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## Istraživanje o razlozima ekstrakcije zuba kod odrasle populacije u Grčkoj

### *A Survey of the Reasons for Dental Extraction in Adult Population in Greece*

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#### Sažetak

**Svrha:** Ovim se studijskim istraživanjem željelo procijeniti razloge za ekstrakcije zuba i ustanoviti njihovu povezanost s dobi i spolom odrasle populacije u Grčkoj. **Materijali i metode:** Uzorak se sastojao od 632 ispitanika – 340 muškaraca i 292 žene u dobi od 18 do 76 godina. Svi su se liječili u privatnoj ordinaciji u Grčkoj. Liječnik je zabilježio njihov spol, dob, broj i vrstu ekstrahiranih zuba te uzrok vađenja. Podatke je skupljao tri godine. **Rezultati:** Dok se radila studija ekstrahirano je, zbog različitih razloga, 1688 trajnih zuba. Rezultati su pokazali da je glavni uzrok za vađenje bila bolest parodonta (38,09 %) te karijes (36,01 %). Bolest parodonta glavni je razlog za ekstrakcije kod pacijenata iznad 50 godina (47,18 %), a karijes kod onih do 49 godina (41,39 %). Maksimalni i mandibularni centralni i lateralni incizivi te kanini najčešće su ekstrahirani zubi zbog parodontoloških razloga, a maksimalni i mandibularni prvi i drugi molari zbog karijesa. **Zaključak:** Bolesti parodonta i karijes i dalje su glavni razlozi za ekstrakcije zuba, bez obzira na dob pacijenta.

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#### Ključne riječi

zub, vađenje; parodontalne bolesti; zubni karijes

#### Uvod

Iako je bezubosti sve manje u mnogim razvijenim zemljama diljem svijeta, ekstrakcija zuba još je velik javnozdravstveni problem (1, 2).

Broj izvađenih zuba može poslužiti kao pokazatelj socijalno-ekonomske razvijenosti i razine oralne higijene u nekoj zemlji. Gubitak nekoliko zuba može činiti velike poteškoće u žvačnom sustavu i potaknuti psihološke poremećaje (3). U nekoliko studija autori su upozorili na razloge gubitka zubi – najčešći su karijes i bolest parodonta, a slijede traume, ekstrakcije iz ortodontskih razloga, želje pacijenata itd. (4–7).

Ipak su karijes i bolest parodonta dva konstantna razloga za ekstrakciju zuba (5, 8–20). U većini istraživanja upozorava se na karijes kao na glavni razlog za ekstrakcije zuba.

Samo su autori nekoliko studija (21–26) upozorili na činjenicu da je bolest parodonta glavni razlog za ekstrakcije zuba, a u drugima se tvrdi da su karijes i bolest parodonta podjednako zastupljeni kao uzročnici (9, 27, 28).

U dosadašnjim istraživanjima upozoravalo se da postoje zemljopisne i kulturološke razlike između zemalja koje se izravno odnose na ekstrakciju zuba (1, 2). Zato je vrlo važno istražiti razloge za vađenje trajnih zuba. Ako se koristimo tim informacijama, možemo u određenim zajednicama predložiti stomatološke smjernice namijenjene smanjenju ekstrakcija zuba, posebice u mlađoj populaciji.

#### Introduction

Although edentulism has been reported to be on the decline in many developed countries, tooth extraction continues to be a major public health problem world-wide (1, 2).

On the other hand, the number of extracted teeth could serve as an indicator of the socio-economic and oral hygiene level of a country. Loss of several teeth can result in serious problems regarding the masticatory system and also in psychological disturbances (3). Several studies have identified the causes of tooth extraction. Dental caries and periodontal disease were the predominant reasons for tooth extraction; other reasons include accidents-injuries, orthodontic reasons, patients' request etc. (4–7).

However, dental caries and periodontal disease have consistently been shown as the two main reasons for tooth extraction (5, 8–20). The majority of those studies have reported dental caries to be the principal reason for tooth extraction in general.

Only few studies (21–26) reported that periodontal disease was the main reason for tooth extraction while other studies found that dental caries and periodontal disease were equally responsible (9, 27, 28).

The reasons for tooth extraction depend largely on geographical and cultural differences among countries as previous studies have shown (1, 2). Therefore, it is important to

Svrha je ove studije odrediti razloge za ekstrakciju zuba u odrasloj populaciji te povezanost nekoliko čimbenika kao što su spol, dob te vrsta izvađenog zuba.

## Materijali i metode

### Ispitanici

Ukupan broj pacijenata uključenih u ispitivanje bio je 632, od kojih 340 muškaraca te 292 žene u dobi između 18 i 76 godina. Svi su se liječili u privatnoj ordinaciji u Patri, jednom od najvećih grčkih gradova.

Tijekom tri godine (od kolovoza 2007. do srpnja 2010.) skupljali su se podaci o razlozima – o bolesti parodonta, karijesu, ortodontskim razlozima, traumama krune ili korijena, zahtjevu pacijenata i ostalome (impaktiranim zubima, perikoronitisu, neodređenim razlozima, itd.).

Liječnik je od svakog pacijenta uzeo detaljnu anamnezu. Sve preglede, klinička mjerenja i ekstrakcije obavio je autor studije.

Uzorak je bio podijeljen u šest skupina prema godinama: I. skupina (18 do 29 godina) – 98 ispitanika; II. skupina (20 do 39 godina) – 102 ispitanika; III. skupina (40 do 49 godina) – 113 ispitanika; IV. skupina (50 do 59 godina) – 115 ispitanika; V. skupina (60 do 69 godina) – 110 ispitanika; VI. skupina (70+ godina) – 94 ispitanika.

Svi pacijenti bili su dobrog općeg zdravlja, što je ustanovljeno upitnikom o zdravstvenom stanju.

### Etička razmatranja

Ova studija nije bila eksperimentalna. Naime, u Grčkoj se samo eksperimentalne studije moraju poslati na reviziju i dobiti dopuštenje mjerodavnih povjerenstava (stomatoloških fakulteta, Stomatološke komore, Ministarstva zdravstva, itd.)

Svi pacijenti koji su dobrovoljno pristali sudjelovati u istraživanju, bili su pravodobno informirani o načinu rada te su potpisali informirani pristanak.

Pacijenti kojima je dijagnosticirano patološko stanje preporučene su konzultacije i daljnji pregledi.

### Klinički pregled

Kliničke preglede sudionika obavio je autor istraživanja.

Kriterij za ekstrakciju zbog karijesa uključivao je inicijalni ili rekurentni karijes te zaostale korijene ako je krunu uništio karijes ili je frakturirala zbog njegova učinka (21).

Neuspjeli endodontski tretmani i frakture zuba zbog djelovanja karijesa dijagnosticirani su radiografskim metodama te su uključeni u već spomenute kategorije.

Kriteriji za ekstrakciju zuba iz parodontoloških razloga uključivali su patološku pomičnost, izražajni gubitak pričvrstka te zahvaćenost furkacije (29, 30).

Ortodontski kriterij za ekstrakciju bio je nedostatak prostora.

investigate the reasons for permanent tooth extraction. Based on such information, public dentistry could put into practice adequate dental policies in order to reduce the rate of tooth extraction, especially in young population.

The aim of this study was to estimate the reasons for tooth extraction in adult population sample and its correlations with several aspects such as gender, age and type of the teeth extracted.

## Materials and methods

### Subjects

The total number of patients involved in the present study was 632, out of which 340 were males and 292 were females between 18-76 years of age, who attended a private practice in Patra, one of the biggest cities in Greece.

The reasons for tooth extraction in the sample for a period of three years (August 2007-July 2010) were recorded and they included aspects such as age, gender and type of teeth extracted due to the following: periodontal disease, dental caries, orthodontic reasons, trauma of crown/root, patients' request and other reasons (impacted teeth, perikoronitis, unspecified reasons, etc.).

A comprehensive medical history was taken and all examinations, clinical measurements and extractions were performed by the author of the present study.

The sample was divided into six groups according to the age range: group I-18 to 29 years: 98 subjects; group II-30 to 39 years: 102 subjects; group III-40 to 49 years: 113 subjects; group IV-50 to 59 years: 115 subjects; group V-60 to 69 years: 110 subjects; group VI-70+ years: 94 subjects.

The participants were in good general health as estimated by a health questionnaire.

### Ethical considerations

The present study was not an experimental one. In Greece, only experimental studies must be reviewed and approved by authorized committees (Dental Schools, Greek Dental Associations, Ministry of Health, etc.)

Subjects who agreed to participate in the present study were informed about the evaluation to which they would be submitted and signed an informed consent form.

Patients with diagnosed pathological conditions were advised to seek consultation and treatment.

### Clinical Examination

The clinical examination of the participants was performed by the author of the present study as mentioned above.

Criteria for tooth extraction due to dental caries included the initial or recurrent caries, its sequelae, root's remnants in case the crown was lost due to dental caries and fractures due to weakening by dental caries (21).

Failed root canal treatment and fracture of the weakened teeth were diagnosed by radiographic and clinical examination and were included into the above mentioned category.

Tooth mobility, severity of attachment loss and furcation involvement were the main criteria which indicated the ex-

Frakture korijena uzrokovane traumom dijagnosticirane su radiografski, a frakture krune kliničkim pregledom.

Od ostalih razloga treba navesti impaktirane zube te ekstrakcije zbog protetskih indikacija.

Zubi i desni sušeni su zrakom iz pusterera. Kao izvor svjetla kod kliničkog se pregleda rabila svjetiljka na stomatološkoj jedinici.

#### Kriterij ubrojivosti

Kriterij ubrojivosti za studiju uključivao je dob iznad 18 godina te prosjek od 20 prirodnih zuba, zbog toga što bi veliki manjak zuba mogao utjecati na rezultate. Ako manjka više od 12 zuba, to uzrokuje probleme kod jela, u govoru te u ostalim aktivnostima i oni se s godinama pogoršavaju. Osim toga na taj se način mogu potaknuti i ostale oralne bolesti, uključujući bolest parodontita (patološku migraciju i pokretljivost), poremećaje u temporomandibularnom zglobu (TMJ), karijes itd. (31) Zato bi takva situacija mogla navesti pacijenta da se odluči na daljnje ekstrakcije iako postoje druga rješenja (fiksna protetika, djelomične proteze, itd.)

#### Kriterij isključivanja

Treći molari bili su isključeni iz studije.

#### Statistička analiza

Varijabla glavnog ishoda bila je uzrok ekstrakcije zuba.

Srednje vrijednosti i frekvencija distribucije izračunati su za sve pozadinske i ishodišne studijske varijable.

Odnosi pozadinskih varijabli kao što su, na primjer, raspon godina i spol u vezi s razlogom za ekstrakciju zuba analizirani su testom chi-square, a razlike u prosječnom broju ekstrahiranih zuba po pacijentu u vezi s uzrokom za ekstrakciju raščlanjene su metodom jednosmjerne analize varijacije (ANOVA).

Analiza podataka obavljena je statističkim paketom SPSS ver. 17,0 (SPSS Inc., Chicago, IL). Vrijednost p manja od 5 posto ( $p < 0,05$ ) uzeta je kao statistički značajna vrijednost.

## Rezultati

Dok se studija pripremala, ukupno je bilo ekstrahirano 1688 zuba od 632 sudionika. Prosječan broj izvađenih zuba iznosio je 2,67 – kod muškaraca 2,9 i kod žena 2,41, što predstavlja statistički značajnu razliku ( $p < 0,01$ ).

Distribucija pacijenata i ekstrahiranih zuba prema rasponu godina i spolu predstavljena je u tablici 1. Muškarci su činili 53,8 posto uzorka i imali su veći postotak ekstrahiranih zuba (58,35 %) nego žene (41,65 %).

Raspon godina kretao se od 18 do 76 (prosječno  $44,6 \pm 5,8$  godina).

Na slici 1. vidi se da je starijim pacijentima izvađeno više zuba nego mlađima. Najveći omjer ekstrahiranih zuba po

traction of periodontally affected teeth (29, 30).

The criterion for tooth extraction due to orthodontic reason was lack of space.

Root fracture as a consequence of accident-trauma was diagnosed by radiographic examination, while crown trauma was diagnosed by clinical examination.

Any other reasons, such as impacted teeth and prosthetic problems, were not included into any of the categories mentioned above.

The teeth and gingiva were dried with compressed air while dental unit light was used as a light source for inspections.

#### Inclusion criteria

The selection criteria comprised age above 18 years and a mean number of 20 natural teeth, since large numbers of missing teeth might interfere with the results of the study. More than 12 missing teeth can cause problems with eating, speech and other basic activities that may worsen with time. Such a condition can cause other oral diseases, including periodontal diseases (pathologic migration, mobility) temporomandibular joint (TMJ) disorder, dental caries, etc. (31) and could make the patient decide to extract the remaining teeth despite the fact that some other treatments are available (fixed prosthodontics, partial dentures, etc.).

#### Exclusion criteria

Third molars were excluded from the study.

#### Statistical analysis

The reason for tooth extraction was considered the main outcome variable.

Means and frequency distributions were calculated for all the background and outcome study variables.

The relation between the categorical background variables, such as age range and gender, and the reasons for tooth extraction was analyzed by chi-square test, while differences in the mean number of extracted teeth per patient according to the reason for extraction were analyzed by the one way analysis of variance (ANOVA) method.

The data analysis was performed by using the statistical package of SPSS ver.17.0 program package (SPSS Inc., Chicago, IL). A p value less than 5% ( $p < 0.05$ ) was considered to be statistically significant.

## Results

A total of 1,688 teeth was extracted from 632 subjects during the study period. The mean number of extracted teeth was 2.67, 2.9 in males and 2.41 in females, the difference was statistically significant ( $p < 0.01$ ).

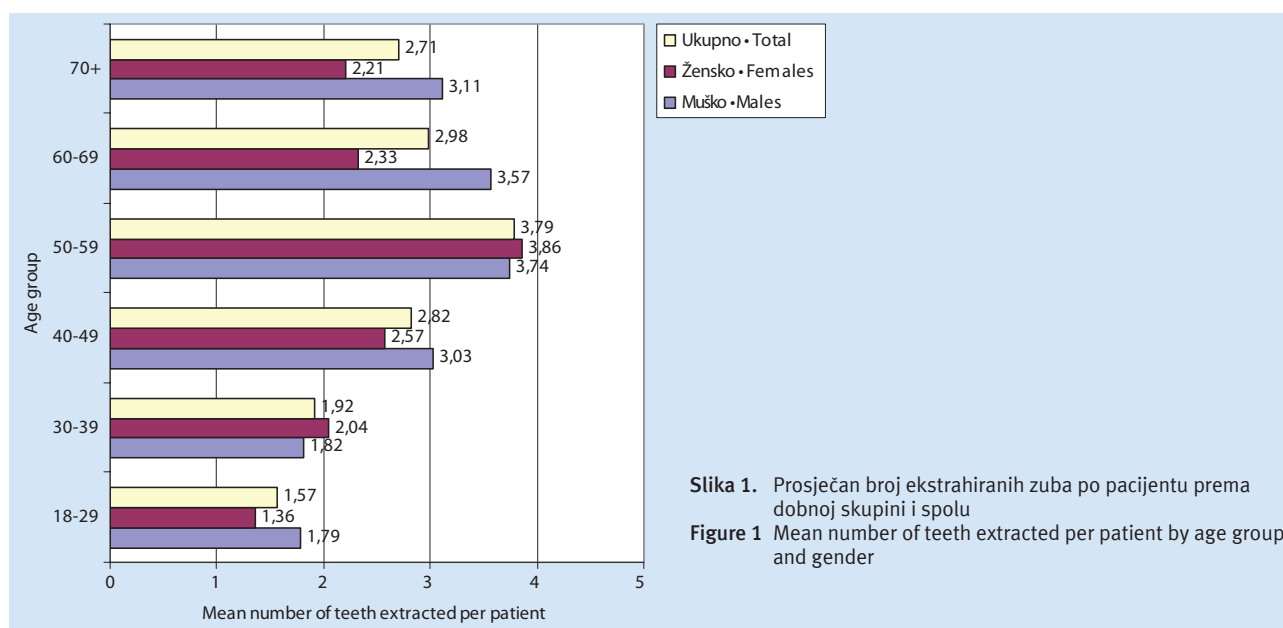
The distribution of patients and extracted teeth by age range and gender is presented in Table 1. Males comprised 53.8% of the sample and showed higher percentage of teeth extracted (58.35%) than females (41.65%).

The patients ranged in age from 18 to 76 years old (mean number  $44.6 \pm 5.8$  years).

In Figure 1 it is shown that older patients lost more teeth than the younger ones, as the highest tooth extraction rate

**Tablica 1.** Distribucija pacijenata i ekstrahiranih zuba prema dobnoj skupini i spolu  
**Table 1** Distribution of patients and extracted teeth by age range and gender

Age range (years)	Muško • Males		Žensko • Females		Ukupno • Total	
	Patients	Teeth	Patients	Teeth	Patients	Teeth
18-29	48	86	50	68	98	154
31-40	56	102	46	94	102	196
41-50	61	185	52	134	113	319
51-60	65	243	50	193	115	436
61-70	58	207	52	121	110	328
71+	52	162	42	93	94	255
	340	985	292	703	632	1,688



**Slika 1.** Prosječan broj ekstrahiranih zuba po pacijentu prema dobnoj skupini i spolu  
**Figure 1** Mean number of teeth extracted per patient by age group and gender

pacijentu (3,79) bio je u skupini od 50 do 59 godina. Nakon toga slijede oni od 60 do 69 godina (2,98). Razlike između prosječnih vrijednosti ekstrahiranih zuba po pacijentu u dobnim skupinama statistički su značajne ( $p < 0,001$ ).

Razlozi za ekstrakciju u različitim dobnim rasponima prikazani su u tablici 2.

Parodontopatije su bile najčešći razlog za ekstrakciju u skupinama pacijenata starije dobi (50–59: 47,18 %; 60–69: 58,64 % i 70+: 66,17 %), a karijes se pokazao kao glavni razlog za ekstrakcije u mlađim dobnim skupinama (18–29: 46,74 %; 30–39: 56,12 % i 40–49: 41,39 %).

per patient was seen in the 50-59 year age group (3.79), and in the 60-69 year age group (2.98) The differences among the mean numbers of teeth extracted per patient by age groups were statistically significant ( $p < 0.001$ ).

The reasons for extraction in different age ranges are shown in Table 2.

Periodontal disease was the most frequent reason for extraction in the oldest age groups (50-59: 47.18%, 60-69: 58.64% and 70+: 66.17%), while dental caries was the main cause of tooth extraction in the youngest age groups (18-29: 46.74% , 30-39: 56.12% and 40-49: 41.39%).

**Tablica 2.** Razlozi za ekstrakciju zuba prema dobnoj skupini  
**Table 2** Reasons for tooth extraction by age range

Age range (year)	Periodontal disease	Dental Caries	Orthodontic reasons	Trauma of root/crown	Patient's request	Other Reasons**	Total
18-29	4.32%	46.74%*	26.44%	6.15%	1.83%	14.52%	100%
30-39	16.27%	56.12%*	8.13%	3.12%	4.15%	12.21%	100%
40-49	35.43%	41.39%*	3.19%	2.88%	5.67%	11.44%	100%
50-59	47.18%*	30.36%	1.22%	2.17%	8.19%	10.88%	100%
60-69	58.64%*	22.93%	0.88%	1.56%	8.77%	7.22%	100%
70+	66.17%*	21.56%	0.00%	0.82%	6.12%	5.33%	100%

\* $p < 0,001$  (ANOVA)

\*\*ostali razlozi: impaktirani zubi, perikoronitis, neodređeni razlozi • other reasons: impacted teeth, perikoronitis, unspecified reasons

Razlika između navedenih dobnih skupina (50 do 70+ godina i 18 do 49 godina) u zastupljenosti parodontnih bolesti i karijesa statistički je značajna ( $p < 0,001$ ).

U tablici 3. su razlozi za ekstrakciju zuba prema spolu i postotak (%) ekstrahiranih zuba zbog glavnih razloga za ekstrakciju. Prema tim podacima može se zaključiti da su muškarci izgubili više zuba nego žene zbog već navedenih razloga. Postotak ekstrahiranih zuba zbog parodontopatija iznosi 38,09 posto, a zbog karijesa 36,01 posto. Ostali razlozi su ortodontske potrebe (7,22 %), trauma krunice ili korijena (3,55 %), zahtjevi pacijenata (5,86 %) te nekategorizirani razlozi (9,24 %), na primjer, impaktirani zubi, perikoronitis i ostalo.

Prosječna vrijednost broja ekstrahiranih zuba zbog trauma krunice ili korijena (3,53) veća je od svih ostalih prosječnih vrijednosti ekstrahiranih zuba za ortodontske potrebe (3,05), na zahtjev pacijenata (2,67), zbog parodontne bolesti (2,66), karijesa (2,64) te nekategoriziranih razloga (2,4). Razlika je statistički značajna ( $p < 0,001$ ). (nije prikazano)

Distribucija ekstrahiranih zuba prema vrsti prikazana je na slici 2.

Na slici 2. vidi se da su najčešće ekstrahirani maksilarni zubi (15,84 %) i prvi mandibularni molari (16,08 %), a slijede drugi maksilarni (10,81 %) i mandibularni (11,38 %) molari.

The difference between the above mentioned age groups (50- to 70+ age groups and (18-to 49 year age groups) regarding the prevalence of periodontal disease and dental caries was statistically significant ( $p < 0.001$ ).

The reasons for tooth extraction by gender and the percentage (%) of teeth extracted due to the main causes are presented in Table 3. According to the above table, males lost more teeth due to the main causes of teeth extracted than females. The percentage (%) of teeth extracted due to periodontal disease and dental caries was 38.09% and 36.01%, respectively. Other reasons included orthodontic reasons (7.22%), trauma of crown/root (3.55%), patient's request (5.86%) and non-categorized reasons (9.24%) such as impacted teeth, pericoronitis, unspecified, reasons, etc.

The mean number of extracted teeth due to trauma of root/crown (3.53) was the greatest compared to other causes such as orthodontic reasons (3.05), patient's request (2.67), periodontal disease (2.66), dental caries (2.64) and non-categorized reasons (2.4) (difference statistically significant,  $p < 0.001$ ) (not presented).

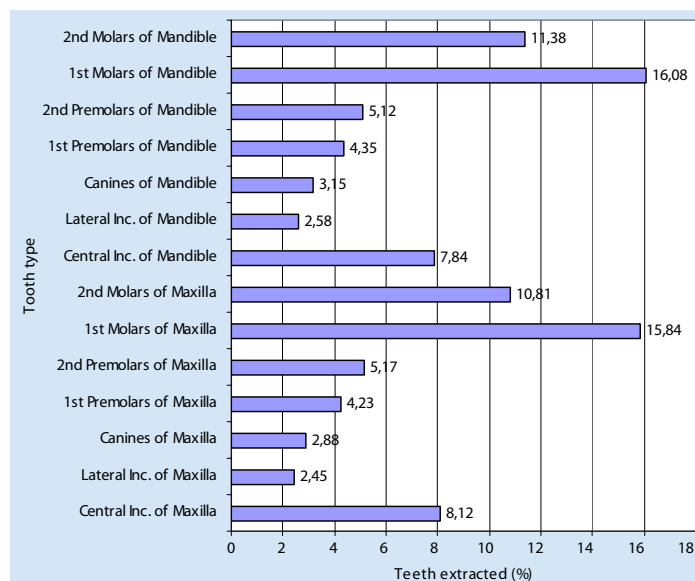
The distribution of extracted teeth by tooth type is shown in Figure 2.

According to the above figure, the most frequently extracted teeth were the maxillary and mandibular 1<sup>st</sup> molars

**Tablica 3.** Razlozi za ekstrakciju zuba prema spolu  
**Table 3** Reasons for tooth extraction by gender

Reasons for extraction	Males	Females	Total	p-value (chi-square test)
Periodontal disease	377 (38.24%)	266 (37.88%)	643 (38.09%)	<0.05
Dental caries	340 (34.51%)	268 (38.12%)	608 (36.01%)	<0.05
Orthodontic reasons	67 (6.82%)	55 (7.78%)	122 (7.22%)	N.S.
Trauma of crown/root	44 (4.45%)	16 (2.25%)	60 (3.55%)	<0.01
Patient's request	62 (6.28%)	37 (5.32%)	99 (5.86%)	<0.01
Other reasons*	95 (9.63%)	61 (8.72%)	156 (9.24%)	<0.001
	985 (100.0%)	703 (100.0%)	1,688 (100.0%)	

\* ostali razlozi: impaktirani zubi, perikoronitis, neodređeni razlozi • other reasons: impacted teeth, pericoronitis, unspecified reasons  
N.S.: bez statističke razlike • no statistical (difference)

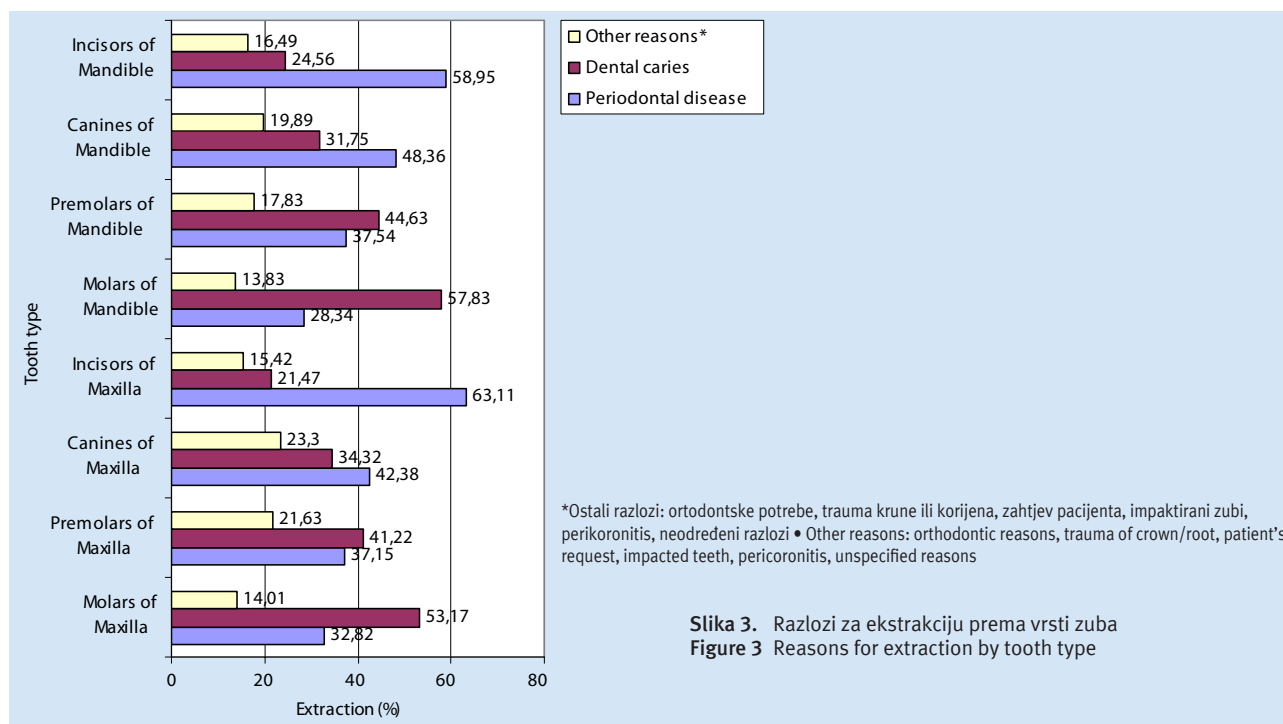


**Slika 2.** Distribucija ekstrahiranih zubi prema vrsti zuba  
**Figure 2** Distribution of extracted teeth by tooth type

Prednji zubi obiju čeljusti (incizivi i kanini) najčešće su ekstrahirani zbog parodontoloških razloga, a molari i premolari zbog karijesa ( $p < 0,001$ ) (slika 3.).

(15.84% and 16.08%, respectively) followed by the 2<sup>nd</sup> molars of both jaws (10.81% and 11.38%, respectively).

The anterior teeth of both jaws (incisors and canines) were the most frequently extracted teeth due to periodontal disease while molars and premolars of both jaws were the most frequently extracted teeth due to dental caries ( $p < 0,001$ ) (Figure 3).



Slika 3. Razlozi za ekstrakciju prema vrsti zuba  
Figure 3 Reasons for extraction by tooth type

## Rasprava

Analizirajući rezultate ove studije, ukupan prosječni broj ekstrahiranih zuba iznosio je 2,67, što je manje ako ih usporedimo sa sličnim studijama u Grčkoj (32–34) u posljednjih desetak godina. U jednoj nedavnoj studiji (26) objavljeno je da je prosječan broj ekstrahiranih zuba 2,36.

Ti rezultati pokazuju da se poboljšavaju socijalno-ekonomski uvjeti, raste interes populacije za održavanje oralnog zdravlja te se prihvaća preventivna stomatologija i oralna higijena. Prosječan broj ekstrahiranih zuba kod muškaraca iznosio je 2,9, a kod žena 2,41, što predstavlja statistički značajnu razliku ( $p < 0,01$ ).

Slični rezultati dobiveni su i u ostalim studijama (9, 15, 19, 26, 35, 36).

Rezultati ove studije upozoravaju da bolest parodonta i karijes čine glavne uzroke za ekstrakcije zuba u privatnim ordinacijama u Grčkoj.

Ta je spoznaja u skladu s rezultatima studija objavljenima u drugim zemljama (4, 5, 7–19, 25) u kojima je stopa u rasponu od 31,8 posto (19) do 94,4 posto (4) za oba slučaja.

No, čini se da je bolest parodonta glavni razlog za ekstrakcije zuba u ograničenom broju studija (6, 22, 23, 26, 37). U ovoj ima glavnu ulogu u ekstrakciji zuba (38,09%), a slijedi karijes (36,01%). U studiji obavljenoj u Njemačkoj (24) istaknuto je da je 27,3 posto ekstrakcija uzrokovano pa-

## Discussion

According to the present study, the mean number of extracted teeth was 2.67, which is lower compared to similar studies performed in Greece (32–34) during the last decades, while in a recent study (26) the above mentioned variable was found to be 2.36.

This finding shows the improvement of socio-economic level, the interest of population regarding its oral health and the acceptance of the value and importance of the role of preventive dentistry and oral hygiene. The mean number of extracted teeth in males was 2.9 and in females 2.41, the difference was statistically significant ( $p < 0.01$ ).

Similar results were observed in many other studies (9, 15, 19, 26, 35, 36).

The results of the present study show that periodontal disease and dental caries were the main causes of tooth extractions performed in a private practice in Greece.

This observation is consistent with previous studies in some other countries (4, 5, 7–19, 25) and the rate ranges from 31.8% (19) to 94.4% (4) for both causes.

However, periodontal disease appears to be the main reason for tooth extraction in a limited number of previous studies (6, 22, 23, 26, 37). In this study, periodontal disease was the main reason for tooth extraction (38.09%) followed by dental caries (36.01%). A study performed in Germany

rodontnim bolestima te da je za 20,7 posto kriv karijes. U jednoj drugoj studiji, rađenoj na temelju ispitivanja azijske populacije (25), kaže se da je 35,8 posto ekstrakcija obavljeno zbog parodontnih bolesti, 35,4 posto zbog karijesa.

U mnogobrojnim studijama karijes je istaknut kao razlog za ekstrakcije te su zabilježeni sljedeći postotci: 70,3 % (4), 67,5 % (7), 63,3 % (10), 59,2 % (12), 59 % (13), 56,4 % (14), 52,6 % (11), 51% (5), 50 % (15), 47,9 % (18), 46,9 % (16), 45,6 % (20), 43,7 % (2), 43,3 % (9) i 39,5 % (38).

U nekoliko istraživanja u Japanu (9), Italiji (27) i Singapuru (28) istaknuto je da su bolest parodonta i karijes podjednako odgovorni za ekstrakcije zuba.

Ostali uzroci, na primjer, ortodontske potrebe, traume i frakture korijena, rijetko su kada uzroci ekstrakcija.

Navedene spoznaje iz drugih studija mogu se objasniti različitim čimbenicima, kao što su heterogenost uzorka, razlike u stajalištu ispitanika prema oralnom zdravlju i redovitim odlascima na stomatološke preglede, različiti kriteriji ispitivača (klinički pregled i upitnik o zdravstvenom stanju) u vezi sa skupljanjem podataka i mjestom skupljanja podataka (stomatološka klinika, privatna ordinacija, itd.). Uzorak u našoj studiji nije mogao biti nasumičan zato što su pacijenti svojevremeno dolazili na tretman u privatnu ordinaciju.

Rezultati u ovoj studiji pokazali su da broj ekstrakcija povezanih s parodontnom bolešću raste proporcionalno s godinama. To je u skladu sa spoznajama u ostalim istraživanjima (9, 10, 16, 20, 26, 24, 25, 35), ali u drugim je studijama također istaknuto da je bolest parodonta glavni razlog za ekstrakcije kod pacijenata u dobi do 35 i više godina (2, 12, 15-17, 22-24, 36, 37). To se može objasniti činjenicom da je uzorak u ovoj studiji malen te da stariji ljudi nemaju naviku preventivno odlaziti stomatologu.

U nekim studijama upozorava se na to da je karijes glavni uzrok ekstrakcija zuba i kod starije populacije (4, 39).

Već spomenute razlike u rezultatima, posebice razlike u vezi s razlozima za ekstrakcije prema dobnim skupinama, mogu se pripisati varijacijama u planiranju istraživačkog postupka, prevelikoj zastupljenosti pojedine dobne skupine ili vrstama zuba koji bi mogli utjecati na uzorak, razlikama u vođenju ordinacije te stajalištima stomatologa i pacijenata o ekstrakciji, odnosno retenciji (22). Trebalo bi istaknuti da su sve dosad nabrojene razlike između studija navedene sa sudržanošću zbog različitih metodologija i različitih populacija pacijenata u svakoj od njih. Zbog toga treba biti vrlo oprezan pri uspoređivanju rezultata (16).

Vrlo je važno istaknuti da je ekstrakcija posljedica čimbenika koji se oslanjaju na bolesno stanje. Istraživanja u mnogim europskim i ostalim zemljama upozorila su na to da na odluku o ekstrakciji zuba utječu zahtjevi kako pacijenta tako i stomatologa (40, 41). Spomenuti čimbenici, odnosno zahtjevi mogu utjecati na odnos stomatologa prema praksi, na njegovo iskustvo, estetiku, protetiku te na financijsku stranu. Ti isti čimbenici mogli su utjecati na odluku o ekstrakciji zuba, ali u većini istraživanja, pa tako i u ovome, oni nisu uzeti u obzir.

Ekstrakcije zbog bolesti parodonta, karijesa i ostalih razloga bile su češće u muškoj nego u ženskoj populaciji. Ipak, u nekim istraživanjima (2, 42, 43) ističe se da su se žene češće

(24) showed that 27.3% of the extractions were due to periodontal reasons and 20.7% due to dental caries, while another study in an Asian population (25) found that 35.8% of the extractions were due to periodontal disease and 35.4% due to dental caries.

Dental caries appears to be the main cause of tooth extraction in a large number of previous studies in which the following rates were recorded: 70.3% (4), 67.5% (7), 63.3% (10), 59.2% (12), 59% (13), 56.4% (14), 52.6% (11), 51% (5), 50% (15), 47.9% (18), 46.9% (16), 45.6% (20), 43.7% (2), 43.3% (9) and 39.5% (38).

Few studies reported that both periodontal disease and dental caries were almost equally important reasons for tooth extraction, such as studies conducted in Japan (9), Italy (27) and Singapore (28).

A low rate was recorded regarding other causes of tooth extraction such as orthodontic reasons, injuries-accidents, root fractures.

The above mentioned observations could be attributed to several factors such as the heterogeneity of subjects, the difference in attitude of the subjects to the value of oral hygiene and the need for a regular dental follow-up, the different criteria used by several examiners (clinical examination-questionnaire) in order to collect data, the origin of the sample collected (dental hospital, private practice, etc.). In addition, the subjects of the present study were seeking dental treatment in a private dental practice and we could not consider the subjects as random ones.

The results of the study show that extracted teeth due to periodontal disease showed a significant increase with age. This observation was similar to previous studies (9, 10, 16, 20, 26, 24, 25, 35), however, other studies have shown that periodontal disease was the main cause of extractions in patients up to and over 35 years of age (2, 12, 15-17, 22-24, 36, 37). This finding could be attributed to the small amount of the present sample and possibly to the negative attitude of the elderly people to seek preventive dental follow-up.

Previous studies have shown that dental caries was the main cause of tooth extraction even in older age groups (4, 39).

The above mentioned differences regarding the causes of tooth extraction by age range could be attributed to variations in study designs, overrepresentation of certain age ranges or tooth types that may have affected the study samples or to differences in practice patterns and attitudes towards the retention of teeth by both patients and dental professionals (22). In addition, the above mentioned differences showed the difficulties of comparing tooth extraction studies due to the differences in methodologies and populations studied, which points to the need for caution in the interpretation of such comparisons (16).

It is important to understand that the extraction of teeth is only based on disease-related factors. Studies in many European and other countries have shown that the decision to extract a tooth is substantially influenced by factors related to both the patient's and dentist's specific requirement (40, 41). These factors may include the dentist's philosophy of practice, his experience as well as aesthetic, prosthetic and eco-

odlučivale za ekstrakcije nakon neuspjelih endodontskih tretmana. U tim istraživanjima takvi su tretmani svrstani u kategoriju karijesa kao uzroka ekstrakcije.

Grossi i suradnici naveli su kao dodatnu činjenicu to da muškarci predstavljaju ozbiljan indikator rizika za parodontnu bolest (44).

Sudeći prema rezultatima ovog istraživanja, možemo zaključiti da su prednji zubi gornje i donje čeljusti bili češće ekstrahirani zbog parodontnih bolesti, a prvi i drugi molari gornje i donje čeljusti zbog karijesa.

Dosadašnja istraživanja pokazala su da su najčešće ekstrahirani zubi mandibularni molari (14, 22, 45), molari obiju čeljusti (18, 26), svi zubi gornje čeljusti (16), centralni mandibularni incizivi (16, 20, 25, 36, 38), kanini i incizivi obiju čeljusti (2, 12), prednji zubi gornje čeljusti (19,20,36,) te lateralni zubi obiju čeljusti (11, 12).

Razlike među studijama mogu se pripisati spomenutim čimbenicima.

Prednji donji zubi manje su skloni karijesu negoli ostali. Za njih postoji veća vjerojatnost da će ostati u ustima starijih pacijenata sklonijih parodontopatijama te posljedičnim ekstrakcijama (45).

Rezultati ovog istraživanja pokazuju da su bolest parodonta i karijes glavni razlozi za ekstrakciju zuba kod odraslih ljudi. Stomatolog kliničar vrlo je važan u održavanju trajne denticije, posebice starijih ljudi kojima manjkaju zubi zbog parodontoloških problema. Karijes je uglavnom razlog za ekstrakciju kod mlađih pacijenata, a bolest parodonta kod ljudi u dobi iznad 50 godina.

## Zaključci

Bolest parodonta (38,09 %) i karijes (36,01 %) glavni su razlozi za ekstrakciju zuba i kod muškaraca i kod žena; Bolest parodonta glavni je razlog za ekstrakcije kod pacijenata u dobi iznad 50 godina, a karijes kod onih do 49 godina; Zbog navedenih razloga muškarcima je ekstrahirano više zuba negoli ženama; Najčešće ekstrahirani zubi zbog parodontopatije su prednji zubi obiju čeljusti, a prvi i drugi molari obiju čeljusti najčešće su ekstrahirani zbog karijesa.

## Sukob interesa

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nom considerations. These factors may have played an important role in the deciding on tooth extraction, but in most other studies, including this study, they have not been taken into consideration.

Extractions due to periodontal diseases, dental caries and other reasons were more frequent in males than in females. However, previous studies (2, 42, 43) have recorded that extractions for failed root canal treatments, which are included into the dental caries category were more frequent in females.

In addition, Grossi et al. observed that male gender is considered as a risk indicator for periodontal disease severity (44).

According to this study, the anterior teeth of the maxilla and mandible showed a trend to be more frequently extracted due to periodontal disease while the 1<sup>st</sup> and 2<sup>nd</sup> molars of both jaws were the most frequently extracted teeth due to dental caries. Previous studies showed that the more frequent teeth were the molars of the mandible (14, 22, 45), the molars of both jaws (18, 26), the teeth of the maxilla (16), the central incisors of the mandible (16, 20, 25, 36, 38), the canines and incisors of both jaws (2, 12), the anterior teeth of the maxilla (19,20,36,) and the posterior teeth of both jaws (11, 12).

Those differences could be attributed to the factors mentioned above.

Lower anterior teeth are less susceptible to caries than other teeth; they are more likely to remain in the dentition in older patients where periodontal disease becomes a more frequent reason for extraction (45).

According to the results of this study, periodontal disease and dental caries remain the main causes of permanent tooth extraction in adults. The role of the clinical dentist is quite important in order to maintain the permanent teeth, especially of the elderly people who miss their teeth due to periodontal disease. Dental caries is the main reason for tooth extraction in younger patients, while periodontal disease is the main cause of tooth extraction in patients up to and over 50 years of age.

## Conclusions

Periodontal disease (38.09%) and dental caries (36.01%) were the main causes of tooth extraction both for males and females; eriodontal disease was the main cause of tooth extraction in the oldest age groups over 50 years of age, while dental caries was the main reason of tooth extraction in patients up to 49 years of age; Males lost more teeth due to the main causes for tooth extraction than females; The more frequently extracted teeth due to periodontal disease were the anterior teeth of both jaws, while those lost due to dental caries were the maxillary and mandibular 1<sup>st</sup> and 2<sup>nd</sup> molars.

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The author declares that he has no conflict of interests. The study was self-funded by the author and its private practice.



**Abstract**

**Aim.** The aim of this study was to estimate the reasons for tooth extraction and their correlations with aspects such as age and gender in adult population in Greece. **Materials and Methods.** The population sample consisted of 632 subjects, 340 males and 292 females, aged 18 to 76 who attended a private practice in Greece. The patients' gender, age, number and type of extracted teeth and the reasons for tooth extraction were recorded for a period of three years. **Results.** One thousand six hundred and eighty eight permanent teeth were extracted for various reasons during the study period. The results showed that the main causes of extractions were periodontal disease (38.09%) and dental caries (36.01%). Periodontal disease was the main cause of extraction in patients over 50 years of age (47.18%), while dental caries was the main cause for extraction in patients up to 49 years of age (41.39%). Maxillary and mandibular central-lateral incisors and canines were the most frequently extracted teeth due to periodontal disease, while maxillary and mandibular 1<sup>st</sup> and 2<sup>nd</sup> molars, were the most frequently extracted teeth due to dental caries. **Conclusions.** Periodontal disease and dental caries are still the main reasons for tooth extraction regardless of the patients' age.

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Tooth Extraction, Periodontal Disease,  
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