

Dinka Diklić¹, Eva Klarić Sever², Nada Galić², Jelena Spajić³, Katica Prskalo²

Stajališta studenata različitih fakulteta Sveučilišta u Zagrebu prema postupku izbjeljivanja zuba

Attitudes of Students of Different Schools of University of Zagreb on Tooth Bleaching

¹ Dom zdravlja Zagreb – Zapad, Hrvatska
Community Health Center Zagreb, Croatia

² Zavod za endodonciju i restorativnu stomatologiju Stomatološkog fakulteta Sveučilišta u Zagrebu, Hrvatska
Department of Endodontics and Restorative Dentistry, School of Dental Medicine, University of Zagreb, Croatia

³ Dom zdravlja Zagreb – Centar, Hrvatska
Community Health Center Zagreb, Croatia

Sažetak

Svrha: Nakana je bila usporediti osviještenost studenata četiriju različitih fakulteta Sveučilišta u Zagrebu o oralnom zdravlju i estetskom postupku izbjeljivanja zuba. **Materijali i metode:** U istraživanju je sudjelovalo 158 ispitanika obaju spolova – 38 studenata Stomatološkog fakulteta te po 40 studenata Medicinskog, Ekonomskog i Građevinskog fakulteta Sveučilišta u Zagrebu. Svi su rješavali anketu s ponudnim odgovorima zaokruživanjem onoga koji smatraju točnim. **Rezultati:** Informacije o oralnom zdravlju prati tek 12 posto ispitanika. Više od dvije trećine svih pere zube dva puta na dan, ali nema statistički značajne razlike među uzorcima s obzirom na fakultet ili spol. Više od polovine ispitanika (55 %) zadovoljno je izgledom svojih zuba, a 12 posto u cijelosti je zadovoljno. Gotovo 80 posto svih ispitanika razlikuje postupak izbjeljivanja od poliranja zuba te, očekivano, bolju prevalenciju imaju studenti dentalne medicine i medicine. Ako bi se odlučili na tretman izbjeljivanja zuba, stomatologa bi posjetilo 80 posto svih ispitanika s obzirom na to da manje od polovine (46 %) svih njih smatra da taj postupak sigurno ima neželjene posljedice. **Zaključak:** Postoji razlika u znanju o oralnoj higijeni i postupku izbjeljivanja zuba među studentima fakulteta Dentalne medicine te Medicinskog, Ekonomskog i Građevinskog fakulteta. Studenti Dentalne medicine pokazali su najbolje znanje o izbjeljivanju zuba i o oralnoj higijeni, što je i očekivano s obzirom na obrazovno usmjerenje.

Zaprimljen: 30. rujna 2016.
Prihvaćen: 9. studenoga 2016.

Adresa za dopisivanje
Eva Klarić Sever
Sveučilište u Zagrebu
Stomatološki fakultet
Zavod za endodonciju i restorativnu
stomatologiju
Gundulićeva 5, 10000 Zagreb
Hrvatska
Tel:+38514899203
eklaric@sfzg.hr

Ključne riječi
izbjeljivanje zuba; oralna higijena;
studenti; stavovi

Uvod

Želja za lijepim osmijehom provlači se kroz cijelu čovjekovu povijest. Budući da su usta i zubi među dominantnim detaljima našega lica, ne iznenađuje činjenica da se lijep, bijel i blistav osmijeh nameće gotovo kao imperativ, što posebno danas dolazi do izražaja. Boja zuba je raznovrsna i pojavljuju se različite nijanse, a proizlazi iz njihove građe, udjela organskih i anorganskih komponenti u caklini i dentinu, te o spektralnoj distribuciji ulazne zrake svjetlosti (1 – 3). Pojedini čimbenici potiču niz kemijskih reakcija u samoj strukturi zuba i na taj ga način diskoloriraju. S obzirom na uzročnike, razlikujemo endogenu (4 – 7) i egzogenu diskoloraciju (8, 9).

Izbjeljivanje zuba najjednostavniji je i najučinkovitiji postupak za liječenje diskoloracija. Razlikujemo interno izbjeljivanje na avitalnim zubima i eksterno na vitalnim zubima. Postupak se obavlja aplikacijom karbamidnog peroksida, vodikova peroksida ili natrijeva perborata s uporabom izbora svjetlosti ili bez njega. Izbjeljivanje vitalnih zuba može se obavljati pod nadzorom doktora dentalne medicine (*in-offi-*

Introduction

The desire for a beautiful smile has been present throughout ages. Since a smile and the teeth are the most dominant details of our faces, it is not surprising that a beautiful smile and white teeth have become such a strong imperative, which is particularly evident at the present time. Tooth color is variable and numerous, and it is the result of the tooth structure and a combination of organic and inorganic components of the enamel and dentin and spectral distribution of incoming light (1-3). Certain factors trigger a cascade of chemical reactions in the tooth structure and thereby cause its discoloration. Considering the causes, discoloration can be endogenous (4-7) and exogenous (8, 9).

Tooth bleaching is considered the easiest and most cost-effective procedure for treating tooth discoloration. Bleaching can be performed internally on non-vital teeth or externally on vital teeth. Bleaching can be performed by applying carbamide peroxide, hydrogen peroxide or sodium perborate with/without additional light activation. There are different

ce *bleaching*) kada se upotrebljava veća koncentracija sredstva za izbjeljivanje uz zaštitu gingive, ili kod kuće (*at home bleaching*) s nižom koncentracijom kemijskoga agensa (10 – 12). Mehanizam izbjeljivanja također nije jasan. Smatra se da je izbjeljivanje oksidacijska reakcija tijekom koje se peroksid metabolizira u vodu i slobodne radikale s pojedinačnim elektronom koji ulazi u reakciju s kromagenim faktorima te ih dekolorizira ili potpuno razgrađuje (13, 14).

Otkako je izbjeljivanje zuba postao uobičajen postupak u svakodnevnom kliničkom radu, postavlja se pitanje biološkog, štetnog utjecaja hidrogen-peroksida na zubne strukture. Iz prikupljenih podataka jasno je da je izbjeljivanje zuba na temelju peroksida siguran i učinkovit postupak ako se koristi prema uputama. Najčešća nuspojava toga postupka jest prolazna preosjetljivost zuba i gingivalna iritacija od blagog do umjerenog intenziteta. Cervikalna resorpcija korijena moguća je posljedica internog izbjeljivanja. Sredstva za izbjeljivanje ne uzrokuju značajne promjene u strukturi cakline i dentina ili na njihovoj površini. Za uspješnu terapiju ključno je definirati indikacije i kontraindikacije, pravilno postaviti dijagnozu i odabrati najsigurniju metodu izbjeljivanja zuba (15 – 17).

Svrha ovog istraživanja bila je usporediti osviještenost studenata četiriju različitih fakulteta Sveučilišta u Zagrebu o oralnom zdravlju i estetskom postupku izbjeljivanja zuba. Nulta hipoteza bila je da nema razlike u znanju studenata Stomatološkog, Medicinskog, Ekonomskog i Građevinskog fakulteta Sveučilišta u Zagrebu o oralnoj higijeni i izbjeljivanju zuba.

Ispitanici i postupci

Studiju je odobrilo Etičko povjerenstvo fakulteta Dentalne medicine Sveučilišta u Zagrebu. U istraživanju je sudjelovalo 158 ispitanika obaju spolova – 38 studenata Stomatološkog fakulteta, te po 40 studenata Medicinskog, Ekonomskog i Građevinskog fakulteta Sveučilišta u Zagrebu. Ispitanicima je objašnjena svrha istraživanja te su zamoljeni da dobrovoljno sudjeluju. Zatim su rješavali anketu s ponuđenim odgovorima tako da su zaokružili onaj koji su smatrali točnim (slika 1.). Dobiveni podatci uneseni su u bazu podataka i statistički obrađeni programskim paketom SPSS. Rezultati su testirani primarno neparametrijskim testovima, odnosno Pearsonovim Hi-kvadratom, a jedno pitanje testirano je T-testom, tj. ANOVA-om.

Rezultati

Od ukupnog broja ispitanika s fakulteta Dentalne medicine, 71,05 posto bile su studentice, a ostalo studenti. Sličan omjer bio je i među studentima Medicinskog i Ekonomskog fakulteta, a na Građevinskom fakultetu podjednako su bila zastupljena oba spola. Raspodjelu prema dobi vidi u tablici 1. Ispitanici smatraju da je izgled važan, ali ne i presudan. Rezultati pokazuju da se njihovi odgovori ne razlikuju značajno s obzirom na spol, dob ili fakultet. Informacije o oralnom zdravlju prati samo desetina ispitanika (12 %), očekiva-

types of vital teeth bleaching procedures including in-office bleaching using high concentrations of bleaching agents with adequate soft tissue protection or at home bleaching procedures with lower concentration of bleaching agents (10-12). The mechanism of bleaching is also unclear. Bleaching is considered to be an oxidation reaction where hydrogen peroxide metabolizes into water and free radicals possess a single electron, which is thought to combine with the chromagens to decolorize or subside them (13,14).

Since tooth bleaching has become a common dental procedure, there are concerns about the biologic adverse effects of hydrogen peroxide. The collected data show that, when used properly, peroxide-based tooth whitening is safe and effective. The most commonly seen side effects are tooth sensitivity and gingival irritation, which are usually mild to moderate and transient. Cervical root resorption is a possible consequence of internal bleaching. Bleaching products do not cause major alterations of enamel and dentin structures or their surfaces. For a successful therapy, it is essential to define indications and contraindications, to correctly set the diagnosis and to select the most suitable tooth-whitening technique (15-17).

The aim of this study was to compare the awareness which students from four different faculties belonging to the University of Zagreb have about oral health and tooth bleaching procedures. The null hypothesis was that there is no difference in knowledge on oral hygiene and tooth bleaching between the students from the School of Dental Medicine, the School of Medicine, the Faculty of Economics and the Faculty of Civil Engineering.

Subjects and methods

The study was approved by the School of Dental Medicine, University of Zagreb Ethics Committee. The study included 158 participants (both male and female) - 38 students from the School of Dental Medicine and 40 students from each faculty as follows: the School of Medicine, the Faculty of Economics and the Faculty of Civil Engineering. The purpose of this study was explained to all participants and they were kindly requested to sign the consent.

After that, the respondents were asked to fill out the survey with multiple choices by marking the answers they considered correct (Figure 1). A statistical analysis was performed using SPSS System. Since the data distribution was not normal, the nonparametric Pearson chi-squared and Anova T-test were used.

Results

Out of the participants surveyed at the School of Dental Medicine, 71.05% were female students, and the rest of them were male students. Similar percentages were found among the students from the School of Medicine and Faculty of Economics, while both sexes were equally represented at the Faculty of Civil Engineering. Age distribution is shown in Table 1. The participants of the study believed that physical appearance is important, but not crucial. The results of the abovementioned study revealed that the respondents' an-

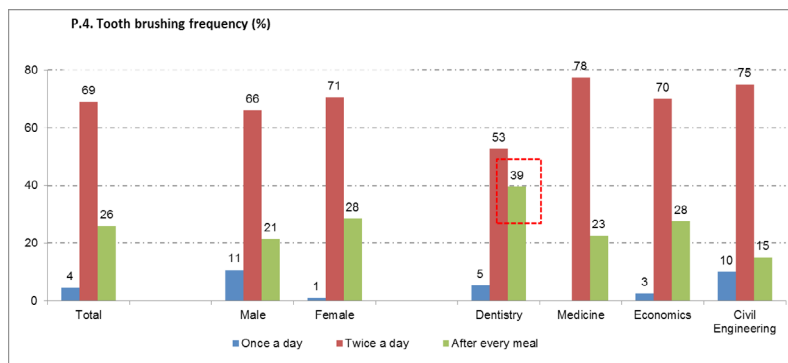
ANKETA • SURVEY

- Koliko vam je važan izgled? • How important is your appearance?
 - presudno mi je važan • vital
 - stalo mi je, ali ne mislim da je najvažniji • I do care, but I do not think that it is most important
 - ni važan, ni nevažan • neither important nor unimportant
 - uopće mi nije stalo do izgleda • in general I do not care about the way I look
- Čitate li rubrike o oralnom zdravlju u novinama/ časopisima/ na internetu i sl.? • Do you read the sections on oral health in newspapers / magazines / Internet etc.?
 - uvijek • always
 - katkad • sometimes
 - nikad • never
- Na stomatološki pregled idete? • How often do you visit the dentist for check-up?
 - svaka 2 do 3 mjeseca • every 2 to 3 months
 - svakih 6 mjeseci • every 6 months
 - jedanput godišnje ili rjeđe • once a year or less frequently
- Zube perete? • How often do you brush your teeth?
 - jedanput dnevno • once a day
 - dvaput dnevno • twice daily
 - nakon svakog obroka • after every meal
 - neredovito • irregular
- Koristite li se zubnim koncem? • Do you use dental floss?
 - da • yes
 - ne • no
- Ocijenite zadovoljstvo vlastitim zubima ocjenom od 1 do 5 (uputa: 1 – uopće nisam zadovoljan/zadovoljna; 5 – potpuno sam zadovoljan/zadovoljna): • Rate the satisfaction with your teeth from 1- 5 (1- not at all satisfied; 5 - I'm totally satisfied):
 - 1
 - 2
 - 3
 - 4
 - 5
- Prema vašem mišljenju, postoji li razlika između postupka IZBJELJIVANJA i postupka POLIRANJA? • According to you opinion, is there a difference between teeth bleaching and teeth polishing?
 - da • yes
 - ne • no
 - ne znam • I do not know
- Jeste li ikad izbjeljivali zube (specijalnim pastama za zube, stomatološkim tretmanom)? • Have you ever whiten your teeth (whitening toothpastes, in-office treatment)?
 - da • yes
 - ne • no
- O pojmu (postupkom) izbjeljivanja prvi put ste doznali iz: • Where did you first hear about tooth bleaching?
 - časopisa • in the magazine
 - na TV-u • on TV
 - od stomatologa • at dental office
 - na internetu • on the Internet
 - u razgovoru s prijateljima • talking to friends
- Biste li željeli izbjeljivati zube? • Would you like to whiten your teeth?
 - da • yes
 - ne • no
 - možda • maybe
- Pretpostavimo da ste se odlučili za spomenuti postupak, vi ćete: • If you decide to whiten you teeth, you will:
 - otići u prodavaonicu i kupiti neki od proizvoda za izbjeljivanje zuba • go to store and buy some teeth bleaching products (over the counter products)
 - otići stomatologu • go to dental office
- Smatrate li da taj postupak ima i neželjene posljedice? • Do you think that teeth bleaching has unwanted side-effects?
 - da, sigurno • yes, definitely
 - možda, ali ne vjerujem • maybe
 - ne znam • I don't know
- Uzročnici koji su zaslužni za tamnjenje zuba su (mogućnost višestrukog izbora): • What are the usual chromogens that may cause teeth discoloration (multiple choice):

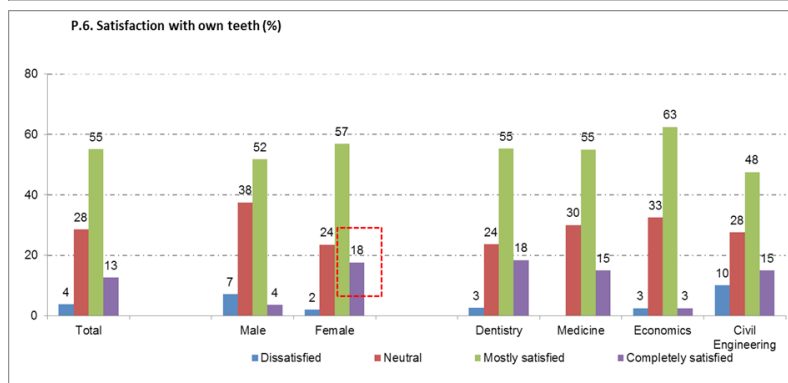
a) kava i čaj • coffee and tea	f) traume • trauma
b) crno vino • red wine	g) antibiotici • antibiotics
c) jaki začini • strong flavors	h) loša higijena • poor hygiene
d) cigarete • cigarettes	i) sve navedeno • all of the above
e) stari ispuni • old fillings	
- Spol: • Gender: a) m. • male b) ž. • female
- Dob: • Age:
 - 18 - 20
 - 21 - 23
 - 24 - 26
 - 26 +

Slika 1. Anketa o oralnoj higijeni i izbjeljivanju zuba
Figure 1 Survey on oral hygiene and tooth bleaching

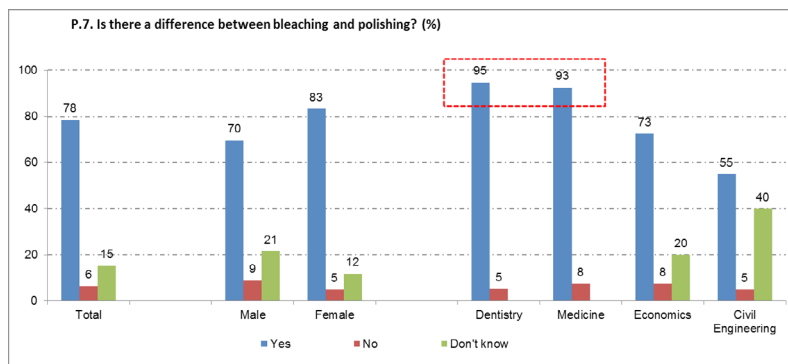
Tablica 1. Opis uzorka Table 1 Description of samples		Spol • Sex		Ukupno • Total
		Muški • Male	Ženski • Female	
	18-20	14	16	30
	21-23	31	84	115
	24-26	10	1	11
	26 +	1	1	2
	Ukupno • Total	56	102	158



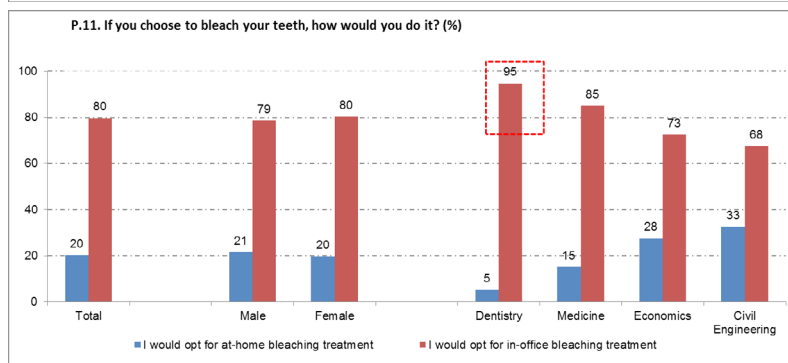
Slika 2. Učestalost pranja zuba
Figure 2. Tooth brushing frequency



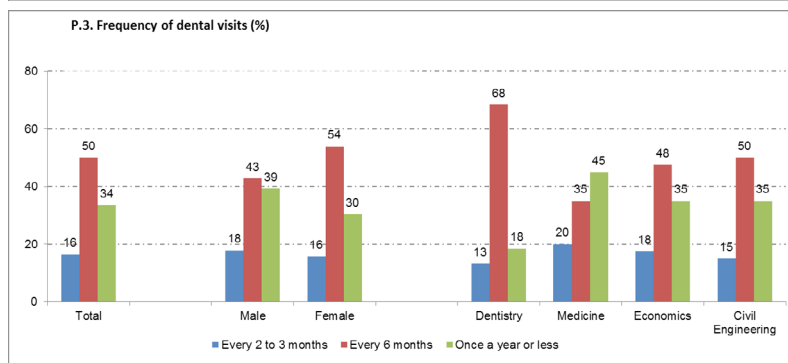
Slika 3. Zadovoljstvo vlastitim zubima
Figure 3. Satisfaction with own teeth



Slika 4. Razlika između postupka izbjeljivanja i poliranja zuba
Figure 4. Difference between teeth bleaching and teeth polishing.



Slika 5. Način provedbe tretmana izbjeljivanja zuba
Figure 5. Option between at home or in-office bleaching treatment



Slika 6. Učestalost odlaska na stomatološki pregled
Figure 6. Frequency of dental visits

no najčešće studenti dentalne medicine (29 %). Više od dvije trećine svih ispitanika pere zube dva puta na dan, što pokazuje da su svjesni važnosti oralnoga zdravlja, ali nema statistički značajne razlike među uzorcima s obzirom na fakultet ili spol (slika 2.). Iako je oralna higijena i zanimanje za nju različito među ispitanicima, zanimljivo je da je kod svih dosta slično zadovoljstvo vlastitim zubima. Više od polovine ispitanika (55 %) zadovoljno je, a 12 posto potpuno je zadovoljno estetikom svojih zuba, a među njima su isključivo djevojke (slika 3.). Gotovo 80 posto svih ispitanika razlikuje postupak izbjeljivanja od poliranja zuba, te očekivano bolju prevalenciju imaju studenti dentalne medicine i medicine (slika 4.). Televizija kao medij za većinu je prvo sredstvo posredstvom kojega su doznali nešto o postupku izbjeljivanja. Trećina svih ispitanika (34 %) željela bi izbjeliti zube. Pritom su muškarci manje zainteresirani (25 %) od žena (39 %). Studenti dentalne medicine imaju veću osviještenost o oralnoj higijeni i, naravno, bolje znanje o postupku izbjeljivanja zuba u usporedbi s ostalim studentima. Ako bi se odlučili za tretman izbjeljivanja zuba, 80 posto svih ispitanika otišlo bi stomatologu (slika 5.). Manje od polovine (46 %) svih ispitanika smatra da postupak izbjeljivanja zuba sigurno ima neželjene posljedice.

Rasprava

Istraživanje je obuhvatilo 38 studenata dentalne medicine i po 40 studenata Medicinskog, Ekonomskog i Građevinskog fakulteta Sveučilišta u Zagrebu.

Studenti dentalne medicine, očekivano, više vode brigu o oralnoj higijeni (18) i pokazali su bolje znanje o postupku izbjeljivanja zuba, što je i razumljivo s obzirom na to da tijekom studija proširuju znanje i tako stvaraju odnos prema oralnome zdravlju (18, 20, 21). Na temelju istraživanja Šimata i suradnika provedenom među studentima Sveučilišta u Zagrebu, može se zaključiti da je dentalna higijena studenata dentalne medicine bolja negoli onih s ostalih fakulteta, a vrijednosti KEP indeksa upućuju na nedostatak prevencije u mlađoj dobi, neovisno o skupini ispitanika (18). Slično istraživanje proveo je Peker sa suradnicima u Istanbulu među studentima dentalne medicine i ustanovio da se njihovo stajalište i odnos prema oralnom zdravlju poboljšavalo s godinama (19).

Analizirajući dobivene podatke može se zaključiti da studentice češće odlaze na kontrolni stomatološki pregled, veći broj njih pere zube dva puta na dan ili češće, dodatno se koriste interdentalnim koncem, te ih više želi izbjeljivati zube u usporedbi sa studentima. Ovi su rezultati očekivani s obzirom na to da djevojke više pozornosti posvećuju oralnoj higijeni, zdravlju i izgledu općenito, što je slično objavljenim rezultatima Pekera i suradnika (19).

Otprilike dvije trećine svih ispitanika odlazi na kontrolni stomatološki pregled jedanput u šest mjeseci ili češće, a ra-

swers did not differ much regarding gender, age or college. Information on oral health is only followed by 12% of subjects, mostly students from the School of Dental Medicine (29%). More than two thirds of all subjects brush their teeth twice a day, which shows that they are aware of the importance of oral health, but there was no statistically significant difference between the subjects with respect to college or gender (Figure 2). Although oral hygiene and interest about the oral hygiene is different between the subjects, it is interesting that the satisfaction with their own teeth is quite similar among the respondents. More than half of the subjects (55%) were satisfied, and 12% of them were completely satisfied by the appearance of their teeth, however, mostly female students (Figure 3). About 80 % of the subjects make difference between the procedures of teeth bleaching and teeth polishing. A greater prevalence was observed in dental and medical students (Figure 4). Regarding media, television is the main medium through which they learn about the teeth bleaching procedures. One third of all the subjects who participated in the study (34%) would like to whiten their teeth. Male students are less interested in bleaching procedures (25%) compared to female students (39%). The students from the School of Dental Medicine have higher awareness about oral hygiene and, also, a better knowledge on oral health and tooth bleaching compared to other students. 80 % of all subjects would go to dental office if they decided to whiten their teeth (Figure 5). Less than a half (46 %) of all the subjects considered that tooth bleaching has some adverse effects.

Discussion

Our study included 38 students from the School of Dental Medicine and 40 students from other faculties within the University of Zagreb: the School of Medicine, the Faculty of Economics and the Faculty of Civil Engineering. According to previous studies, dental students have better oral hygiene (18) and better knowledge on tooth bleaching, which can be explained by education they receive during the study of dental medicine and by their attitude towards oral health (18,20,21). Šimat et al. (18) reported that students from the School of Dental Medicine have better oral hygiene habits than students from other faculties, while DMFT index is associated with a lack of prevention at a young age, regardless of the group of subjects. Similar results were obtained by Peker et al. who reported that the overall knowledge of oral health has improved in dental students with increased education (19). According to our results, female students visit their dentist at least once each year for a regular dental checkup, brush their teeth twice a day or more, and use dental floss. Also, a higher percentage of female dental students (80%) would like to whiten their teeth compared to male students. These results are expected since women pay more attention to oral hygiene, health and their appearance, which is similar to the results obtained by Peker et al. (19).

About two thirds of the subjects visit their dentist for a preventive dental checkup once in six months or more often, and the difference was found between sexes (females 70%, males 61%) in comparison to their college orientation where

zlika je uočljiva ako se promatra njihov spol (djevojke 70 %, momci 61 %), za razliku od njihova fakultetskog usmjerenja u čemu nema statistički značajne razlike. Studenti dentalne medicine predvode, pa njih 82 posto svakih šest mjeseci odlazi na pregled, dok to neočekivano čini samo 55 posto studenata medicine (18, 22). Chrysanthakopoulos proveo je istraživanje u Grčkoj u kojemu su sudjelovali studenti Medicinskog fakulteta, polaznici pretkliničkog i kliničkog stupnja, te prema rezultatima nisu pokazali zavidno znanje o oralnom zdravlju, premda se ono povećavalo kako su napredovali u kliničkom dijelu obrazovanja (22).

U odgovoru na pitanje postoji li razlika između postupka izbjeljivanja i poliranja zuba, kod ispitanika je uočena statistički značajna razlika s obzirom na fakultetsko usmjerenje ($\chi^2 = 34,293$, $df = 6$, očekivani $\chi^2 = 12,592$). Naime, 78 posto njih smatra da postoji razlika između dvaju navedenih dentalnih postupaka, no očekivano taj je postotak viši kod studenata dentalne medicine i medicine (tablica 2. i slika 4.).

no statistically significant differences were found. 82% of dental students visit their dentist for a control dental check-up every 6 months, while only 55% of medical students visit their dentist for a control dental check-up, which was not expected (18, 22). Chrysanthakopoulos found that medical students in Greece did not possess good knowledge on oral health during their preclinical and clinical studies, but it increased as they progressed in their clinical part of education (22). When the respondents were asked whether there were any differences between tooth bleaching and tooth polishing it turned out that there was a statistically significant difference, which was in accordance with the type of their education i.e. vocational orientation ($\chi^2=34,293$, $df=6$, expected $\chi^2=12,592$). 78% of the subjects thought there was a difference between those two dental procedures; however the percentage was higher among dental and medical students (Table 2 and Figure 4). According to the results obtained in previous studies, the null hypothesis claiming that there was no differ-

Tablica 2. Postoji li razlika između postupka izbjeljivanja i postupka poliranja zuba
Table 2 Difference between tooth bleaching and tooth polishing

		Fakultet • Faculty				Ukupno • Total
		Stomatologija • Dental Medicine	Medicina • Medicine	Ekonomija • Economics	Građevina • Civil Engineering	
Da • Yes	freq.	36	37	29	22	124
	%	94.7%	92.5%	72.5%	55.0%	78.5%
Ne • No	freq.	2	3	3	2	10
	%	5.3%	7.5%	7.5%	5.0%	6.3%
Ne znam • Don't know	freq.	0	0	8	16	24
	%	0%	0%	20.0%	40.0%	15.2%
Ukupno • Total %	freq.	38	40	40	40	158
		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-square test • Chi-Square Tests						
	Vrijednost • Value					df
Pearsonov chi-square • Pearson Chi-Square	34.293*					6

Opovrgnuta je nulta hipoteza i pronađene su razlike u znanju o postupku izbjeljivanja zuba među studentima navedenih fakulteta. Najzanimljiviji rezultat pokazuje da je svaki četvrti ispitanik izbjeljivao zube, bez obzira na spol ili fakultet. Interpretacijom ovakvih odgovora proizlazi da su mlađoj studentskoj populaciji estetika, osmijeh i lijepi zubi iznimno važni, kao jedni od najdojmljivijih detalja lica (22). Trećina svih ispitanika (34 %) željela bi izbijeliti zube, a taj je postotak najniži kod studenta dentalne medicine (28 %) zbog edukacije tijekom studija jer uče o indikacijama, kontraindikacijama i potencijalnim neželjenim posljedicama toga postupka (23, 24). Ako bi se odlučili izbjeljivati zube, 80 posto svih ispitanika otišlo bi u ordinaciju dentalne medicine i savjetovali bi se sa svojim liječnikom, za razliku od onih koji se koriste raznim preparatima dostupnima u supermarketima. Ovdje je uočena statistički značajna razlika ($\chi^2 = 10,985$, $df = 3$, očekivani $\chi^2 = 7,815$) (tablica 3. i slika 5.). Manje od polovine (46 %) svih ispitanika smatra da postupak izbjeljivanja zuba ima neželjene posljedice, a među njima je 57 posto stude-

ence in knowledge about oral hygiene and tooth bleaching among different students was rejected.

Every fourth respondent claimed that he/she had his/her teeth bleached, regardless of gender or faculty. These results suggest that the younger the student population, the more essential esthetics, smile and beautiful teeth are as distinctive facial details (22). One third of patients (34%) would like to whiten their teeth, while the percentage is lower among the population of dental students (28%), which is associated with their education during the study, especially as they progress and receive more information on indications, contraindications and potential side-effects during tooth bleaching procedures (23, 24). If they decided to bleach their teeth, 80% of the subjects would go to their dentist's office rather than use some of 'over the counter' bleaching products with statistically significant difference ($\chi^2=10,985$, $df=3$, expected $\chi^2=7,815$) (Table 3 and Figure 5).

Less than half of all subjects (46%) considered that tooth bleaching has potential side-effects, mostly dental students

Tablica 3. Način provedbe tretmana u slučaju da se odluče za postupak izbjeljivanja zuba
Table 3 Difference between bleaching treatments

		Fakultet • Faculty				Ukupno • Total
		Stomatologija • Dental Medicine	Medicina • Medicine	Ekonomija • Economics	Građevina • Civil Engineering	
Kupili proizvod u trgovini • Over the counter products	freq.	2	6	11	13	32
	%	5.3%	15.0%	27.5%	32.5%	20.3%
Otišli stomatologu • In-office treatment	freq.	36	34	29	27	126
	%	94.7%	85.0%	72.5%	67.5%	79.7%
Ukupno • Total	freq.	38	40	40	40	158
	%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-square test • Chi-Square Tests

	Vrijednost • Value	df
Pearsonov chi-square • Pearson Chi-Square	10.985 ^a	3

nata dentalne medicine, ali nema statistički značajne razlike. Hatherell i suradnici proveli su istraživanje među studentima na posljednjoj godini studija dentalne medicine u Cardiffu, Corku i Malmöu. Studenti u Corku pohađali su nekoliko sati nastave o izbjeljivanju zuba, a oni u Cardiffu i Malmöu nisu o toj temi slušali predavanja. Tako izbjeljivanje zuba smatra sigurnim postupkom 76 posto studenata u Corku, a kod ostalih je taj postotak nešto niži (Cardiff < 70 %, Malmö < 36 %)(24). Nadalje, Tanalp je sa suradnicima ustanovio da studenti ne vjeruju u uspjeh izbjeljivanja avitalnih, endodontski liječenih zuba (23). Do danas je proveden zavidan broj istraživanja o mehanizmu djelovanja pojedinih sredstava za izbjeljivanje zuba, o učinkovitosti samog tretmana i o neželjenim, štetnim učincima (10, 13, 14, 17, 25, 26). Ako se slijede upute proizvođača i ako se obavlja pod stalnim stručnim nadzorom doktora dentalne medicine, izbjeljivanje zuba siguran je klinički postupak. U literaturi dosad nije zabilježeno istraživanje ili prikaz slučaja u kojemu su uočene makroskopske, klinički vidljive posljedice nakon izbjeljivanja zuba (17). Među neželjenim posljedicama koje se najčešće pojavljuju tijekom postupka izbjeljivanja ili neposredno nakon toga jest preosjetljivost zuba (8, 11, 13). Očituje se kao prolazna, bolna senzacija u zubu koja potpuno nestaje za dva do tri dana (13, 14, 27, 28). Naime, tijekom procesa izbjeljivanja slobodni kisikovi radikali iz vodikova peroksida penetriraju kroz caklinu i dentin do pulpe gdje uzrokuju reverzibilni pulpitis. Prema klinički provedenom istraživanju Matisa i suradnika, takva bol je treći dan nakon izbjeljivanja na vrhuncu intenziteta jer je tada najveća koncentracija slobodnih kisikovih radikala unutar pulpe. Paste za desenzibilizaciju koje sadržavaju kalijeve soli i sredstva za zatvaranje dentinskih tubulusa, poput amorfnog kalcijeva fosfata, koriste se za ublažavanje preosjetljivosti (28). Iritacija desni pojavljuje se kao nuspojava pri profesionalnom izbjeljivanju pod nadzorom stomatologa (*in office bleaching*) zbog popuštanja gingivalne barijere, ili zbog neadekvatnih udloga u koje se aplicira sredstvo za izbjeljivanje tehnikom izbjeljivanja koja se provodi kod kuće (*at home bleaching*) (29, 30, 31). Klinički se očituje kao ulceracija koju je potrebno isprati mlazom hladne vode kako bi se uklonilo kemijsko sredstvo za izbjeljivanje, a Burgess navodi da aplikacija vitamina E izravno na oštećenu gingivu pridonosi br-

(57%) but with no statistically significant differences between them. In 2010, Hatherell et al. (24) examined dental students in Cardiff, Cork and Malmö. The students in Cork had few hours of education on teeth bleaching, while students in Cardiff and Malmö didn't have any theoretical education on same subject. 76 % of students in Cork and less than 70 % students in Cardiff and 36% students in Malmö considered tooth bleaching a very safe procedure. Tanalp et al. reported that students considered bleaching of endodontically treated teeth not so effective (23). Many researchers have concluded that tooth bleaching has some negative effects (10, 13, 14, 17, 25, 26) but they stated that it is a safe procedure if performed professionally, under the dentist's supervision. No clinical studies or case reports in the literature have documented macroscopically or clinically visible damage due to vital bleaching or clinically relevant tissue destruction (17). Tooth sensitivity can occur during or after the bleaching treatment (8, 11, 13) and it is considered a transient painful sensation which usually completely disappears in two to three days (13, 14, 27, 28). Pain and sensitivity can be explained by the irritating effect of hydrogen peroxide on the pulp cells because the molecules of hydrogen peroxide can penetrate to the pulp through enamel and dentin. There, they can cause mild reversible pulpitis which can be manifested as tooth hypersensitivity and intermittent spontaneous pain. Matis et al. found that the sensitivity peaks on the third day of treatment, which is associated with a higher concentration of peroxide radicals inside the pulp (29). Many desensitizing dentifrices contain potassium salts, which are believed to reduce the excitability of the intradental nerves and they should be more effective than tubule-occluding agents such as amorphous calcium phosphate (ACP). On the other hand, ACP may increase the mineral density of enamel hardening (28). Gingival and soft tissue irritation is also a common, but temporary side effect. It is usually related to high concentrations of whitening agents or to long term usage at home and can be avoided by proper soft tissue isolation or by individual tray application (29, 30, 31). Clinically, irritation can appear as an ulceration which fades away in a few days. Burgess reported that application of vitamin E directly to the ulceration leads to faster healing (32). Klarić et al. showed

žem zacjeljivanju (32). Zanimljivo istraživanje *in vitro* proveli su Klarić i suradnici – zabilježili su da različita kemijska sredstva za izbjeljivanje zuba (Zoom2 i Boost) uzrokuju značajnu redukciju u površinskoj mikrotvrdoći cakline i dentina (17). Amorfní kalcijev fosfat (ACP) pospješuje mineralizaciju, postiže mineralnu ravnotežu u caklini i dentinu te umanjuje neželjene posljedice nastale izbjeljivanjem zuba (17, 33, 34, 35). Sredstva s nižom pH vrijednosti također mogu uzrokovati promjene na caklinskoj površini te potaknuti demineralizaciju cakline. Važno je preventivno uočiti mogućnost štetnog djelovanja izbjeljivanja zuba adekvatnom pripremom pacijenta i dijagnostičiranjem kontraindikacija u slučaju provođenja. To znači da se moraju isključiti karijes, ekspanzirani dentin i oštećeni restorativni ispuni, te da se svakom diskoloriranom zubu treba ispitati vitalitet i rendgenski potvrditi da nema periapikalnih patoloških promjena. Učenje o oralnoj higijeni svakako zahtijeva svoje mjesto kao dio osnovnog i srednjoškolskog obrazovanja, kako bi se što kvalitetnije modificirao odnos odraslih prema oralnom zdravlju. Takve promjene približile bi profesiju dentalne medicine te objasnile određene kliničke postupke, poput izbjeljivanja zuba. Rezultati ovog istraživanja pokazuju da su potrebna nova istraživanja među studentima različitih fakulteta kako bi se ustanovile kulturne i socijalno-ekonomske razlike, ne samo među studentima u Hrvatskoj nego i u ostalim zemljama.

Zaključak

Ovim istraživanjem zaključili smo da postoji razlika u znanju o postupku izbjeljivanja zuba među studentima Stomatološkog fakulteta te Medicinskog, Ekonomskog i Građevinskog fakulteta. Očekivano su se pozitivno istaknuli studenti dentalne medicine s obzirom na obrazovno usmjerenje. Informacije o mehanizmu djelovanja, načinu provedbe tretmana, indikacijama, kontraindikacijama i mogućim neželjenim posljedicama, trebale bi biti dostupnije širokoj populaciji. Potrebna su daljnja istraživanja s vremenskim odmakom u svrhu usporedbe i praćenja znanja i informiranosti o dentalnom postupku izbjeljivanja zuba, posebno aktualnom u studentskoj populaciji.

Sukob interesa

Autori nisu bili u sukobu interesa.

that bleaching agents with high concentrations of hydrogen peroxide resulted in a reduction in surface enamel and dentin microhardness while postoperative treatment with ACP demonstrated the increase in surface microhardness, improved surface roughness and enhance the remineralization of the hard dental tissues (17), which was also confirmed by a number of previous studies (33,34,35). Also, more acid bleaching gels can cause additional alterations in the enamel surface and a low pH of bleaching agents can sometimes be below critical pH for enamel demineralization (16, 33, 34).

It is important to point to possible adverse effect of tooth bleaching and to provide adequate patient preparation with proper clinical examination prior to bleaching. Also, some contraindications should be excluded such as carious teeth, teeth with exposed dentin or teeth with large fillings or those with damaged restorative fillings. Also, every discolored tooth should be tested for potential periapical or pulpal inflammation. Education on good and adequate oral hygiene certainly claims its place as part of primary and secondary education and is the best way to modify the attitude of adults towards oral health. Such education should result in better understanding of other dental procedures such as tooth bleaching or tooth whitening. The results of this study show that further research is needed which would include students of different faculties in order to gain insight into the cultural and socio-economic disparities, not only among students in Croatia but also international students.

Conclusion

having identified the most important limitations to our study, we can conclude that there is a difference in knowledge about oral hygiene and tooth bleaching among the students from the School of Dental Medicine, School of Medicine, the Faculty of Economics and the Faculty of Civil Engineering. As expected, dental students have the best knowledge on tooth bleaching and oral health which was in accordance with their educational guidance and level of education. Information on the mechanism of tooth bleaching, types of bleaching treatments, indications and contraindications and possible adverse effects should be made available to the public. Further studies, with a time delay, for the purpose of comparison and monitoring of knowledge and information about tooth bleaching procedure, especially in the current student population, are required.

Conflict of Interest

None declared

Abstract

Objective: To compare the awareness that students from four different faculties within the University of Zagreb have of oral health and tooth bleaching procedure. **Materials and Methods:** The study included 158 subjects (both male and female) - 38 students from the School of Dental Medicine and 40 students from each of the following faculties: the School of Medicine, the Faculty of Economics and the Faculty of Civil Engineering. The respondents were asked to fill out the survey with multiple choices by marking the answers they considered correct. **Results:** Only 12% of the respondents followed the information on oral health. More than two thirds of all subjects brush their teeth twice a day, but there were no statistically significant differences between the subjects with respect to college or gender. More than half of the participants (55%) were satisfied, and 12% were completely satisfied with their dental appearance. About 80 % of the respondents were aware of differences between teeth bleaching and teeth polishing procedures, with greater prevalence among Dental Medicine and Medicine students. 80 % of all subjects would go to a dental office if they decided to whiten their teeth while less than a half (46 %) of all the subjects believed that a tooth bleaching has some adverse side-effects. **Conclusions:** There is a difference in knowledge on oral hygiene and tooth bleaching between the students from the School of Dental Medicine, the School of Medicine, the Faculty of Economics and those from the Faculty of Civil Engineering. Dental students have the best knowledge on tooth bleaching and oral health, which was in accordance with their educational guidance and level of education.

Received: September 30, 2016

Accepted: November 9, 2016.

Address for correspondence

Eva Klaric Sever
University of Zagreb, School of Dental
Medicine
Department of Endodontics and
Restorative Dentistry
Gundulićeva 5, 10000 Zagreb
Croatia
Tel: +38514899203
eklaric@sfzg.hr

Key words

Tooth Bleaching; Oral Hygiene; Students; Attitude

References

- Dozić A, Zukanović A, Bajsmán A, Sečić S, Petaros A. Spectrophotometric Evaluation of Color Alterations of Teeth Exposed to Different Conditions in Time. *Acta Stomatol Croat.* 2011;45:247-257.
- Ten Bosch JJ, Coops JC. Tooth color and reflectance as related to light scattering and enamel hardness. *J Dent Res.* 1995 Jan;74(1):374-80.
- Poljak-Guberina R, Kosovel Z, Šternberg Z. Prilog poznavanju utjecaja refleksije svjetlosti na boju zuba. *Acta Stomatol Croat.* 1984;18:263-8.
- Li Y. Successful bleaching of teeth with dentinogenesis imperfecta discoloration: a case report. *J Esthet Restor Dent.* 2011 Feb;23(1):11.
- Wats A, Addy M. Tooth discoloration and staining: a review of the literature. *British Dental Journal.* 2001;190: 309-16.
- Suliman M. An overview of tooth discoloration: extrinsic, intrinsic and internalized stains. *Br Dent J.* 2001 Mar 24;190(6):309-16.
- Petrovečki V, Čarapina M, Strinovic D, Kovačić Z, Nestić M, Mayer D, et al. Dental discoloration and Erosion Resulting from Addiction to Compound Analgesics. *Acta Stomatol Croat.* 2011;45(4):287-94.
- Benetti AR, Valera MC, Mancini MNG, Miranda CB, Balducci I. In vitro penetration of bleaching agents into the pulp chamber. *Int Endod J.* 2004 Feb;37(2):120-4.
- Zanatta FB, Antoniazzi RP, Rosing CK. Staining and calculus formation after 0.12% chlorhexidine rinses in plaque-free and plaque covered surfaces: a randomized trial. *J Appl Oral Sci.* 2010 Sep-Oct;18(5):515-21.
- Paliska J, Stipetić A, Tarle Z, Ristić M, Ban T, Vujičić N, et al. Colorimetric Assessment of Different Tooth Whitening Procedures. *Acta Stomatol Croat.* 2011;45(4):258-67.
- Kwon, SR; Ko, SH; Greenwall, LH; Goldstein, RE; Haywood, VB – editors. *Tooth whitening in esthetic dentistry: Principles and techniques.* 1st ed. London: Quintessence Publishing Co; 2009.
- Suliman M, MacDonald E, Rees JS, Newcombe RG, Addy M. Tooth bleaching by different concentrations of carbamide peroxide and hydrogen peroxide whitening strips: an in vitro study. *J Esthet Restor Dent.* 2006;18(2):93-100; discussion 101.
- Klarić E, Par M, Profeta I, Matošević D, Tarle Z. Postoperative sensitivity after two in-office bleaching methods. *Acta Stomatol Croat.* 2011;45(2):100-9.
- Li Y, Greenwall L. Safety issues of tooth whitening using peroxide-based materials. *Br Dent J.* 2013 Jul;215(1):29-34.
- Carey CM. Tooth whitening: what we now know. *J Evid Based Dent Pract.* 2014 Jun;14 Suppl:70-6.
- Suliman M. An overview of bleaching techniques: I. History, chemistry, safety and legal aspects. *Dent Update.* 2004 Dec;31(10):608-10, 612-4, 616.
- Klarić E, Marcius M, Ristić M, Sever I, Prskalo K, Tarle Z. Surface changes of enamel and dentin after two different bleaching procedures. *Acta Clin Croat.* 2013 Dec;52(4):419-29.
- Šimat S, Mostarčić K, Matijević J, Simeon P, Rošin Grget K, Jukić Krmek S. A Comparison of Oral Status of the Fourth-Year Students of Various Colleges at the University of Zagreb. *Acta Stomatol Croat.* 2011;45(3):177-83.
- Peker K, Uysal O, Bermek G. Dental training and changes in oral health attitudes and behaviors in Istanbul dental students. *J Dent Educ.* 2010 Sep;74(9):1017-23.
- Rong WS, Wang WJ, Yip HK. Attitudes of dental and medical students in their first and final years of undergraduate study to oral health behaviour. *Eur J Dent Educ.* 2006 Aug;10(3):178-84.
- Polychronopoulou A, Kawamura M. Oral self-care behaviours: comparing Greek and Japanese dental students. *Eur J Dent Educ.* 2005 Nov;9(4):164-70.
- Chrysanthakopoulos NA. Self-Reported Oral Health Attitude and Behaviour of Greek Medical Students. *Acta Stomatol Croat.* 2012;46(2):126-35.
- Tanalp J, Güven EP, Oktay I. Evaluation of dental students perception and self-considence levels regarding endodontic treatment. *Eur J Dent.* 2013 Apr;7(2):218-24.
- Hatherell S, Lynch CD, Burke FM, Ericson D, Gilmour ASM. Attitudes of final-year dental students to bleaching of vital and non-vital teeth in Cardiff, Cork and Malmö. *J Oral Rehabil.* 2011 Apr;38(4):263-9.
- Li Y. Toxicological considerations of tooth bleaching using peroxide-containing agents. *J Am Dent Assoc.* 1997 Apr;128 Suppl:31S-36S.
- Li Y. The safety of peroxide-containing at-home tooth whiteners. *Compend Contin Educ Dent.* 2003 Apr;24(4A):384-9.
- Jorgesen MG, Carroll WB. Incidence of tooth sensitivity after home whitening treatment. *J Am Dent Assoc.* 2002 Aug;133(8):1076-82.
- Pohjola RM, Browning WD, Hackman ST, Myers ML, Downey MC. Sensitivity and tooth whitening agents. *J Esthet Restor Dent.* 2002;14(2):85-91.
- Matis BA, Mousa HN, Cochran MA, Eckert GJ. Clinical evaluation of bleaching agents of different concentrations. *Quintessence Int.* 2000 May;31(5):303-10.
- Suliman M, Addy M, MacDonald E, Rees JS. A safety study in vitro for the effects of an in-office bleaching system on the integrity of enamel and dentine. *J Dent.* 2004 Sep;32(7):581-90.
- Schulte JR, Morrisette DB, Gasior EJ, Cajewski MV. Clinical changes in the gingiva as a result of at home bleaching. *Compendium.* 1993 Nov;14(11):1362, 1364-6.
- Burgess C. Topical vitamins. *J Drugs Dermatol.* 2008 Jul;7(7 Suppl):s2-6.
- White DJ, Kozak KM, Zoladz Jr, Duschner H, Götz H. Peroxide interactions with hard tissues: effects on surface hardness and surface/subsurface ultrastructural properties. *Compend Contin Educ Dent.* 2002 Jan;23(1A):42-8; quiz 50.
- Abouassi T, Wolkewitz M, Hahn P. Effect of carbamide peroxide and hydrogen peroxide on enamel surface: an in vitro study. *Clin Oral Investig.* 2011 Oct;15(5):673-80.
- Markovic L, Jordan RA, Lakota N, Gaen-Gler P. Micromorphology of enamel surface after vital tooth bleaching. *J Endod.* 2007 May;33(5):607-10.