ACTA
STOMATOLOGICA
CROATICA
www.ascro.hr

Acta Stomatol Croat. 2011;45(3):166-176.
IZVORNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

Ariana Žuvela[1], Iva Ž. Alajbeg[2], Davor Illeš[2], Zrinka Tarle[3]

Znakovi povezani s trošenjem zuba kod pripadnika Hrvatske ratne mornarice

Tooth Wear Related Signs in the Croatian Navy Employees

[1] Stomatološka ambulanta pomorske baze "Lora", Split, Hrvatska
Naval Infirmatory, Croatian Naval Base 'Lora' Split, Croatia
[2] Zavod za stomatološku protetiku Stomatološkog fakulteta Sveučilišta u Zagrebu, Hrvatska
Department of Prosthodontics, School of Dental Medicine, University of Zagreb, Croatia
[3] 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*

Sažetak

Svrha: U ovom se istraživanju željelo odrediti stupanj trošenja zuba kod pripadnika Hrvatske ratne mornarice te procijeniti oralne znakove i demografske čimbenike povezane s tim procesom. **Materijali i postupci:** Uzorak se sastojao od 1092 pripadnika Hrvatske ratne mornarice u dobi od 20 do 60 godina (srednja dob 37,06±7,85) i to 985 muškaraca i 107 žena. Mjerenje iznosa trošenja zuba temeljilo se na relativnom stupnju nalaza brusnih faseta (ljestvica 0 –4). *Ukupno trošenje zuba* (iznos zbroja svih brusnih faseta) i *indeks trošenja zuba* (prosječan godišnji porast zbroja svih faseta korigiran za postotak zuba koji nedostaju) korelirani su s demografskim podacima, hipertrofijom žvačnih mišića i njihovom napetošću nakon buđenja, pomičnošću zuba, lineom albom, impresijama na jeziku, bukalnim ranicama, nekarijesnim cerviksnim lezijama (NKCL-om), brojem zuba i anamnestičkim podatkom o bruksizmu kako bi se odredile specifične povezanosti tih varijabli s trošenjem zuba. **Rezultati:** Postotak zuba s okluzijskim trošenjem bio je od 21,66 posto u najmlađoj dobnoj skupini do 52,45 posto u najstarijoj. Ukupno trošenje zuba bilo je najjače izraženo kod ispitanika u najstarijoj dobnoj skupini, a najmanje kod najmlađih. Linearna multipla regresijska analiza pokazala je da je povećano trošenje zuba bilo značajno povezano s NKCL-om (β=0,55, p<0,001), impresijama na jeziku (β=0,17, p<0,001), muškim spolom (β=-0,105, p<0,001), mišićnom napetošću (β=0,103, p<0,05) i hipertrofijom mišića (β=0.063, p<0.05). Koeficijent determinacije (R^2) modela iznosio je 0,49. **Zaključak:** Rezultati ovog istraživanja upućuju na to da su NKCL, impresije na jeziku, napetost mišića, muški spol i hipertrofija mišića potencijalni čimbenici koji pokazuju najveću povezanost s trošenjem zuba. Nije pronađena znatna povezanost između indeksa trošenja zuba i linee albe, pomičnsti zuba, bukalnih ranica i anamnestičkog podatka o bruksiranju.

Zaprimljen: 12. svibnja 2011.
Prihvaćen: 24. kolovoza 2011.

Adresa za dopisivanje
doc.dr.sc. Iva Ž. Alajbeg
Sveučilište u Zagrebu
Stomatološki fakultet
Zavod za stomatološku protetiku
Gundulićeva 5, 10000 Zagreb
Hrvatska
tel.+38514899211
ialajbeg@sfzg.hr

Ključne riječi
trošenje zuba; žvačni mišići; bruksizam; vojno osoblje

Uvod

Trošenje zuba, tj. gubitak zubnog tkiva uzrokovan atricijom i abrazijom, nastaje uglavnom zbog kontakta zuba o zub ili kontakta između zuba i nekog materijala u ustima. Prema podacima u literaturi, trošenje zuba usko je povezano s bruksizmom (1,2), iako nije specifičan znak jer postoje i drugi uzroci trošenja zuba kao što je, primjerice, erozija (3,4). Budući da se neki obrasci trošenja zuba često smatraju znakovima bruksizma, za točnu kliničku dijagnozu nužna je pouzdana procjena takvih modela trošenja. Bruksizam je oralna navika obilježena ritmičkom aktivnošću temporomandibularnih mišića koja uzrokuje prisilan kontakt između zubnih površina. Praćen je stiskanjem ili škripanjem zubima često toliko glasnim da ga čuje partner s kojim osoba spava. Najveći i najteži problem u istraživanju bruksizma predstavlja dijagnosticiranje toga stanja u epidemiološkim studijama. Najtočniji način za proučavanje bruksizma tijekom razmatranja

Introduction

Tooth wear, a loss of substance on opposing units or surfaces as a result of attrition or abrasion, occurs mostly as a result of tooth-to-tooth contact or contact of teeth with other materials in the mouth. According to the literature, tooth wear has strong association with bruxism (1, 2), but it is not a specific sign since there are other causes of tooth wear such as erosion (3, 4). Since some patterns of tooth wear are often considered to be signs of bruxism, a reliable assessment of such patterns is necessary for the reliable clinical diagnosis of bruxism.

Bruxism is an oral habit characterized by rhythmic activity of the temporomandibular muscles that causes a forced contact between dental surfaces. It is accompanied by tooth clenching or grinding that can often be loud enough to be heard by the bed partner. One of the largest and most difficult problems when investigating bruxism is how to diag-

pojedinačnih slučajeva jest polisomnografija koja se obavlja u laboratorijima za spavanje (5). Alternativne metode uključuju intraoralne i ekstraoralne naprave za otkrivanje visokih žvačnih elektromiografskih aktivnosti i broja epizoda bruksizma (6,7,8), no pokazale su se nepouzdanima i u nekim slučajevima neisplativima za velike epidemiološke studije. I u istraživanjima i u kliničkom radu, dijagnoza bruksizma postavlja se na temelju kliničkog oralnog pregleda, anamnestičkog podatka da pacijent bruksira ili kombinacijom tih dvaju čimbenika.

Prema Paesaniju i suradnicima (9), neki znakovi tijekom kliničkog pregleda mogu upućivati na to da se radi o bruksizmu. No, kako oni sami nisu dovoljan dokaz, njihovo je značenje relativno. Trošenje zuba može se lako i pouzdano procijeniti iz sadrenih modela ili izravnim pregledom usta. Pomičnost zuba, ako nije posljedica parodontne bolesti, ponekad može biti povezana s traumom zbog parafunkcijske aktivnosti (10). Ranice na oralnoj sluznici te frakture zuba mogu biti prouzročene kontinuiranim stiskanjem i škripanjem zuba (9). Izrazito razvijeni žvačni mišići, osobito tijekom voljne kontrakcije (11,12) i osjećaj napetosti žvačnih mišića nakon buđenja, ponekad mogu biti znak da pacijent konstantno stišće zube (13). Nadalje, neki autori tvrde da je linea alba, hiperkeratinizirana bijela linija na sluznici obraza, još jedan znak koji se može pripisati bruksizmu (14), a drugi je pripisuju pritisku koji obraz čini tijekom gutanja (15). Neki znanstvenici (16) također smatraju da impresije na jeziku nastaju zbog pritiska jezika na zubne lukove istodobno sa stiskanjem zuba, a drugi, pak, kažu kako pritisak jezika na lingvalne površine zuba tijekom odmora, stiskanja zuba ili gutanja nije povezan s formiranjem impresija na jeziku (17). Uglavnom se smatra da je nepravilno četkanje zuba odgovorno za nastanak nekarijesnih cervikalnih lezija (NKCL-a). Dodatno objašnjenje za ta oštećenja su velika naprezanja zuba tijekom stiskanja ili škripanja koja rezultiraju stvaranjem mikro-pukotina na caklinsko-cementnom spojištu (9). U nekoliko studija temeljenih na analizi konačnih elemenata ističe se da okluzijska preopterećenja mogu izazvati mikrofrakture u caklini, što rezultira NKCL-om (18,19).

Škripanje zubima tijekom spavanja najočitiji je znak bruksizma. Intenzitet tih zvukova obično je tako jak da ga može registrirati i druga osoba, a u nekim slučajevima zvukovi mogu probuditi i osobu koja škripi zubima. Zato je iz upitnika potrebno dobiti podatak o tome stišće li osoba i/ili škripi zubima u snu, je li to činila i prije te je li joj itko rekao da to čini. Takvi upitnici vrlo su korisna dijagnostička sredstva jer se dobiju informacije koje će nam, uz klinički pregled, pomoći identificirati potencijalne uzroke trošenja zuba. Klinička točnost procjene zvukova škripanja tijekom spavanja (treba ih potvrditi treća osoba) pokazala je 78-postotnu osjetljivost i 94-postotnu specifičnost u usporedbi s polisomnografskim nalazima (20).

Iako se razlikuje od studije do studije, svijest pacijenata da bruksiraju uglavnom je niska i iznosi oko 15 posto, (21). No, prevalencija se povećava do 50 posto ako se ispitanici s atricijom zuba klinički procjenjuju, što pokazuje da je parafunkcijske aktivnosti vrlo teško dijagnosticirati. Prema Cosmeu i suradnicima (22), bruksizam se prepoznaje na temenose the condition in epidemiological studies. When investigating a particular patient, polysomnography conducted in a sleep laboratory is the most accurate method for studying bruxism (5). Alternative methods including intraoral and extraoral devices for detection of high masticatory EMG activity and the number of bruxism episodes have been suggested (6, 7, 8), but have been proven unreliable and in some cases not cost-effective for large epidemiological studies. In both research and clinical settings, an individual's bruxism status is typically based on clinical oral examination, the participants' self-report of bruxism or the combination of the two.

As suggested by Peaseani at al. (9) during clinical examination, some signs which suggest bruxism may be present. The character of these signs is relative since they alone are not sufficient evidence of bruxism. Tooth wear can be easily and reliably evaluated from dental casts or by direct visual inspection of the mouth. Tooth mobility, with no periodontal disease involved, can sometimes be associated with trauma due to parafunctional activity (10). Traumatic ulcers of the oral mucosa, as well as dental fractures can be caused by continuous clenching and grinding (9). The presence of excessively developed masseter muscles during voluntary contraction (11, 12), as well as masticatory muscles tension upon awakening, are sometimes signs of constant clenching (13). Furthermore, some authors claim that the presence of linea alba, a hyperkeratinized white line in the buccal mucosa is another sign that can be ascribed to bruxism (14), while the others disagree and attribute it to the cheek pressure exerted during deglutition (15). Also, some authors (16) consider that tongue impressions result from the force that the tongue exerts against the dental arches simultaneously with clenching, while others found that neither volume of lingual pressure exerted on the lingual surface of the teeth during rest, clenching, or swallowing are related to the formation of tongue indentations (17). It has been generally believed that the tooth brushing is responsible for the development of noncarious cervical lesions (NCCL). An additional explanation for these defects is that heavy stressing of the teeth (during clenching or bruxist behaviour) will result in microfractures at the cemento-enamel junction (9). Several studies using finite element analysis showed that occlusal overloading might generate microfractures in the enamel, resulting in NCCL (18, 19).

The most obvious signs of bruxism are tooth-grinding sounds and movements produced during sleep. The intensity of the sounds is usually so high that they can be heard by the other person, and in some cases awakes the subject himself. Therefore, the data concerning whether subjects clenched or ground their teeth as well as if anybody confirmed that the patients produced grinding sounds while sleeping should be obtained via a questionnaire. Such questionnaires are very helpful diagnostic tools, since they collect information which, along with clinical examination, will help identify the potential causes of tooth wear. Clinical accuracy of grinding sounds during sleep (heard by the third person) had 78% sensitivity and 94% specificity when it was compared with polysomnography (20).

However, the awareness of bruxism is low, about 15%, even though it varies from one study to another (21) but the

lju anamnestičkog podatka o njemu i/ili prisutnosti trošenja zuba. U istraživanju Carvalhoa i njegovih kolega (13) bruksizam je dijagnosticiran u slučajevima kad su brusne fasete bile povezane s jednim od sljedećih znakova ili simptoma: podatkom o škripanju zubima, bolnoj osjetljivosti masetera i temporalnih mišića te nelagodom u čeljusnoj muskulaturi nakon buđenja.

Svrha ovog istraživanja bila je utvrditi stupanj trošenja zuba u uzorku ozubljenih pripadnika Hrvatske ratne mornarice te multivarijantnim linearnim modelom u ispitivanom uzorku odrediti prediktivne čimbenike povezane s trošenjem zuba. Hipoteza je bila da je trošenje zuba povezano s dobi i spolom, te da se češće može očekivati uz hipertrofiju žvačnih mišića, napetost žvačnih mišića nakon buđenja, pomičnost zuba, lineu albu, impresije na jeziku, ranice na bukalnoj sluznici, nekarijesne cervisne lezije, te ako postoji anamnestički podatak da ispitanik škripi zubima.

Materijali i metode

Ispitanici

Istraživački protokol odobrilo je Etičko povjerenstvo Stomatološkog fakulteta, Glavni stožer OSRH-a – Uprava za logistiku, Uprava za ljudske resurse – Služba za zdravstvenu zaštitu, Zapovjedništvo za potporu vojno-zdravstvenog središta i Zapovjedništvo HRM-a – Odjel za logistiku. Istraživanje je provedeno na pripadnicima Hrvatske ratne mornarice koji su bili poslani na rutinski godišnji stomatološki pregled. Svi su prije nastavka daljnjih kliničkih procjena potpisali informirani pristanak. U mjerenje trošenja zuba mogli su biti uključeni samo podaci ozubljenih ispitanika. Zato su ispitanici kojima je u dva ili više sekstanata nedostajalo tri ili više zuba (isključujući umnjake) bili isključeni. To znači da je apsolutni minimalni broj preostalih zuba potrebnih za uključivanje ispitanika u uzorak bio 15. Iz istraživanja su bili isključeni i ispitanici s:

1.) parodontitisom,
2.) zubnim protezama,
3.) potpunim fiksno-protetskim nadomjescima,
4.) psihijatrijskim ili neurološkim poremećajima.

Kriterije za odabir ispunila su 1092 ispitanika u dobi od 20 do 60 godina (srednja dob 37,06±7,85).

Klinički pregled

Mjerenje iznosa trošenja zuba temeljilo se na relativnom stupnju nalaza brusnih faseta po modificiranom indeksu prema Pullingeru i Seligmanu (1); za svaki zub dobiveni su sljedeći rezultati: stupanj 0 – nema vidljive atricije; stupanj 1 – minimalna atricija kvržica ili incizalnih bridova, u caklini; stupanj 2 – vidljive fasete usporedne s normalnim područjima kontura ploha (caklina); stupanj 3 – zamjetno zaravnjenje kvržica ili incizalnih bridova (caklina); stupanj 4 – potpuni gubitak kontura ploha i bridova i ekspozicija dentina do polovice visine nekadašnje krune zuba.

Procijenjene su sljedeće nezavisne varijable: (1) NKCL – vrh sonde postavljen je okomito na površinu zuba i vođen iz

prevalence increases to 50% if we clinically evaluate the subjects interpreting dental attrition. This illustrates how difficult it is to detect parafunctional activity in a population. According to Cosme et al. (22) the recognition of bruxism was performed by means of self-reported bruxism and/or presence of tooth wear. In the study by Carvalho et al. (13) bruxism was diagnosed by the presence of aligned dental wear facets associated with the presence of one of the following signs or symptoms: self-report of tooth-grinding, painful sensitivity of the masseter and temporal muscles, discomfort in the jaw muscles upon awakening.

This study aimed to evaluate the severity of tooth wear in a sample of dentate Croatian navy employees and to determine the predictive factors that are related to tooth wear in the studied sample by using a multivariate logistic regression model. The hypothesis of this study is that tooth wear is related to age and gender and can be anticipated by masticatory muscles hypertrophy, masticatory muscles tension upon awakening, tooth mobility, linea alba, tongue indentations, traumatic ulcers, noncarious cervical lesion and self-report of bruxism.

Materials and methods

Subjects

The study protocol was approved by the Ethics Committee of the School of Dental Medicine, CAF General Staff-Directorate for Logistics, Human Resources Directorate-Medical Department, The Support Command of Military Medical Centre and Navy Command- Department for Logistics. Navy employees who received routine annual dental examination were evaluated. The informed consent was obtained from subjects before we proceeded with any further clinical evaluations. Only the data from dentate subjects could be included for tooth wear measurements. Subjects were excluded if in two or more sextants three or more teeth per sextant were missing (excluding third molars). This means that the absolute minimum number of remaining teeth necessary for including the subjects in the model was 15. The exclusion criteria also included subjects with: 1) severe periodontitis, 2) dentures, 3) complete fixed prosthodontic restorations 4) subjects with psychiatric or neurological disturbances. 1092 of the respondents met the selection criteria. Their ages ranged from 20 to 60 years (mean age 37.06±7.85).

Clinical examination

The attrition severity measurements were described by Pullinger and Seligman (1); for each tooth the scores were given as follows: 0=no facet; 1=slight facet; 2=noticeable flattening with the normal planes of contour; 3=flattening of cusps or grooves; 4=total loss of contour and dentinal exposure when identifiable.

Factors checked for correlations were as follows: (1) NCCL - the probe tip was positioned perpendicularly to the dental surface and brought from the bottom of the gingival sulcus through the CEJ. If some irregularity was felt, it was considered to be a noncarious cervical lesion; (2) tongue indentations – subjects were requested to open their mouths

dna gingivnog sulkusa do kraja caklinsko-cementnog spojišta (CCS-a). Opažene nepravilnosti smatrale su se nekarijesnim cerviksnim lezijama; (2) impresije na jeziku – od ispitanika je zatraženo da lagano otvori usta i zadrži jezik u relaksiranom položaju kako protruzija ne bi spriječila vidljivost impresija na jeziku; (3) linea alba – bilateralna hiperkeratinizirana bijela linija na unutarnjoj strani obraza, paralelna i usklađena s okluzalnom ravninom; (4) hipertrofija žvačnih mišića – prisutnost prekomjerno razvijenih žvačnih mišića tijekom hotimične kontrakcije; (5) pomičnost zuba – procjena pomičnosti zuba na temelju Millerova indeksa (23); (6) ranice na oralnoj sluznici – prisutnost traumatskog ulkusa na bukalnoj sluznici (24).

Prijavljeni bruksizam

Iz upitnika su dobiveni podaci o tome stišće li i/ili škripi osoba zubima (nikad, rijetko, ponekad, često, stalno), je li to činila i ranije te je li joj itko potvrdio da škripi u snu. Bruksizam je evidentiran ako se javljao „često“ ili „stalno“ te kada ga je potvrdila treća osoba. Upitnik je također sadržavao pitanja o zamoru žvačnih mišića i zamoru čeljusti nakon buđenja.

Kalibracija ispitivača

Dvoje iskusnih ispitivača (svaki posebno) evidentirali su jačinu trošenja zuba na 30 slučajno odabranih ispitanika od 1092 sudionika u istraživanju. Postupak je ponovljen nakon tjedan dana. Rezultati su pokazali da je podudarnost u mjerenjima dvaju ispitivača bila zadovoljavajuća (za trošenje zuba: $\varkappa$=0,92) te da nije postojala statistički značajna razlika između prvog i drugog mjerenja svakog ispitivača (za trošenje zuba p=0,89, t-test za zavisne uzorke)

Ukupno trošenje zuba određeno je na temelju zbroja rezultata svih brusnih faseta. Korištenjem tehnike multiple regresije provjerena je povezanost ukupnog trošenja zuba u odnosu na sljedeće nezavisne varijable: dob, spol, broj zuba, hipertrofiju žvačnih mišića, napetost žvačnih mišića nakon buđenja, pomičnost zuba, linea alba, impresije na jeziku, traumatske ulkuse, NKCL i prijavljeni bruksizam.

Zatim je određen *indeks trošenja zuba* – ukupno trošenje zuba podijeljeno je s dobi ispitanika (korigiranoj za razdoblje mliječne denticije) i pomnoženo s omjerom prisutnih zuba i onih kojih nije bilo. Indeks trošenja zuba predstavlja prosječni godišnji porast zbroja rezultata svih procjena korigiranih za postotak zuba koji nedostaju, i korišten je kao zavisna varijabla u regresijskom modelu.

Statistička analiza

U svim analizama korišten je statistički paket Statistica (verzija 8). Višestruka stupnjevita regresijska analiza provedena je kako bi se procijenio doprinos svake prediktorske varijable u objašnjenju varijance ukupnog trošenja zuba i indeksa trošenja zuba. Za uključivanje u regresijsku jednadžbu prema dosadašnjim postupcima mora se postići razina značajnosti od p< 0,05. Također su izračunate pojedinačne korelacije prediktorskih varijabli u odnosu na ukupno trošenje zuba i indeks trošenja zuba.

slightly and keep their tongue in a rest position since tongue protrusion might prevent TI visualization; (3) linea alba - a bilateral hyperkeratinized white line located within the cheek, parallel to the occlusal plane and matching the occlusal plane; (4) the masseter muscle hypertrophy - the presence of excessively developed masseter muscles during voluntary contraction; (5) tooth mobility – evaluation of tooth mobility using Miller's Index (23); (6) traumatic ulcers – the presence of traumatic ulcers on buccal mucosa (24).

Reported bruxism

Data concerning whether the subjects clenched their teeth (never, seldom, sometimes, often, continually) as well as if anybody confirmed that the patient produced grinding sounds while sleeping were obtained via a questionnaire. Bruxism was confirmed when it occurred 'often' or 'continually' or when it was verified by a third person. The questionnaire also contained a question on masticatory muscles tension and jaw fatigue upon awakening.

Observer training

Two experienced examiners rated the tooth wear on 30 subjects randomly selected from the 1092 subjects enrolled in the study on two occasions one week apart. The weighted kappa statistics showed satisfactory agreement between the observers (for tooth wear: $\varkappa$=0.92). No significant differences were noted between the first and the second measurement (for tooth wear p=0.89, paired t-test).

The *tooth wear score* was defined as the sum of all facets scores. The following independent variables were checked for correlations with the tooth wear score using a multivariate regression model: age, gender, number of teeth, masticatory muscles hypertrophy, masticatory muscles tension upon awakening, tooth mobility, linea alba, tongue indentations, traumatic ulcers, NCCL and reported bruxism.

In the second step the *tooth wear index* was determined; the tooth wear score was divided by the age (corrected for the primary dentition period) and then multiplied by the percent of missing teeth. The *tooth wear index* represented average annual growth of sum of ratings corrected for the percent of missing teeth and was used as a dependent variable in the regression model.

Statistical analysis

The statistical package Statistica (version 8) was used in all analyses. Multiple stepwise regression analyses were conducted to assess the contribution of each predictor variable to the explanation of the variance of the tooth wear score and tooth wear index. For the inclusion into regression equation by the 'forward' procedures, a significance criterion of p<0.05 had to be attained. Individual correlations of the predictor with the tooth wear score and tooth wear index were also calculated.

Rezultati

Struktura uzorka i prevalencija ispitivanih varijabli prikazane su u tablici 1.

Results

Sample structure and the prevalence of the examined variables are given in Table 1.

Tablica 1. Karakteristike uzorka
Table 1 Characteristics of the sample (n=1092)

variable/ varijable	frequency/ frekvencija			
	No. of subjects/ broj ispitanika	%	mean (sd)/ prosjek (sd)	range/ raspon
gender/ spol				
female/ ženski	107	9.8		
male/ muški	985	90.2		
age/ dob				
20-30 y/ g	234	21.4	37.06 (7.85)	20-60
30-40 y/ g	520	47.6		
40-60 y/ g	338	31		
masseter muscle hypertrophy/ hipertrofija žvačnih mišića				
yes/ da	46	4.2		
muscle tension upon awakening/ napetost mišića nakon buđenja				
yes/ da	224	20.5		
tooth mobility/ pomičnost zuba				
solitary/ izolirana	38	3.5		
general/ generalizirana	13	1.2		
tongue indentations/ impresije na jeziku				
yes/da	446	40.1		
linea alba/ linea alba				
yes/ da	366	33.5		
traumatic ulcers/ traumatski ulkusi				
yes/da	179	16.4		
number of existing teeth/ broj postojećih zuba			28 (2.8)	17-32
tooth wear / trošenje zuba	905	82.8		
20-30 y/god.	154	65.8		
30-40 y/god.	427	82.12		
40-60 y/god.	324	95.8		
% of teeth with wear/ % zuba s trošenjem			38.20 (32.32)	
20-30 y/god.			21.66 (27.01)	0-88.88
30-40 y/god.			36. 38 (31.33)	0-100
40-60 y/god.			52.45(31.09)	0-100
noncarious cervical lesion/ nekarijesne cervikalne lezije	513	46		
number of NCCL per person/ broj NKCL po osobi			5.98 (5.25)	0-22
number of NCCL/number of existing teeth/ broj NKCL/ broj postojećih zuba			0.21 (0.193)	0-1
reported bruxism/ prijavljeni bruksizam				
yes/ da	86	7.8		

Prevalencije trošenja zuba

Postotak zuba s okluzijskim trošenjem kod postojećih zuba izražen je u obliku srednje vrijednosti za ukupni uzorak i za svaku dobnu skupinu. Raspon se kretao od 21,6 posto u najmlađoj dobnoj skupini do 52,45 posto u najstarijoj.

Prosječan broj zuba s rezultatom trošenja 1 bio je najniži među ispitanicima u dobi od 40 do 60 godina, a broj zuba s rezultatom 2 i 3 – 4 povećavao se s dobi (tablica 2).

U tablici 3. prikazano je ukupno trošenje zuba (zbroj rezultata svih brusnih faseta) za ukupan uzorak i za svaku dobnu skupinu. Ukupno trošenje zuba bilo je najviše kod ispitanika u dobi od 40 do 60 godina, a najniže kod onih od 20 do 30 godina.

Prevalence of tooth wear

The percentage of teeth with occlusal wear related to existing teeth is given as mean values for total sample and for each age group. They ranged from 21.66% in the youngest age group to 52.45% teeth with wear per person in the oldest age group.

Mean number of teeth with score 1 was the lowest among 40-60-year-old subjects, while number of teeth with scores 2 and 3/4 increased with age (Table 2).

The tooth wear scores (sum of all facets scores) for total sample, as well as for each age group are given in Table 3. The tooth wear score was highest in 40-60-year-old subjects, and lowest in 20-30-year-old subjects.

Tablica 2. Ukupan broj zuba i prosječan broj zuba (sd) s rezultatom trošenja 1 – 4 u svakoj dobnoj skupini
Table 2 Total number of teeth and mean (sd) of number of teeth with certain wear score in each age group/

age group/ dobna skupina		total teeth/ ukupno zuba		wear score 1/ ukupno trošenje 1		wear score 2/ ukupno trošenje 2		wear score 3 / 4/ ukupno trošenje 3/4	
y/ god.	n/ b	mean/ prosjek	sd	mean/ prosjek	sd	mean/ prosjek	sd	mean/ prosjek	sd
20-30	234	29.7	2.3	3.08	5.04	3.01	5.04	0.2	1.66
30-40	520	28.4	2.5	3.31	5.01	6.1	6.98	0.83	2.93
40-60	338	26.4	2.9	2.93	3.89	8.31	7.03	2.55	5.01

Tablica 3. Ukupno trošenje zuba i indeks trošenja zuba
Table 3 Tooth wear score and tooth wear index/

	age group/ dobna skupina	mean/ prosjek	median/ medijan	lower quartile/ donji kvartil	upper quartile/ gornji kvartil	range/ raspon
tooth wear score/ ukupno trošenje zuba	total/ ukupno	19.141	18	1	32	84
	20-30 y/god.	9.78	2	0	17	69
	30-40 y/ god.	18.03	16	1	32	72
	40-60 y/ go.	27.31	32	10	40	84
tooth wear index/ indeks trošenja zuba	total/ ukupno	0.599	0.545	0.04	1.007	3.619

Učestalost kliničkih znakova i simptoma

Hipertrofija žvačnih mišića uočena je kod 4,2 posto ispitanika, pomičnost zuba imalo je 4,8 posto, impresije na jeziku nađene su kod njih 40,1 posto, a linea alba kod 33,5 posto. Ranice na bukalnoj sluznici imalo je 16 posto ispitanika, a kod 46 posto pronađene su nekarijesne cervikasne lezije. U upitniku je 7,8 posto ispitanika navelo kako je svjesno da bruksira tijekom spavanja ili im je to potvrdila druga osoba, a 20,5 posto navelo je da osjeća napetost žvačnih mišića nakon buđenja.

Sljedeći potez bio je testirati statističku povezanost ukupnog trošenja zuba s dobi, spolom, hipertrofijom žvačnih mišića, napetošću žvačnih mišića nakon buđenja, pomičnošću zuba, linea alba, impresijama na jeziku, bukalnim ranicama, brojem zuba, nekarijesnim cerviksnim lezijama te anammestičkim podatkom o bruksizmu. Za to je korišten Spearmanov test korelacije. Umjeren stupanj korelacije ustanovljen je za sljedeće varijable: NKCL (r=0,745), impresije na jeziku (r=0,42), napetost mišića (r=0,378), dob (r=0,5) i linea alba (r=0,318). Slabija korelacija pronađena je između ukupnog trošenja zuba i podatka o bruksiranju (r=0,23), broja zuba (r=-0,18) i hipertrofije mišića (r=0,17). Nije pronađena korelacija između ukupnog trošenja zuba i varijable spola (r=-0,07), bukalne ranice (r=0,08) te pomičnosti zuba (r=-0,01).

Zatim je izračunat indeks trošenja zuba i stavljen u korelaciju s ispitivanim varijablama. Umjeren stupanj korelacije pronađen je između indeksa trošenja zuba i NKCL-a (r=0,659), impresija na jeziku (r=0,427), napetosti mišića (r=0,333) i linee albe (r=0,301). Slabiju korelaciju s indeksom trošenja zuba imao je podatak o bruksizmu (r=0,17), hipertrofija mišića (r=0,126) i spol (r=-0,114). Koeficijenti korelacije između varijable indeksa trošenja zuba i varijabli bukalne ranice te pomičnost zuba bili su slabi i statistički nesignifikantni (r=0,007 i r=-0,007 razine značajnosti).

Prevalence of clinical signs and symptoms

Masseter muscle hypertrophy was found in 4.2% of subjects, 4.8% of subjects had tooth mobility, tongue indentations were found in 40.1% and linea alba in 33.5% of subjects. In 16.4% of subjects, traumatic ulcers on buccal mucosa were present, while 46% of subjects had noncarious cervical lesions. In 7.8% of subjects, a third person confirmed grinding sounds while sleeping and 20.5% of subjects reported masticatory muscle tension upon awakening.

Spearman's rank correlation coefficients were calculated to determine the relationship between *tooth wear score* and age, gender, masticatory muscles hypertrophy, masticatory muscles tension upon awakening, tooth mobility, linea alba, tongue indentations, traumatic ulcers, number of teeth, noncarious cervical lesion and self-report of tooth-grinding. The moderate degree of correlation was found for the following variables: NCCL (r=0.745), tongue indentations (r=0.42), muscle tension (r=0.378), age (r=0.35) and linea alba (r=0.318). A weaker correlation existed for reported bruxism (r=0.23), number of teeth (r=-0.18) and muscle hypertrophy (r=0.17). There was no correlation between the variable tooth wear score and the variable gender (r=-0.07), traumatic ulcers (r=0.08) and tooth mobility (r=-0.01).

The *tooth wear index* was then determined and put into a correlation with the examined variables. A moderate degree of correlation was found between tooth wear index and NCCL (r=0.659), tongue indentations (r=0.427), muscle tension (r=0.333) and linea alba (r=0.301). A weaker correlation existed for reported bruxism (r=0.17), muscle hypertrophy (r=0.126) and gender (r=-0.114). The correlation coefficients between variable tooth wear index and variables traumatic ulcers and tooth mobility were weak and insignificant (r=0.07 and r=-0.07 respectively).

Multipla regresijska analiza

Multipla regresijska analiza provedena je kako bi se odredio utjecaj pojedinih prediktora na varijancu varijabli *ukupno trošenje zuba* i *indeks trošenja zuba.*

U tablicama 4. i 5. navedeni su regresijski koeficijenti i značajnost multiple linearne regresijske analize. Regresijski model (tablica 4.), pokazao je koeficijent determinacije (R^2) od 0,613. Pritom je najistaknutija varijabla bila NKCL koja je objasnila 55 posto varijance. Analiza je pokazala da su, osim NKCL-a, s povećanjem ukupnog trošenja zuba usko povezane impresije na jeziku, starija dob, muški spol, napetost mišića i smanjen broj zuba. Varijable: podatak o bruksizmu (p>0,05), pomičnost zuba (p>0,05), bukane ranice (p>0,05), mišićna hipertrofija (p>0,05) te linea alba (p>0,05) nisu bile znatno povezane s ukupnim trošenjem zuba.

Nakon uključivanja dobi i broja zuba u indeks trošenja zuba, varijabla hipertrofija mišića ulazi u model te objašnjava 0,4 posto varijance (tablica 5). Regresijski model ovaj je put pokazao koeficijent determinacije (R^2) od 0,490. Ponovno je najistaknutija varijabla bio NKCL koji je objasnio 44 posto varijance. Impresije na jeziku, napetost mišića, muški spol i hipertrofija mišića bili su značajno povezani s povećanjem ukupnog trošenja zuba te su objasnili daljnjih 5 posto varijance. Podatak o bruksizmu (p>0,05), bukalne ranice (p>0,05), linea alba (p>0,05) i pomičnosti zuba (p>0,05) nisu bili značajno povezani s indeksom trošenja zuba.

Multiple regression analyses

Multiple regression analyses were performed to determine the amount of variance of *tooth wear score* and *tooth wear index* that could be explained by the predictors.

The regression coefficients and significance levels of the multiple linear regression analysis are listed in Table 4 and Table 5. Regarding *tooth wear score* (Table 4); the regression model produced a total factor of explanation (R^2) of 0.613. The most prominent variable was NCCL, which explained 55% of the variance. The analysis revealed that, besides NCCL, tongue indentations, increasing age, male gender, muscle tension and decreased number of teeth were significantly associated with an increase of tooth wear score. Multivariate analysis of the tooth wear score data suggests that there was no significant relationship or association between the tooth wear score and reported bruxism (p>0.05), tooth mobility (p>0.05), traumatic ulcers (p>0.05), muscle hypertrophy (p>0.05) and linea alba (p>0.05).

After inclusion of age and number of teeth into the tooth wear index, an additional factor became significant and entered the logistic regression model for *tooth wear index* (Table 5): muscle hypertrophy (explained 0.4% of the variance). The regression model produced a total factor of explanation (R^2) of 0.490. Again NCCL predicted 44% of the variance. Tongue indentations, muscle tension, male gender and muscle hypertrophy were significantly associated with an increase of tooth wear score and explained a further 5% of the variance. Multivariate analysis of the tooth wear index data suggests that there was no significant relationship or association between the tooth wear score and reported bruxism (p>0.05), traumatic ulcers (p>0.05), linea alba (p>0.05) and tooth mobility (p>0.05).

Tablica 4. Prediktivni pokazatelji ukupnog trošenja zuba (multipla regresijska analiza)
Table 4 Multiple regression analysis predicting tooth wear score values

Variable/ varijable	beta	higher tooth wear score for/ veće ukupno trošenje zuba za	R^2change/ promjena R^2	significance/ značajnost
NCCL/ NKCL	0.616	higher NCCL index/ veći indeks NKCL-a	0.555	<0.001
tongue indentations/ impresije na jeziku	0.121	yes/ da	0.021	<0.001
age/ dob	0.182	increased/ povećanje	0.020	<0.001
gender/ spol	-0.07	male/ muški	0.007	<0.001
muscle tension/ mišićna napetost	0.11	yes/ da	0.006	<0.001
number of teeth/ broj zuba	0.056	decreased number/ smanjen broj	0.004	<0.05
total/ ukupno			0.613	

Beta = Standardizirani regresijski koeficijent • Standardized regression coefficient; R^2 = Koeficijent determinacije • Factor of explanation

Tablica 5. Prediktivni pokazatelji indeksa trošenja zuba (multipla regresijska analiza)
Table 5 Multiple regression analysis predicting tooth wear index values/

Variable/ varijable	beta	higher tooth wear index for/ veći indeks trošenja zuba za	R^2change/ promjena R^2	significance/ značajnost
NCCL/ NKCL	0.55	higher NCCL index/ veći NKCL indeks	0.435	<0.001
tongue indentations/ impresije na jeziku	0.170	yes/ da	0.033	<0.001
gender/ spol	-0.105	male/ muški	0.012	<0.001
muscle tension/ mišićna napetost	0.103	yes/ da	0.004	<0.05
muscle hypertrophy/ mišićna hipertrofija	0.063	yes/ da	0.004	<0.05
total/ ukupno			0.490	

Beta = Standardizirani regresijski koeficijent • Standardized regression coefficient; R^2 = Koeficijent determinacije • Factor of explanation

Rasprava

Zbog opsežnosti ovog istraživanja fokus je bio usmjeren uglavnom na trošenje zuba kao posljedicu atricije/abrazije, iako i erozija može utjecati na okluzijske površine zuba (25). Kako se za procjenu trošenja zuba upotrebljavaju različite mjerne skale, rezultate našeg istraživanja nije lako usporediti s rezultatima ostalih studija. Unatoč tomu, prevalencija trošenja zuba dobivena ovim istraživanjem bila je najbliža podacima Hugsona i suradnika (26). Kod samo 17,12 posto ispitanika uključenih u istraživanje nije evidentirano trošenje zuba. U najmlađoj dobnoj skupini 34,2 posto ispitanika nije imalo brusne fasete, a u najstarijoj je bez trošenja zuba bilo 4,2 posto. Hugson i suradnici (26) navode kako među dvadestogodišnjim ispitanicima njih 35 posto nije imalo, ili je imalo samo blagi oblik okluzijskog trošenja, a u istraživanju Seligmana i suradnika (27) 91,5 posto mlađe populacije imalo je jednu ili više zubnih ploha s izraženim brusnim fasetama.

Nema dvojbe da se okluzijsko trošenje povećava tijekom života (2, 28, 29), što je također potvrđeno u našoj studiji. U dobi od 20 godina povećava se učestalost trošenja zuba sa 65,8 posto na 82,12 posto, a kod starijih dobnih skupina i do 95,8 posto. Medijan ukupnog trošenja zuba u našem istraživanju bio je 18 (raspon 0 – 84). Postotak zuba zahvaćen okluzijskim trošenjem bio je od 21,66 posto za najmlađu dobnu skupinu do 52,45 posto za najstariju. Prosječan broj zuba s rezultatom 1 najniži je među ispitanicima u dobi od 40 do 60 godina, a broj zuba s rezultatima 2 i 3 – 4 povećavao se s dobi.

Na osnovi kliničkog iskustva, pregleda literature i preliminarnih analiza odabrane su varijable koje mogu upućivati na trošenje zuba uzrokovano bruksizmom (9). Zbog multivarijante prirode varijable *trošenja*, multipla regresijska analiza primijenjena je kako bi se odredili čimbenici koji bi mogli biti povezani s tom varijablom.

Na povećano trošenje zuba najviše su utjecali sljedeći čimbenici: NKCL, impresije na jeziku, dob, muški spol, napetost mišića i smanjen broj zuba. Tako visok koeficijent determinacije (R^2= 0,613) u regresijskoj analizi ističe klinički utjecaj tih čimbenika na ukupno trošenje zuba. Visoka korelacija između trošenja zuba i dobi također je očekivana zbog povećanog trošenja zuba tijekom života. Unatoč tomu, Smith i suradnici (30) opisuju veće trošenje u dobi od 15 do 26 godina, negoli u ostalim dobnim skupinama. Njihov nalaz upućuje na to da erozija može predstavljati mehanizam koji uzrokuje razmjerno povećano trošenje zuba u mlađim dobnim skupinama. Korelacija između ukupnog trošenja zuba i broja preostalih zuba, pronađena u našem istraživanju, u skladu je s istraživanjem Ekfeldta i suradnika (31). Utjecaj normalne žvačne funkcije na trošenje zuba vjerojatno će se povećati pri smanjivanju broja zuba. Zato smo uveli indeks trošenja zuba u koji smo uključili broj zuba i dob kako bismo kompenzirali utjecaj tih čimbenika na trošenje zuba.

Pri uvođenju indeksa trošenja zuba u multiplu regresijsku analizu, model je pokazao koeficijent determinacije od 0,490. Statistički najistaknutija varijabla bila je NKCL koja objašnjava 44 posto varijance. Etiologija NKCL-a složena je

Discussion

Because of the comprehensive nature of the study, focus was mainly on tooth wear due to attrition/abrasion, although erosion could also affect occlusal surfaces of the teeth (25). Since different measurement scales are used to evaluate tooth wear, it is not easy to compare our results with the results of other studies. In spite of this, the prevalence of tooth wear found in this study was closest to the data of Hugoson et al. (26). 17.12% of all examined subjects in our study had no tooth wear. In the youngest age group, 34.2% of the subjects had no wear facets, while in the oldest age group; in only 4.2% of the population sample no tooth wear was found. Hugoson et al. (26) reported that among the 20-year-old subjects 35% had no or slight occlusal wear, while in the study of Seligman et al. (27) 91.5% of the young adult population sample had one or more tooth sites with a significant wear facet.

There is no doubt that occlusal wear increases throughout life (2, 28, 29), which is also confirmed in our study. From the age of 20, there was an increase in the prevalence of tooth wear from 65.8% to on average 82.12% to 95.8% in the older age groups. The median of total tooth wear score was 18 (range 0-84). The percentage of teeth with occlusal wear related to existing teeth ranged from 21.66% in youngest age group to 52.45% teeth with wear per person in the oldest age group. Mean number of teeth with score 1 was the lowest among 40-60-year-old subjects, while the number of teeth with scores 2 and 3-4 increased with age.

On the basis of clinical experience, review of the literature and the preliminary analysis of the variables that may suggest tooth wear due to bruxism, subjects were selected for evaluation (9). Because of the multifactorial character of the development of tooth wear, a multiple regression analysis was used to determine the factors that are related to tooth wear.

The factors that were found to correlate with the increased tooth wear score were NCCL, tongue indentations, age, male gender, muscle tension and decreased number of teeth. The reasonably high factor of explanation (R^2=0.613) for the regression analysis emphasizes the clinical significance of these factors for increased tooth wear score. A high correlation between tooth wear and age was expected because of the increased wear that teeth experience with time. In spite of that, Smith et al. (30) reported a greater wear in 15-26-year-old group than in intermediate age groups. The finding of his study suggests that erosion is the mechanism causing the increased tooth wear rates in younger age groups. A correlation between tooth wear score and the number of remaining teeth, found in our study, was also identified by Ekfeldt et al. (31). The influence of normal masticatory function on tooth wear will probably increase when the number of teeth is reduced. Therefore, we introduced a tooth wear index in which we included the number of teeth, as well as the age in order to eliminate the effect of these factors on tooth wear.

When introducing tooth wear index into multiple regression analysis, the regression model produced a total factor of explanation R^2= 0.490. From a statistical point of view, the

i ne postoji mehanizam koji sa sigurnošću može objasniti te lezije. Iako ih neki istraživači pripisuju nepravilnom četkanju zuba (32) i pretjeranoj oralnoj higijeni, gotovo je nevjerojatno da samo četkanje zuba može biti glavni uzrok NKCL-a. Grippo i suradnici (33) smatraju kako cervikalne lezije uzrokuje okluzijski stres u kombinaciji s abrazijom zbog četkanja zuba i djelovanja kiseline. U našem je istraživanju potvrđena znatna povezanost NKCL-a i trošenja zuba. U nekoliko drugih istraživanja također je istaknuto da su cervikalne lezije češće kod osoba s bruksizmom u odnosu prema osobama bez bruksizma (34), iako se ta teorija uglavnom temelji na laboratorijskim (35), a ne na kliničkim istraživanjima.

U našoj studiji impresije na jeziku, napetost mišića, muški spol i hipertrofija mišića bili su znatno povezani s povećanjem iznosa trošenja zuba te su opisali daljnjih 5 posto varijance. Muški spol navodi se kao važan čimbenik u trošenju zuba (28,29). Općenito je prihvaćeno da muškarci imaju veću stopu atricije od žena (2,30), a tu pretpostavku potvrđuju i naši rezultati. Statističkom analizom ustanovljeno je da je spol važan, no zbog znatno većeg udjela muškaraca u ispitivanom uzorku mogla je nastati disproporcija u uočenim rezulatima kod žena.

Iako u ranijim studijama nije pronađena povezanost između mišićne osjetljivosti i jakog okluzijskog trošenja (30,36), zaključujući kako osjetljivost sprječava razvoj brusnih faseta i sprječava bruksizam, rezultati našeg istraživanja pokazuju pozitivan odnos između tih dviju varijabli. Nadalje, hipertrofija mišića značajno je povezana s povećanjem trošenja zuba, što upozorava da postoji jak pozitivan utjecaj jedne varijable na drugu.

Neki istraživači smatraju kako impresije na jeziku i linea alba na sluznici obraza, izazvani silama usmjerenim od mekih tkiva prema površini zuba, predstavljaju jasne znakove bruksizma (16). Tako je istraživanje provedeno na osobama s minimalno petogodišnjim aktivnim bruksizmom, pokazalo prevalenciju linee albe od 58,6 posto i prevalenciju impresija na jeziku od 41,4 posto (14). Prema našem istraživanju impresije na jeziku povezane su s povećanim trošenjem zuba, a linea alba nije bila znatnije povezana s trošenjem zuba. Long (37) smatra kako nazubljeni jezik, odnosno impresije na jeziku, mogu biti uzrokovane učinkom vakuuma stvorenim između jezika i nepca tijekom stiskanja zubima. No, to je samo pretpostavka koja nije znanstveno potvrđena. Iako se impresije na jeziku, sudeći prema našem istraživanju, čine kao prediktivni čimbenik trošenja zuba, potrebna su daljnja istraživanja kako bi se potvrdio taj nalaz. Moguće je da se linea alba javlja kao posljedica pritiska obraza tijekom gutanja i nije povezana s trošenjem. Takagi i suradnici (15) tijekom istraživanja čimbenika povezanih s bruksizmom, ustanovili su da je skupina ispitanika s lineom albom imala veliko povećanje pritiska tijekom gutanja.

U istraživanju Bernhardta i suradnika (2) prijavljeni bruksizam bio je usko povezan s okluzijskim trošenjem. No, Seligman i suradnici (27) nisu našli takvu povezanost, ističući kako je prevalencija prijavljenog bruksizma podatak koji ovisi o metodi prikupljanja podataka te o ispitivanoj populaciji. U našoj studiji anamnestički podatak o bruksizmu nije bio značajno povezan s trošenjem zuba, što dokazuje da ana-

most prominent variable was again NCCL which predicted 44% of the variance. The aetiology of NCCL is complex and there is no mechanism that can explain all the phenomena of these lesions. Some authors ascribe it to tooth brushing (32) and higher oral hygiene, although, according to the literature, it is unlikely that tooth-brushing effects alone can be the main cause of NCCLs. Grippo et al. (33) believed that occlusal stress in combination with the abrasion from tooth brushing and the effects of acid caused cervical lesions. The high impact of NCCL on tooth wear was found in our study. Several other studies have also revealed that cervical lesions are more prevalent in bruxists than in non-bruxists (34), although this theory is mainly based on laboratory (35) instead of clinical studies.

Tongue indentations, muscle tension, male gender and muscle hypertrophy were significantly associated with an increase in tooth wear score in our study and explained a further 5% of the variance. Male gender has been described in the literature as an important factor for tooth wear (28, 29). It is generally accepted that men have higher levels of attrition than women (2, 30), an assumption also confirmed by the results of this study. Although the statistical analysis found gender to be significant, the proportion of male individuals can be considerable, therefore resulting in decreased prevalence of tooth wear in female subjects.

Although previous studies did not find any positive relation between muscle tenderness and high occlusal wear (30,36), concluding that tenderness prevents the development of wear facets or prevents bruxism, the results of our study revealed a positive relation between those two variables. Furthermore, muscle hypertrophy correlated significantly with increased tooth wear indicating that there is a strong positive influence of one variable on another.

Some authors believed that a scalloped tongue and the presence of a jugal mucosa ridging 'linea alba' are clear signs of bruxism (16) caused by the force exerted by soft tissues against surfaces of teeth. A study of individuals with a history of at least 5 years of active bruxism reported a linea alba prevalence of 58.6% and tongue indentations prevalence of 41.4% (14). According to our study, the tongue indentations are associated with high tooth wear, while linea alba did not show a significant influence on tooth wear. Long (37) has suggested that lingual scalloping can be caused by a vacuum effect created between the tongue and the palate during sustained tooth clenching. This is, however, a speculation which is not scientifically confirmed. Although tongue indentations, according to our study, seemed to be a predictive factor of tooth wear, further studies are needed to confirm this finding. Regarding linea alba, it is more likely that it occurs as a result of the cheek pressure exerted during deglutition, and is not related to bruxism. Takagi et al (15), when investigating factors related to bruxism, found that the group of subjects with linea alba showed significant pressure increase during deglutition.

In the study of Bernhardt et al. (2) the reported bruxism was strongly related to occlusal wear. Seligman et al. (27), however, found no such relation, assuming that the prevalence of self-reported bruxism is highly sensitive to data col-

mnestički podaci mogu biti ograničavajući čimbenik za mjerenje incidencije bruksizma u ispitivanom uzorku, te da upozoravaju samo na mali broj najizraženijih slučajeva.

Zaključak

Rezultati ovog istraživanja upućuju na to da su nekarijesne cerviksne lezije, impresije na jeziku, napetost mišića, muški spol i hipertrofija mišića čimbenici koji pokazuju najveću povezanost s trošenjem zuba. Nije pronađena značajna povezanost indeksa trošenja zuba s linea alba, bukalnim ranicama, pomičnošću zuba te podatkom o bruksizmu.

lection methods and the population that has been examined. In this study, the reported bruxism did not show a significant influence on tooth wear, indicating that this anamnestic data alone may be too restricting a factor to measure the incidence of bruxism in the studied sample. The possible underreporting of the phenomenon in individuals living alone poses a problem, since no one can witness their symptoms. Therefore, this variable alone might greatly underestimate a problem in general population selecting only a small number of most prominent cases.

Conclusion

The results of this study suggest that noncarious cervical lesions, tongue indentations, muscle tension, male gender and muscle hypertrophy are potential factors that may influence or predict tooth wear. There was no significant relationship or association between tooth wear index and linea alba, traumatic ulcers, tooth mobility and reported bruxism.

Abstract

Objective: The objective of this study was to determine the severity of tooth wear in a sample of Croatian navy employees and to evaluate oral signs and demographic factors related to it. **Materials and Methods:** The sample included 1092 navy employees aged 20 to 60 years (mean age 37.06±7.85), 985 men and 107 women. The tooth wear severity measurements were based on the relative degree of faceting (0-4 scale). The *tooth wear score* (the sum of all facets scores) and *tooth wear index* (average annual growth of sum of ratings corrected for the percent of missing teeth) were correlated to demographic data, masticatory muscles hypertrophy, masticatory muscles tension upon awakening, tooth mobility, linea alba, tongue indentations, traumatic ulcers, noncarious cervical lesions (NCCL), number of teeth and self-reported bruxism in order to determine the specific correlates of tooth wear. **Results:** The percentage of teeth with occlusal wear ranged from 21.66% in the youngest age group to 52.45% in the oldest age group. The tooth wear score was highest in 40-60-year-old subjects, and lowest in 20-30-year-old subjects. The stepwise multiple linear regression analysis showed that increased tooth wear was significantly associated with NCCL (ß=0.55, p<0.001), tongue indentations (ß=0.17, p<0.001), male gender (ß=-0.105, p<0.001), muscle tension (ß=0.103, p<0.05), and muscle hypertrophy (ß=0.063, p<0.05). The R^2 of the model was 0.49. **Conclusion:** The results of this study suggest that NCCL, tongue indentations, muscle tension, male gender and muscle hypertrophy are potential factors that may influence or predict tooth wear. There was no significant relationship or association between tooth wear index and linea alba, tooth mobility, traumatic ulcers and self report of bruxism.

Received: May 12, 2011
Accepted: August 24, 2011

Address for correspondence
Professor Iva Ž. Alajbeg DMD, PhD
University of Zagreb
School of Dental Medicine
Department of Removable Prosthodontics
Gunduliceva 5, HR-10 000 Zagreb, Croatia
Tel: + 385 1 4802 111
ialajbeg@sfzg.hr

Key words
Tooth Wear; Masticatory Muscles; Bruxism; Military Personnel

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