

The Efficacy of the Interventional Health Education Program for Oral Health Improvement in School Children

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SUMMARY

Introduction Dental caries and gingivitis are common in school children although they can be prevented through the health education and application of preventive measures. The aim of this study was to determine the prevalence of caries, gingivitis and orthodontic irregularities in school children and to assess the efficacy of health education program in relation to the plaque and gingivitis control as well as caries treatment.

Material and Methods This study included 56 second grade students with early mixed dentition and 56 seventh grade students with permanent dentition, from elementary school "Borislav Petrov Braca" in Pancevo. DMFT/dmft index, Plaque index (PI) according to Silness-Löe, and the prevalence of gingivitis and orthodontic anomalies were determined by clinical examination. The Interventional Program included oral hygiene education and the application of prophylactic measures. At one and six months follow-ups, PI, gingival health and changes in DMFT/dmft structure were reexamined.

Results Gingivitis was recorded in 78.56% of II and 50% of VII grade students. In the II grade students, mean DMFT was 1.36 ± 1.41 , and dmft 5.07 ± 2.66 . In the VII grade students mean DMFT was 4.36 ± 3.34 . The most common orthodontic anomalies were narrow maxilla, deep bite and distal bite. After six months of conducting the Program, reduction of gingivitis and number of carious teeth in DMFT/dmft structure as well as oral hygiene improvement were achieved in both age groups.

Conclusion Oral hygiene, dental status and the prevalence of orthodontic anomalies in school children indicate the necessity to intensify preventive measures. Health education programs contribute to improvement of oral health and increase motivation for self-care in children.

Keywords: health education; oral hygiene; caries; gingivitis; orthodontic anomalies; school children

INTRODUCTION

Oral diseases, although they can be prevented and controlled, are still highly prevalent in developing countries, and their impact on both the society and an individual is significant. Pain, discomfort, sleepless nights and time off from school or work are the most common problems for many children and adults whose treatment also requires considerable financial resources [1]. The main oral health problems of school children are tooth decay and gingivitis [2]. These diseases can be controlled through the complex measures of primary and secondary prevention, based on health education, oral hygiene improvement, healthy diet, fluoride prophylaxis, early diagnostic and treatment of orofacial system's developmental anomalies [3].

Health education, as the part of oral health promotion, contributes to better understanding of the importance of oral health and helps development of specific skills, enabling behavioral change from risk to health improving behavior. Health education is important at school age, because of early behavioral development that has an enduring impact on oral health and is difficult to change

later in life [4]. Due to insufficient resources in the health sector, it is important to choose cost-effective prevention strategies such as school intervention programs, proved to significantly improve oral health and health related behavior of school children [5].

The aim of this study was to determine the prevalence of caries, gingivitis and orthodontic irregularities. In addition, the effectiveness of the Interventional Program for improving oral health of school children in relation to dental plaque control and caries reduction was assessed.

MATERIAL AND METHODS

The study included 112 children (56 student per grades II and VII) from the elementary school "Branislav Petrov Braca" in Pancevo. The Interventional Program for improving oral health of school children was conducted at the Department of Pediatric and Preventive Dentistry, Faculty of Dentistry in Pancevo and at the school, including work in small groups (6 respondents). The carriers of the Program were teachers and students of the Faculty of Dentistry.

Before beginning the study, two dentists performed clinical examination according to the WHO criteria, in dental setting, and determined the number of healthy, decayed, missing and filled teeth (DMFT index), the presence of gingival inflammation, Plaque index (PI) according to Silness-Loe, as well as the presence and type of orthodontic irregularities. At the school, during the classes, previously trained dental students disclosed dental plaque of school children and explained them the nature and consequences of the presence of plaque on teeth and gums. Dental students verbally explained and demonstrated modified Bass brushing technique on models. After practicing on models, the children were brushing their teeth under students' supervision. Each participant received a free toothbrush, toothpaste and fluoride-containing mouth rinse, as well as a brochure about the importance of oral health and methods for prevention of oral diseases. During the next visit, the children received prophylactic plaque removal and fluoride varnish application (Fluoroprotector, Ivoclar). Dental students educated the children about the role of fluorides in caries prevention. The fourth visit included placing pit and fissure sealants on permanent molars. The use of dental floss was demonstrated to the seventh grade students. Dental students remotivated the children to maintain proper oral hygiene by discussing the factors that influence oral hygiene habits (such as fatigue, getting up early or going late to bed, parental help with brushing, the impact of clean, healthy teeth on the personal appearance and social contacts with peers). After the last visit, dental and orthodontic treatments were proposed to the children in accordance to the individual treatment needs.

First follow-up examination was performed one month after the fourth visit, and the second 6 months later. At the first follow-up, PI and presence of gingivitis were recorded. Patients with untreated caries were reminded about the importance of dental treatment to prevent complications. After six months dental status, PI and the presence of gingival inflammation among the subjects were reexamined.

Statistical analysis

Data was analyzed using SPSS statistical software (SPSS for Windows 15.0, Chicago, IL). Fisher's and T-test were used to compare the prevalence of gingivitis, PI values and DMFT index between the II and VII grade students at the same visit, while changes in PI between the visits were assessed using one-way ANOVA for repeated measurements. In all tests, p value<0.05 was considered statistically significant.

RESULTS

Only 14.28% of II grade students and none of VII grade students had all healthy teeth (DMFT=0). Completely restored permanent teeth (DT=0, DMFT>0) had 28.57% of seventh grade students. In the mixed dentition, 50% of II grade students had untreated decay affecting at least one permanent tooth. Mean DMFT index in second grade

Table 1. Average number of decayed, missing and filled permanent and primary teeth before and 6 months after the completion of the Program in II grade students

Tabela 1. Prosečan broj karijesnih, ekstrahovanih i plombiranih stalnih i mlečnih zuba kod učenika drugog razreda pre početka i šest meseci nakon završetka primene programa

Parameter Parametar	Before Pre	After Posle	t	p
DMFT KEP	1.36±1.41	1.39±1.44	1.000	0.3217
D-T K	1.14±1.42	0.18±0.39	5.643	<0.001
M-T E	0.07±0.26	0.14±0.35	2.057	0.044
F-T P	0.14±0.35	1.07±1.23	5.441	<0.001
Dmft kep	5.07±2.66	5.16±2.54	1.299	0.199
d-t k	3.86±2.17	0.61±0.85	12.246	<0.001
m-t e	0.50±0.63	1.12±1.05	5.41	<0.001
f-t p	0.71±1.45	3.43±1.92	12.41	<0.001

Table 2. Average number of decayed, missing and filled permanent and primary teeth before and 6 months after the completion of the Program in VII grade students

Tabela 2. Prosečan broj karijesnih, ekstrahovanih i plombiranih zuba kod učenika sedmog razreda pre početka i šest meseci nakon završetka primene programa

Parameter Parametar	Before Pre	After Posle	t	p
DMFT KEP	4.36±3.34	4.38±3.34	1.000	0.322
D-T K	1.86±1.42	0.21±0.53	9.462	<0.001
M-T E	0.64±0.85	0.86±1.18	2.833	0.006
F-T P	1.86±1.98	3.32±2.57	10.008	<0.001

students was 1.36±1.41, while dmft was 5.07±2.66, with 76.13% of untreated primary teeth in the structure of dmft (dt=3.86±2.17; Table 1). Mean DMFT in the seventh grade students was 4.36±3.34, with 42.66% of decayed and filled teeth in DMFT structure (D=1.86±1.42; F=1.86±1.98; Table 2). After 6 months, the average number of decayed teeth significantly decreased in both groups, while the number of extracted and filled teeth increased. Fissure sealants were placed on 68% of first and second permanent molars.

Orthodontic irregularities were frequent in both groups (Tables 3 and 4). The most frequent were narrow maxilla (71% of II and 54.8% of VII grade students), deep bite (64.5% of II and 67.7% of VII grades) and distal bite (83.9% and 87.1% in II and VII grade students, respectively).

At the first examination, gingivitis was diagnosed in 78.57% of II and 50% of VII grade subjects, with statistically significant difference between the groups (p=0.003), according to the results of the Fisher's test. At the first follow-up visit, there was statistically significant reduction in gingival inflammation to 28.57% of the II grade students (Graph 1), while the prevalence of gingivitis decreased to 35.71% among the seventh grade students (Graph 2).

Table 3. Frequency of orthodontic anomalies and bad habits in students of both groups**Tabela 3.** Učestalost ortodontskih nepravilnosti i loših navika kod učenika dve grupe

Orthodontic anomalies Ortodontske nepravilnosti	II grade students Učenici II razreda	VII grade students Učenici VII razreda
Oral respiration Oralna respiracija	35.5%	19.4%
Infantile swallowing Infantilno gutanje	51.5%	48.4%
Bad habits (thumb-sucking, objects-biting etc.) Loše navike (sisanje prsta, grickanje predmeta itd.)	16.1%	9.7%
Narrow upper jaw Uskost gornje vilice	71.0%	54.8%
Crowding of upper incisors Teskobnost gornjih sekutića	35.5%	48.4%
Crowding of lower incisors Teskobnost donjih sekutića	54.8%	54.8%
Deep bite Dubok zagrižaj	64.5%	67.7%
Cross bite Ukršten zagrižaj	13.0%	35.5%

Table 4. Upper and lower jaw relation in sagittal plane in students of both groups**Tabela 4.** Sagitalni odnos gornje i donje vilice kod učenika dve grupe

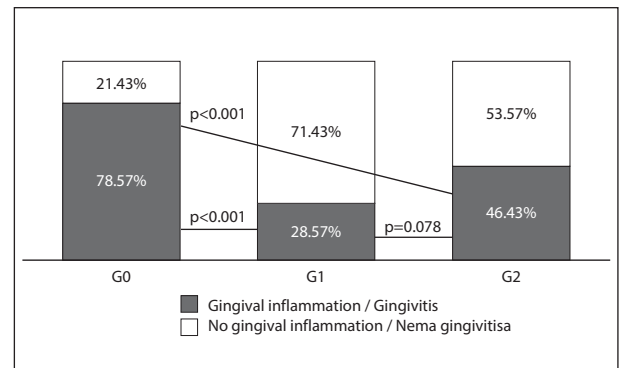
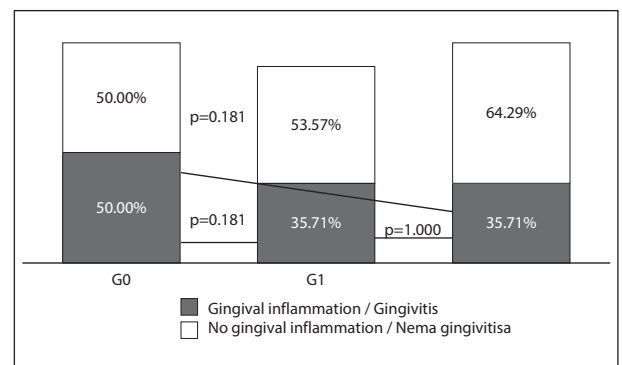
Jaws relation in sagittal plane Odnos vilica u sagitalnoj ravni	II grade students Učenici II razreda	VII grade students Učenici VII razreda
III class (mesiocclusion) III klasa (mezijalni zagrižaj)	3.2%	3.2%
II class (distocclusion) II klasa (distalni zagrižaj)	83.9%	87.1%
I class (neutroclusion) I klasa (neutralni zagrižaj)	12.9%	9.7%

Table 5. Differences in Plaque index (PI) scores before (PI0), one month (PI1) and six months after conducting the Program (PI2) between the students of two groups**Tabela 5.** Razlike u vrednostima plak-indeksa (PI) na početku (PI0), mesec dana (PI1) i šest meseci nakon završetka primene programa (PI2) između učenika dve grupe

PI	II grade students Učenici II razreda			VII grade students Učenici VII razreda			t	p
	$\bar{X} \pm SD$	95% CI		$\bar{X} \pm SD$	95% CI			
		Min	Max		Min	Max		
PI0	1.578±0.299	1.498	1.659	1.174±0.490	1.042	1.305	5.278	<0.001
PI1	1.221±0.286	1.144	1.297	0.993±0.303	0.040	1.075	4.080	<0.001
PI2	1.324±0.239	1.260	1.388	1.068±0.390	0.963	1.172	4.192	<0.001

 $\bar{X} \pm SD$ – mean value and standard deviation; 95% CI – 95% confidence interval; Min – minimal value; Max – maximal value $\bar{X} \pm SD$ – srednja vrednost i standardna devijacija; 95% CI – 95% interval poverenja; Min – najmanja vrednost; Max – najveća vrednost**Table 6.** Comparison of Plaque index (PI) scores before (PI0), one month (PI1) and six months after the Program (PI2) in both groups of students**Tabela 6.** Poređenje plak-indeksa (PI) izmerenih na početku (PI0), mesec dana (PI1) i šest meseci nakon primene programa (PI2) kod učenika dve grupe

Parameter Parametar		Mean difference Prosečna razlika	95% CI		q	p
			Min	Max		
II grade students Učenici II razreda	PI0–PI1	0.358	0.266	0.450	13.120	<0.001
	PI0–PI2	0.254	0.163	0.346	9.323	<0.001
	PI1–PI2	-0.104	-0.195	-0.012	3.797	<0.05
VII grade students Učenici VII razreda	PI0–PI1	0.180	0.104	0.256	8.002	<0.001
	PI0–PI2	0.106	0.030	0.181	4.700	<0.01
	PI1–PI2	-0.074	-0.150	0.001	3.302	>0.05

**Graph 1.** Prevalence of gingival inflammation in II grade students before (G0), one month (G1) and six months after conducting the Program (G2)**Grafikon 1.** Prevalencija gingivitisa kod učenika drugog razreda na početku (G0), mesec dana (G1) i šest meseci po završetku primene programa (G2)**Graph 2.** Prevalence of gingival inflammation in VII grade students before (G0), one month (G1) and six months after conducting the Program (G2)**Grafikon 2.** Prevalencija gingivitisa kod učenika sedmog razreda na početku (G0), mesec dana (G1) i šest meseci po završetku primene programa (G2)

After 6 months, the prevalence of gingivitis among II grade students (46.43%) remained significantly lower as compared to the initial value ($p < 0.001$), while the prevalence of gingivitis remained unchanged as compared to the previous measurement ($p > 0.05$) among the VII grade students. No statistically significant difference was found in the prevalence of gingivitis between II and VII grades students one month ($p = 0.544$) and six months ($p = 0.337$) after the Program was completed.

The mean PI at baseline was 1.58 ± 0.30 in II, and 1.17 ± 0.49 in VII grade students (Table 5), with statistically significant difference between the groups ($p = 0.001$). ANOVA test for repeated measurements showed that PI values at one- and six-month follow-ups were significantly lower as compared to the initial value within the groups (Table 6). Seventh grade students had significantly lower PI as compared to younger children at each point of measurement (Table 5).

DISCUSSION

Although advanced preventive procedures have significantly decreased caries prevalence in the population, fissure caries on occlusal surfaces and buccal/lingual surfaces is still a considerable problem [6]. Primary teeth are more frequently affected than permanent by caries due to difference in enamel structure, lack of oral hygiene, or absence of preventive measures [7]. In the current study, greater number of primary than permanent teeth was affected. Large percentage of untreated caries (73.96%) indicated that parents haven't considered primary teeth restoration important. Tickle and al. found that, if a child had carious but asymptomatic primary tooth, approximately one third of parents wanted to remain the tooth untreated. Also, if the child had a toothache, parents had a preference for an intervention if their child has already had an extraction or filling in the past [8]. In surveys conducted between 1991 and 1995, the mean dmft in primary dentition in children age 5-7 years ranged between 0.9 and 8.5 [9]. It was the lowest in Ireland (0.9), Spain (1.0), while mean dmft values below 2.0 were also reported in Finland, Netherlands, and Norway [9].

In our sample mean DMFT among the VII grade students was 4.36. Epidemiological data from our region showed that mean DMFT value was 3.43 among 12-years old in Montenegro [10], 4.16 in Bosnia and Herzegovina [11], 4.8 in Croatia [12] and 5.8 in Kosovo [13]. Mean DMFT value recorded in the sample from the current study was higher than those recorded among 12-years old in Spain (1.33) [14], Sicily (2.88) [15] or North-European countries with DMFT values below 3 [16]. On the other hand, 12-year-olds in many countries had a mean DMFT higher than 3.0, such as Latvia (7.7), Poland (5.1), Ukraine (4.4), Hungary (4.3), Lithuania and Belarus (3.8) and Russia (3.7) [9].

The current study confirmed that gingivitis is more prevalent among younger subjects and oral hygiene is improving with ages [2]. Outcome evaluation of the Program for oral health improvement in school children showed that it effectively motivated parents and their children resulting in improved dmft/DMFT structure where the incidence of carious primary and permanent teeth decreased from 76.13% to 11.82% and from 42.66% to 4.79% in younger and older subjects, respectively. The Program substantially improved oral hygiene in children, manifested as reduction of PI and prevalence of gingivitis in both age groups. Based on literature, dental health interventions have positive but temporary effect on plaque accumulation [17]. Increase in the percentage of gingival inflammation during time is common finding in many studies. Short-term preventive programs induce a transient improvement of gingival health but only during the instructional period [18]. In order to maintain improved gingival health over longer time periods, prolonged, repeated instruction by professionals and continuous oral health promotion are required [19, 20].

Children do not have well defined perceptions why they should brush their teeth and certainly prevention of tooth decay does not readily come to mind for many, which increases the risk of developing disease [21]. It has been documented that children can be motivated to maintain oral hygiene by dentists [22], as done in the current study, by providing free toothbrushes, toothpastes and mouthwashes for all subjects. During adolescence, motivation for oral health improvement tend to shift from cognitive to emotional and the emphasis of health education in this segment of population should be placed on the social rather than health consequences of oral health related behavior [23, 24, 25].

To improve oral health of school children, it is necessary to involve wider community and strengthen actions towards oral health promotion. For children of school age, it is important to incorporate oral health promotion activities to the school curriculum, as proposed by the WHO in the concept of "Healthy Schools" [26].

CONCLUSION

The existing level of oral hygiene, dental status and the prevalence of orthodontic anomalies, primarily crowding of upper and lower incisors, narrow maxilla and distal bite indicate the need to intensify preventive measures and to comprehensively plan preventively oriented dental care for children with early mixed or primary dentition. The effects of this pilot Program indicated that health education and preventive interventions were suitable for improving oral hygiene, gingival health and increasing motivation for self-care in school children.

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Efikasnost interventnog zdravstvenovaspitnog programa za unapređenje oralnog zdravlja dece školskog uzrasta

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KRATAK SADRŽAJ

Uvod Karijes i gingivitis su česta oboljenja kod dece školskog uzrasta, iako se mogu staviti pod kontrolu kroz zdravstveno vaspitanje i primenu preventivno-profilaktičkih mera. Cilj ovog rada bio je da se utvrde rasprostranjenost karijesa, gingivitisa i ortodontskih nepravilnosti kod učenika osnovne škole i efikasnost zdravstvenovaspitnog programa u pogledu kontrole zubnog plaka, gingivitisa i stepena sanacije karijesa.

Materijal i metode rada Istraživanje je obuhvatilo 56 učenika drugog razreda s ranom mešovitom denticijom i 56 učenika sedmog razreda sa stalnom denticijom iz osnovne škole "Borislav Petrov Braca" u Pančevu. Kliničkim pregledom utvrđeni su: indeks KEP/kep, plak-indeks (PI) po Silnes-Louu (*Silness-Löe*) i prevalencija gingivitisa i ortodontskih nepravilnosti. Interventni program se sastojao od edukacije u pogledu higijene usta i zuba i primene profilaktičkih mera. Na kontrolnim kliničkim pregledima posle mesec dana i šest meseci određeni su PI, stanje gingive i promene u strukturi indeksa KEP/kep.

Rezultati Gingivitis je dijagnostikovao kod 78,56% učenika drugog i 50,00% učenika sedmog razreda. Prosečan broj obolelih stalnih zuba (KIP) u prvoj grupi bio je $1,36 \pm 1,41$, a mlečnih (kip) $5,07 \pm 2,66$, dok je u drugoj grupi KIP bio $4,36 \pm 3,34$. Najčešće ortodontske nepravilnosti bile su uskost gornje vilice, dubok zagrižaj i distalni zagrižaj. Šest meseci nakon primene programa ustanovljeni su smanjenje učestalosti gingivitisa, poboljšanje higijene usta i zuba (izraženo kroz smanjenje vrednosti PI) i smanjenje učestalosti zuba zahvaćenih karijesom u strukturi indeksa KEP/kep u obe grupe ispitanika.

Zaključak Utvrđeno stanje oralnog zdravlja i učestalost ortodontskih nepravilnosti kod dece školskog uzrasta ukazuju na neophodnost intenziviranja mera prevencije. Zdravstvenovaspitni programi doprinose poboljšanju zdravlja usta i zuba i povećanju motivacije za brigu o celokupnom sopstvenom zdravlju.

Gljučne reči: zdravstveno vaspitanje; oralna higijena; karijes; gingivitis; ortodontske nepravilnosti; deca školskog uzrasta

UVOD

Oboljenja usta i zuba, iako se mogu sprečiti i kontrolisati, i dalje su vrlo česta u ekonomski slabije razvijenim zemljama i značajno utiču kako na pojedinca, tako i na društvo u celini. Bol, neprijatnost, neprospavane noći i izostajanje iz škole jesu problemi koji se često javljaju kod velikog broja dece, čije lečenje iziskuje znatna finansijska sredstva [1]. Glavni problemi u vezi s oralnim zdravljem dece školskog uzrasta jesu karijes i gingivitis [2]. Ova oboljenja mogu se staviti pod kontrolu primenom mera primarne i sekundarne prevencije, koje se prvenstveno zasnivaju na zdravstvenom vaspitanju, poboljšanju higijene usta i zuba, pravilnom režimu ishrane, profilaksi fluorom, otkrivanju nepravilnosti u razvoju orofacijalnog sistema u početnoj fazi i njihovoj uspešnoj i pravovremenoj sanaciji [3].

Zdravstveno vaspitanje, kao deo promocije oralnog zdravlja, doprinosi povećanju pozitivnih shvatanja o značaju zdravlja usta i zuba i razvijanju određenih veština koje omogućavaju promenu ponašanja rizičnog po zdravlje u ponašanje kojim se zdravlje čuva i unapređuje. Zdravstvena edukacija je značajna u školskom uzrastu, jer se rano formirane navike teže menjaju i imaju dugotrajn uticaj na oralno zdravlje [4]. Zbog nedovoljnih resursa u zdravstvenom sektoru, važno je odabrati strategije za prevenciju, kao što su interventni školski programi, koje uz male troškove mogu značajno poboljšati oralno zdravlje i ponašanje u vezi sa zdravljem ove dece [5].

Cilj ovog istraživanja bio je da se utvrdi rasprostranjenost karijesa, gingivitisa i ortodontskih nepravilnosti kod dece školskog uzrasta i proceni efikasnost interventnog programa za poboljšanje njihovog oralnog zdravlja u pogledu kontrole zubnog plaka, gingivitisa i stepena sanacije karijesa.

MATERIJAL I METODE RADA

Istraživanje je obuhvatilo 112 dece (po 56 učenika drugog i sedmog razreda) iz OŠ „Branislav Petrov Braca” u Pančevu. Interventni program za unapređenje zdravlja usta i zuba dece školskog uzrasta odvijao se kroz rad u grupama od po šest učenika na Odeljenju za dečju i preventivnu stomatologiju Stomatološkog fakulteta u Pančevu i u školi, a nosioci programa bili su nastavnici i studenti četvrte godine fakulteta. Na početku istraživanja kliničkim pregledom u ambulantnim uslovima, prema kriterijumima Svetske zdravstvene organizacije (SZO), dva stomatologa su kod svakog deteta utvrdila: broj zdravih, karijesnih, ekstrahovanih i plombiranih zuba (indeks KEP), stanje zdravlja gingive, količinu zubnog plaka pomoću plak-indeksa (PI) po Silnes-Louu (*Silness-Löe*) i zastupljenost, odnosno vrstu ortodontske nepravilnosti. U školi su, za vreme razredne nastave, prethodno obučeni studenti obojili zubni plak učenicima i objasnili im prirodu i uticaj naslaga na zube i desni. Zatim su im objasnili i na modelu demonstrirali modifikovanu Basovu tehniku pranja zuba. Nakon ponavljanja na modelu, deca su vežbala pranje zuba pod nadzorom studenata. Svaki ispitanik dobio je na poklon četkicu, pastu za zube i rastvor za ispiranje s fluoridima, kao i brošuru o značaju zdravlja usta i zuba i načinima sprečavanja oboljenja. Pri sledećoj poseti učenicima su u ambulanti uklonjene meke naslage profilaktičkom pastom i aplikovan lak s fluoridima (*Fluoroprotector*, *Ivoclar*), uz edukaciju o značaju fluorida u sprečavanju nastanka karijesa. Tokom četvrte posete zalivene su jamice i fisure stalnih molara, a učenicima sedmog razreda demonstrirana je i upotreba zubnog konca. Studenti su ponovo motivisali decu za održavanje higijene usta i zuba kroz razgovor o faktorima koji utiču na oralno higijenske navike (kao

što su umor, rano ustajanje ili kasni odlazak na spavanje, pomoć roditelja pri pranju zuba, uticaj čistih i lepih zuba na celokupan izgled i odnos s vršnjacima). Nakon ove posete deci su, u skladu s individualnim potrebama, predloženi sanacija obolelih zuba i ortodontski tretman.

Prvi kontrolni pregled je obavljen mesec dana nakon četvrte posete, a drugi šest meseci kasnije. Na prvom kontrolnom pregledu utvrđeni su PI i postojanje gingivitisa. Učenici sa nesaniranim karijesom su upozoreni na važnost blagovremenog tretmana zuba. Prilikom druge kontrolne posete stomatološkim pregledom su utvrđeni stanje zuba, PI i postojanje zapaljenja gingive.

Statistička analiza

Dobijeni podaci su analizirani pomoću programa SPSS (*SPSS for Windows, 15.0, Chicago, IL*). Za poređenje prevalencije gingivitisa vrednosti PI i prosečnog broja obolelih zuba između uzrasnih grupa pri istoj poseti korišćeni su Fišerov (*Fisher*) i Studentov *t*-test, dok je promena PI pri različitim posetama analizirana primenom testa ANOVA za ponavljana merenja. Značajnost je određena na osnovu vrednosti $p > 0,05$.

REZULTATI

Sve zdrave zube (KEP=0) imalo je 14,28% učenika sedmog razreda, dok u grupi ispitanika drugog razreda nijedan učenik nije imao sve zdrave zube. Potpuno sanirane stalne zube (K=0, KEP>0) imalo je 28,57% učenika sedmog razreda. U grupi ispitanika sa mešovitom denticijom, kod 50% učenika drugog razreda utvrđen je nesanirani karijes na barem jednom stalnom zubu. Kod učenika drugog razreda prosečan broj obolelih stalnih zuba (KIP) bio je $1,36 \pm 1,41$, a mlečnih (kip) $5,07 \pm 2,66$, sa 76,13% nesaniranih zuba u strukturi kep ($k=3,86 \pm 2,17$; Tabela 1). Prosečan broj obolelih zuba (KIP) kod učenika sedmog razreda bio je $4,36 \pm 3,34$, sa po 42,66% karijesnih i plombiranih zuba u strukturi KEP ($K=1,86 \pm 1,42$; $P=1,86 \pm 1,98$; Tabela 2). Posle šest meseci u obe grupe ispitanika se značajno smanjio prosečan broj zuba zahvaćenih karijesom, odnosno povećao broj plombiranih i ekstrahovanih zuba. Zalivanjem je obuhvaćeno 68% prvih i drugih stalnih molara.

Ortodontske nepravilnosti bile su veoma česte u obe grupe ispitanika (Tabele 3 i 4): uskost gornje vilice (71,0% učenika drugog i 54,8% sedmog razreda), dubok zagrižaj (64,5% učenika drugog i 67,7% sedmog razreda) i distalni zagrižaj (83,9% učenika drugog i 87,1% sedmog razreda).

Gingivitis je na početku istraživanja ustanovljen kod 78,57% mlađih i 50,00% starijih ispitanika, pri čemu je primenom Fišerovog χ^2 -testa utvrđeno da je razlika između uzrasnih grupa statistički visoko značajna ($p=0,003$). Prilikom prve kontrolne posete utvrđeno je statistički značajno smanjenje gingivitisa na 28,57% kod učenika drugog razreda (Grafikon 1), odnosno 35,71% kod učenika sedmog razreda (Grafikon 2). Nakon šest meseci prevalencija gingivitisa kod učenika drugog razreda ostala je značajno niža u odnosu na početnu vrednost ($p<0,001$), dok je kod učenika sedmog razreda ostala nepromenjena u odnosu na poslednje merenje ($p>0,05$). Primenom Fišerovog testa utvrđeno je da ne postoji statistički značajna razlika u prevalen-

ciji gingivitisa između učenika dva razreda nakon mesec dana ($p=0,544$), odnosno šest meseci po završetku primene programa ($p=0,337$).

Vrednosti PI na početku istraživanja bile su $1,58 \pm 0,30$ kod učenika drugog i $1,17 \pm 0,49$ kod učenika sedmog razreda (Tabela 5); ova razlika bila je statistički značajna ($p=0,001$). Primenom testa ANOVA za ponavljana merenja utvrđeno je da je u obe grupe nakon mesec dana i šest meseci vrednost PI bila značajno niža u odnosu na početnu (Tabela 6). Kod učenika sedmog razreda zabeležene su značajno niže vrednosti PI prilikom svakog merenja u poređenju s mlađim učenicima (Tabela 5).

DISKUSIJA

Primena mera prevencije dovela je do smanjenja prevalencije karijesa u populaciji dece školskog uzrasta, ali karijes u fisurama, na bukalnim i lingvalnim površinama zuba i dalje je klinički problem [6]. Karijes se češće javlja na mlečnim nego na stalnim zubima zbog razlika u strukturi gleđi, slabije oralne higijene u mlađem uzrastu ili izostanka mera prevencije [7]. U našem istraživanju broj mlečnih zuba zahvaćenih karijesom kod mlađih ispitanika bio je veći u poređenju s obolelim stalnim zubima starije dece. Veliki procenat nesaniranog karijesa (76,13%) ukazuje na to da roditelji ne pridaju veliki značaj blagovremenoj sanaciji mlečnih zuba. Tikl (*Tickle*) i saradnici [8] utvrdili su da trećina roditelja ne želi da se njihovom detetu saniraju karijesni mlečni zubi ukoliko ne izazivaju tegobe, dok u slučaju bolova češće prihvataju intervenciju ukoliko je dete ranije već plombiralo ili vadilo mlečne zube. Epidemiološka ispitivanja karijesa kod dece predškolskog uzrasta u Evropi utvrdila su da je prosečan broj obolelih mlečnih zuba (kip) u uzrastu od pet do sedam godina bio 0,9-8,5 [9]. Najniži je bio u Irskoj (0,9) i Španiji (1,00), dok su u Finskoj, Norveškoj i Holandiji vrednosti kip bile manje od 2,00 [9].

Prosečan broj obolelih stalnih zuba (KIP) kod učenika sedmog razreda bio je 4,36. U poređenju s epidemiološkim podacima iz regiona, kod dvanaestogodišnjaka vrednost KIP je bila 3,43 u Crnoj Gori [10], 4,16 u Bosni i Hercegovini [11], 4,8 u Hrvatskoj [12] i 5,8 na Kosovu [13]. Vrednost indeksa KEP zabeležena u ovom uzorku daleko je veća od onih zabeleženih među dvanaestogodišnjacima u Španiji (1,33) [14], na Siciliji (2,88) [15] ili u zemljama severne Evrope, gde je prosečna vrednost indeksa KEP manja od 3 [16]. S druge strane, vrednosti indeksa KEP bile su veće od 3 kod dvanaestogodišnjaka u Letoniji (7,7), Poljskoj (5,1), Ukrajini (4,4), Mađarskoj (4,3), Litvaniji i Belorusiji (3,8) i Rusiji (3,7) [9].

Naše istraživanje je potvrdilo da je gingivitis češći u mlađem uzrastu, odnosno da se higijena usta i zuba poboljšava s uzrastom pacijenata usled poboljšanja manuelne spretnosti [2]. Ocena ishoda primene programa za unapređenje oralnog zdravlja dece školskog uzrasta pokazala je da je ovaj program efikasno motivisao roditelje i decu da saniraju obolele zube, što je dovelo do značajnog poboljšanja strukture kep, odnosno KEP, tako što je učestalost karijesa smanjena sa 73,96% na 11,82% kod mlečnih, odnosno sa 42,66% na 4,79% kod stalnih zuba. Takođe, primena programa je dovela do značajnog unapređenja higijene usta i zuba, što se manifestovalo smanjenjem PI i prevalencije gingivitisa u obe grupe ispitanika, iako je kontrolnim pregledom nakon šest meseci utvrđen manji porast

vrednosti. Istraživanja pokazuju da zdravstvenovaspitne intervencije najčešće imaju pozitivan, ali privremeni, efekat na smanjenje zubnog plaka [17], a prevalencija gingivitisa se takođe vremenom povećava. Kratkotrajni programi dovode do poboljšanja zdravlja gingive, ali najčešće samo tokom trajanja programa [18]. Da bi poboljšanje bilo trajno, potrebno je da se pacijentima u dužem periodu ponove saveti za održavanje oralnog zdravlja i da se promocija zdravlja usta i zuba odvija kontinuirano [19, 20].

Deca često nemaju jasnu predstavu o tome zašto treba da peru zube, a većina ne razmišlja o važnosti prevencije karijesa, što povećava rizik od obolevanja [21]. Da bi povećali motivaciju za održavanje oralne higijene kod dece mlađeg uzrasta, stomatolozi im mogu dati sitan poklon [22], što je primenjeno i u ovom istraživanju, gde je svaki ispitanik na poklon dobio četkicu, pastu i rastvor za ispiranje. Kod adolescenata efekti edukacije su bolji ukoliko je akcenat na socijalnim pre nego na zdravstvenim efektima ponašanja u vezi sa zdravljem usta i zuba, jer u ovom uzrastu motivacija u većoj meri počiva na emotivnim, a manje na kognitivnim osnovama [23, 24, 25].

Da bi se poboljšalo zdravlje dece školskog uzrasta, potrebno je pokenuti širu zajednicu i uključiti je aktivno u promociju oralnog zdravlja. Za ovu decu značajno je da promocija zdravlja usta i zuba postane svakodnevni deo školske sredine i aktivnosti, kao što je SZO predvidela u konceptu „zdravih škola” [26].

ZAKLJUČAK

Utvrđeno stanje oralne higijene i zdravlja zuba, kao i rasprostranjenost ortodontskih nepravilnosti kod dece školskog uzrasta, pri čemu se prevashodno misli na teskobnost u predelu gornjih i donjih sekutića, uskost gornje vilice i distalan zagrižaj, ukazuju na neophodnost intenziviranja mera prevencije i celishodnije programiranje i usmeravanje stomatološke zdravstvene zaštite kod dece s ranom mešovitom ili čak mlečnom denticijom. Efekti programa pokazuju da su zdravstvenovaspitne i preventivne intervencije pogodne za unapređenje higijene usta i zuba, smanjenje učestalosti gingivitisa i povećanje motivacije za brigu o sopstvenom oralnom zdravlju kod dece školskog uzrasta.