema „autor – broj“, doveli su do toga da se Vankuverska pravila citiranja u savremenoj nauci svrstavaju među najčešće korišćene citatne stilove - ne samo u oblasti biologije, medicine i srodnih zdravstvenih nauka, već i u celokupnom akademskom stvaralaštvu.

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THE INTERNET ADDICTION AS A PROBLEM IN SCHOOL AGE CHILDREN

ZAVISNOST OD INTERNETA KAO PROBLEM ŠKOLSKE DECE

Radoje Jevtić[1], Dragana Jevtić

SUMMARY

During the past several years, the use of Internet has become a daily part of life for many people worldwide for many reasons. The development of new devices, the low cost of Internet services, and the great capabilities of the Internet, make Internet alluring for many adults and children to use it for many hours almost daily. However, there are some negative consequences of the Internet, especially for school-age children. One of these consequences is the so-called "Internet addiction". Many studies indicate that the Internet is becoming the primary and only means of communication, the principal and the sole medium when it comes to the life of a school-age child. There is a neglect of sports activities, socializing, live chat, going out in nature etc. Some aspects of the life are slowly being replaced by the virtual. The happiness that a child should feel when solving problems or during sport competitions, is being substituted by the happiness experienced while playing video games. The main responsibility lies within the family and school teachers, who must jointly and constantly supervise and direct children to other aspects of life, nature, socializing, sports etc. Of course, the use of the Internet should not be criticized or disputed, and it should be viewed as something that makes life easier and intends to serve the users. This review summarizes the results of previous research on the misuse of the Internet by school-age children in different countries of the world and at the Electrotechnical school "Nikola Tesla" in Niš, with the aim of proposing appropriate preventive measures to ensure their proper development and guidance.

Keywords: *internet, addiction, research, secondary school*

SAŽETAK

Tokom prethodnih nekoliko godina, internet je postao svakodnevni deo života za mnoge ljude širom sveta. Razvoj različitih uređaja, niska cena internet usluga i velike mogućnosti interneta omogućavaju da veliki broj ljudi i dece koristi internet više sati, gotovo svakodnevno. Međutim, postoje i neke negativne posledice interneta, posebno kod školske dece. Jedna od tih posledica je, tzv. „zavisnost od interneta". Mnoga istraživanja ukazuju da internet postaje glavno i jedino sredstvo komunikacije i glavni i jedini medijum kada je u pitanju život deteta školskog uzrasta. Dolazi do zanemarivanja sportskih aktivnosti, druženja, živog razgovora, odlaska u prirodu i sl. Određeni aspekti svakodnevnog života se polako zamenjuju virtuelnim. Sreća koju dete treba da oseti prilikom rešavanja problema ili prilikom sportskih takmičenja se zamenjuje srećom koju dete oseća dok igra video igre. Glavna odgovornost leži u porodici i nastavnicima koji moraju udruženo i stalno kontrolisati i usmeravati decu na realan život, na prirodu, druženje, sport i sl. Naravno, pri tome ne treba kritikovati niti osporavati upotrebu interneta, ali treba stalno podsećati da je internet tu da nam olakša život i da služi korisnicima, a ne da korisnici služe njemu. U ovom preglednom radu prikazani su rezultati dosadašnjih istraživanja o zloupotrebi interneta od strane školske dece kako u različitim zemljama sveta, tako i u Elektrotehničkoj školi "Nikola Tesla" u Nišu, sa ciljem predlaganja odgovarajućih preventivnih mera radi obezbeđivanja njihovog pravilnog razvijanja i usmeravanja.

Ključne reči: *internet, zavisnost, škola, deca*

Introduction

Generally, the Internet represents a world system of computer-integrated networks that changed the way communication systems were functioning. The history of Internet was connected with founding of Advanced Research Projects Agency Network (ARPANET) in 1969, the computer network controlled by the Ministry of defense of the United States (1). Today, the Internet connects billions of computers all around the world in one non-hierarchical way. Also, today the Internet represents technical innovation that transforms society, economy and many other aspects of human activities and interests. From the beginning, the Internet has been characterized by its permanent expansion, related to the growing number of users and information becoming available to them. At first, the Internet

[1] Elektotehnička škola „Nikola Tesla" (Electrotechnical school "Nikola Tesla")

was available only via computers; today, there are many devices which can be connected to the Internet, such as laptops, tablets and smart mobile phones. There are many services on the Internet that are used for different purposes, such as WWW-World Wide Web (transfer of web pages written in HTML), Chat (written communication), Skype (direct visual and voice communication), e-mail, Usenet and many others.

Investigations of the Internet addiction worldwide

On the global level, according to the latest statistics reports, until the June 2019, there was 4.422.494.622 Internet users. The overview is the following: Asia – 49.8%, Europe – 16.3%, Africa – 11.9%, Latin America/Caribs – 10.1%, North America – 7.4%, Middle East – 3.9% and Oceania/Australia – 0.6% (2). The lowest number of Internet users is in Africa, in Chad (2.7%), Nigeria (2.2%), Somalia (1.8%) and Eritrea (1.1%). In 2018, the highest number of mobile subscribers per 100 people was in Hong Kong (259.4) and the lowest in the Central African Republic (27.7) (3). Worldwide, the average was 110.3 subscribers per 100 people (3).

Great changes in the modern world were caused by the occurrence of social nets on the Internet. Social networks are different free online services that provide their users with different ways of communications with people all around the world and have a great potential of self-presentation (via pictures, video contents, blogs and similar). From the beginning of the 21st century, a number of social networks appeared, most famous being Facebook, Twitter, LinkedIn, etc. It is obvious that the Internet has great benefits related to human interests and activities, but also, it was noted that the Internet has become more than information - communication instrument for a great number of users, and unfortunately the object of pathological addiction and compulsive need (4).

One of the most recent and frequently used terms in the negative sense about the Internet is so-called "Internet addiction". The Internet addiction is a psychophysic disturbance that implies tolerance - the occurrence that user spends more and more time on the Internet for the purpose of achieving the same quantity of pleasure; after that, it implies the symptoms of social retreat (overstrain, anxiety, grudge and similar when person doesn't use the Internet); affective disturbances (depression and irritability) and damaged social relations (the loss of quality and quantity of the relationship with surroundings) (5). The same author compares the given definition with the present definition of addiction which is applied and related to alcoholism and drug addiction as the most frequent forms of addiction. The author noted that there are no differences between these forms of addictions, except in the fact that there is no physical import of destructive substance in organism in the case of the Internet. Regarding the last fact, one part of the science publicity asks the question of how it is possible to use the term addiction (5).

The Internet, in the current form, presents the main communication medium and source of information in the modern world. People, especially young people, spend more and more time in front of the screens of their laptops, computers and mobile phones. In the situation where virtual life replaces real life, the question about reasons for overuse of the Internet is being raised. One of the presumptions is that such behavior is based on the certain psychical difficulties of personal, familial or professional nature. The exploration of the relationship between the time that young people spend on the Internet and social networks and feeling of the seclusion showed that pupils spend three hours on average on a daily basis, where boys spend significantly more time on the Internet than girls and their feeling of seclusion was more evident. It has been shown that there is a significant relationship between time spent on the Internet and social networks and the feeling of seclusion. Also higher level of emotional seclusion, lower level of self-respect and lower level of social skills related to medium Internet users was noted (6).

Along with the increased usage of the Internet, the number of researches about its influence on social relationships, life habits and personality of its users also increased (7,8). It is very important to note that many contradictions could be found in those researches, so, according to that, some of them accent the positive influence of the Internet on greater social activities, identity development, while some of them point out the superficial relationships with users, social isolation, depression and similar (9,10).

One of the first serious researches in the field of Internet addiction was the research by the author Kimberly Young. She determined, apart from the significance of the problem of the Internet addiction, models of Internet usage for addicted users so as potential ways of adequate problem treatment. Those

researches showed that addicted Internet users spent eight times more time on the Internet than users from the control group, so that they suffered consequences in the field of social relationships, professional work, academic skills adoption, which all had financial consequences beside physical consequences (11). Using the criteria from the fourth edition of diagnostic and statistical manual DSM-IV for pathological gambling (gambling is considered as the most similar form of addiction to Internet addiction), Young developed the test for Internet addiction detection in 2004 (IAT- Internet addiction test) (12). In order for a person to be recognised as Internet addict, five or more criteria out of eight noted should be fulfilled within the time period of six months:

• occupation by the object of addiction;

• tolerance on Internet usage (decreased satisfaction by time spent on the Internet, the need for constant time increment on the Internet);

• the appearance of abstention crisis at the attempt of usage decrement or prohibiting the Internet (anxiousness, slough, irritability);

• impossibility to control of the Internet usage (ineffectual attempts to forbid or interrupt Internet usage);

• the time spent on the Internet is much longer than planned time;

• the hiding of the real time spent on the Internet (fooling the family, colleges, doctors, therapeutics and similar) and

• perception of the Internet as a way to escape from problems (12).

There are several types of Internet addiction, but one of the most popular and the most famous has arisen as result of practical work of 35 psychologists with dependent patients (11). The great number of certain activities and compulsive behaviors were classified and assorted in the following five types:

• cyber-sexual addiction (the usage of web sites for cyber-sex and cyber pornography), where addicted population succeeded to preserve their behavior at the sexual phantasy level. It is important to note that this kind of Internet addicts is different from classic sexual delinquents because they use the Internet only as a way of escaping from problems in real life;

• social network addiction (Facebook, Twitter, LinkedIn and similar);

• net compulsions (gamble addiction, purchasing and playing video games online). This addiction type makes is exception by some authors because, for example, gambling occurs under the influence of certain factors, while the rest are connected with the Internet (compulsive gambling behavior can be performed without Internet) (12);

• the glut of information (obsessive surfing and searching through databases either for professional interests or fun, but without interactions) and

• addiction to information communication technologies (computers, mobile phones, tablets and similar) (4,12-14).

The great number of studies on pathological Internet usage showed that a number of users increases and that it's gaining very serious proportions. It is probably enough to note that hither researches showed that between 5 and 10 % of user population show maladaptive forms of Internet misuse. Researches accentuate that Internet addicts spend between 40 and 80 hours per week on the Internet, sometimes more than 20 hours continually. In order to adapt to this state, their sleeping rhythm was very disturbed. This kind of rest and sleep period disturbance leads to sensations of chronic weariness, immune system collapse, appetite disorder, frequent headaches, profuse coffee consumption, which all together significantly increase organism vulnerability and makes it prone to many diseases (5).

Related to digital technologies addiction, it is important to mention the prevalence of the number of addicted teenagers in relation to complete teenagers number. In one great research which was realized in 2014, in several Asian countries (Japan, China, South Korea, Malaysia and the Philippines), the prevalence of internet behavior and addiction was examined. The complete prevalence of addicted teenagers regarding smart mobile phones usage was 62%, ranging from 41% (China) to 4% (South Korea); participation in on-line games ranged from 11% (China) to 39% (Japan). The Internet addiction is usual among the adolescents in Asian countries so the problematic usage of the Internet also characterizes problematic cyber behavior of the young in those countries. The prevalence of the addiction from the Internet among teenagers was from 13-46%. It is very high and it is connected to high development and technical performances in those countries (15). Highly expressed depression symptoms and social isolation could be noted in children that spent too much time on Internet.

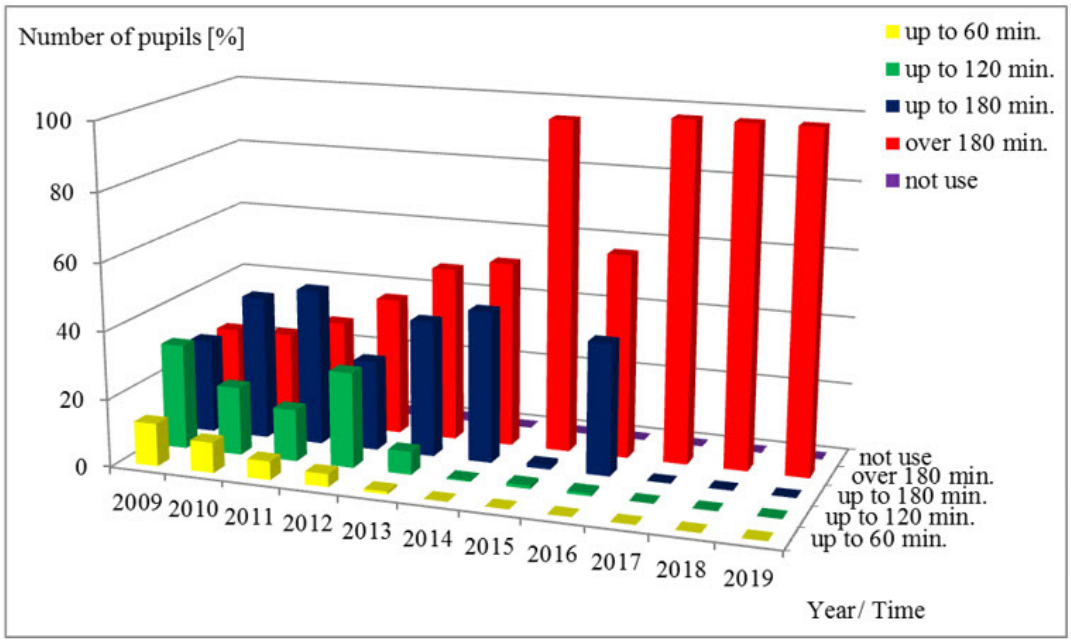

Figure 1. The average daily usage of the Internet by pupils in Electrotechnical school "Nikola Tesla" from 2009 to 2019

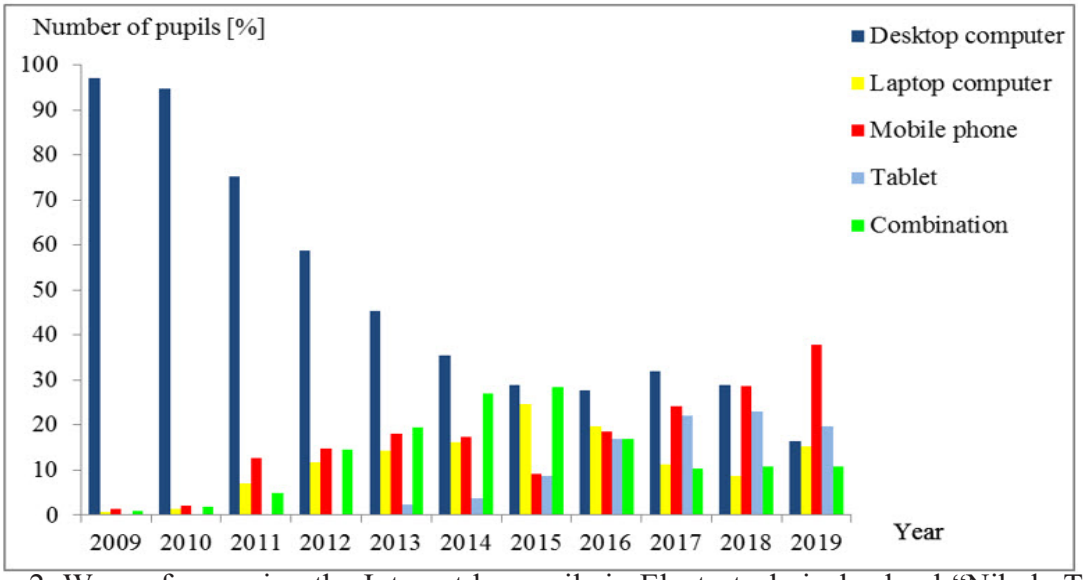

Figure 2. Ways of accessing the Internet by pupils in Electrotechnical school "Nikola Tesla" from 2009 to 2019

Investigations of the Internet addiction in Niš, Serbia

In our county, the studies were conducted in Niš, in Electrotechnical school "Nikola Tesla", in the period between 2009 and 2019. The investigations were related to, in the first place, mobile phones, their usage, their electromagnetic radiation (electric and magnetic field). After that, investigations were expanded on laptop usage, computers usage, Internet usage, and Facebook usage. In different periods of time different number of pupils were included (500 pupils for each year from 2013 till 2015 and from 2017 till 2019, and 600 pupils for each year from 2009 till 2012 and in 2016) (4,13,14,16-20). Total number of included pupils was 6000. All data from the pupils were collected by the means of questionnaire. The questionnaire consisted of questions about the average time spent on the Internet, purpose of Internet usage, ways of accessing to the Internet, help that the Internet provides in real life and learning, visiting some inappropriate contents (sites with porn contents, violence etc.), changing real life with virtual and many others. The most important results from all of these studies are presented on figures.

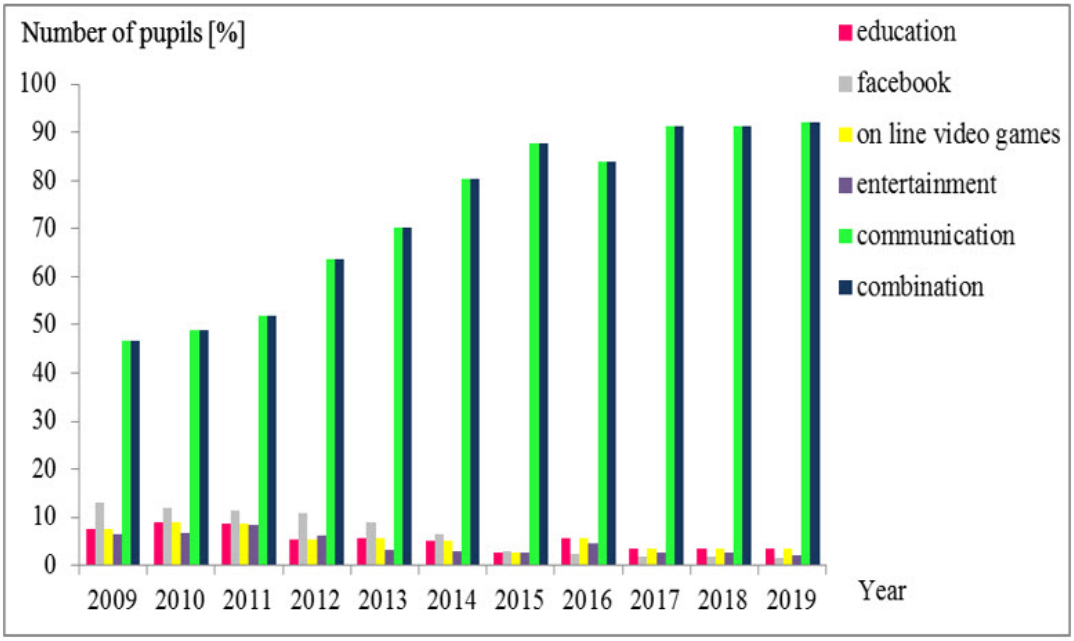

Figure 3. The purpose of Internet usage by pupils in Electrotechnical school "Nikola Tesla" from 2009 to 2019

Average daily usage of the Internet increased in the last several years (Figure 1), which was expected. In particular, the percentage of those who have been online for more than 3 hours a day has increased during the last five years (fourth red painted column in Figure 1). Also all pupils used Internet between 2009 and 2019 (fifth purple painted column on Figure 1). School-age children today have great possibilities on the Internet such as learning, electronic books, history contents, fun and many others. However, that fact does not imply that other resources and activities, such as books, sports, walking, fishing, theatre, cinema and many others should be ignored. The main device for Internet access during the first several years was a desktop computer, but in 2019 it was mobile telephone (Figure 2). But laptops and tablets are also very popular for Internet access over the last few years. Today, the Internet is available, especially wireless Internet so Internet users don't have to be physically connected to the Internet. Also, the low price of laptops, smart phones and tablets enabled to their users to provide and use them. Throughout the period, the highest number of pupils in Electrotechnical school "Nikola Tesla" used the Internet for communication, but the lowest used it for learning (Figure 3). That's surprising because all respondents were pupils. Results presented on Figure 4 maybe the best way to explain the term "Internet addiction". In the period during which the research was conducted, the percentage of school-age children that couldn't imagine their lives without the Internet was always bigger than 95% of all examined. Also, there are more and more school-age children that visit some Internet site with inappropriate contents (Figure 5). This is particularly troubling because the appearance of violence between school-age children in the recent period rapidly increases and can have very serious consequences, even with death scenario. Easy access to different inappropriate contents at one emotionally and socially unformed young person without proper and strict school and family control could create different dangerous, violent and destructive ideas.

The Internet and other mediums are present in all life segments and they are component parts of modern society. As a "public opinion" creator, the Internet as one massive medium can form models of children`s behaviors. The researched literature showed that the knowledge about the etiology of "Internet addiction" is still insufficient. It is obvious that there is not only one cause of the addiction. In modern society, the greater influence of massive communication mediums can be noticed, so many researchers place it as one of the most important causes of socialization. One of the most important reasons of the decreasing influence of parents and school lies in the fact that the model of a digital picture is much richer in details, clearer, and more concrete, so, according to that, much easier to adopt than moralities and verbal instructions about proper behavior.

Related to many modern theories, presentation in media is considered very important for identity forming. It is also important for the public perception of actors, it influences on social attitude related to minorities, including their acceptance or rejection. For this reason, the consequences of the inappropriate presentation are great and serious. The ways how children and young people absorb those influences are imitation, identification, learning by model and inspiration (21). The addiction is a process that implies different phases and answers on treatment and largely depends on individual factors. One of the main indicators of addiction is that the person does not accept the fact that its behavior is out of control and denies that the problem exists (22). Denial is psychological and defensive mechanism that enables a person to continue their maladaptive behavior that obviously has bad

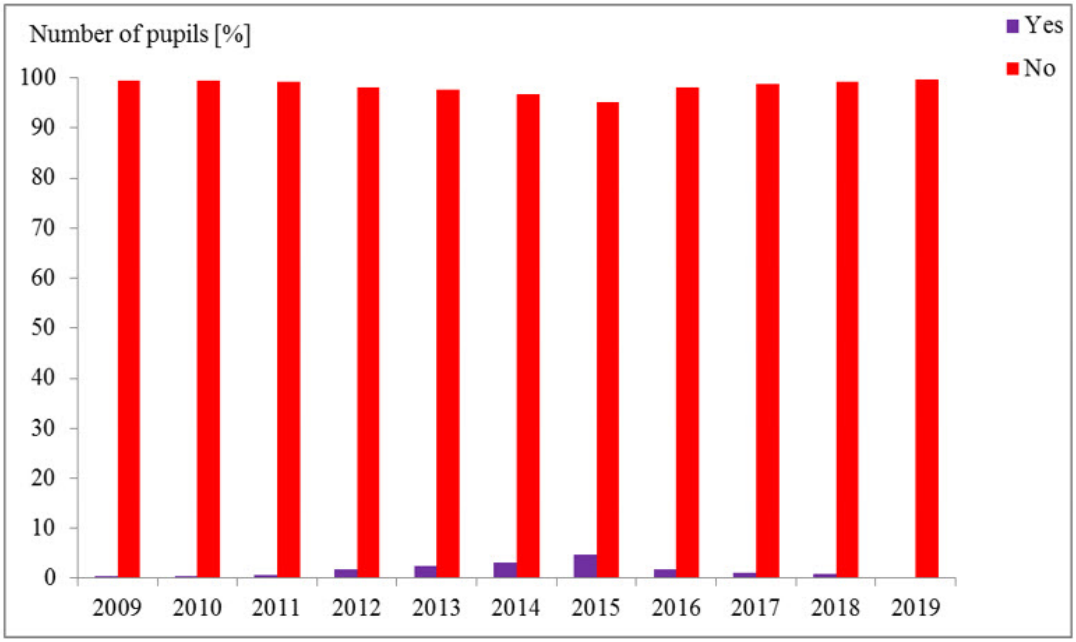

Figure 4. Percentage of pupils from Electrotechnical school "Nikola Tesla" that could not imagine their life without Internet/Facebook usage, 2009-2019

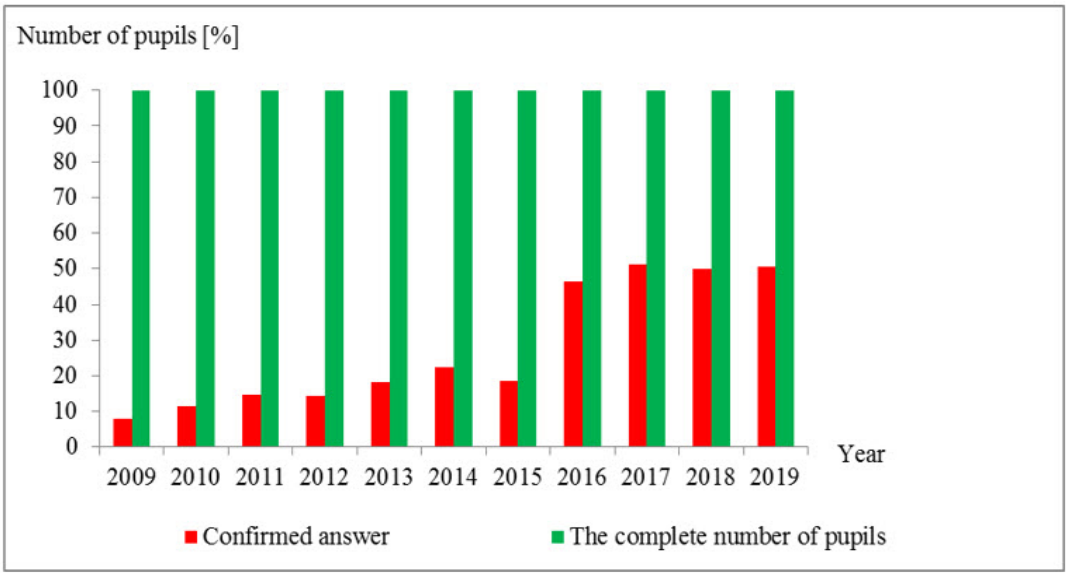

Figure 5. Percentage of pupils from Electrotechnical school "Nikola Tesla" that visited some site with inappropriate content (porn sites, sites with violence contents and similar), 2009-2019

influence on individual`s quality of life (5,23).

Conclusions

The main problem in the population of school age children is finding the balance between smart and purposeful Internet usage and Internet usage that becomes an addiction. Crucial role here lies with family members and teachers. They have to join forces in order to supervise and direct children to sport, social and nature activities, continually explaining that the Internet presents medium created to serve people, not the other way around.

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