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IZVORNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

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Učestalost karijesa u pacijenata upućenih na ortodontski pregled

Caries Experience in Patients Referred for an Orthodontic Consultation

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Sažetak

Cilj rada: Karijes je velik javnozdravstveni problem. Denticija bez aktivnog karijesa i dobra oralna higijena preduvjeti su za uključivanje u ortodontsku terapiju. Cilj ovog istraživanja bio je procijeniti oralno zdravlje pacijenata upućenih ortodontu. **Ispitanici i metoda:** U presječnoj studiji analizirani su dentalni kartoni 351 pacijenta u dobi od 6 do 23 godine (55 % žena) koje su u riječkoj regiji opći stomatolozi uputili ortodontu tijekom 2014. i 2015. godine. Analizirani su podatci o rasprostranjenosti karijesa, iskustvo s krijesom i intenzitet aktivnog karijesa s obzirom na spol i vrstu denticije. **Rezultat:** Kod osoba upućenih ortodontu u mješovitoj denticiji rasprostranjenost karijesa mliječnih zuba bila je 68 %, iskustvo s karijesom 3,6, a aktivni karijes uočen je na 2,5 zuba Kad je riječ o trajnim zubima u mješovitoj denticiji te su vrijednosti bile 21 %, 1,3 i 0,4, a kod osoba s trajnom denticijom iznosile su 40 %, 4,2 i 1,1. Mliječni zubi češće su bili zahvaćeni karijesom, a trajni su imali ispune. Nije bilo razlike između spolova. **Zaključak:** Oralno zdravlje djece i adolescenata upućenih na ortodontski pregled ne zadovoljava. Opći stomatolozi često upućuju pacijente s karijesom na ortodontski pregled, a to odgađa uključivanje u ortodontsku terapiju. Prijeko je potrebno podsjetiti opće stomatologe da na ortodontski pregled šalju samo pacijente sa zdravom denticijom i dobrom oralnom higijenom.

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Uvod

Zubni karijes danas je još uvijek velik javnozdravstveni problem. To je najčešća kronična bolest dječje dobi koja uzrokuje bol, otežano žvakanje i izgovor, sustavne bolesti i lošiju kvalitetu života (1, 2). Oralno zdravlje zahtijeva dnevno obavljanje postupaka koji sprječavaju obolijevanje oralnih tkiva (3, 4). Prije ikakve aktivne ortodontske terapije nužno je da pacijent provodi zadovoljavajuću oralnu higijenu i ima izliječene sve kariozne lezije i na mliječnim i na trajnim zubima (5). Naime, ako zubi nisu izliječeni, onemogućeno je sidrenje ortodontske naprave. Uz to, ako bi se kariozne lezije prekrile dijelovima fiksne ortodontske naprave anaerobni uvjeti potaknuli bi progresivno razaranje zuba karijesom (6). Naime, kada se pojave bijele točkaste lezije, preporučuje ih se odmah tretirati, inače bi bilo mnogo teže ili čak nemoguće remineralizirati takav zub nakon završetka ortodontske terapije (7 – 10). Problem pacijenata s aktivnim karijesom upućenih u ortodontsku ordinaciju veće je poznat – takvi pacijenti oduzimaju vrijeme koje bi se moglo korisnije potrošiti na aktivnu ortodontsku terapiju, umjesto na brojenje karijesa.

Malokluzije koje su uzrokovane posljedicama zubnog karijesa zahtijevaju povećanu potrebu za restaurativnim i ortodontskim zahvatima (12) – očit primjer je nedostatak prostora za smještaj trajnih zuba lateralnog segmenta. Prelazak iz zdrave mliječne denticije u trajnu u kojoj su zubi pravilno

Introduction

Dental caries still represents a significant public health problem. It is the most common childhood chronic disease which leads to pain, masticatory and pronunciation difficulties, systemic diseases and lower quality of life (1, 2). Oral health implies daily performance of procedures that prevent oral tissue diseases (3, 4). Before any active orthodontic treatment, it is necessary that the patient has established satisfactory oral hygiene and cured all carious lesions, both on deciduous and permanent teeth (5). If teeth are not cured, orthodontic appliance cannot have controlled anchorage. Also, if a caries lesion was possibly covered with parts of fixed orthodontic appliance, anaerobic environment would lead to progressive tooth destruction as a result of dental caries (6). Once the white spot lesion occurs, it is advised to treat it immediately; otherwise it would be more difficult or even impossible to re-mineralize such tooth after the end of orthodontic treatment (7-10). The problem of patients referred to an orthodontic office with active caries was recognized in the past (11). Such patients take up the time which could be spent more usefully on actual orthodontic treatment, instead of counting caries.

Malocclusions caused by consequences of tooth decay lead to increased need for restorative and orthodontic therapeutic procedures (12). An obvious example is the lack of

smješteni u zubne lukove moguć je zbog zaklonskog prostora, tj. veće ukupne meziodistalne širine postraničnih mliječnih zuba (očnjaka i kutnjaka) u odnosu prema njihovim trajnim nasljednicima. Prema tome, dobro očuvani mliječni zubi najbolji su držači mjesta (13) i zbog toga ih je itekako važno održati zdravima (tj. bez karijesa). Gubitak zaklonskog prostora rezultira mezijalnom migracijom prvoga trajnog kutnjaka nakon vađenja drugoga mliječnog kutnjaka, gubitkom prostora za smještaj trajnih zuba-nasljednika i znatnim skraćivanjem i transverzalnim suženjem zubnog luka. Ova vrsta malokluzije jednostavno se može prevenirati redovitim kontrolama u ordinacijama i terapijom karioznih mliječnih zuba, posebno onih iz grupe zaklonskog prostora. U prevenciji raznih malokluzija uzrokovanih gubitkom prostora zbog karijesa, vrlo je važna uloga općeg stomatologa (12, 13). Nadalje, malokluzija klase III, umjeren do izražen križni zagriz te ozbiljno povećan pregriz i prijeklop trebalo bi pravodobno tretirati, jer se njihova ozbiljnost ne smanjuje spontano tijekom promjene iz mješovite u trajnu denticiju (14).

Svrha ortodontske terapije nije samo uspostaviti optimalni okluziju nego i poboljšati zdravlje tvrdih i mekih oralnih tkiva. Osim toga, djelovi ortodontskih naprava pogodna su mjesta za razvoj zubnog karijesa (3). Bijele mrljaste lezije jedna su od najčešćih i najozbiljnijih nuspojava ortodontske terapije. Katkad ih se može uočiti već tijekom prvog mjeseca aktivne terapije. Te lezije pojavljuju se češće kod pacijenata s fiksnim napravama negoli s mobilnima i najčešće su na gornjim sjekutićima i očnjacima te na donjim očnjacima i pretkutnjacima (8, 9). Loša oralna higijena može u prosjeku produljiti ortodontsku terapiju za dva mjeseca (7).

Svrha ovog istraživanja bila je procijeniti oralno zdravlje pacijenata upućenih ortodontu i istražiti povezanost spola i vrste denticije s rasprostranjenošću i intenzitetom dentalnog karijesa.

Ispitanici i metode

Analiziran je zubni status 405 susljednih pacijenata koji su bili od 1. siječnja 2014. do 31. prosinca u2015. godine upućeni na prvi pregled u ortodontsku ordinaciju Kliničkoga bolničkog centra Rijeka. Oni sa samo mliječnom denticijom (N = 54) isključeni su iz daljnje analize. Svi su bili u dobi od 6 do 23 godine (medijan dobi 11, interkvartilni raspon 9 – 13), a žena je bilo 55 %. Svi pacijenti pregledani su tijekom prvog posjeta ortodontskoj ordinaciji. Klinički pregled tvrdih tkiva obavljen je pod umjetnom rasvjetom s pomoću stomatološkog zrcala i sonde. Pregledani su svi zubi i status je detaljno zabilježen i pohranjen s informiranim pristancima pacijenata. Zubni karijes dijagnosticiran je u skladu s preporukama Svjetske zdravstvene organizacije (SZO) (15). Podatci su skupljeni retrospektivno iz ortodontskih kartona i korišteni za daljnju analizu. Podatci o dobi, spolu, karioznim, izvađenim i ispunjenim zubima te o pečatnim ispunima u jamicama i fisurama u mješovitoj i trajnoj denticiji, prikupljeni

space for alignment of the permanent lateral teeth. The transition from the healthy primary to the well-aligned permanent dentition is possible due to the leeway space, i.e. difference between the sum of the mesiodistal widths of the deciduous cuspid and molar teeth, and their successors. Thus, well-preserved deciduous teeth are the best space maintainers (13), therefore, it is of greatest importance to keep deciduous teeth healthy (i.e. caries free). Loss of leeway space leads to mesial migration of first permanent molars after the exfoliation of second deciduous molars, lack of space for positioning permanent successor teeth and significant shortening and transverse constriction of dental arch. This type of malocclusion is easily preventable with regular controls at dental offices and treatment of decayed deciduous teeth, especially those from the leeway space group. In prevention of various malocclusions caused by the loss of space due to caries, the role of general dentists is of the greatest importance (12, 13). Furthermore, the class III malocclusion, moderate to severe cross-bite, as well as severe increased overjet and overbite would benefit from early treatment, because they seem not to improve spontaneously with the transition from the mixed into the permanent dentition (14).

An objective of an orthodontic treatment is not only to establish optimal occlusion but also to improve the health of the hard and soft oral tissues. Nevertheless, parts of the orthodontic appliance make suitable spots for development of dental caries (3). White spot lesion is one of the most common and serious side effects of orthodontic treatment. Sometimes it can be found even during the first month of active therapy. These lesions appear more often in patients with fixed than removable orthodontic appliances and are most commonly located on upper incisors and canines as well as lower canines and premolars (8, 9). Poor oral hygiene can extend orthodontic treatment on average for two months (7).

The objective of this research was to assess oral health of patients referred to orthodontists and to compare the relationship between gender and dentition type with prevalence and severity of dental caries.

Subjects and methods

Dental records of 405 consecutive patients, who were referred to their first orthodontic examination to the Orthodontic Clinic in the Clinical Hospital Center in Rijeka, Croatia between January 1st 2014 and December 31st 2015, were analyzed in this cross-sectional study. Patients with only primary dentition (N=54) were excluded from further analysis. Patients were aged 6-23 years (median age was 11, interquartile range 9-13), 55% of them were females. All patients were examined when they had their first appointment in the orthodontic office. Clinical examination of the hard tissues was performed under artificial light, with a dental mirror and a dental probe. All present teeth were inspected, and a detailed record of the findings was saved together with their informed consent. Dental caries was diagnosed according to the WHO recommendations (15). Data were collected retrospectively, from the existing orthodontic charts, and used for further analyses. Age, gender, carious, extracted and filled teeth as well as sealed pits

su za svakog pacijenta. Iz tih podataka izračunate su sljedeće epidemiološke mjere: rasprostranjenost, odnosno prevalencija kariozne denticije (udjel osoba s najmanje jednim aktivnim karijesom), prevalencija zdrave denticije (udjel osoba bez karijesa), prevalencija preventivnih pečaćenja (udjel osoba sa zapečaćenim jamicama i fisurama na zubima), iskustvo s karijesom (prosječan broj zuba s bilo kojim oblikom karijesa – aktivnim karijesom, ispunom kao posljedicom karijesa ili izvađenih zuba kao posljedicom karijesa), intenzitet zubnog karijesa (prosječan broj zuba s aktivnim karijesnim lezijama) i broj izvađenih i ispunjenih zuba.

Razlika u prevalenciji aktivnog karijesa, udjelu osoba sa zdravom denticijom, osoba sa zapečaćenim jamicama i fisurama između spolova – posebno za mliječne i trajne zube – analizirana je χ^2 testom. Razlika u iskustvu s karijesom, intenzitetu aktivnog karijesa te broju izvađenih i ispunjenih mliječnih i trajnih zuba, analizirana je među spolovima t-testom. Snaga efekta, tj. veličina razlike među spolovima kvantificirana je Cramerovim V testom za χ^2 test, te jednadžbom $r = \sqrt{t^2}/ (t^2 + df)$ za t-test. Za interpretaciju snage efekta korišteni su Cohenovi kreiteriji: r = 0,1 - 0,3 = niska; r = 0,3 - 0,5 = srednja; r = >0,5 = visoka. Statistička analiza obavljena je softverom IBM SPSS 22 (IBM Corp., Armonk, SAD) sa značajnošću postavljenom na $p < 0,05$.

Rezultati

Nije bilo statistički značajnih razlika među vrstama denticije između spolova, iako su žene nešto češće imale trajnu denticiju (tablica 1.).

Prevalencija zdrave trajne denticije kod djece upućene ortodontu (broj karioznih, ekstrahiranih i ispunjenih zuba, KEP = 0) bila je 39 % (slika 1.). Unutar mješovite denticije 20 % djece imalo je mliječne zube bez karijesa i 50 % trajne zube bez karijesa. Ukupno je 39 % osoba bilo bez karijesa, kad se uzmu u obzir oba tipa denticije (slike 2. i 3.).

Prevalencija aktivnog karijesa na trajnim zubima kod djece upućene ortodontu bila je 30 % – prosječno jedan zub bio je zahvaćen aktivnim karijesom (tablice 2. i 3.). Unutar mje-

and fissures in the mixed and permanent dentition were identified for each patient. Furthermore, the prevalence of active caries lesions (percentage of subjects with at least one active caries lesion), the prevalence of healthy dentition (percentage of subjects who were caries free), the prevalence of subjects who had sealed pits and fissures (percentage of subjects with sealed teeth), dental caries experience (mean number of teeth with any form of caries experience), severity of active dental caries (mean number of teeth with active caries lesions) and severity of extracted and filled teeth were evaluated. In addition to that, the index of past caries experience based on the number of decayed, missing, and filled deciduous (indicated by lower-case "dmft" letters) or permanent (indicated by capital "DMFT" letters) teeth was determined.

The difference in prevalence of subjects with active caries lesions, the prevalence of those with healthy dentition, the prevalence of subjects who had sealed pits and fissures between genders, separately in deciduous and permanent teeth, was analyzed using the χ^2 test. The t-test was used to analyze the difference in caries experience, severity of active caries and severity of extracted and filled teeth of deciduous and permanent teeth between genders. Effect size, i.e. the size of the difference between genders was quantified with Cramer V for χ^2 and with equation $r=\sqrt{t^2}/ (t^2+df)$ for the t-test. To interpret effect size, Cohen's criteria were used: r= 0.1-0.3= low; r= 0.3-0.5= medium; r= >0.5= high. A statistical analysis was performed with IBM SPSS 22 software (IBM Corp., Armonk, USA) with significance at $p< 0.05$.

Results

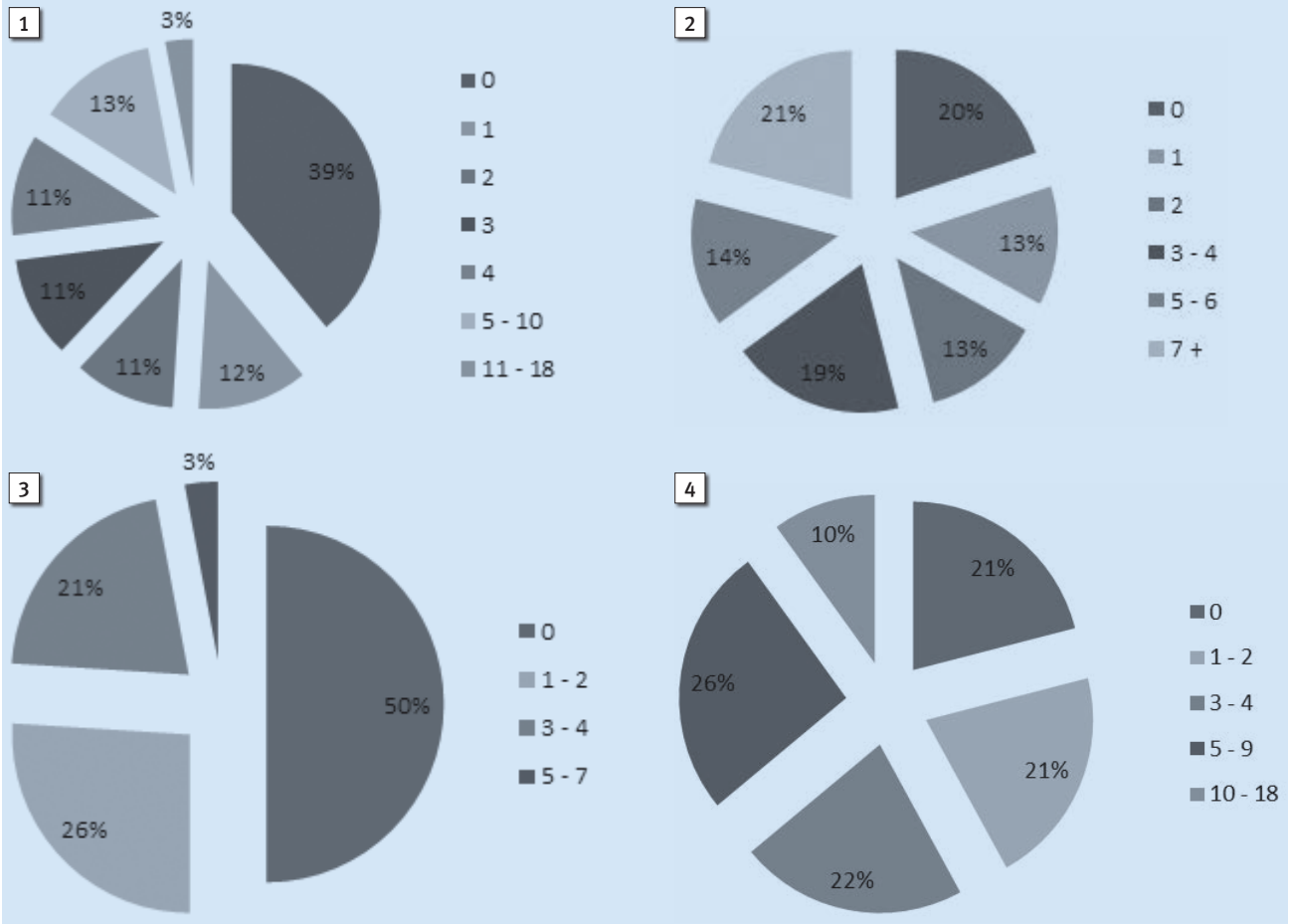
There were no statistically significant differences within the dentition types between genders, although the permanent dentition was found to be slightly more frequent in females (Table 1).

The prevalence of healthy permanent dentition of children referred to orthodontist (DMFT=0) was 39% (Figure 1). Within mixed dentition, there were 20% of children who had caries free deciduous teeth and 50% of them had caries free permanent teeth. Altogether, 39% of subjects were caries free, considering both dentition types (Figures 2 and 3).

The prevalence of the active caries on the permanent teeth of children referred to orthodontist was 30%, while

Tablica 1. Raspodjela vrsta denticije među spolovima
Table 1 Distribution of the dentition types between genders

			Vrsta denticije • Dentition type		Ukupno • Total	P	V
			Mješovita • Mixed	Trajna • Permanent			
Spol • Gender	Muškarci • Male	N	102	56	158		
		Denticija • Dentition (%)	64.6	35.4	100.0		
		Spol • Gender (%)	48.3	40.0	45.0		
	Žene • Female	N	109	84	193		
		Denticija • Dentition (%)	56.5	43.5	100.0		
		Spol • Gender (%)	51.7	60.0	55.0	0.127	0.082
Ukupno • Total		N	211	140	351		
		Denticija • Dentition (%)	60.1	39.9	100.00		
		Spol • Gender (%)	100.0	100.0	100.00		



Slika 1. Raspodjela karijesnog iskustva u mješovitoj i trajnoj denticiji (u rasponu od 0 do 18) među ispitanicima (prikazano u postotcima)
Figure 1 Distribution of the caries experience of the permanent teeth in mixed and permanent dentition (in range from 0 to 18) among participants (displayed as percentage)
Slika 2. Raspodjela iskustva s karijesom na mliječnim zubima u mješovitoj denticiji (u rasponu od 0 do 7+) među ispitanicima (prikazano u postotcima)
Figure 2 Distribution of the caries experience of the deciduous teeth in mixed dentition (in range from 0 to 7 +) among participants (displayed as percentage)
Slika 3. Raspodjela iskustva s karijesom na trajnim zubima u mješovitoj denticiji (u rasponu od 0 do 7) među ispitanicima (prikazano u postotku)
Figure 3 Distribution of the caries experience of the permanent teeth in mixed dentition (in range from 0 to 7) among participants (displayed as percentage)
Slika 4. Raspodjela iskustva s karijesom u trajnoj denticiji (u rasponu od 0 do 18) među ispitanicima (prikazano u postotku)
Figure 4 Distribution of the caries experience in the permanent dentition (in range from 0 to 18) among participants (displayed as percentage)

Tablica 2. Prevalencija aktivnog karijesa trajnih zuba s obzirom na tip denticije
Table 2 Prevalence of the active caries of the permanent teeth, regarding the dentition type

			Aktivni karijes trajnih zuba • Active caries of the permanent teeth		Ukupno • Total	P	V
			Da • Yes	Ne • No			
Vrsta denticije • Dentition type	Mješovita • Mixed	N	45	166	211		
		Aktivni karijes • Active caries (%)	21.3	78.7	100.0		
		Denticija • Dentition (%)	44.6	66.4	60.1		
	Trajna • Permanent	N	56	84	140		
		Aktivni karijes • Active caries (%)	40.0	60.0	100.0		
		Denticija • Dentition (%)	55.4	33.6	39.9	p<0.001	0.202
Ukupno • Total		N	101	250	351		
		Aktivni karijes • Active caries (%)	28.8	71.2	100.0		
		Denticija • Dentition (%)	100.0	100.0	100.0		

Tablica 3. Intenzitet zdravih zuba i iskustvo s karijesom s obzirom na tip denticije
Table 3 Severity of the healthy teeth and caries experience, regarding the dentition type

	Vrsta denticije • Dentition type	
	Mješovita • Mixed	Trajna • Permanent
Intenzitet zdravih mliječnih zuba • Severity of the healthy deciduous teeth	5.5±4.3	
Intenzitet aktivnog karijesa mliječnih zuba (k) • Severity of the active caries of the deciduous teeth (d)	2.5±2.9	
Intenzitet ispuna na mliječnim zubima (p) • Severity of the filled deciduous teeth (f)	1.0±1.6	
Iskustvo s karijesom na mliječnim zubima (kp) • Caries experience of the deciduous teeth (df)	3.6±3.2	
Intenzitet zdravih trajnih zuba • Severity of the healthy permanent teeth	13.0±5.0	22.8±4.0
Intenzitet aktivnog karijesa trajnih zuba (K) • Severity of the active caries of the permanent teeth (D)	0.4±0.8	1.1±2.1
Intenzitet izvađenih trajnih zuba (E) • Severity of the extracted permanent teeth (M)	0.01±0.2	0.2±0.5
Intenzitet ispuna na trajnim zubima (P) • Severity of the filled permanent teeth (F)	0.9±1.4	2.9±3.3
Iskustvo s karijesom na trajnim zubima (KEP) • Caries experience of the permanent teeth (DMF)	1.3±1.6	4.2±4.1

šovite denticije prevalencija aktivnog karijesa na mliječnim zubima bila je 68 %, s prosječno gotovo tri zuba s aktivnim karijesom. Prevalencija aktivnog karijesa na trajnim zubima u mješovitoj denticiji bila je 21 %. Ukupno je prevalencija aktivnog karijesa na trajnim zubima u mješovitoj i trajnoj denticiji iznosila 29 % (tablica 2.).

Iskustvo s karijesom bilo je nešto veće u mješovitoj denticiji negoli u trajnoj (prosječno su četiri mliječna i jedan trajni zub u mješovitoj denticiji, te četiri trajna zuba u trajnoj denticiji imali karijes) (tablica 3.). Razlika u iskustvu s karijesom između spolova nije bila značajna (tablica 4.). Uočeno je ne-

there was, on average, one tooth with active carious lesion (Table 2 and 3). Within mixed dentition, the prevalence of active caries lesions on deciduous teeth was 68%, with almost three teeth, on average, having active caries lesions. The prevalence of the active caries on the permanent teeth in the mixed dentition was 21%. Altogether, the prevalence of active caries on permanent teeth, both in mixed and permanent dentition was 29% (Table 2).

Caries experience was slightly higher in the mixed than in the permanent dentition (on average, 4 deciduous and 1 permanent teeth in the mixed dentition and 4 permanent teeth

Tablica 4. Intenzitet zdravih zuba i iskustvo s karijesom s obzirom na spol
Table 4 Severity of the healthy teeth and caries experience, in relation to gender

	Spol • Gender		P*	r**
	Muškarci • Male	Žene • Female		
Intenzitet zdravih mliječnih zuba • Severity of the healthy deciduous teeth	6.0±4.4	5.0±4.1	0.091	0.120
Intenzitet aktivnog karijesa na mliječnim zubima (k) • Severity of the active caries on the deciduous teeth (d)	2.3±2.6	2.7±3.1	0.345	0.060
Intenzitet ispuna na mliječnim zubima (p) • Severity of the filled deciduous teeth (f)	1.1±17	0.9±1.5	0.498	0.050
Iskustvo s karijesom na mliječnim zubima (kp) • Caries experience of the deciduous teeth (df)	3.4±3.0	3.7±3.3	0.614	0.030
Intenzitet zdravih trajnih zuba u mješovitoj denticiji • Severity of the healthy permanent teeth in the mixed dentition	12.5±5.1	13.5±4.9	0.123	0.110
Intenzitet aktivnog karijesa trajnih zuba (K) u mješovitoj denticiji • Severity of the active caries of the permanent teeth (D) in the mixed dentition	0.4±0.8	0.4±0.9	0.773	0.020
Intenzitet izvađenih trajnih zuba (E) u mješovitoj denticiji • Severity of the extracted permanent teeth (M) in the mixed dentition	0.01±0.1	0.02±0.2	0.687	0.030
Intenzitet ispuna na trajnim zubima (P) u mješovitoj denticiji • Severity of the filled permanent teeth (F) in the mixed dentition	1.0±1.4	0.8±1.4	0.383	0.060
Iskustvo s karijesom na trajnim zubima (KEP) u mješovitoj denticiji • Caries experience of the permanent teeth (DMF) in the mixed dentition	1.4±1.6	1.2±1.6	0.399	0.060
Intenzitet zdravih zuba u trajnoj denticiji • Severity of the healthy teeth in the permanent dentition	22.7±3.8	22.9±4.2	0.766	0.025
Intenzitet aktivnog karijesa (K) u trajnoj denticiji • Severity of the active caries (D) in the permanent dentition	1.3±2.6	1.0±1.7	0.364	0.077
Intenzitet izvađenih zuba (E) u trajnoj denticiji • Severity of the extracted teeth (M) in the permanent dentition	0.1±0.3	0.2±0.7	0.100	0.140
Intenzitet ispuna (P) u trajnoj denticiji • Severity of the filled teeth (F) in the permanent dentition	2.9±3.1	2.9±3.4	0.975	0.003
Iskustvo s karijesom (KEP) u trajnoj denticiji • Caries experience (DMF) in the permanent dentition	4.3±3.7	4.1±4.4	0.820	0.019

*P < 0,05 statistički značajna razlika • *P < 0.05 statistically significant difference
**vrijednost r izračunata je jednadžbom $r = \sqrt{t^2}/ (t^2 + df)$ • **value r was calculated via equation $r=\sqrt{t^2}/ (t^2+df)$

što više zdravih i ispunjenih mliječnih zuba u muškoj populaciji te nešto više aktivnog karijesa mliječnih zuba kod ženske populacije.

Prevalencija pečaćenja jamica i fisura kod djece i adolescenata upućenih ortodontu bila je 13,4 % – podjednako u objema denticijama i obama spolovima. Prosječno je 0,3 ± 0,9 zuba bilo pečaćeno u ukupnom uzorku – podjednako u objema denticijama i obama spolovima. Kod osoba koje su imale barem jedan pečaćeni zub prosječno je pečaćeno 2,1 ± 1,4 zuba – podjednako u objema denticijama i obama spolovima.

Rasprava

Ovo istraživanje pokazuje da hrvatski stomatolozi upućuju ortodontu i djecu i adolescente a da im prije toga ne saniraju zube, što odgađa njihovo uključivanje u ortodontsku terapiju. Gotovo 70 % djece dolazi ortodontu s karioznim mliječnim zubima i 30 % s karioznim trajnim zubima. Pacijenti poslani ortodontu imaju prosječno tri kariozna mliječna zuba i jedan kariozni trajni zub. Jedan od svaka 3,5 pacijenta ima aktivni karijes, prema jednom od pet iz ranije slične studije (11). Sudeći prema ovim podatcima, intenzitet iskustva u Hrvatskoj ne dosiže ciljeve koje je postavio SZO (5). Cilj, kad je riječ o karijesu, bio je za dvanaestogodišnju djecu do 2000. godine ispod 3, a za 2010. godinu ispod jedan (1). Treba uzeti u obzir činjenicu da bi ortodontu trebali biti upućeni pacijenti sa zdravom denticijom i ostalim mekim tkivima i s dobrom oralnom higijenom, što je trebao procijeniti njihov primarni stomatolog koji ih je poslao ortodontu. Ova zapažanja potvrđena su istraživanjem provedenim tijekom 2008. i 2009. godine na istom području, kada su šestogodišnja i sedmogodišnja djeca imala prije početka škole prevalenciju karijesa mliječnih zuba 75 % (u prosjeku 3,7 karioznih zuba) i trajnih zuba 12 % (prosječno 0,1 kariozni zub) (2).

Prema ciljevima SZO-a, do 2020. godine trebalo bi smanjiti broj zubnog karijesa i povećati udjel šestogodišnje djece bez karijesa te smanjiti udjel pacijenata koji će eventualno izgubiti zub zbog karijesa (16).

Karijes češće pogađa mliječne zube jer su i njihova caklina i dentin tanji negoli na trajnim zubima. Djeca također vole slatke međuobroke i pića (tj. hranu zasićenu ugljikohidratima) i smanjena im je sposobnost održavanja oralne higijene (1). Karijes mliječnih zuba također je često ozbiljniji negoli na trajnim zubima, jer se često otkrije u uznapredovalom stadiju i /ili nije ispravno tretiran zbog slabe suradnje pacijenta. Rezultati ove studije upućuju na činjenicu da su trajni zubi češće tretirani ispunima u odnosu na mliječne.

Više od 60 % trajnih zuba i 80 % mliječnih zuba imalo je karijes, što potvrđuje da je svijest o tome da zubi i oralne strukture trebaju biti zdravi sveukupno niska. Veliko iskustvo s karijesom najvjerojatnije je rezultat loših navika u održavanju oralne higijene, rijetkih redovitih dentalnih kontrola te niske stope i preventivnih i kurativnih postupaka na mliječnim zubima.

in the permanent dentition experienced caries) (Table 3). The difference regarding the caries experience between genders was not significant (Table 4). There was slightly higher severity of healthy and filled deciduous teeth within the male population and slightly higher severity of active deciduous caries within the female population.

The prevalence of pits and fissure sealing in children and adolescents referred to an orthodontist was 13.4% and was equal for both dentitions and genders. On average, 0.3 ± 0.9 teeth were sealed in the entire sample, equally in both dentitions and genders. Within the children and adolescents who had at least 1 sealed tooth, there were on average 2.1 ± 1.4 sealed teeth, equally in both dentitions and genders.

Discussion

This research points to the fact that Croatian dentists refer both children and adolescents with unhealthy teeth to an orthodontist, which postpones their inclusion in the orthodontic treatment. Almost 70% of children are referred to orthodontist with decayed deciduous teeth and 30% with decayed permanent teeth. The patients referred to an orthodontist have, on average, three carious deciduous teeth and one carious permanent tooth. One in 3.5 patients has active caries, as opposed to one in 5 in a previous similar study (11). According to these data, the severity of caries experience in Croatia is above the goals set by the World Health Organization (WHO) (5). In 2000, a goal for 12-year olds was the DMFT below three, and for year 2010 below one (1). However, the fact that needs to be considered is that patients who are referred to an orthodontist have supposedly healthy dentition, as well as other soft tissues and, also, good oral hygiene, as evaluated by their referring dentists. These observations were confirmed by the research conducted during years 2008 and 2009 in the same region, where six- and seven-year olds had prevalence of dental caries on deciduous teeth 75% (3.7 carious teeth on average) and on permanent teeth 12% (0.1 carious teeth on average) before starting school (2).

The WHO goals for 2020 are to reduce the severity of dental caries and increase the percentage of six-year olds who are caries free as well as to reduce the percentage of the patients who eventually lose a tooth due to dental caries (16).

Caries strikes the primary teeth more often because both enamel and dentin of the primary teeth are thinner than those of the permanent teeth. Also, children are fond of sweetened food and drinks (i.e. saturated with carbohydrates) furthermore, they have the reduced capability of oral hygiene maintenance (1). Also, caries is often more severe on the deciduous teeth than on the permanent teeth. The fact is that caries is often detected too late; when it has progressed to a later stage and/or is not properly treated due to the poor cooperation. The findings from this study show that permanent teeth get treated more often with dental fillings and preventive measures than deciduous teeth.

More than 60% of permanent teeth, as well as 80% of deciduous teeth have had caries experience, which confirms the fact that the awareness of importance of having healthy oral structures is low. High scores of caries experience are most

Žene imaju nešto veće iskustvo s karijesom na mliječnim zubima, više zuba s aktivnim karijesom i manje zdravih mliječnih zuba negoli muškarci koji imaju veće iskustvo s karijesom i manje zdravih zuba u trajnoj denticiji. Ovo opažanje može se objasniti činjenicom da djevojčice češće osjećaju tjeskobu kad je riječ o stomatološkom zahvatu, ali tijekom odrastanja bolje shvaćaju važnost oralnog zdravlja od dječaka, usvajaju bolje higijenske navike i raste njihov stupanj suradnje sa stomatologom (17).

Usporedba prevalencije i intenziteta aktivnog karijesa, iskustva s karijesom i intenziteta saniranosti mliječnih i trajnih zuba navodi na zaključak da bi naglasak trebalo staviti i na preventivne i na restaurativne zahvate na mliječnim zubima. Trajni zubi češće su sanirani ispunima negoli mliječni, što se može objasniti široko rasprostranjenim stajalištem: *mliječne zube ne treba popravljati jer će tako i tako ispasti*. Dio problema povezanih s nesaniranim karioznim mliječnim zubima jest u nezadovoljavajućoj organizaciji javnoga dentalnog zdravstvenog sustava. Zbog toga velik broj pacijenata treba restaurativne zahvate umjesto pravodobnih preventivnih mjera. Zbog nerazmjera između velikog broja pacijenata s obzirom na broj dentalnih timova, duže su i liste čekanja između dvaju uzastopnih posjeta, što također pridonosi činjenici da klinički slučajevi često nisu pravodobno odgovarajuće tretirani. Nadalje, opći stomatolozi koji imaju ugovor s Hrvatskim zavodom za zdravstveno osiguranje (HZZO), imaju mjesečni financijski limit koji ograničava dentalne zahvate, a ako ga liječnik prijeđe prijeti mu financijski gubitak. Uz to velik dio radnog vremena specijalist ortodoncije, kojeg plaća HZZO troši se na brojenje i evidentiranje karioznih zuba te dopisivanje s primarnim stomatologom, što pridonosi neučinkovitom trošenju javnog novca.

Opažena su kretanja u karioznoj trajnoj denticiji 12-godišnjaka u Hrvatskoj u razdoblju od 1968. do 1999. (18). Godine 1968. nije bilo djece bez karijesa i prosječan KEP indeks iznosio je 7. Nakon toga, karijes je kod djece bio u opadanju te je 1991. godine prosječan KEP indeks je bio 2,6 (29 % djece bilo je bez karijesa). No, zbog Domovinskoga rata (od 1991. do 1995.), ukidanja preventivnih mjera i privatizacije ordinacija dentalne medicine, intenzitet iskustva s karijesom povećao se na prosječni KEP 3,5 u 1999. godini (15 % djece bilo je bez karijesa) (18). Jednako tako je pad broja karijesa uočen u gradu Zagrebu od 1985. do 1992 godine, kada su 6-godišnjaci imali prosječan KEP indeks 5,9 1985. godine te 4,4 1992. godine. Također se udjel djece bez karijesa u istom razdoblju povećao od 16 % na 27 % (19).

Intenzitet karijesa u Hrvatskoj ima uzlaznu stopu u odnosu na dob (za dob od 7 do 14 godina), ali nije povezan sa spolom (1). Djeca i adolescenti u dobi od 11 do 14 godina 2009. godine, te od 15 do 18 godina 2006. godine imali su u gradu Zagrebu nešto više vrijednosti iskustva s karijesom te intenzitet aktivnog karijesa u odnosu na djecu upućenu ortodontu u ovoj studiji (1, 5). Broj karijesa od 2013. do 2015. na mliječnim zubima 6-godišnjaka u Hrvatskoj može se pratiti zahvaljujući Centralnom zdravstvenom informatičkom sustavu Republike Hrvatske (CEZIH). U navedenom razdoblju prosječni KEP indeks bio je 4,1, a za trajne zube 12-godišnjaka iznosio je 4,2 (19). Hrvatska komora dentalne medicine pro-

probably a result of poor oral hygiene habits, low frequency of regular dental check-ups as well as low rate of both preventive and curative treatments on the deciduous teeth.

The female participants had slightly higher scores of caries experience on their deciduous teeth, more teeth with active caries and less healthy deciduous teeth than male participants, whereas male participants had higher scores of caries experience and less healthy teeth in the permanent dentition. This can be explained by the fact that girls suffer from dental anxiety more often than boys. Yet, while growing up girls tend to understand the importance of oral health in a better way than their male counterparts. Also, girls adopt better hygiene habits than boys thus increasing the degree of co-operation with dentists (17).

The comparison of the prevalence and severity of caries, caries experience and severity of treated deciduous and permanent teeth lead to a conclusion that the emphasis should be put on both preventive and curative measures of deciduous teeth. The permanent teeth are more often treated with dental fillings than deciduous teeth, which can be interpreted by a widespread belief that deciduous teeth are not to be treated because they will fall out anyway. Part of the problems associated with uncured carious deciduous teeth may be attributed to unsatisfactory organization of the public dental health system. Consequently, the majority of patients receive restorative treatments rather than preventive measures. Due to the discrepancy between a large number of patients and a small number of dental teams, there are longer waiting lists and longer time spans between the two consecutive visits, thus creating the situation in which clinical cases often do not get suitable treatment on time. Furthermore, general dental practitioners, who have the contract with Croatian National Health Insurance Company (*Croatian* acronym HZZO), have a monthly financial limit regarding dental procedures; surpassing the monthly maximum could lead to financial losses. Besides, the vast majority of orthodontic specialists' chair time paid by the HZZO is spent on counting the patients' carious teeth, which contributes to the inefficient use of public money.

There were fluctuations in the carious permanent dentition of 12-year olds in Croatia from 1968 to 1999 (18). In 1968, there were not any children with caries free dentition and the mean DMFT score was 7. After 1968, caries experiences of the children had a descendant rate and in year 1991 the mean DMFT score was 2.6 (29% of the children had caries free dentition). However, due to the Croatian war for the independence (from 1991 to 1995), annulment of preventive measures and privatization of dental offices, severity of caries experience increased to the DMFT mean of 3.5 in 1999 (15% of the children had caries free dentition) (18). An equally descending trend of severity of caries experience from year 1985 to 1992 has been perceived in the city of Zagreb, where 6-year olds had mean dmft score 5.9 in 1985 and 4.4 in 1992. Also, the prevalence of children with the caries free dentition increased in the same period from 16 to 27% (19).

Severity of caries experience in Croatia has an increasing rate in relation to age (from age of 7 until 14), but has no relation to gender (1). In 2009, children and adolescents,

vela je nacionalno istraživanje tijekom 2015. godine i kao rezultat prosječni je KEP indeks 12-godišnjaka bio 4,5 (prevalencija aktivnog karijesa bila je 51 %) (20). U zemljama istočne Europe posljednjih nekoliko godina bilježi se spor, ali pozitivan trend u smanjenju karijesa, no u Hrvatskoj se događa suprotno (19).

Zubni karijes i njegove posljedice najčešći su razlog za gubitak zuba u svim dobnim skupinama u Hrvatskoj. Zato je prijeko potrebno podignuti svijest javnosti o važnosti dobre oralne higijene u svakoj dobi. Opći stomatolozi trebali bi provoditi više vremena poučavajući pacijente o održavanju dobre oralne higijene i o redovitim pregledima kako bi se zube, ako je potrebno, tretiralo na vrijeme (10). Unatoč jednostavnosti i velikom omjeru troška i koristi, preventivno pečaćenje zuba ne koristi se koliko bi trebalo. U sklopu sredstava zdravstvenog osiguranja koja su na raspolaganju za dentalnu medicinu, preraspodjela s kurativnih na preventivne mjere mogla bi se iskoristiti za poboljšanje oralnog zdravlja.

Zaključak

U Hrvatskoj je loše oralno zdravlje djece i adolescenata upućenih ortodontu. Naime, jedno od 3,5 djece ima karijes, a jedno od 7,5 djece ima preventivno zapečaćene fisure. Upućivanje djece i adolescenata s aktivnim karijesom ortodontu gubitak je radnog vremena specijalista i odgađa početak ortodontske terapije. Opći stomatolozi trebali bi imati na umu da samo pacijenti sa zdravom denticijom i dobrom oralnom higijenom trebaju biti poslani ortodontu. Preventivne mjere trebale bi se primjenjivati češće i pravodobno.

Zahvale

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Sukob interesa

Nije bilo sukoba interesa.

aged 11-14 and 15-18 in year 2006 in the city of Zagreb, had slightly higher values of caries experience and severity of active caries in relation to children referred to an orthodontist in this study (1, 5). Severity of the caries experience in the period from 2013 to 2015 on deciduous teeth of the 6-year olds in Croatia can be monitored by the Central Health Informational System of the Republic of Croatia (*Croatian* acronym CEZIH). In this period, the mean dmft score was 4.1, whereas for the permanent teeth of 12-year olds, the DMFT score was 4.2 (19). In 2015, the Croatian Dental Chamber has conducted a national survey, and as a result the mean DMFT score of 12-year olds was 4.5 (prevalence of active caries was 51%) (20). Recently, the countries from the eastern European region, according to the WHO data, have shown a slow but positive trend in caries reduction. In Croatia, this trend was reversed (19).

Dental caries and its consequences are the most common reasons for tooth loss in Croatia in every age group. Therefore, it is necessary to raise the public awareness about the importance of having good oral health at every age. General dentists should spend more time educating patients about the maintenance of the good oral hygiene and require regular check-ups so that teeth can be treated timely, if necessary (10). In spite of its simplicity and great cost/benefit ratio, preventive teeth sealing is not used to the extent scientific data would recommend. Within the health insurance funds available for dentistry, redistribution from the curative to the preventive measures might be beneficial to the improvement of the oral health.

Conclusions

Oral health of the children and the adolescents who are referred to an orthodontist in Croatia is poor. Out of 3.5 children, one child has caries, and one in 7.5 children has preventive tooth sealant. The referral of the caries active children and adolescents to the orthodontist presents loss of the specialist's time and postpones the commencement of children's orthodontic treatment. General dentists should bear in mind the fact that only patients with healthy dentition and good oral hygiene should be referred to an orthodontist. Preventive measures should be more often and timely employed.

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Conflict of Interest

None declared

Abstract

Objective of work: Caries represents a significant public health problem. Caries free dentition and good oral hygiene are prerequisites for inclusion into orthodontic treatment. The objective of this research was to assess oral health of the patients referred for an orthodontic assessment. **Subjects and methods:** In this cross sectional study, dental records of 351 patients aged 6-23 years (55% females), were referred to an orthodontist by general dentist during 2014 and 2015 in the Rijeka region, and the records were subsequently analyzed. Prevalence of caries, caries experience and active caries related to gender and dentition type were analyzed. **Results:** In subjects with the mixed dentition, who were referred to an orthodontist, caries prevalence was 68% in deciduous teeth, caries experience was 3.6, and active caries was present in 2.5 teeth; in permanent teeth in mixed dentition the values were 21%, 1.3 and 0.4., respectively. The values in subjects with permanent dentition were as follows: 40%, 4.2, and 1.1. Caries was more frequent in deciduous teeth, and there were more fillings in permanent teeth compared to deciduous teeth. There were no gender related differences. **Conclusions:** Oral health of children and adolescents referred to an orthodontic consultation is not satisfactory. General dentists frequently refer patients with caries to an orthodontic consultation. However, the presence of caries postpones inclusion into orthodontic treatment. It is important to begin raising general dentists' awareness of the need to refer to an orthodontist only those patients who have healthy dentition and good oral hygiene.

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Key words
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