ACTA
STOMATOLOGICA
CROATICA
www.ascro.hr

Acta stomatol Croat. 2017;51(2):122-132.
DOI: 10.15644/asc51/2/5

IZVORNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

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Stanje oralnoga zdravlja povezano s društvenim ponašanjem među učenicima u dobi od 6 do 11 godina na Kosovu

Oral Health Status Related to Social Behaviors among 6 - 11 Year Old Schoolchildren in Kosovo

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Sažetak
Svrha ovog istraživanja bila je procijeniti status oralnoga zdravlja učenika u dobi od 6 do 11 godina na Kosovu. **Materijali i metode:** U istraživanju je sudjelovalo 5679 učenika u dobi od 6 do 11 godina iz različitih kosovskih gradova. Stanje oralnoga zdravlja ocijenjeno je na temelju dijagnostičkih kriterija Svjetske zdravstvene organizacije (SZO) koji uključuju bilježenje broja karijesa, izvađenih zuba i ispuna (kep/KEP indeks) u mliječnoj i trajnoj denticiji. Uključena djeca odgovorila su i na nekoliko pitanja o oralnoj higijeni, prehrambenim navikama i posjetima stomatologu. Analiza je uključivala frekvencije i prosječne vrijednosti. Razlike između prosječnih vrijednosti analizirane su studentovim t-testom ($p < 0,05$), a čimbenici povezani sa zubnim karijesom Spearmanovim koeficijentom korelacije. **Rezultati:** Prosječni kep/KEP indeks među učenicima u dobi od 6 do 11 godina iznosio je 4,36 ± 3,763 i 1,20 ± 1,488. Zapečaćene zube imalo je 90 učenika – ukupno 1,58 posto. U dobi od 8 godina do 50 posto djece zube je četkalo dva puta na dan. Od uključene djece 40 posto konzumiralo je slastice jedanput na dan, a većina je stomatologa posjećivala samo ako je bilo potrebno. Potvrđena je statistički značajna korelacija između konzumiranja slastica, oralne higijene te posjeta stomatologu i prevalencije karijesa. **Zaključak:** Naši rezultati pokazali su veliku prevalenciju karijesa među učenicima u dobi od 6 do 11 godina, što upućuje na to da je potreban sveobuhvatan program primarne oralne zdravstvene zaštite i rani redoviti posjeti stomatologu te preventivne mjere.

Zaprimljen: 17. veljače 2017.
Prihvaćen: 16. svibnja 2017.

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Ključne riječi
oralno zdravlje; KEP indeks; dijete

Uvod

Zubni karijes je multifaktorska bolest koja pogađa velik dio svjetske populacije, bez obzira na dob, spol ili etničku pripadnost, i to uglavnom pojedince nižega socijalno-ekonomskog statusa (1). Također je jedna od najčešćih kroničnih dječjih oralnih bolesti (2). Na razvoj karijesa utječu mnogobrojni čimbenici, a prehrana pritom ima ključnu ulogu. Čimbenici povezani s nastankom karijesa su svojstva sline, mikroorganizmi u zubnom plaku, oralna flora, prehrambene navike, kvaliteta zuba i histomorfološka obilježja površine cakline (3). To je prijenosna bakterijska bolesti uzrokovana kiselinama iz bakterijskoga metabolizma koje prodiru u caklinu i dentin te otapaju minerale (4). Smanjenje prevalencije zubnog karijesa pripisuje se preventivnim programima uz primjenu fluora, sudjelovanju u programima promicanja oralnoga zdravlja, poboljšanju oralne higijene i smanjenju konzumacije šećera. S druge strane, povećana incidencija

Introduction

Dental caries, also known as tooth decay, is a multifactorial disease which affects a huge proportion of the world's population regardless of age, gender or ethnicity, although it does tend to affect to a greater extent the individuals with a low socio-economic status (1). It is also one of the most common chronic oral diseases in children (2). Caries is a multicausal, diet-dependent infectious disease. The increase of dental caries depends on the following factors: properties of saliva, dental plaque microorganisms, oral flora, dietary habits, the quality of enamel and histo-morphological characteristics of enamel surface (3). It is a transmissible bacterial disease caused by acids from bacterial metabolism diffusing into enamel and dentine and dissolving the minerals (4). The decline in the prevalence of dental caries has been attributed to preventive programs with the use of fluoride, a continuous participation in oral health programs, changes in oral hygiene

zubnog karijesa posljedica je nezdravih prehrambenih navika, ograničene upotrebe fluora i loše oralno-zdravstvene zaštite. U mnogim zemljama oralno-zdravstvena zaštita uglavnom se temelji na simptomatskom liječenju i nedovoljno se ističe prevencija (5).

Dobro oralno zdravlje poboljšava opće zdravlje i kvalitetu života te pridonosi samopouzdanju i društvenoj interakciji (6). Oralno zdravlje djece i adolescenata smatra se glavnim područjem djelovanja, a sve se zemlje potiču na razvijanje preventivnih pristupa sa zdravstvenim obrazovanjem u školama, na partnerstvo između obitelji, stručnjaka za oralno zdravlje i zajednice te na poboljšanje pristupa preventivnim i kurativnim mjerama oralno-zdravstvene zaštite (7).

Ciljevi Svjetske zdravstvene organizacije (SZO) za 2000. godinu obuhvaćali su odsutnost zubnog karijesa višu od 50 posto kad je riječ o djeci od 6 godina i globalni prosjek KEP indeksa koji ne prelazi 3,0 za djecu od 12 godina (8). Već je spomenuto da je zubni karijes bolest raširena diljem svijeta zbog povećane konzumacije rafinirane hrane, gaziranih pića i raznovrsnih slastica. Uzroci su i premalo korištenje fluora, pečaćenja fisura, neredovita uporaba četkica za zube i fluoridnih pasta te nedostatak zdravstvenog obrazovanja i promicanja važnosti oralnoga zdravlja (9,10).

Istaknimo da su zdrave prehrambene navike i dobra oralna higijena najkorisnije mjere za sprječavanje karijesa i parodontne bolesti. Održavanje dobre oralne higijene znači redovito četkanje zuba fluoridnim pastama najmanje dva puta na dan. Većina školaraca u svijetu zube rutinski četka jedanput na dan (11, 14). Nadalje, socijalno-ekonomski čimbenici utječu na oralno-higijenske navike djece predškolske i osnovnoškolske dobi. Oralna higijena u osnovnim školama utječe na samopoštovanje, percepciju među vršnjacima i osobni izgled (15, 16).

Pečaćenje fisura primjenjuje se kao preventivna mjera kojom se zatvaraju jamice i fisure na površinama okluzalnih ploha zuba radi sprječavanja razvoja karijesa među djecom. Učinkovitost toga postupka u sprječavanju karijesa dobro je dokumentirana (17, 18). Istraživanja su pokazala da je status bez karijesa kod djece u dobi od 6 do 17 godina bio povezan s pečaćenjem fisura (19).

Kosovo je najmlađa europska zemlja u jugoistočnoj Europi s ukupnom površinom od 10 908 km^2 i oko 1 804 944 stanovnika (20). Trenutačno ima nerazvijenu ekonomiju s razmjerno lošim obrazovnim i zdravstvenim sustavom. U obrazovanje još uvijek nije uključena nikakva edukacija kojom bi se promicalo oralno zdravlje, ni konkretne aktivnosti u preventivnoj stomatologiji u organizaciji Ministarstva zdravstva (5). Svrha ovoga rada bila je procijeniti status oralnoga zdravlja učenika u dobi od 6 do 11 godina na Kosovu i to na temelju dobi, spola, navika četkanja, konzumiranja slastica, posjeta stomatologu i primjene preventivnih mjera – pečaćenja fisura.

and sugar intake habits. In contrast, the increase of dental caries has resulted from unhealthy dietary habits, limited use of fluoride and poor access to oral health services. In many of developed countries, most of the oral health services provide symptomatic treatment, with slight priority given to prevention and restoration (5).

Good oral health improves general health and quality of life and contributes to self-image and social interaction (6). Oral health in children and adolescents was accepted as the main concern action, while countries were encouraged to develop preventive approaches to health education in schools through partnerships between families, oral health professionals, communities by improving access to preventive and curative oral health services (7).

The World Health Organization (WHO) goals for 2000 included a 50% reduction in dental caries for 6 year- old children and globally an average of the DMFT index not exceeding more than 3.0 for 12 year olds (8). It has been already mentioned that dental caries is a worldwide spread disease due to increased consumption of refined foods, fizzy drinks and a wide variety of sweets. The additional reasons are a low utilization of fluoride supplements, fissure sealants, lack of widespread and regular use of toothbrushes with fluoride toothpaste, as well as lack of dental health education and promotion (9, 10).

In addition, healthy food lifestyle and good oral hygiene are the most useful measures to prevent caries and periodontal disease. Maintaining a good oral hygiene means regular tooth brushing with fluoride toothpaste at least twice a day. The majority of worldwide schoolchildren brush their teeth as daily routine once a day (11, 14). Furthermore, the socio-economic factors have negative effects on oral hygiene practices among preschool and elementary schoolchildren. Facilitators for maintaining oral hygiene habits in primary schoolchildren were found to be a high level of self-esteem, peers influence and personal appearance (15, 16).

Dental sealants are applied as a preventive measure covering pits and fissures on occlusal tooth surfaces in order to prevent the development of caries among children. The effectiveness of fissure sealants in preventing caries has been well documented (17, 18). In particular, some studies have shown that the caries-free status of children 6-17 years of age has been associated with subsequent sealant placement (19).

Kosovo is the youngest European country in Southeastern Europe with the total land area of 10, 908 km^2 and about 1, 804 944 inhabitants (20). Currently, Kosovo has an underdeveloped economy with relatively poor educational and health system. Basically, neither a training program for promotion of oral health, nor any concrete activities in preventive dentistry have been organized by Kosovo Ministry of Health (5). The aim of this study was to assess the oral health status among schoolchildren aged 6 – 11, in Kosovo, based on age, gender, brushing habits, confectionery consumption, dental visits, and application of preventive measures such as fissure sealants.

Materijali i metode

Ovo istraživanje poprečnog presjeka provedeno je između rujna 2016. i siječnja 2017. godine na temelju korištenja podataka prikupljenih epidemiološkim pregledom oralnoga zdravlja među učenicima u dobi od 6 do 11 godina na Kosovu. Odobrenje za istraživanje dobiveno je od Ministarstva obrazovanja, znanosti i tehnologije Republike Kosovo, s referentnim brojem 3752/2016. Primijenjeno je dvostupanjsko uzorkovanje klastera u nasumično odabranim osnovnim školama. Svakoj je poslan poziv za sudjelovanje u ovom istraživanju, a odabrane su prve dvije iz svakoga grada koje su pozitivno odgovorile. Stoga je svaka škola u svakom gradu imala jednaku mogućnost za sudjelovanje u uzorku. Uzorak je uključivao 5679 djece školske dobi od 6 do 11 godina obaju spolova koja su pohađala javne škole u deset različitih gradova diljem Kosova.

Radni tim od šest istraživača osposobljen je i kalibriran za klinička mjerenja, neovisno o iskustvu. Pouzdanost inspekcijskih kriterija izmjerena je pilot-istraživanjem na slučajno odabranoj skupini od 30 učenika u dobi od 6 do 11 godina. Ponovljivost je mjerena Cohenovim kappa indeksom, a dobiveni rezultati kretali su se između 0,88 i 0,80.

Pregledi su obavljeni u učionicama odabranih škola u standardnim uvjetima koje preporučuje Svjetska zdravstvena organizacija. Zubi su pregledani pod umjetnim svjetlom sterilnim dentalnim zrcalima i sondama, bez dijagnostičkih dodataka kao što su prethodno četkanje zuba i sušenje. Stanje denticije procijenjeno je korištenjem kep/KEP indeksa, kao što je opisano u kriterijima i postupcima SZO-a (1997) za epidemiološka istraživanja (21). Uz to, bilježeni su demografski podatci, dob, spol i škola:

- zub s karijesom – d/D, izvađeni zub – e/E, zub s ispunom – p/P i kep/KEP indeks. KEP/kep indeks (za trajnu i mliječnu denticiju) metoda je numeričke ekspresije incidencije karijesa, a dobiva se zbrajanjem broja karioznih (K) i izvađenih zuba (E) te zuba s ispunom (P).
- KEP/kep je nula i primjena preventivnih mjera – pečaćenja zuba.

Osim oralnih pregleda i prikupljanja demografskih podataka, školskoj djeci postavljena su i pitanja o njihovoj oralnoj higijeni, koliko često četkaju zube tijekom dana (mogućnosti su bile rijetko, jedanput ili dva puta na dan). Drugo pitanje bilo je povezano s prehrambenim navikama – koliko često jedu slastice (rijetko, jedanput, dva, tri ili više puta na dan) i koliko često tijekom godine posjećuju stomatologa (jedanput u 6 mjeseci, jedanput na godinu ili samo kada je to potrebno). Kriteriji za isključivanje iz ovog istraživanja bili su mentalno, fizički i senzorički hendikepirana djeca te medicinski ugroženi pacijenti, npr. oni koji boluju od leukemije, hemofilije itd. Navedena djeca bila su pošteđena zbog opterećenja, nedostatka suradnje i posebnih potreba tijekom pregleda.

Material and Methods

This cross-sectional study was performed using data from the epidemiological survey of oral health among 6-11 year old schoolchildren in Kosovo, performed between September 2016 and January 2017. The approval for the study was obtained from the Ministry of Education, Science, and Technology of the Republic of Kosovo, with Reference Number: 3752/2016. A two-stage cluster sampling was applied. The schoolchildren were chosen in town schools during the first stage which was followed by the second-stage. The schools were selected reasonably and randomly. An invitation was sent to each school for participating in this study and the first two of them who positively responded to the invitation were selected from each town. Therefore, children from every school in any town in Kosovo had equal opportunities of participating in the study. The sample included 5679 schoolchildren aged 6- 11 years of both genders who attended public schools in ten different towns in Kosovo.

The work team of six examiners received training and calibration in making clinical measurements independently from an experienced pedodontist-researcher and epidemiological pathfinder study to ward off the impenetrability of participants. The reliability of the inspection criteria was measured by a pre-test performed on a group randomly selected 30 schoolchildren, aged 6-11 years. Inter-rater agreement was measured by the Cohen kappa index, and the obtained results for the best and worst agreement were ranged between 0.88 and 0.80.

The assessment took place in the classrooms of the selected schools under standardized conditions recommended by the WHO, whereas dental examinations were carried out under artificial light using sterile dental mirrors and dental probes, without diagnostic adjuncts such as previous dental brushing and drying. Dental caries status was assessed using the dmft/DMFT index in the previously described manner, according to the criteria and procedures by the WHO (1997) for epidemiological studies (21). Data collection was compromised by demographic data. The age, gender and schools of the participants were, also, recorded:

- Decayed teeth – d/D, missing teeth m/M, filled teeth f/F and dmft /DMFT decayed-missing-filled index. DMFT/dmft index (for permanent and primary dentition) is a method to numerically express the caries experience and is obtained by calculating the number of decayed (D), missing (M) and filled (F) teeth (T).
- DMFT/dmft free and application of preventive measures - fissure sealants.

Apart from oral examination and demographic data collection, the schoolchildren were also asked about their oral hygiene habits. They were asked how frequently they brushed their teeth during the day (the options were; rare, once or two times per day). Another question was related to eating habits – how often they consumed sweet food and confectionery items such as sweets and chocolate per day (rare, once, two or three and more times per day) and how often they went to see their dentists during the year (once in 6 months, once a year or only when necessary). The exclusion criteria for this study were;

Statistička analiza

Statistička analiza obavljena je softverom MS Excel (Microsoft Office, Windows 2010, SAD) i SPSS 19 za Windowse (SPSS Inc., Chicago, Illinois, SAD). Analiza je uključivala frekvencije i prosječne vrijednosti. Razlike između prosječnih vrijednosti testirane su studentovim t-testom. Razina statističke značajnosti postavljena je na $p < 0,05$. Povezanost između učestalosti konzumiranja slastica, čekanja i posjeta stomatologu s k/K komponentom ispitana je korištenjem Spearmanove korelacije (Spearmanov rho).

Rezultati

Demografska obilježja sudionika nalaze se u tablici 1. Dječaci i djevojčice (N = 5679) bili su u dobi od 6 do 11 godina. Tablica 2. prikazuje strukturu kep indeksa prema dobi. Dominantna komponenta k (zubi s karijesom) ili prevalencija karijesa pronađena je u dobi od 6 godina (k = 27,6 %). Najveća učestalost za komponentu e ili izvađene zube te za komponentu i ili zube s ispunom, bila je najveća u dobi od 8 godina (e = 24,8 %; p = 29,6 %), a u dobi od 6 godina utvrđen je najveći kep indeks (kep = 26,3 %) (tablica 2.). Najviše karijesa na trajnim zubima pronađeno je u dobi od 11 godina (KEP = 33,7 %). Najvažnija komponenta K – prevalencija karijesa, komponente E i P (K = 30,4 %, E = 57,7 %, P = 41,6 %) također su pronađene u istoj dobi (tablica 3.). Ukupno su među učenicima od 6 do 11 godina kep i KEP indeks iznosili nula u 23,5 % i 49,3 % (tablica 4.).

Utvrđena je statistički značajna razlika između najvišega prosjeka kep i KEP indeksa među ispitanicima između 6 i 11 godina. Najveći prosječni kep indeks pronađen je među dječacima u dobi od 7 godina – 6,82 ± 3,608, a najveća sred-

mentally, physically, sensory handicapped children and medically compromised patients, e.g. individuals suffering from leukemia, hemophilia and so forth. The abovementioned children were spared from participating in the study due to lack of cooperation and special requirements during the examination.

Statistical Analysis

The statistical analysis was carried out using MS Excel (Microsoft Office, Windows 2010, USA) and SPSS 19 for Windows (SPSS Inc., Chicago, Illinois, USA) software. The analysis included frequencies and means. The differences between means were tested using the student t-test. Statistical significance was set at $p<0.05$. The association between frequencies of consumption of confectionary, oral hygiene and dental visits with d/D components were tested using the Spearman's rank correlation (Spearman's rho).

Results

Demographic characteristics of participants are shown in Table 1. The sample included participants (N= 5679) between 6-11 years of age, of both genders. Table 2 shows the structure of dmft index for the observed ages. The dominant component d (decayed teeth) or prevalence of caries were found at the age of 6 (d=27.6%). The highest prevalence for component m or missing teeth and component f or filled teeth were found at the age of 8 (m=24.8%; f = 29.6 %), whereas the highest structure of dmft index was found for the age of 6 (dmft= 26.3%), which is shown in Table 2. The highest prevalence value of caries amongst permanent teeth was found for the age of 11 (DMFT=33.7%). The foremost component D – prevalence of decayed, components M and F (D= 30.4 %; M = 57.7 %; F= 41.6 %) were also found for the same age (Table 3). Total dmft-free and DMFT-free for schoolchildren 6 to 11 years of age were found to be 23.5% and 49.3%, respectively (Table 4).

There was a statistically significant difference between the highest mean of dmft and DMFT index among 6 to 11-year-

Table 1 Sample overview (age, gender, frequency)
Tablica 1. Uzorak (dob, spol, postotci)

Dob • Age	Ukupno • Total	%	Spol • Gender	Raspodjela • Frequency	%
6 godina • 6 years	1011	17.8	Dječaci • Boys	492	8.7
			Djevojčice • Girls	519	9.1
7 godina • 7 years	924	16.3	Dječaci • Boys	471	8.3
			Djevojčice • Girls	453	8.0
8 godina • 8 years	951	16.7	Dječaci • Boys	510	9.0
			Djevojčice • Girls	441	7.7
9 godina • 9 years	942	16.6	Dječaci • Boys	537	9.5
			Djevojčice • Girls	405	7.1
10 godina • 10 years	867	15.3	Dječaci • Boys	423	7.4
			Djevojčice • Girls	444	7.9
11 godina • 11 years	984	17.3	Dječaci • Boys	441	7.7
			Djevojčice • Girls	543	9.6
Ukupno • Overall	5679	100.0	Dječaci • Boys	2874	50.6
			Djevojčice • Girls	2805	49.4

Učenici osnovnih škola iz različitih gradova Republike Kosovo • Schoolchildren from Elementary Schools, from different towns, Republic of Kosovo

Tablica 2. Distribucija kep vrijednosti po dobi
Table 2 Distribution of dmft values based on age groups

Dobna skupina • Age Group	k • d		e • m		p • f		kep • dmft	
	n	%	n	%	n	%	n	%
6 godina • 6 years	6162	27.6	246	12.3	96	22.5	6504	26.3
7 godina • 7 years	5712	25.6	468	23.5	66	15.5	6246	25.2
8 godina • 8 years	4860	21.7	495	24.8	126	29.6	5481	22.1
9 godina • 9 years	3390	15.2	477	24.0	75	17.6	3942	16.0
10 godina • 10 years	1719	7.7	270	13.6	42	9.9	2031	8.2
11 godina • 11 years	495	2.2	36	1.8	21	4.9	552	2.2
Ukupno • Total	22338	100	1992	100	426	100	24756	100

n = Broj zuba • Number of teeth

Tablica 3. Distribucija KEP vrijednosti prema dobi
Table 3 Distribution of DMFT values based on age groups

Dobna skupina • Age Group	K • D		E • M		P • F		KEP • DMFT	
	n	%	n	%	n	%	n	%
6 godina • 6 years	201	3.8	3	0.8	6	0.5	210	3.1
7 godina • 7 years	567	10.7	3	0.8	21	1.8	591	8.7
8 godina • 8 years	987	18.6	36	10.2	90	7.7	1113	16.3
9 godina • 9 years	909	17.1	36	10.2	243	21.0	1188	17.4
10 godina • 10 years	1029	19.4	72	20.3	318	27.4	1419	20.8
11 godina • 11 years	1614	30.4	204	57.7	483	41.6	2301	33.7
Ukupno • Total	5307	100	354	100	1161	100	6822	100

n = Broj zuba • Number of teeth

Tablica 4. Bez kep/KEP-a u ukupnom uzorku
Table 4 dmft/DMFT - free on overall sample

Dobna skupina • Age Group	Bez kepa u ukupnom uzorku • dmft- free on overall sample		Bez KEP-a u ukupnom uzorku • DMFT- free on overall sample	
	N	%	N	%
6 godina • 6 years	111	2.0	897	15.8
7 godina • 7 years	57	1.0	603	10.61
8 godina • 8 years	51	0.9	444	7.8
9 godina • 9 years	81	1.4	357	6.3
10 godina • 10 years	285	5.0	285	5.0
11 godina • 11 years	750	13.2	225	4.0
Ukupno • Total	1335	23.5	2811	49.3

N = Broj učenika • Number of schoolchildren

Tablica 5. Prosječne vrijednosti i standardna devijacija za kep i KEP kod djece prema dobi i spolu
Table 5 Mean and standard deviation for dmft and DMFT in children based on their age and gender

Dobna skupina • Age Group	Spol • Gender	kep • dmft		KEP • DMFT	
		X± SD	p	X± SD	p
6 godina • 6 years	Dječaci • Boys	6.56 ± 4.355	0.001	0.18 ± 0.675	0.001
	Djevojčice • Girls	6.31 ± 4.388	0.001	0.23 ± 0.612	0.001
7 godina • 7 years	Dječaci • Boys	6.82 ± 3.608	0.001	0.59 ± 0.952	0.001
	Djevojčice • Girls	6.70 ± 3.357	0.001	0.69 ± 1.051	0.001
8 godina • 8 years	Dječaci • Boys	5.72 ± 2.653	0.001	1.11 ± 1.282	0.001
	Djevojčice • Girls	5.81 ± 2.704	0.001	1.24 ± 1.333	0.001
9 godina • 9 years	Dječaci • Boys	4.44 ± 2.730	0.001	1.28 ± 1.238	0.001
	Djevojčice • Girls	3.85 ± 2.552	0.001	1.24 ± 1.195	0.001
10 godina • 10 years	Dječaci • Boys	2.56 ± 2.589	0.001	1.51 ± 1.444	0.001
	Djevojčice • Girls	2.12 ± 2.509	0.001	1.76 ± 1.480	0.001
11 godina • 11 years	Dječaci • Boys	0.61 ± 1.282	0.001	2.20 ± 1.935	0.001
	Djevojčice • Girls	0.52 ± 1.091	0.001	2.45 ± 1.901	0.001
Ukupno • Overall		4.36 ± 3.763	0.001	1.20 ± 1.488	0.001

T-Test; X = Prosječna vrijednost • Mean; SD = Standardna devijacija • Standard deviation; p<0.05

nja vrijednost KEP-a zabilježena je kod djevojčica u dobi od 11 godina – 2,45 ± 1,901. Stoga je potvrđeno da prevalencija zubnog karijesa na mliječnim zubima opada s povećanjem dobi, a na trajnim zubima povećava se s godinama. Ukupna vrijednost kep/ KEP indeksa za djecu od 6 do 11 godina prema dobi i spolu bila je umjereno visoka (kep = 4,36 ± 3,763, KEP = 1,20 ± 1,488) (tablica 5.).

Među uključenom djecom zapečaćene zube imalo je samo njih 90 ili 1,58 % (tablica 6.). U tablici 7. prikazan je broj zapečaćenih zubnih površina, učestalost i ukupan broj pečata.

Kad je riječ o oralno-zdravstvenim navikama, pokazalo se da u dobi od osam godina do 50 posto učenika zube četka dva puta na dan (tablica 8.). Do 40 posto uključene djece izjavilo je da jede slastice barem jedanput na dan. Većina djece rekla je da posjećuje stomatologa samo kada je to potrebno (tablica 8.).

Univarijantnom uvjetnom regresijom, koristeći se Spearmanovom korelacijom, potvrđena je statistički značajna po-

olds. The highest mean of the dmft index was found among 7 year- old boys (6.82 ± 3.608), while the highest mean for DMFT was found among 11 year- old girls (2.45 ± 1.901). Therefore, this study confirmed the fact that there is a decline in the caries prevalence in the primary dentition with increasing the age. On the contrary, there was an increase in the caries prevalence in the permanent dentition, which increases with age. The total value of dmft/DMFT index for children 6 to 11 years old based on age and gender was moderately high (dmft = 4.36 ± 3.763, DMFT=1.20 ± 1.488) (Table 5).

From all children observed, fissure sealants were found only in 90 schoolchildren, amounting to only 1.58% (Table 6). A number of sealed tooth surfaces, frequency and a total number of sealants are shown in Table 7.

The oral health practices showed that from the age of eight, up to 50% of children brush their teeth twice a day (Table 8). Up to 40% of the observed children declared that they consumed sweet food and confectionary at least once on

Tablica 6. Pečaćenje u ukupnom uzorku
Table 6 Sealant placements in overall sample

	Pečaćenje zuba • Sealant placement		
	N	Djeca s pečaćenjem • Children with sealants	%
Ukupan uzorak • Overall sample	5679	90	1.58

Tablica 7. Broj zapečaćenih površina zuba, učestalost i ukupni broj pečata
Table 7 Number of sealed tooth surfaces, frequency and total number of sealants

Broj zapečaćenih površina zuba • Number of sealed surfaces	Djeca • Children	Broj pečata • Number of sealants	%
1	24	24	26.7
2	36	72	40.0
3	12	36	13.3
4	18	72	20.0
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
Ukupno • Total	90	204	100.0

Tablica 8. Učestalost četkanja zuba, konzumacija slastica i posjeti stomatologu prema dobi
Table 8 Tooth brushing frequency, sweetened food and confectionery consumption and dental visits based on age

Dobna skupina • Age Group	6 godina • 6 years		7 godina • 7 years		8 godina • 8 years		9 godina • 9 years		10 godina • 10 years		11 godina • 11 years	
N	1011		924		951		942		867		984	
	n	%	n	%	n	%	n	%	n	%	n	%
Učestalost četkanja zuba (dnevno) • Brushing frequency (per day)												
Rijetko • Rare	213	21.1	135	14.6	78	8.2	81	8.6	75	8.7	42	4.2
Jedanput • Once	426	42.1	372	40.3	366	38.5	198	21.0	204	23.5	285	29.0
Dva puta • Two times	372	36.8	417	45.1	507	53.3	663	70.4	588	67.8	642	66.8
Konzumacija slastica (dnevno) • Sweetened food and confectionery consumption (per day)												
Rijetko • Rare	324	32.0	336	36.4	258	27.1	357	37.9	246	28.4	624	63.5
Jedanput • Once	438	43.3	372	40.2	459	48.3	426	45.2	420	48.4	201	20.4
Dva puta • Two	135	13.4	135	14.6	123	12.9	90	9.6	114	13.2	75	7.6
Tri puta ili češće • Three or more times	114	11.3	81	8.8	111	11.7	69	7.3	87	10.0	84	8.5
Posjeti stomatologu • Dental visits												
Jedanput u 6 mjeseci • Once in 6 months	21	2.1	24	2.6	18	1.9	231	24.5	195	22.5	318	32.3
Jedanput na godinu • Once a year	69	6.8	81	8.8	126	13.2	171	18.2	198	22.8	159	16.2
Samo prema potrebi • Only when necessary	921	91.1	819	88.6	807	84.9	540	57.3	474	54.7	507	51.5

Tablica 9. Univarijantna uvjetna logistička regresijska analiza za oralnu higijenu, konzumaciju slastica u odnosu na k/K komponentu i posjet stomatologu
Table 9 Conditional univariate logistic regression analysis of oral hygiene, sweetened food and confectionery factors related to d/D component, and dental visits

			Korelacije • Correlations				
			Navike četkanja • Brushing habits	Konzumacija slastica • Sweetened food and Confectionery	Posjeti stomatologu • Dental Visits	K-karijes • D-Decay	k-karijes • d-decay
Spearmanov rho • Spearman's rho	Navike četkanja • Brushing habits	Koeficijent korelacije • Correlation Coefficient	1.000	0.040**	-0.081**	0.070**	-0.003
		Sig. (2-tailed)	.	0.002	0.001	0.001	0.797
		N	5679	5679	5679	5679	5679
	Konzumacija slastica • Sweetened and Confectionery	Koeficijent korelacije • Correlation Coefficient	0.040**	1.000	0.076**	-0.060**	0.134**
		Sig. (2-tailed)	0.002	.	0.001	0.001	0.001
		N	5679	5679	5679	5679	5679
	Posjeti stomatologu • Dental Visits	Koeficijent korelacije • Correlation Coefficient	-0.081**	0.076**	1.000	-0.080**	0.268**
		Sig. (2-tailed)	0.001	0.001	.	0.001	0.001
		N	5679	5679	5679	5679	5679
	K-karijes • D-Decay	Koeficijent korelacije • Correlation Coefficient	0.070**	-0.060**	-0.080**	1.000	-0.106**
		Sig. (2-tailed)	0.001	0.001	0.001	.	0.001
		N	5679	5679	5679	5679	5679
	k-karijes • d-decay	Koeficijent korelacije • Correlation Coefficient	-0.003	0.134**	0.268**	-0.106**	1.000
		Sig. (2-tailed)	0.797	0.001	0.001	0.001	.
		N	5679	5679	5679	5679	5679

** Korelacija je statistički značajna na razini 0,01 level (2-tailed) • Correlation is significant at the 0.01 level (2-tailed)

vezanost između učestalosti konzumacije slastica, učestalosti četkanja i posjeta stomatologu s d/D komponentom (tablica 9.).

Rasprava

Ovo istraživanje osmišljeno je kako bi se procijenila učestalost karijesa, navika četkanja, pečaćenja fisura, posjeta stomatologu i konzumiranja slastica tijekom dana među učenicima u dobi od 6 do 11 godina na Kosovu. Prema izvješću Svjetske zdravstvene organizacije iz 2003., karijes je i dalje glavni javnozdravstveni problem, bez obzira na veliko poboljšanje oralnoga zdravlja u ukupnoj svjetskoj populaciji. U većini razvijenih zemalja zahvaća od 60 do 90 posto učenika i većinu odraslih osoba. Problemi uglavnom i dalje postoje među siromašnom populacijom i u razvijenim zemljama i u onima u razvoju (22).

Oralno zdravlje uključeno je i u projekt *Strategija protiv kroničnih bolesti u Europi* (23). Akcije promicanja oralnoga zdravlja i prevencije bolesti bile su namijenjene unaprjeđenju oralne higijene osnovnim mjerama – četkanjem zuba dvaput na dan fluoridnom pastom, čišćenjem interdentalnih prostora zubnim koncem, uravnoteženom zdravom prehranom, redovitim odlaskom stomatologu i žvakanjem žvakaćih guma bez šećera (23, 24).

a regular daily basis. Also, the majority of children visited the dentist only when necessary (Table 8).

With initial conditional univariate regression, using the Spearman's rank correlation, it was confirmed that there was a significant association between frequencies of consumption of confectionary, oral hygiene, dental visits and d/D components (Table 9).

Discussion

This study was designed to evaluate the prevalence of caries, brushing habits, fissure sealants, dental visits and frequency of confectionery consumption during the day. The sample included 6 -11 year old schoolchildren from Kosovo. According to the World Oral Health Report from 2003, dental caries is still a serious public health problem regardless of great improvements in the oral health of populations worldwide. In most of the developed countries, it affects 60–90% of schoolchildren and the majority of adults. Mainly, problems persist still among poor and disadvantaged groups in both developed and developing countries (22).

The oral health was included also in the project "Strategy against chronic diseases in Europe" [23]. Work policies of the oral health promotion and disease prevention were designed for the training on oral hygiene, using daily basic methods - brushing teeth twice a day with fluoride toothpaste, cleaning interdental spaces using dental floss, balanced healthy diet, going to regular dental visits and using sugar-free chewing gums (23, 24).

U dobi od 6 do 11 godina djeca stvaraju vlastite navike i uče pravila o održavanju oralnoga zdravlja. Tijekom tog razdoblja uglavnom trebaju potporu roditelja, poticanje od nastavnika te promicanje oralnoga zdravlja, što trebaju činiti stomatolozi i dentalni higijeničari koji će im pružiti znanje i pokazati kako prevenirati oralne bolesti (23, 25).

Općenito, ukupni pokazatelji incidencije karijesa veći su u mješovitoj denticiji. Mliječni zubi dulje su izloženi rizičnim čimbenicima za nastanak karijesa, npr., redovitom konzumiranju zašećerene hrane, pića i slastica. To također objašnjava zašto mliječni kutnjaci imaju veću srednju vrijednost incidencije karijesa dentina od trajnih. Nekoliko istraživanja otkrilo je korelaciju u incidenciji karijesa između mliječnih i trajnih zuba (26).

Rezultati našeg istraživanja, prema očekivanjima, pokazali su veću incidenciju karijesa u mliječnoj denticiji negoli u trajnoj. Prevalencija karijesa bila je veća kod dječaka negoli kod djevojčica u mliječnoj denticiji, a veća kod djevojčica s trajnom denticijom. Najveća vrijednost kepa pronađena je među 7-godišnjim dječacima, a KEP je bio veći kod 11-godišnjih djevojčica. Ukupna vrijednost kepa ili KEP-a za učenike u dobi od 6 do 11 godina na temelju dobi i spola, bila je razmjerno visoka.

Srednja vrijednost kepa i KEP-a za djecu od 6 do 7 godina u našem istraživanju bila je veća negoli u Njemačkoj (27). Istaknimo također da se naši nalazi smatraju visokima u usporedbi sa skandinavskim zemljama koje su postigle nizak stupanj incidencije karijesa (28 – 30). Naši rezultati kep vrijednosti također su bili najviši u usporedbi s učenicima iz Albanije u dobi od 7 do 15 godina, ali su naše vrijednosti KEP-a bile najniže (5). Ipak, naš nalaz za KEP bio je najniži u usporedbi s drugim zemljama u regiji – Hrvatskom i Bosnom i Hercegovinom, te za kep u usporedbi s Turskom i Filipinima (31, 34).

U istraživanju smo utvrdili da je primjena preventivnih mjera – pečaćenje fisura – diljem zemlje bila vrlo niska kod djece u dobi od 6 do 11 godina. Među uključenom djecom samo njih 90 imalo je zapečaćene zube. Niska prevalencija pečaćenja zuba zabilježena je i kod grčkih adolescenata u dobi od 12 do 15 godina (26 % za 12-godišnjake i 19 % za 15-godišnjakinje), no očito su vrijednosti bile više negoli u našem istraživanju (19). Srednje vrijednosti KEP-a u Njemačkoj smanjile su se s 2,44 u 1994./1995. na 1,24 u 2000. godini, a prosječan broj zapečaćenih zuba po djetetu iznosio je između 2,13 i 2,83 (35). Prevalencija zubnih pečata bila je vrlo visoka i u Danskoj, gdje su dvije trećine 15-godišnje djece imale barem jednu zapečaćenu površinu ili više njih. Srednji broj zapečaćenih zuba iznosio je 3,06 (SD = 1,60) (36).

Rezultati našeg istraživanja pokazali su da je četkanje zuba relativno uobičajeno ili se rutinski obavlja među uključenom djecom u dobi od 6 do 11 godina. Naši nalazi mogu se usporediti s drugim istraživanjima o oralnoj higijeni među većinom djece u svijetu koja zube, kao dnevnu rutinu, četka barem jedanput do dva puta na dan (11, 14). Može se također smatrati da je četkanje postalo društvena norma među djecom na Kosovu. U drugom je istraživanju ustanovljena povezanost između loše oralne higijene, incidencije karijesa i dobi djece (37). Nedostatak oralno-zdravstvenog odgoja i ne-

Children in middle childhood (ages 6-11) create their own habits; they learn basic details and rules on maintaining oral health. Throughout this period, children need to be supported by their parents. They learn from their teachers, who are expected to inspire them. Oral health should be promoted by dentists or/and hygienists offering children basic knowledge on oral disease prevention (23, 25).

Generally, the total caries experience indicators are higher in the mixed dentition. Primary teeth are exposed to risk factors of caries such as regular consumption of sugar- sweetened snacks, sugar-sweetened beverages and confectionery items such as sweets and chocolate over a longer period of time than permanent teeth. This explains also why primary molars have a higher mean of a number of dentine caries lesions than permanent molars. Several studies have revealed common correlations in caries experience between primary and permanent teeth (26).

As expected, the results of our study revealed that there was higher prevalence of dental caries in primary dentition than in permanent dentition. Boys had a slightly higher prevalence of caries in primary dentition than girls, whereas girls had higher prevalence of caries in their permanent dentitions. The highest dmft value was found among 7 year- old- boys, whereas the DMFT was higher in 11 year- old- girls. However, the total value of dmft or/and DMFT for schoolchildren aged 6-11 years, based on age and gender, was found to be relatively high.

The dmft and DMFT means values for children aged 6 to 7 years in our study were higher than those in Germany (27). Furthermore, the values in our findings are considered to be high compared to findings from Scandinavian countries, which have achieved a low degree of caries incidence across the time [28-30]. Also, our results of dmft values were higher compared to those regarding 7-15 years old schoolchildren in Albania, whereas our DMFT values were lower. (5). Therefore, our findings for DMFT values were found lowest compared with other studies in the region such as those obtained in Croatia and Bosnia and, also, for dmft values in Turkey and Filipino (31, 34).

In our study, we have established that application of preventive measures throughout the country - dental sealants among children aged 6 - 11 was very low. Out of all the children observed, we have found sealed teeth only in ninety children. The low prevalence of dental sealants was found also in Greek adolescents aged 12 – 15 years (26% for the 12 and 19% for the 15-year-olds), but obviously, the values were higher than those in our study (19). The mean DMFT scores for Germany declined from 2.44 in 1994-1995 and to 1.24 in 2000. In 2000, on average between 2.13 and 2.83 teeth with fissure sealants per child were found (35). Also, a high prevalence of dental sealants was found in Denmark, where two-thirds of 15-year-old Danish children had at least one or more sealed surfaces. The mean number of sealants was 3.06 (SD=1.60) (36).

The results of our study revealed that tooth brushing is relatively common or routinely practiced in a sample of 6–11-year-old children. Our data confirmed the results of previous studies on oral hygiene in the sense that the majori-

odgovarajuća tehnika četkanja glavni su čimbenici koji nepovoljno utječu na prevalenciju karijesa (38, 39).

U našem istraživanju otkrili smo da većina djece konzumira slastice barem jedanput na dan. To bi trebalo smatrati ugrozom kad je riječ o održavanju uravnoteženog unosa hranjivih tvari i sprječavanju karijesa na zubima i njihovu preranom gubitku, čak iako je taj postotak bio najniži u usporedbi s drugim istraživanjima (40, 41). Naši rezultati potvrđuju značajnu korelaciju između učestalosti konzumiranja slastica tijekom dana i prevalencije karijesa. Djeca od 6 do 11 godina odlazila su stomatologu uglavnom samo kada je to bilo potrebno, što je u korelaciji s našim nalazima, visokim kep/KEP indeksom i niskom razinom preventivnih mjera – pečaćenjem zuba. U drugim istraživanjima razlozi za posjete stomatologu među djecom bili su više u sklopu preventivnih mjera (19, 36). Naši rezultati sugeriraju da bi za poboljšanje oralnoga zdravlja djeca trebala trošiti više vremena na četkanje zuba, a u obrazovnom sustavu postoji potreba za uključivanjem programa za promicanje oralnoga zdravlja i prevenciju oralnih bolesti.

Niz je prednosti i ograničenja u ovom istraživanju. Pozitivan aspekt uključuje nužne mjere i pilot-testiranje za usklađivanje istraživača, tako da su dobiveni rezultati pouzdani i dosljedni. Drugo, procijenili smo status oralnoga zdravlja prema kriterijima i postupcima SZO-a za epidemiološka istraživanja, pa bi naši rezultati u budućnosti mogli služiti za usporedbu s drugim dobivenim rezultatima na Kosovu i u ostalim razvijenim zemljama ili zemljama u razvoju s različitim kulturama. U naše istraživanje uključili smo učenike u dobi od 6 do 11 godina iz različitih kosovskih gradova, što daje sveobuhvatniju sliku prevalencije karijesa na Kosovu. Potrebno je razmotriti i ograničenja istraživanja. Iako smo pokušali obuhvatiti učenike iz različitih gradova, općenito nismo dobili informacije o mjesečnim primanjima obitelji i o obrazovanju roditelja, a nismo uključili ni djecu iz ruralnih područja. Zato ne možemo isključiti važan utjecaj socijalno-ekonomskog čimbenika. Drukčija dostupnost preventivnih mjera, pristup oralno-zdravstvenim uslugama i obično manji broj stomatologa po broju stanovnika u ruralnim područjima, može značajno utjecati na rezultate. Posljedično se u našem uzorku ne može potpuno isključiti potencijalna pristranost.

ty of children all over the world brush their teeth as daily routine at least once to two times per day (11, 14). Likewise, our study points to the fact that similar social norms are respected by children in Kosovo and, also, that the frequency and timing for oral hygiene are satisfactory. Another study published in 2012 reported a correlation between poor oral hygiene, dental caries experience and children's age (37). The lack of oral health education and proper technique of brushing teeth are other factors that have been formerly shown to be highly correlated with the prevalence of dental caries (38, 39).

In our study, we have found that the majority of children in Kosovo consume sugar sweetened beverages, sweets and chocolate at least once a day. Inadequate nutrition and fluid intake can result in serious problems; therefore, decreased intake of sugars and well-balanced nutrition can prevent tooth decay and premature tooth loss. The percentage of carious teeth in schoolchildren from Kosovo is lower compared to that of other studies (40, 41). Our results confirmed the fact that there is a significant correlation between frequencies of consumption of sweetened beverages and confectionery items such as sweets and chocolate per day, and prevalence of caries. Some studies reported that a large number of children aged 6-11 visit their dentists "only when necessary". Such a high ratio is in line with our findings, the high dmft/DMFT index and low preventive measures with a small number of dental sealants. Furthermore, other studies reported that such a situation is calling for a national preventive program with sealants which could eliminate caries to a larger extent (19, 36). Consequently, our results suggest that for improving their oral health, children should spend more time on brushing their teeth. Besides, special programs for the promotion of oral health and prevention of oral diseases should be integrated into educational systems.

There is a large number of strengths and limitations of this study. The main strength of our study includes necessary steps and pilot testing for inter-rater agreement. In this way, the obtained results are reliable and consistent. Secondly, we have assessed oral status according to WHO criteria and procedures for epidemiological studies; hence the obtained results from Kosovo can be compared with the results obtained from other developed and developing countries with different cultures. Also, in our study, we have included schoolchildren aged 6-11 years from different towns of Kosovo, which gives an overview of the prevalence of caries in Kosovo. Few limitations of the study must be considered. Even though we have attempted to comprise schoolchildren from different towns, in general, we did not receive information regarding family monthly income and parents' education level and we did not include children from rural areas. Therefore, we cannot exclude the important significance of broad socioeconomic factors, which could contribute to taking different approaches to specific population, thus improving preventive measurements efficacy, and enabling an easier and better access to preventive oral health services. It is a well-known fact that there are fewer dentists per population living in rural areas and this additional deficiency results in lower access and operation of dental care. Therefore, a potential variety bias in our sample cannot be completely excluded.

Zaključak

Zubni karijes među djecom u dobi od 6 do 11 godina na Kosovu i dalje je velik oralno-zdravstveni izazov. Zbog toga su motivacija i izobrazba djece ključni u našoj zemlji za poticanje i usvajanje poželjnog ponašanja i zdravog načina života od rane dobi. Roditelji i učitelji trebaju djeci povećati svijest o oralnome zdravlju te nastojati poboljšati oralnu higijenu zajedno s pedodontom ili higijeničarom demonstriranjem pravilne metode, a to je učestalost i trajanje četkanja zuba. Osim toga, rani redoviti posjeti stomatologu i preventivne mjere – pečaćenje fisura – smanjile bi među djecom kep/KEP indeks. Razvoj javnozdravstvene politike i vladinih sektora ključan je za poboljšanje oralnoga zdravlja i općega zdravlja društva.

Conclusion

Dental caries among children aged 6-11 years in Kosovo remains a significant oral health challenge. Consequently, motivation and education of children are essential in our country for encouraging and inculcating early healthy lifestyle behavior. Parents and school teachers should increase dental awareness among schoolchildren by improving oral hygiene methods and habits together with pedodontists and/or hygienists, demonstrating the proper method, and duration of teeth brushing. In addition, early regular dental visits and preventive measures such as fissure sealants among children would decrease dmft/DMFT indexes. Since oral health is integral to general health, policy makers need to include oral health in public health policies, thus leading to improvement in the differences in health status of urban and rural population.

Sukob interesa

Autori nisu bili u sukobu interesa.

Competing interests

The authors declare no conflict of interests.

Izvor financiranja

Ovo istraživanje nije dobilo nikakvu potporu od agencija za financiranje u komercijalnom, javnom ili neprofitnom sektoru.

Funding

This research did not receive any grant from funding agencies in the commercial, public or not-for-profit sectors.

Zahvala

Autori zahvaljuju svim sudionicima na suradnji i sudjelovanju u ovom istraživanju. Istraživanje je potpuno podupirala matična institucija autora.

Acknowledgment

The authors gratefully acknowledge all study participants for their cooperation. The study was supported entirely by the institutions of the authors.

Abstract

The aim of the present study was to evaluate the current oral health status among schoolchildren in Kosovo aged 6-11 years. **Material and methods:** A study included 5679 schoolchildren aged 6 -11 years, from different towns of Kosovo. Dental health status was evaluated using the World Health Organization (WHO) caries diagnostic criteria for decayed, missing and filled teeth (dmft/DMFT index), for deciduous and permanent dentition. The observed children have answered a number of questions about their oral hygiene, eating habits, and dental visits. The analysis included frequencies and means. The differences between means were tested using the student t-test ($p<0.05$). The factors associated with dental caries were tested using the Spearman's rank. **Results:** The mean dmft/DMFT of schoolchildren aged 6-11 years was 4.36 ± 3.763 and 1.20 ± 1.488, respectively. Sealant placements were found among 90 schoolchildren, amounting to 1.58%. From 8 years of age, 50% of children brush their teeth twice a day. Confectionery consumption among the observed children has increased. Forty percent of them eat sweets at least once a day, and majority of them visit their dentists only when necessary. A significant correlation between consumption of confectionery, oral hygiene, dental visits and the prevalence of caries was confirmed. **Conclusion:** The results of the present study show that there is a high prevalence of caries among 6-11 year old schoolchildren, thus pointing to a need for an extensive program of primary oral health care as well as utilizing preventive measures and regular dental visits.

Received: February 17, 2017
Accepted: May 16, 2017

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Key words
Oral Health; DMF index; Child

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