

Berna Gokkaya, Betul Kargul

## Prevalencija i karakteristike nesindromske hipodoncije u grupi turske djece

### Prevalence and Pattern of Non-Syndromic Hypodontia in a Group of Turkish Children

Zavod za dječju dentalnu medicinu Sveučilišta Marmara, Istanbul, Turska  
Department of Pediatric Dentistry, Marmara University, Istanbul

#### Sažetak

**Svrha:** Tijekom četiri godine (2009. – 2012.) procjenjivali su se prevalencija i prirodni nedostatak trajnih zuba (osim umnjaka) među turskom djecom. **Ispitanici i metode:** U istraživanje je bilo uključeno 1658 ispitanika – 873 djevojčice i 785 dječaka. Svi su pregledani u Zavodu za dječju dentalnu medicinu Fakulteta dentalne medicine pri Marmarskom sveučilištu. Za određivanje razlike u prevalenciji hipodoncije među spolovima korišten je hi-kvadrat test. **Rezultati:** Prevalencija hipodoncije bila je 6,2 posto (6,3 % djevojčice, 6 % dječaci) bez statističke razlike među spolovima ( $P = 0,601$ ). Najčešće su nedostajali drugi lijevi mandibularni pretkutnjak – nisu ga imala 63 mala pacijenta (20,7 %), zatim desni mandibularni pretkutnjak – kod 61 (20,1 %) te lijevi maksilarni pretkutnjak – bez njega je bio 31 sudionik istraživanja (10,2 %). Ustanovljeno da djeci nedostaje 89 prednjih zuba i 214 stražnjih. Bilateralna hipodoncija ustanovljena je kod 70 pacijenata – 39 djevojčica i 31 dječaka (67,9 %). Najčešće nisu imali drugi mandibularni pretkutnjak – 22 djevojčice i 21 dječak (42,1 %) te maksilarni pretkutnjak – 6 djevojčica i 15 dječaka (20,5 %). Jednostrano je uglavnom manjkao lijevi mandibularni pretkutnjak – nije ga imalo 9 dječaka i 8 djevojčica (5,6 %), a slijedio je desni mandibularni drugi pretkutnjak – bez njega je bilo 10 djevojčica i 6 dječaka (5,28 %). **Zaključak:** Naši podatci ističu koliko su važni detaljni klinički i radiološki pregledi jer pomažu u dugoročnom planiranju terapije, ovisno o individualnoj potrebi djeteta.

**Zaprimljen:** 15. kolovoza 2015.  
**Prihvaćen:** 8. veljače 2016.

**Adresa za dopisivanje**  
Professor Betul Kargul  
Marmara University  
Department of Pediatric Dentistry  
bkargul@marmara.edu.tr

**Ključne riječi**  
hipodoncija; anodoncija; dijete; Turska

#### Uvod

Hipodoncija je zajednički naziv za prirodni nedostatak mlječnih ili trajnih zuba, premda se posebno opisuje manjak jednoga do šest zuba, isključujući treće kutnjake. Oligodontijom se smatra nedostatak više od šest zuba, isključujući treće kutnjake. Dentalna ageneza češće pogađa trajne zube, negoli mlječne (1, 2, 3, 4). Hipodoncija može nepovoljno utjecati na estetiku i funkciju (4, 5, 6, 7). Razvojno zubi mogu nedostajati zbog mnogobrojnih etioloških razloga, poput promjena u formiranju dentalne lamine, nesposobnosti zubnog zametka da se razvije u optimalno vrijeme, ograničenja prostora, sustavnih stanja i genetskih čimbenika (8, 9). Osim trećih kutnjaka, hipodontijom su najčešće zahvaćeni drugi pretkutnjaci i bočni sjekutići (8, 10). Klinički je istraživanje prevalencije hipodoncije vrlo važno zbog rane dijagnoze i učinkovitoga planiranja terapije (5). Prevalencija hipodoncije u trajnim zubima, ovisno o proučavanoj populaciji, opisana je od 0,3 posto do 10,1 posto (11). U približno 80 posto opisanih slučajeva nedostajali su samo jedan ili dva zuba, u 10 posto manjkala su četiri ili više zuba, a manje od jedan posto pacijenata nije imalo šest i više zuba (12). Iz literature možemo izdvojiti mnogobrojna istraživanja o prevalenciji

#### Introduction

Hypodontia is often used as a collective term for congenital absence of primary or secondary teeth, although specifically it describes the absence of one to six teeth excluding third molars. Oligodontia refers to the absence of more than six teeth, excluding third molars. Dental agenesis affects more frequently the permanent dentition rather than the primary dentition (1, 2, 3, 4). Hypodontia may detrimentally affect the aesthetics and function (4, 5, 6, 7). Developmentally missing teeth may be the result of numerous etiologic factors such as changes of the dental lamina formation, failure of tooth germ to develop at the optimal time, space limitation, systemic condition and genetic factors (8, 9). Apart from the third molars, the most commonly affected teeth by hypodontia are second premolars and lateral incisors (8,10). Investigating the prevalence of hypodontia is of significant clinical value, in terms of early diagnosis and effective treatment planning (5).

The prevalence of hypodontia in the permanent dentition has been reported to be 0.3% to 10.1%, depending on the population studied (11). In approximately 80% of reported cases of hypodontia, only 1 or 2 teeth are missing; in 10%, 4

**Tablica 1.** Prevalencija hipodoncije u različitim populacijama  
**Table 1** Prevalence of Hypodontia in Different Population

Autor • Author	Godina • Year	Država • Country	Dob • Age (year)	Veličina uzorka • Sample size	Ženski % • Female %	Muški % • Male %	M/F	Prevalencija • Prevalence
Haaviko et al.	1971	Finland	5-13	1041				8
Backmann et al.	1974	Švicarska • Switzerland	7	8694				7.7
Rolling et al.	1980	Danska • Denmark	9-10	3325	7.8	7.7	0.98	7.8
Davis et al.	1987	Hong Kong	12	1093			0.78	6.9
Aasheim et al.	1993	Norveška • Norway	7-10	1953	7.2	0.8	0.806	6.5
Meza et al.	2003	Meksiko • Mexico	9-20	668				2.7
Fekonja et al.	2005	Slovenija • Slovenia	12	212	7.1	4.2	0.591	11.3
Endo et al.	2006	Japan	5-15	3358	9.3	8.5	0.914	7.5
Altug-Atac et al.	2007	Turska • Turkey	8-15	3043	3.1	2.1	0.677	2.6
Goya et al.	2008	Japan	3-17	2072	10.8	8.7	0.806	9.4
Gomes et al.	2010	Brazil	10-16	1049	7.4	5.1	0.689	6.3

hipodoncije u trajnoj denticiji među različitim populacijama (isključujući treće kutnjake) (tablica 1.). Razlika u frekvenciji može se objasniti razlikama u uzorcima zbog tehnika mjerenja – korištene su drukčije metode za radiografske i kliničke preglede, različiti su bili dob i spol te geografski ili demografski profil (2, 4, 13, 14). Obrazac i prevalencija hipodoncije mogu varirati, ovisno o etničkim grupama (15). Evolucijske promjene također mogu pridonijeti razlikama. Neki istraživači smatrali su da se tijekom godina povećala prevalencija hipodoncije (2), a drugi stručnjaci pak ne podupiru to stajalište (14, 15). U nekoliko istraživanja istaknuta je veća pojavnost raka kod ljudi s hipodocijom (16, 17, 18). Tako Fekonja i suradnici (19) tvrde da rezultati njihova istraživanja statistički podupiru moguću povezanost epitelnoga ovarijalnog karcinoma i hipodoncije. Iz toga razloga, ako se hipodoncija uoči rano, taj nalaz može pomoći u ranom otkrivanju EOC-a, što bi omogućilo bolju prognozu i terapiju u ranim stadijima te bolesti. Pravodobno postavljanje dijagnoze za EOC i liječenje mogli bi spasiti mnoge živote. Unatoč mnogobrojnim istraživanjima malo je onih opsežnih o hipodonciji među turskom djecom. Zato je svrha ovoga istraživanja od 2009. do 2012. godine bila procijeniti prevalenciju i koji zubi prirođeno nedostaju u grupi turske djece (isključujući treće kutnjake).

## Materijali i metode

U ovom deskriptivnom poprečno-presječnom istraživanju analizirali smo bilješke o turskoj djeci pregledanoj između 1. siječnja 2009. i 31. prosinca 2012. U tom razdoblju svi su dolazili u Zavod za dječju dentalnu medicinu Fakulteta dentalne medicine pri Marmarskom sveučilištu u Istanbulu. Istraživanjem je bilo obuhvaćeno ukupno 1658 sudionika – 785 dječaka i 873 djevojčice. Dijagnoza hipodoncije postavljena je na temelju predoperativnih panoramskih radiograma. Treći kutnjaci nisu procjenjivani. Iz istraživanja su bila isklju-

or more teeth are missing, while in less than 1%, 6 or more teeth are absent (12).

The literature consists of numerous studies on the prevalence of hypodontia (third molars excluded) in the permanent dentition, among different populations (Table 1).

The differences in frequencies could be explained by the variety in samples with respect to measuring techniques—different methods of radiography and clinical examinations, age, gender, geographic or demographic profiles (2,4,13;14). The pattern and prevalence of hypodontia can vary in different ethnic groups (15).

Evolutionary changes might as well contribute to the differences; some researchers suggested that hypodontia had increased in prevalence through time (2) whereas some studies do not support this statement (14, 15).

Several studies reported a higher presence of cancer in people with hypodontia (16, 17, 18). Fekonja et al. (19) stated that the results of their study statistically support a possible association between EOC (epithelial ovarian cancer) and hypodontia. Because of that reason, hypodontia can be recognized early in life, this finding could possibly help in an earlier detection of EOC, resulting in better prognosis and treatment in earlier stages of the disease. Earlier EOC diagnosis and treatment could save many lives.

Despite numerous studies, there are a limited number of comprehensive studies regarding hypodontia among Turkish children in the literature. Therefore, the aim of this study was to assess the prevalence and pattern of congenital missing in the permanent dentition (excluding third molars), among a group of Turkish children, during 2009-2012.

## Materials and methods

In this descriptive cross-sectional study, we reviewed the records of Turkish children treated between 01/01-2009 and 31/12-2012. All children visited the Department of Pediatric Dentistry, Dental School of Marmara University, Istanbul, Turkey. A total of 1658 children (785 boys, 873 girls) were included in this study. Diagnosis of hypodontia was based on pretreatment panoramic radiographs. Third molars were not evaluated in this study. The exclusion criteria comprised the presence of anodontia, developmental anomalies (ectodermal

čena djeca s enodontijom, razvojnim anomalijama (ektodermalna displazija, rascjep usnice i nepca te sindromi), bilo kakvom sistemskom bolesti, izvađenima zubima, traumama, ortodontskim terapijama, radiogramima loše kvalitete i nepotpunom medicinskom dokumentacijom. Panoramski radiogrami korišteni su za potvrdu dijagnoze hipodontije. Zubi su dijagnostificirani kao oni koji prirodno nedostaju ako je na panoramskom radiogramu ustanovljeno da nije bilo mineralizacije krune i nema dokaza o vađenju. Aasheim i Ogaard (20) izvijestili su da se ni jedan ljudski zub ne mineralizira nakon dobi od dvanaest godina, osim trećih kutnjaka. Prikaz zubnih zametaka na radiogramu ovisi o stupnju njihove mineralizacije i velike su razlike u stupnjevima mineralizacije i u starosti zuba između pojedinaca iste kronološke dobi. Doktori dječje dentalne medicine istraživali su sveukupnu prevalenciju hipodontije u trajnoj denticiji (osim trećih kutnjaka) i obrazac pojavljivanja ovisno o pogođenoj strani (lijeva u odnosu prema desnoj; prednji zubi prema stražnjima), zatim vrstu zuba i spol ispitanika.

### Statistička analiza

Prikupljeni podatci uneseni su u program za statističku analizu SPSS 20.00 (IBM, SPSS paket). Raščlamba razlike u raspodjeli hipodontije prema spolu, čeljusti i strani obavljena je Hi-kvadrat testom. Stupčasti dijagrami korišteni su za prikaz raspodjele zuba koji nedostaju, ovisno o dobi i spolu.

### Rezultati

Kad isključimo treće kutnjake, prirodni nedostatak zuba uočen je u trajnoj denticiji 102 djeteta (6,2 %) – 55 djevojčica (6,3 %) i 47 dječaka (6 %). Među spolovima nije bilo značajne razlike u prevalenciji hipodontije ( $P = 0,601$ ).

Ukupno su nedostajala (ako isključimo treće kutnjake) 303 zuba – 158 kod djevojčica i 145 kod dječaka. Iz priloženoga je izračunat prosječan broj od  $2,81 \pm 1,94$  zuba koji nedostaju po djetetu (prosjeak od  $2,72 \pm 1,95$  za svaku djevojčicu i  $2,91 \pm 1,95$  za svakog dječaka). Kliniku su prvi put najčešće posjetili u dobi između 10 i 12 godine (tablica 1.).

Istaknimo da je 61 pojedincu s hipodontijom (59,8 %) prirodno nedostajao jedan ili dva zuba. U tome nije bilo

dysplasia, cleft lip and palate and syndromes), any history of systemic diseases, tooth extractions, trauma, and history of orthodontic treatment, poor image quality, or incomplete dental records. Panoramic views were used to confirm the diagnosis of hypodontia. A tooth was diagnosed as congenitally missing when there was no mineralization of its crown on panoramic images and no evidence of its extraction. Aasheim and Ogaard (20) reported that no tooth, excluding third molars was found to mineralize in patients after age 12 years. The visibility of tooth germs on radiographs depends on their mineralization stage, and there are major differences in mineralization stage and dental age in individuals of the same chronological age. The overall prevalence of hypodontia in the permanent dentition (excluding missing third molars), as well as its pattern of occurrence regarding the involved sides (left vs. right / anterior vs. posterior), tooth types, and gender were investigated by a pediatric dentist.

### Statistical analysis

Data were collected and entered into the SPSS 20.00 program for statistical analysis (IBM SPSS package). The Chi square test was used to analyze differences in the distribution of hypodontia by gender, jaw and side. Bar charts were used to show the distribution of missing teeth according to age and gender.

### Results

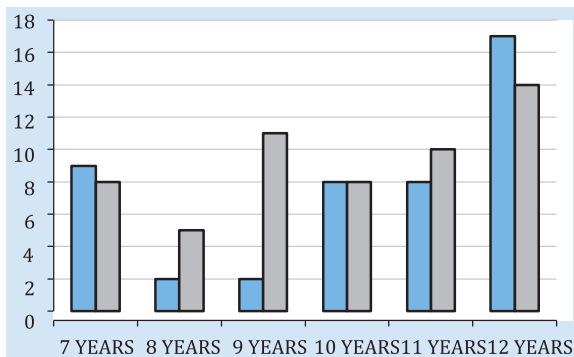
Apart from the third molars, congenitally missing teeth were observed in the permanent dentition of 102 (6.2 %) children, including 55 girls (6.3 %) and 47 boys (6 %). There was no significant difference between the prevalence of hypodontia in boys and girls ( $P = 0.601$ ).

A total of 303 teeth (excluding third molars) were missing (158 in girls and 145 in boys). Therefore, an average number of  $2.81 \pm 1.94$  missing teeth per children was calculated (average of  $2.72 \pm 1.95$  missing teeth for each girl, and  $2.91 \pm 1.95$  missing teeth for each boy). The first attendance at the clinic (Figure 1) was mostly between 10 and 12 years of age.

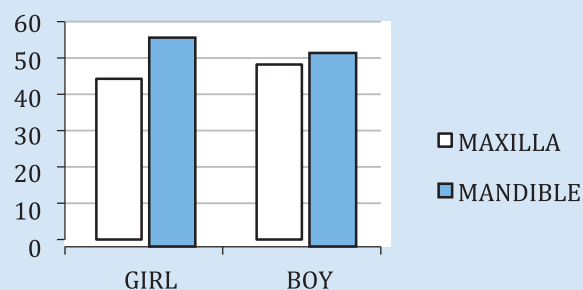
Among the individuals with hypodontia, 61 (59.8 %) had one or two teeth missing congenitally. There was no signifi-

Tablica 2. Raspodjela broja zuba koji nedostaju  
Table 2 Distribution of the number of missing teeth

Broj zuba koji nedostaju • Number of missing teeth	Djevojčice • Girls (n=55) Broj • Number (%)	Dječaci • Boys (n=47) Broj • Number (%)	Ukupno • Total (n=102) Broj • Number (%)
1	14(26)	15(32)	28(27)
2	21(38)	11(23)	32(31)
3	6(11)	4(9)	10(10)
4	6(11)	8(17)	14(14)
5	2(4)	2(4)	4(4)
6	3(5)	2(4)	6(6)
6+	3(5)	5(11)	8(8)



**Slika 1.** Dob i spol pacijenata s hipodoncijom  
**Figure 1** Age and gender distribution of hypodontia patients



**Slika 2.** Raspodjela frekvencija (%) zuba koji nedostaju  
Max. = maksila (n:140); Mand. = mandibula (n = 163); G = djevojčice; B = dječaci  
**Figure 2** Frequency distribution (%) of the missing teeth.  
Max. = Maxilla (n:140) ; Mand. = Mandible (n = 163).; G= Girl; B = Boy

značajne razlike između dječaka – bilo ih je 26 (42,62 %) i djevojčica – njih 35 (57,38 %) ( $P = 0,257$ ) (tablica 2.).

Najčešće su nedostajali donji lijevi pretkutnjak – bez njega su bila 63 ispitanika (20,7 %), zatim drugi donji desni pretkutnjak – nije ga imao 61 pacijent (20,1 %) i gornji lijevi pretkutnjak – kod 31 ispitanika (10,2 %). S druge strane, u uzorku turskih djevojčica u oba zuba luka nisu nedostajali gornji središnji sjekutić, donji očnjak, prvi i drugi gornji kutnjak te prvi donji kutnjak. Kod turskih dječaka bilo je manje zuba bez urođenog nedostatka, samo donji očnjaci te gornji i drugi donji kutnjaci. Ukupno su nedostajala 303 zuba (osim trećih kutnjaka) – 158 kod djevojčica i 145 kod dječaka. Stope prevalencije bile su u maksili 46,2 posto ( $n = 140$ ) i u mandibuli 53,8 posto ( $n = 163$ ) (slika 2.). Razlika između maksilarnih i mandibularnih zuba koji su nedostajali kod djevojčica i dječaka nije bila statistički značajna ( $P = 0,282$ ). Nije pronađena ni značajna razlika između desne i lijeve strane muških i ženskih pacijenata ( $P = 0,427$ ), ni između desne i lijeve strane ukupnog uzorka ( $P = 0,427$ ).

Prevalencije hipodoncije u desnim i lijevim kvadrantima bile su: desni kvadranti ( $n = 149$ ) 49,2 % i lijevi kvadranti ( $n = 154$ ) 50,8 posto (tablica 3.).

Nedostajalo je 89 prednjih zuba i 214 stražnjih. Obostrana hipodoncija zabilježena je kod 70 pacijenata – 39 djevojčica i 31 dječaka (67,9 %). Najčešće im nije izrastao drugi donji pretkutnjak – kod 22 djevojčice i 21 dječaka (42,1 %) i drugi gornji pretkutnjak – kod 6 djevojčica i 15 dječaka (20,5 %). Od svih zuba koji su nedostajali obostrano, 92 para manjkala su istodobno u maksili i mandibuli, a najčešće

razliku između dječaka – bilo ih je 26 (42,62 %) i djevojčica – njih 35 (57,38 %), ( $P=0,257$ ), (Table 2).

The most common tooth types were the mandibular second left premolar 63 (20.7%), the mandibular second right premolar 61 (20.1%), and maxillary left premolar 31 (10.2%). On the other hand, the maxillary central incisors, mandibular canines, maxillary first and second molars, mandibular first molars in both arches showed no congenital absence in the sample of Turkish girls. The tooth types without congenital absence in Turkish boys are fewer, just mandibular canines, maxillary and mandibular second molars.

A total of 303 teeth (excluding third molars) were missing (158 in girls and 145 in boys).

The prevalence rates for missing teeth in the maxilla and mandible were 46.2% and 53.8% ( $n = 140$  maxilla + 163 mandible) (Figure 2), respectively. The difference between maxillary and mandibular missing teeth in boys and girls was not statistically significant ( $P=0,282$ ). Also, no significant differences were seen between the right and left sides of males and females ( $P=0,427$ ), and in the right and left sides of the overall population ( $P=0,427$ ). Hypodontia prevalence in the right and left quadrants ( $n=149$  right + 154 left quadrants) was 49.2 % and 50.8 %, respectively (Table 3).

There were 89 anterior and 214 posterior missing teeth. Bilateral hypodontia was observed in 70 (39 girls, 31 boys) patients (67.9%). The most common bilaterally missing teeth were the mandibular second premolar (22 girls, 21 boys) (42.1%) and the maxillary second premolar (6 girls, 15 boys) (20.5 %). Of the teeth missing bilaterally, 92 pairs were

**Tablica 3.** Broj zuba koji nedostaju u odnosu na pogodenu čeljust i stranu  
**Table 3** The number of missing teeth with respect to the affected jaws and sides

Broj zuba koji nedostaju • Number of missing teeth	Djevojčice • Girls (n=158) Broj • Number (%)	Dječaci • Boys (n=145) Broj • Number (%)	Ukupno • Total (n=303) Broj Number (%)
Maksila • Maxilla	70- (44%)	70- (48%)	140- (46%)
Mandibula • Mandible	88- (56%)	75- (52%)	163- (54%)
Desno • Right	79- (50%)	70- (48%)	149- (49%)
Lijevo • Left	79- (50%)	75- (52%)	154- (51%)



je to bio drugi donji lijevi pretkutnjak (20,7 %). Jednostrano je najčešće nedostajao drugi donji lijevi pretkutnjak – kod 9 dječaka i 8 djevojčica (5,6 %), a slijedio je drugi donji desni pretkutnjak – kod 10 djevojčica i 6 dječaka (5,28 %).

U ovom istraživanju nije bilo ni sindroma ni sistemskih bolesti, te je od svih pacijenata samo njih sedam (6,8 %) izjavilo da i članovima njihove obitelji prirodno nedostaju neki zubi.

## Rasprava

Ustanovljena prevalencija zuba koji prirodno nedostaju u trajnoj denticiji bila je u ovom istraživanju 6,2 posto. Sisman (21) je pak došao do podatka od 7,54 posto u populaciji turskih ortodontskih pacijenata. Ovaj rezultat potvrđuje da hipodoncija među turskom djecom nije česta. Istaknimo da je Nik-Hussein (7) ustanovio prevalenciju od 2,8 posto, a Meza (10) od 2,7. Suprotno tim rezultatima, Fekonja (32) i Goya (4) utvrdili su prevalenciju hipodoncije od 11,3 i 9,4 posto. Dodajmo da su u različitim društvima velike varijacije u prevalenciji hipodoncije.

U ovom istraživanju nije bilo značajne razlike u prevalenciji hipodoncije između dječaka i djevojčica. Kod djevojčica je bila nešto viša, ali bez statistički značajne razlike, što se slaže s većinom objavljenih rezultata, i to onih Grahnéna (22), Haavikko (23), Seowa (24), Fekonje (32), Endoa (25) i Meze (10). Ali Larmour (12) je ustanovio da hipodoncija u slučaju mliječnih zuba nema značajnu spolnu distribuciju, a u trajnoj denticiji žene su pogođenije negoli muškarci u omjeru 3 : 2. Prosječan broj zuba koji su nedostajali u ovom je istraživanju po pogođenom djetetu bio 2,81. Tuncet i suradnici (11) istaknuli su da je prosječan broj bio 1,99 zuba po djetetu, a Kirzioglu (26) je ustanovio prosječan broj od 2,6 zuba po djetetu. Aashaimand Ogaard (20) i Rolling (27) dobili su prosječan broj od 1,71 i 1,77. Osim toga, Goya (4) i Endo (25) ustanovili su da broj zuba koji nedostaju po djetetu iznosi 2,84 i 2,4.

Većina djece prvi put je otišla u kliniku na stomatološki pregled uglavnom u dobi između 10 i 12 godina. Uočavanje mlađih pacijenata s hipodoncijom rezultat je slučajnog opažanja ili obiteljske anamneze te se može očekivati da će se većina anomalija pronaći u fazi miješane denticije. Takvi pacijenti vjerojatno su teško pronašli odgovarajuću kliniku u kojoj bi mogli dobiti savjet ili terapiju (28). Općenito, dijagnoza ageneze zuba u trajnoj denticiji trebala bi se postaviti nakon dobi od šest godina jer se tada pouzdano može očekivati početak mineralizacije trajne denticije (29, 30). Zato smo u ovom istraživanju ograničili dobni raspon između sedam i trinaest godina.

U ovom istraživanju među pojedincima s hipodoncijom, kod njih 61 posto nedostajali su jedan ili dva zuba. Peker (29) je došao do sličnih rezultata za jedan ili dva zuba. U drugim istraživanjima istaknuta je sve veća učestalost u nedostatku jednoga ili dva zuba. Tako je Haavikk zabilježio 23 slučaja, Rølling 27, Davis 31, Fekonja 32, Gomes 33 i Goya 4. Većina slučajeva uključuje agenezu samo jednoga ili dva zuba, pa zato pogođeni pojedinci imaju samo blagi oblik hipodoncije.

missing simultaneously in the maxilla and mandible, among which, the mandibular second left premolar was the most frequently missing tooth (20.7%). The mandibular left second premolar (9 boys, 8 girls) was the most frequent unilaterally missing tooth (5.6 %) followed by the mandibular right second premolar (10 girls, 6 boys) (5.28 %).

In this study, there were no syndromes and systemic diseases in all patients and only 7 patients (6.8 %) reported familial history about missing teeth.

## Discussion

the prevalence of congenitally missing teeth was observed in the permanent dentition of 6.2 % subjects in this study. Sisman (21) showed that the prevalence of hypodontia was 7.54 % for Turkish orthodontic patient population. These results confirm that hypodontia is not common in Turkish children. On the other hand, Nik-Hussein (7) found that the prevalence was 2.8; Meza (10) found that the prevalence was 2.7. In contrast, Fekonja (32) and Goya (4) found that the prevalence of hypodontia was 11.3 and 9.4. There is a great variation in the prevalence of hypodontia in different societies.

In this study there was no significant difference between the prevalence of hypodontia in boys and girls. Females presented a higher prevalence of hypodontia, however no statistically significant difference was observed, which is in accordance with the majority of reports by Grahnén (22), Haavikko (23), Seow (24), Fekonja (32), Endo (25) and Meza (10). But Larmour (12) found that hypodontia in the primary dentition has no significant gender distribution, on the other hand, in the permanent dentition females are affected more frequently than males by a ratio of 3:2.

The average number of missing teeth per child was 2.81 in this study. Tunc et al. (11) observed an average number of 1.99 teeth per child and Kirzioglu (26) found that an average number of 2.6 teeth per child. Aashaim and Ogaard (20) and Rolling (27) observed an average number of 1.71 and 1.77 teeth per child. Besides, Goya (4) and Endo (25) found that the numbers of missing teeth per affected child were 2.84 and 2.4.

The first attendance at the clinic occurred mostly between the ages of 10 and 12 years. Detecting a younger patient with hypodontia results either from chance observation or family history, it might be expected that the majority of cases would be identified in the mixed dentition phase. For these cases, it is likely that there are difficulties in locating an appropriate clinic to which a referral for advice or treatment would be made (28). In general, diagnosis of tooth agenesis in the permanent dentition should be made after the age of 6 because the mineralization of the permanent dentition can reliably be expected to have commenced (29, 30). That is why the age range of this study was limited between 7 and 13.

In the present study, of the individuals identified with hypodontia, 61% had one or two missing teeth. Peker (29) obtained similar results of one or two missing teeth. Other studies (Haavikko (23), Rølling (27), Davis (31), Fekonja (32), Gomes (33) and Goya (4)) reported a higher frequency of one or two missing teeth. Most cases involved agenesis of just

Najčešće u ovom istraživanju prirođeno nedostaju drugi donji lijevi pretkutnjak, drugi donji desni pretkutnjak i drugi gornji lijevi pretkutnjak. U literaturi postoje određene varijacije u opisima zuba koji najčešće nedostaju, kad isključimo treće kutnjake. Slučajeve kad nedostaje drugi donji pretkutnjak opisali su Rølling (27), Bäckman (34), Polder (14), Mattheeuws (35), Endo (25), Tunc (11), Goya (4) i Kirzioglu (26). S druge strane, u nekim istraživanjima istaknuto je da je trajni gornji bočni sjekutić najčešće pogođeni trajni zub – ustanovili su to Meza (10), Fekonja (32), Gomes (33) i Altug-Atac (1).

Mi smo utvrdili da nedostaje više zuba u mandibuli, negoli u maksili, ali razlika nije značajna te se ovi rezultati slažu s onima Kirzioglu (26). No Pecker (29) je pronašao više takvih zuba u maksili, negoli u mandibuli. Fekonja (32) i Wong (36) istaknuli su da kod ortodontskih pacijenata mnogo češće nedostaju zubi u maksili negoli u mandibuli. Gomez (33) je pronašao hipodonciju u maksili kod 59,2 posto pacijenata, a u mandibuli kod njih 40,8 posto, uz ukupni omjer od 1,45 : 1 za ortodontske pacijente. Obostrana hipodoncija uočena je kod 67,9 posto pacijenata. Najčešće su obostrano nedostajali drugi donji pretkutnjak i drugi gornji pretkutnjak. Goya i suradnici istaknuli su da je simetrija zuba koji prirođeno nedostaju predominantna (74,6 %), a Kirzioglu i njegovi kolege izvijestili su (26) da su pronašli 73,2 posto takvih zuba. Stoviše, simetrična hipodoncija bila je dominantna i pronađena je u kontralateralnom i u antagonističkom kvadrantu, što sve upućuje na snažan genetski utjecaj.

Premda se hipodoncija može pojaviti s više od 60 različitih sindroma, ove anomalije mogu nastati i bez sindroma i bez sistemskih bolesti. Hipodoncija je češća u nesindromskom ili obiteljskom obliku, nego u sindromskom (13, 37). U ovom istraživanju pacijenti nisu imali ni sindrome ni sistemskih bolesti i samo je njih sedmero (6,8 %) reklo da u njihovim obiteljima ima članova kojima prirođeno nedostaju zubi.

## Zaključak

Epidemiološka istraživanja mogu se koristiti za oblikovanje javnozdravstvenih izvještaja s dovoljnom količinom informacija o specifičnostima svake populacije. Rezultati ovog istraživanja mogu se smatrati reprezentativnima kad je riječ o turskoj djeci. Prevalencija, lokalizacija i raspodjela hipodoncije može itekako koristiti u budućim istraživanjima. Naši podatci ističu koliko je važna detaljna i pozorna analiza radiograma. Naime, to pomaže u dugoročnom planiranju terapije prilagođene individualnoj potrebi djeteta.

## Sukob interes

Nije bilo sukoba interesa.

one or two teeth, and therefore most of the affected individuals suffer only a mild form of hypodontia.

The most common congenital missing tooth types were the mandibular second left premolar, the mandibular second right premolar and maxillary left premolar in this study respectively. There is some variation in the literature concerning the description of the most frequently missing tooth, excluding third molars. The mandibular second premolar is normally the most frequently missing tooth reported by Rølling (27), Bäckman (34), Polder (14), Mattheeuws (35), Endo (25), Tunc (11), Goya (4) and Kirzioglu (26). However, other studies have also shown the permanent maxillary lateral incisor to be the most affected tooth (Meza (10), Fekonja (32), Gomes (33), Altug-Atac (1)).

We found more missing teeth in the mandible than in the maxilla and the difference was not significant. This result was in agreement with Kirzioglu's study (26). However, Peker (29) found more missing teeth in the maxilla than in the mandible. Fekonja (32) and Wong (36) found missing teeth considerably more frequently in the maxilla than in the mandible in orthodontic patients. Gomez (33) found maxillary hypodontia in 59.2 % of patients and in the mandible amounting to 40.8 % with an overall ratio of 1.45 : 1 in orthodontic patients.

Bilateral hypodontia was observed in 67.9% patients. The most common bilaterally missing teeth were the mandibular second premolar and the maxillary second premolar. Goya et al. (4) found that symmetry of congenitally missing teeth was predominant (74.6%) and Kirzioglu et al. (26) observed that bilaterally missing teeth was 73.2%. Moreover, symmetrical hypodontia was predominant, being found in both the contralateral and antagonistic quadrant, possibly suggesting a strong genetic pattern.

Although hypodontia can occur in over 60 different syndromes, these anomalies can occur without any syndrome or systemic disease. However, hypodontia is seen more commonly in non-syndromic or familial form than syndromic form (13, 37). In this study, there were no syndromes and systemic diseases in all patients and only 7 patients (6.8 %) reported familial history about missing teeth.

## Conclusion

Epidemiological studies can be used for the raising of public health awareness by sufficiently informing on the specificities of every population. The results of this study can be considered representative of Turkish children. The prevalence, location and distribution of hypodontia could provide useful data for future studies.

Our data point to the importance of a detailed and careful radiographic examination. This could help in a long-term and effective treatment planning according to a child's individual requirements.

## Conflict of interest

None declared

**Abstract**

**Objective:** The aim of this study was to assess the prevalence and pattern of congenital missing teeth in the permanent dentition (excluding wisdom teeth), among Turkish children in a 4-year period (2009-2012). **Methods:** The study group comprised 1658 children (873 girls, 785 boys). The children were examined in Department of Pediatric Dentistry, Dental School of Marmara University. A chi square test was used to determine the difference in the prevalence of hypodontia between genders. **Results:** The prevalence of hypodontia was 6.2% (6.3% girls, 6% boys) with no statistically significant difference between the genders ( $P=0.601$ ). The most frequently missing tooth were the mandibular left second premolars, 63 (20.7%), followed by the mandibular right second premolars, 61 (20.1%), maxillary left premolars, 31 (10.2%). There were 89 anterior and 214 posterior missing teeth. Bilateral hypodontia was observed in 70 (39 girls, 31 boys) patients (67.9%). The most common bilateral missing teeth were the mandibular second premolar (22 girls, 21 boys) (4.1%) and the maxillary second premolar (6 girls, 15 boys) (20.5%). The mandibular left second premolar (9 boys, 8 girls) was the most frequent unilaterally missing tooth (5.6%) followed by the mandibular right second premolar (10 girls, 6 boys) (5.28%). **Conclusion:** The obtained results point to the importance of detailed clinical and radiographic examination. These help with long-term treatment planning according to a child's individual requirements.

Received: August 15, 2015

Accepted: February 8, 2016

**Address for correspondence**

Professor Betül Kargul  
Marmara University  
Department of Pediatric Dentistry  
bkargul@marmara.edu.tr

**Key words**

Hypodontia; Anodontia; Child; Turkey

**References**

- Altug-Atac AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. *Am J Orthod Dentofacial Orthop.* 2007 Apr;131(4):510-4.
- De Coster PJ, Marks LA, Martens LC, Huysseune A. Dental agenesis: Genetic and clinical perspectives. *J Oral Pathol Med.* 2009 Jan;38(1):1-17.
- Shimizu T, Maeda T. Prevalence and genetic basis of tooth agenesis. *Jpn Dent Sci Rev.* 2009; 45:52–58.
- Goya HA, Tanaka S, Maeda T, Akimoto Y. An orthopantomographic study of hypodontia in permanent teeth of Japanese pediatric patients. *J Oral Sci.* 2008; 50:143–150.
- Pemberton TJ, Das P, Patel PI. Hypodontia: Genetics and future perspectives. *Braz J Oral Sci.* 2005;4:695–709.
- Nunn JH, Carter NE, Gillgrass TJ, Hobson RS, Jepson NJ, Meechan JG. The interdisciplinary management of hypodontia: Background and role of paediatric dentistry. *Br Dent J.* 2003 Mar 8;194(5):245-51.
- Nik-Hussein NN. Hypodontia in the permanent dentition: A study of its prevalence in Malaysian children. *Aust Orthod J.* 1989 Oct;11(2):93-5.
- Dhanrajani PJ. Hypodontia: etiology, clinical features, and management. *Quintessence Int.* 2002 Apr;33(4):294-302.
- Zhu JF, Marcushamer M, King DL, Henry RJ. Supernumerary and congenitally absent teeth: a literature review. *J Clin Pediatr Dent.* 1996 Winter;20(2):87-95.
- Meza R S. Radiographic assessment of congenitally missing teeth in orthodontic patients. *Int J Paediatr Dent.* 2003 Mar;13(2):112-6.
- Tunc ES, Bayrak S, Koyuturk AE. Dental development in children with mild-to-moderate hypodontia. *Am J Orthod Dentofacial Orthop.* 2011 Mar;139(3):334-8.
- Larmour CJ, Mossey PA, Thind BS, Forgie AH, Stirrups DR. Hypodontia — a retrospective review of prevalence and etiology. *Quintessence Int.* 2005 Apr;36(4):263-70.
- Amini F, Rakhshan V, Babaei P. Prevalence and pattern of hypodontia in the permanent dentition of 3374 Iranian orthodontic patients. *Dent Res J (Isfahan).* 2012 May;9(3):245-50.
- Polder BJ, Van't Hof MA, Van der Linden FPMG, Kuijpers-Jagtman AM. A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community Dent Oral Epidemiol.* 2004 Jun;32(3):217-26.
- Chung CJ, Han JH, Kim KH. The pattern and prevalence of hypodontia in Koreans. *Oral Dis.* 2008 Oct;14(7):620-5.
- Lammi L, Arte S, Somer M, Jarvinen H, Lahermo P, Thesleff I, et al. Mutation in AXIN2 cause familial tooth agenesis and predispose to colorectal cancer. *Am J Hum Genet.* 2004 May;74(5):1043-50.
- Kücher EC, Lips A, Tannure PN, Ho B, Costa MC, Granjeiro JM, et al. Tooth agenesis association with self-reported family history of cancer. *J Dent Res.* 2013 Feb;92(2):149-55.
- Chalothorn LA, Beeman CS, Ebersole JL, Kluemper GT, Hicks EP, Kryscio RJ, et al. Hypodontia as a risk marker for epithelial ovarian cancer. *J Am Dent Assoc.* 2008 Feb;139(2):163-9.
- Fekonja A, Cretnik A, Takac I. Hypodontia prevalence and pattern in women with epithelial ovarian cancer. *Angle Orthod.* 2014 Sep;84(5):810-4.
- Aasheim B, Ögaard B. Hypodontia in 9-year-old Norwegians related to need of orthodontic treatment. *Scand J Dent Res.* 1993 Oct;101(5):257-60.
- Sisman Y, Uysal T, Gelgor IE. Hypodontia. Does the Prevalence and Distribution Pattern Differ in Orthodontic Patients? *Eur J Dent.* 2007 Jul;1(3):167-73.
- Grahnén H. Hypodontia in the permanent dentition. *Odont Rev.* 1956; 7(Suppl.3):1–100.
- Haaviko K. Hypodontia of permanent teeth. An orthopantomographic study. *Suom Hammaslaak Toim.* 1971;67(4):219-25.
- Seow WK, Lai PY. Association of taurodontism with hypodontia: a controlled study. *Pediatr Dent.* 1989 Sep;11(3):214-9.
- Endo T, Ozoe R, Kubota M, Akiyama M, Shimooka S. A survey of hypodontia in Japanese orthodontic patients. *Am J Orthod Dentofacial Orthop.* 2006 Jan;129(1):29-35.
- Kızıoğlu Z, Sentut T K, Ertürk MS O, Karayılmaz H. Clinical features of hypodontia and associated dental anomalies: a retrospective study. *Oral Dis.* 2005 Nov;11(6):399-404.
- Rølling S. Hypodontia of permanent teeth in Danish schoolchildren. *Scand J Dent Res.* 1980 Oct;88(5):365-9.
- Hobkirk J A, Goodman J R, Jones S P. Presenting complaints and findings in a group of patients attending a hypodontia clinic. *Br Dent J.* 1994 Nov 5;177(9):337-9.
- Peker I, Kaya E, Darendeliler-yaman S. Clinical and radiographical evaluation of non-syndromic hypodontia and hyperdontia in permanent dentition. *Med Oral Patol Oral Cir Bucal.* 2009 Aug 1;14(8):e393-7.
- Jorgenson RJ. Clinician's view of hypodontia. *J Am Dent Assoc.* 1980 Aug;101(2):283-6.
- Davis PJ. Hypodontia and hyperdontia of permanent teeth in Hong Kong schoolchildren. *Community Dent Oral Epidemiol.* 1987 Aug;15(4):218-20.
- Fekonja A. Hypodontia in orthodontically treated children. *Eur J Orthod.* 2005 Oct;27(5):457-60.
- Gomes R, Fonseca J, Paula L M, Faber J and Acevedo AC. Prevalence of hypodontia in orthodontic patients in Brazil. *Eur J Orthod.* 2010 Jun;32(3):302-6.
- Bäckman B, Wahlin YB. Variations in number and morphology of permanent teeth in 7-year-old Swedish children. *Int J Paediatr Dent.* 2001 Jan;11(1):11-7.
- Mattheeuws N, Dermout L and Martens G. Has hypodontia increased in Caucasians during the 20 th. Century ? A meta-analysis. *Eur J Orthod.* 2004 Feb;26(1):99-103.
- Wong A TY, McMillan A S, McGrath C. Oral health-related quality of life and severe hypodontia. *J Oral Rehabil.* 2006 Dec;33(12):869-73.
- Cobourne MT. Familial human hypodontia-is it all in the genes? *Br Dent J.* 2007 Aug 25;203(4):203-8.