

## THE PREVALENCE OF DENTAL ANOMALIES IN A TURKISH POPULATION

### Türk Toplumunda Dental Anomalilerin Görülme Sıklığı

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#### ABSTRACT

**Purpose:** The aim of the present study was to investigate the prevalence of dental anomalies in a Turkish population according to the gender and age.

**Materials and Methods:** A retrospective study was performed using panoramic radiographs of 2025 patients (885 males and 1140 females) ranging in age from 9 to 35 (mean age 25.61±10.04) years attending Department of Oral Radiology, University of Istanbul, Faculty of Dentistry. These patients were examined to determine the presence of developmental dental anomalies involving hypodontia, hyperdontia, microdontia, taurodontism and other root anomalies. The incidence of these anomalies were assessed according to the gender and age.

**Results:** Among the 2025 subjects, a total of 96 individuals (42 males and 54 females) showed at least one of the selected dental anomalies (4.74%). Tooth agenesis was the most common dental abnormality (1.77%) followed by taurodontism (1.18%), hyperdontia (0.79%), microdontia (0.54%) and root anomalies (0.44%), respectively.

**Conclusion:** Tooth agenesis is the most common developmental dental anomaly in the studied Turkish population followed by taurodontism.

**Keywords:** Dental anomalies; hypodontia; hyperdontia; taurodontism; microdontia

#### ÖZ

**Amaç:** Bu çalışmanın amacı Türk toplumunda dental anomalilerin görülme sıklığının cinsiyet ve yaşa göre araştırılmasıdır.

**Gereç ve Yöntem:** Çalışmada İstanbul Üniversitesi Diş Hekimliği Fakültesi Ağız, Diş-Çene Radyolojisi Anabilim Dalı'na başvuran, yaşları 9-35 yaş arasında değişen (ortalama yaş: 25.61±10.04) 2025 hastanın (885 erkek ve 1140 kadın) panoramik radyografileri geriye dönük olarak araştırılmıştır. Hastalar hipodonti, hiperdonti, mikrodonti, taurodontizm ve diğer kök anomalileri gibi dental anomalilerin varlığı açısından incelenmiştir. Bu anomalilerin görülme oranları cinsiyet ve yaşa göre değerlendirilmiştir.

**Bulgular:** 2025 hastanın toplam 96'sının (42 erkek, 54 kadın) incelenen dental anomalilerden en az birine sahip olduğu belirlenmiştir (%4.74). En sık gözlenen dental anomali diş eksikliği olup (%1.77) bunu sırasıyla taurodontizm (%1.18), hiperdonti (%0.79), mikrodonti (%0.54) ve diğer kök anomalileri (%0.44) takip etmektedir.

**Sonuç:** Diş eksikliği incelenen popülasyonda en sık gözlenen gelişimsel dental anomali olup bunu taurodontizm takip etmektedir.

**Anahtar kelimeler:** Dental anomaliler; hipodonti; hiperdonti; taurodontizm; mikrodonti

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## Introduction

Although the aetiology of dental anomalies remains largely unclear (1), some anomalies in tooth number, shape and size occur as a result of disturbances during the morphodifferentiation stage of tooth development. Abnormalities in the formation of the dental hard tissues resulting in disturbances in tooth structure are due to the disruption during the histodifferentiation stage (2-4). Several studies reported the frequencies of various dental anomalies in different populations, but the results are conflicting. The discrepant results of these studies were attributed to racial differences, variable sampling techniques and different diagnostic criteria (5-7).

Tooth agenesis is the congenital absence of one or more teeth. It has been reported to be more common in the permanent dentition, with prevalence rates ranging from 0.03 to 10.1 % (8, 9). Oligodontia is the congenital agenesis of six or more permanent teeth apart from the third molars whereas absence of less than six teeth is referred as hypodontia. Hyperdontia is the presence of additional teeth compared to the normal series (10, 11), with a prevalence rate varying from 0.07 to 1.7 % in the primary dentition (12, 13) and from 0.1 to 3.8 % in permanent dentition (10, 14). Microdontia involving peg-shaped teeth is characterized by marked reduction in a tooth's crown diameter, with the crown's incisal mesiodistal width being shorter than its cervical width. Prevalence rates range from 0.7-9.9% (15, 16). A relationship between microdontia and tooth agenesis in the permanent dentition has been suggested (17). Macrodonia was defined when the radiograph revealed the increased size of the teeth and taurodontism was described as an extension of the rectangular pulp chamber into the elongated body of the tooth in the radiograph (18). The prevalence rates of taurodont molars range from 0.25% to 48% in different populations (19, 20).

The purpose of this study was to determine the prevalence and distribution of developmental dental abnormalities in shape and number of teeth in a group of Turkish population.

## Materials and Methods

A retrospective study was performed using panoramic radiographs of 2025 patients (885 males and 1140 females) ranging in age from 9 to 35 (mean age  $25.61 \pm 10.04$ ) years drawn from the archives of Department of Oral Radiology, University of Istanbul,

Faculty of Dentistry between the years of 2009 and 2012. Written informed consents have routinely obtained prior to the any examination or treatment. No additional radiograph was taken for this study. Selection criteria of the samples included the patients that were not diagnosed with any syndrome or illness that involved odontogenesis and dental eruption. Only subjects of Turkish origin were selected.

The following developmental dental anomalies were assessed in the present study.

1. Number abnormalities: Tooth agenesis (hypodontia/oligodontia), hyperdontia.

A tooth was considered "congenitally missing" when absence of radiopacity of the bud was confirmed in the panoramic radiographs with respect to the dental age and the time of tooth calcification. hyperdontia. While collecting data on hypodontia/oligodontia, missing third molars were not included in the sample, which might be due to extraction.

2. Shape abnormalities: microdontia (including peg-shaped lateral incisors), macrodonia, taurodontism and root abnormalities.

## Statistical Analysis

Statistical Package for Social Sciences (SPSS) for Windows software, version 16.0 (SPSS Inc., Chicago, IL, USA) was used in this study. The standard descriptive methods such as the mean, standard deviation, median, frequency, minimum and maximum were applied to determine the characteristics of the sample. The chi square and Fisher's exact tests were used to determine potential differences in the distribution of dental anomalies stratified by gender and age variables.

## Results

Among the 2025 subjects, a total of 96 individuals (42 males and 54 females) showed at least one of the selected dental anomalies (4.74%). Distribution of the subjects according to the gender and age was shown in Table 1. Table 2 showed the distribution of each dental anomaly according to the gender. No statistically significant differences in the frequency of any of the dental anomalies based on gender were found ( $p > 0.05$ ). The frequency of dental anomalies was statistically higher in age groups of 13-18 years and 19-35 years compared to the age group of 9-12 years ( $p < 0.05$ ).

**Table 1.** Distribution of the subjects according to the gender and age.

Demographic data		Presence of dental anomalies		$\chi^2$ ; <i>p</i>
		Yes	No	
Gender	Male	42 (4.75%)	843 (95.25%)	$\chi^2$ :0.057; p: 0.811
	Female	54 (4.74%)	1086 (95.26%)	
Age	9-12 years	35 (8.58%)	373 (91.42%)	$\chi^2$ :14.272 p: 0.0008**
	13-18 years	15 (4.46%)	321 (95.54%)	
	19-35 years	46 (3.59%)	1135 (88.60%)	

**Table 2.** Distribution of dental anomalies according to the gender.

Dental anomalies	Female	Male	Total (%)	<i>p</i>
Hypodontia	23	13	36 (1.77)	0.354
Hyperdontia	10	6	16 (0.79)	0.615
Taurodontism	10	14	24 (1.18)	0.146
Microdontia	6	5	11 (0.54)	0.906
Root anomalies	5	4	9 (0.44)	0.968

#### Number Abnormalities

Tooth agenesis was the most frequent tooth number anomaly. Of 36 patients, 13 male and 23 female patients had at least 1 congenitally missing tooth. The total prevalence of tooth agenesis was 1.77%, making it the most frequent of all developmental anomalies for all 2025 patients (Table 2). Tooth agenesis was found most frequently in the maxillary lateral incisors (n=16;44.4%) followed by maxillary and mandibular premolars together (n=14; 38.8%). The prevalence of agenesis of mandibular incisors and maxillary and mandibular canines was found in 5 (13.8%) and 1 (2.7%) of the subjects, respectively. Hyperdontia was observed in 16 subjects (6 male and 10 female), with a total prevalence of 0.79% (Table 2). Of the 16 hyperdontia subjects examined, 14 had supernumerary incisors whereas only 2 of them supernumerary premolars. When the distribution of hyperdontia subjects were evaluated according to the dental arches, 14 patients had supernumerary teeth on their maxilla whereas 2 of them had supernumeraries on the mandibular.

#### Shape Abnormalities

Taurodontism was the most common tooth shape anomaly occurring 24 (14 male and 10 female) of all patients (1.18%). Microdontia was the second most frequent tooth shape anomaly and observed in 11 subjects (5 males and 6 females) with a total prevalence of 0.54%. Root anomalies were observed in 9 subjects (4 males and 5 females) with a total prevalence of 0.44% (Table 2).

## Discussion

Odontogenic anomalies are the formative defects caused by genetic disturbances or environmental factors during tooth morphogenesis. Occurrence of multiple anomalies in individuals or families, without evidence of other systemic manifestations or syndromes have rarely been reported (21, 22).

This study evaluates the prevalence and distribution of various developmental dental anomalies in 2025 patients treated between 2009 and 2012 at the Istanbul University, Faculty of Dentistry. In this study, 4.74% of the total study group had at least 1 dental anomaly.

Significant differences in the occurrence of dental anomalies were observed between this study and previous epidemiological studies (4-7, 16). These conflicting results can be explained primarily by racial differences and sampling techniques. These variations could be related to many factors, such as differences between different population groups as well as gender differences, and body size. However, all variations might be manipulated by the interaction of genetic, epigenetic and environmental factors. This interaction may have a direct or indirect impact on the development of the dentition (17). Thongudomporn and Freer (7), and Altug-Ataç and Erdem (2) examined orthodontic patients and reported that the prevalences of several dental anomalies were higher than in previous studies. The explanation for this difference was the selection of the study group of patients who consulted the orthodontic clinic with esthetic concerns. We report the results of a group of 2025 patients, but the prevalence rates of the anomalies were lower than these studies of Thongudomporn

and Freer (7), and Altug-Ataç and Erdem (2). In our study, 4.74% of 2025 patients had dental anomalies, whereas, in the study of Thongudomporn and Frer (7), 74.7% of 111 patients, and in the study of Altug-Ataç and Erdem (2) 5.46% of 3043 patients had dental anomalies. Smaller samples in some studies tend to be less reliable, and there might have been a selection factor in that study group. The reported frequency of tooth agenesis depends on the population studied. There is great variation in the literature depending on ethnic groups; in Africans and Australian Aborigines the prevalence is 1%, but it is 30 times higher in Japanese (23). The frequency of tooth agenesis in a Brazilian population was reported as 4.8% (1). Uslu et al evaluated the prevalence of dental anomalies in 900 orthodontic patients from Turkey and found the agenesis as the most frequent dental anomaly with a prevalence of 21.6% (4). Altug-Ataç and Erdem reported a lower rate of tooth agenesis (0.13%) in a sample Turkish group (2). This difference might be explained by the higher sample size in their study. In the present study, the prevalence of tooth agenesis was 1.77% and 63.88% of the patients were female.

The types of teeth reported missing vary in different ethnic groups. In American children maxillary lateral incisors were the most frequent missing teeth (24) whereas the most frequent missing teeth in European children is the mandibular second premolars (25-27). In the present study, the maxillary lateral incisors have been found as the most frequently missing teeth, followed by premolars which agrees with the previous reports in Turkish population (2, 4). The stage of tooth morphogenesis within the development process controls the presence or absence as well as the size and shape of the individual tooth (28). Microdontia is the condition in which one or more teeth are smaller than normal in size. Information regarding the prevalence of microdontia among healthy populations is scarce, with varying criteria used in assessments. Uslu et al (4) found the prevalence of microdontia as 0.7% of the total study sample and only in female subjects whereas in the study of Altug-Ataç and Erdem (2) microdontia was reported in 48 (23 male, 25 female) out of 3043 subjects (1.58%). In the present study the prevalence of microdontia and peg-shaped maxillary lateral incisors were 0.54%, making it the second most frequent dental anomaly. Macrodonia is a rare dental anomaly characterized by an excessive enlargement of all tooth structures that generally could be related with some syndromes. Dental anomalies, including macrodonia, are caused by complex multifactorial

interactions including genetic, epigenetic and environmental factors during the long process of dental development (28). According to Kondo and Townsend (29) shape variation in teeth is related more to genetic and environmental than to other factors; however, they also state that these changes are expressed more in the crown development stage, which is congruent with the findings in Brook's review (28). None of the subjects showed macrodonia in our study. The prevalence of taurodontism was found to be 1.18% in the total study sample which is similar to the Altug-Ataç and Erdem's study (2). Darwazeh et al (20) found a higher rate (8.0%) of taurodontism in Jordanian dental patients and the maxillary second molar was the most commonly affected tooth (4.4%). Different results might be related to racial variations.

Short-root anomaly, occurring mostly in permanent maxillary incisors has been described as teeth having developmentally very short roots with a crown-to-root ratio of more than 1:1. (30) Idiopathic generalized short-root anomaly is extremely rare (21, 31). We evaluated both root anomalies and short roots under taurodontism because we observed short roots in only 4 patients. The prevalence of short root was found to be 0.7%.

## Conclusion

Tooth agenesis is the most common developmental dental anomaly in our study population, followed by taurodontism. The most common congenitally missing and microdont (peg-shaped) teeth are maxillary lateral incisors.

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## Conflict of interest

None declared

## References

1. Kuchler EC, Risso PA, Costa Mde C, Modesto A, Vieira AR. Studies of dental anomalies in a large group of school children. *Arch Oral Biol* 2008;53(10):941-946.
2. Altug-Ataç AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. *Am J Orthod Dentofacial Orthop* 2007;131(4):510-514.
3. Basdra EK, Kiokpasoglou M, Stellzig A. The

- class ii division 2 craniofacial type is associated with numerous congenital tooth anomalies. *Eur J Orthod* 2000;22(5):529-535.
4. Uslu O, Akcam MO, Evirgen S, Cebeci I. Prevalence of dental anomalies in various malocclusions. *Am J Orthod Dentofacial Orthop* 2009;135(3):328-335.
  5. al-Emran S. Prevalence of hypodontia and developmental malformation of permanent teeth in saudi arabian schoolchildren. *Br J Orthod* 1990;17(2):115-118.
  6. Ooshima T, Ishida R, Mishima K, Sobue S. The prevalence of developmental anomalies of teeth and their association with tooth size in the primary and permanent dentitions of 1650 japanese children. *Int J Paediatr Dent* 1996;6(2):87-94.
  7. Thongudomporn U, Freer TJ. Prevalence of dental anomalies in orthodontic patients. *Aust Dent J* 1998;43(6):395-398.
  8. Mattheeuws N, Dermaut L, Martens G. Has hypodontia increased in caucasians during the 20th century? A meta-analysis. *Eur J Orthod* 2004;26(1):99-103.
  9. Polder BJ, Van't Hof MA, Van der Linden FP, Kuijpers-Jagtman AM. A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community Dent Oral Epidemiol* 2004;32(3):217-226.
  10. De Oliveira Gomes C, Drummond SN, Jham BC, Abdo EN, Mesquita RA. A survey of 460 supernumerary teeth in brazilian children and adolescents. *Int J Paediatr Dent* 2008;18(2):98-106.
  11. Rajab LD, Hamdan MA. Supernumerary teeth: Review of the literature and a survey of 152 cases. *Int J Paediatr Dent* 2002;12(4):244-254.
  12. Chen YH, Cheng NC, Wang YB, Yang CY. Prevalence of congenital dental anomalies in the primary dentition in taiwan. *Pediatr Dent* 2010;32(7):525-529.
  13. Kapdan A, Kustarci A, Buldur B, Arslan D, Kapdan A. Dental anomalies in the primary dentition of turkish children. *Eur J Dent* 2012;6(2):178-183.
  14. Celikoglu M, Kamak H, Oktay H. Prevalence and characteristics of supernumerary teeth in a non-syndrome turkish population: Associated pathologies and proposed treatment. *Med Oral Patol Oral Cir Bucal* 2010;15(4):e575-578.
  15. Gupta SK, Saxena P, Jain S, Jain D. Prevalence and distribution of selected developmental dental anomalies in an indian population. *J Oral Sci* 2011;53(2):231-238.
  16. Patil S, Doni B, Kaswan S, Rahman F. Prevalence of dental anomalies in indian population. *J Clin Exp Dent* 2013;5(4):e183-186.
  17. Brook AH. A unifying aetiological explanation for anomalies of human tooth number and size. *Arch Oral Biol* 1984;29(5):373-378.
  18. Ezoddini AF, Sheikhhah MH, Ahmadi H. Prevalence of dental developmental anomalies: A radiographic study. *Community Dent Health* 2007;24(3):140-144.
  19. Bharti R, Chandra A, Tikku AP, Arya D. Prevalence of taurodont molars in a north indian population. *Indian J Dent* 2015;6(1):27-31.
  20. Darwazeh AM, Hamasha AA, Pillai K. Prevalence of taurodontism in jordanian dental patients. *Dentomaxillofac Radiol* 1998;27(3):163-165.
  21. Desai RS, Vanaki SS, Puranik RS, Rashmi GS, Nidawani P. An unusual combination of idiopathic generalized short-root anomaly associated with microdontia, taurodontia, multiple dens invaginatus, obliterated pulp chambers and infected cyst: A case report. *J Oral Pathol Med* 2006;35(7):407-409.
  22. Suprabha BS, Sumanth KN, Boaz K, George T. An unusual case of non-syndromic occurrence of multiple dental anomalies. *Indian J Dent Res* 2009;20(3):385-387.
  23. Nunn JH, Carter NE, Gillgrass TJ, Hobson RS, Jepson NJ, Meechan JG, Nohl FS. The interdisciplinary management of hypodontia: Background and role of paediatric dentistry. *Br Dent J* 2003;194(5):245-251.
  24. Muller TP, Hill IN, Peterson AC, Blayney JR. A survey of congenitally missing permanent teeth. *J Am Dent Assoc* 1970;81(1):101-107.
  25. Bergstrom K. An orthopantomographic study of hypodontia, supernumeraries and other anomalies in school children between the ages of 8-9 years. An epidemiological study. *Swed Dent J* 1977;1(4):145-157.
  26. Nordgarden H, Jensen JL, Storhaug K. Reported prevalence of congenitally missing teeth in two norwegian counties. *Community Dent Health* 2002;19(4):258-261.
  27. Rose JS. A survey of congenitally missing teeth, excluding third molars, in 6000 orthodontic patients. *Dent Pract Dent Rec* 1966;17(3):107-114.

28. Brook AH. Multilevel complex interactions between genetic, epigenetic and environmental factors in the aetiology of anomalies of dental development. *Arch Oral Biol* 2009;54 Suppl 1:S3-17.
29. Kondo S, Townsend GC. Associations between carabelli trait and cusp areas in human permanent maxillary first molars. *Am J Phys Anthropol* 2006;129(2):196-203.
30. Daley TD, Wysocki GP, Bohay RN. Osteopathia striata, short stature, cataracts, and microdontia: A new syndrome? A case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1996;81(3):356-360.
31. Silverman NE, Ackerman JL. Oligodontia: A study of its prevalence and variation in 4032 children. *ASDC J Dent Child* 1979;46(6):470-477.

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