

Dental Number Anomalies in Children Applying to Recep Tayyip Erdoğan University Faculty of Dentistry: A Retrospective Cross-Sectional Study

Recep Tayyip Erdoğan Üniversitesi Diş Hekimliği Fakültesi'ne Başvuran Çocuklarda Diş Sayı Anomalileri: Bir Retrospektif Kesitsel Çalışma

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ABSTRACT Objective: Hypodontia is tooth deficiency compared to normal dentition, whereas hyperdontia is the presence of extra teeth. Hypodontia and hyperdontia are opposite numerical variations of human dentition and the occurrence of both is called concomitant hypo-hyperdontia (CHH). In this study, we aimed to determine the prevalence of dental number anomalies in children aged 7-12 years. **Material and Methods:** We examined 7,011 children with good quality panoramic radiographs and no history of the syndrome was examined for the presence of dental number anomalies among children who applied to Recep Tayyip Erdoğan University Department of Pediatric Dentistry between 2015 and 2019. Statistical analysis was performed using SPSS software and the chi-square test. **Results:** Out of 7,011 patients, 360 (5.14%) had congenital anomalies in tooth number. The prevalences of congenital absence of teeth and hyperdontia were 4.75% and 0.4%, respectively. CHH was observed in one patient only. Although hypodontia was observed more frequently in females, the difference in both sexes was not statistically significant. Hyperdontia was more common in males (8.6%) than in females (6.9%), with no statistically significant difference. **Conclusion:** The frequency of tooth number anomalies in patients who applied to our faculty was 5.14%. Panoramic radiographs taken at the first examination and routine controls are of great importance in the early diagnosis and treatment of congenital tooth number anomalies. If diagnosed early, alternative treatment methods can be planned and applied in a multidisciplinary approach to create an esthetic and functional tooth structure.

ÖZET Amaç: Normal yapı içinde daha az sayıda dişin varlığı hipodonti, daha fazla sayıda dişin varlığı ise hiperdonti olarak kabul edilir. Hipodonti ve hiperdonti, insan dişlenmesinin 2 zıt sayısal varyasyonudur ve bu 2 durumun ortaya çıkması, konkomitant hipo-hiperdonti (KHH) olarak adlandırılır. Bu çalışmada, 7-12 yaş arası çocuk hastalarda dental sayı anomalilerinin prevalansının belirlenmesi amaçlanmıştır. **Gereç ve Yöntemler:** Recep Tayyip Erdoğan Üniversitesi Çocuk Diş Hekimliği Anabilim Dalına 2015 ve 2019 yılları arasında başvuran çocuklardan, herhangi bir sendrom öyküsü olmayan, iyi kalitede panoramik radyografları olan 7.011 çocuğun panoramik radyografları, diş sayı anomalilerinin varlığı açısından incelendi. İstatistiksel analiz SPSS yazılımı ve ki-kare testi kullanılarak yapıldı. **Bulgular:** Fakültemizde taranan 7.011 hastanın 360'unda (%5,14) diş sayısı anomalilerinin varlığı saptandı. Konjenital hipodonti ve hiperdonti prevalansı sırasıyla %4,75 ve 0,4 olarak tespit edildi. Sadece bir hastada KHH görüldü. Kadınlarda hipodonti daha sık görülmesine rağmen, 2 cinsiyet arasında istatistiksel olarak anlamlı bir fark yoktu. Hiperdonti erkeklerde (%8,6), kadınlara (%6,9) göre daha sık görülmesine rağmen cinsiyet açısından istatistiksel olarak anlamlı bir fark bulunamadı. **Sonuç:** Fakültemize başvuran hastalarda, diş sayı anomalilerinin sıklığı %5,14 bulundu. İlk muayenede ve rutin kontrollerde alınan panoramik radyograflar konjenital diş sayı anomalilerinin eksikliklerinin erken teşhisinde ve tedavisinde büyük öneme sahiptir. Erken teşhis ile birlikte, estetik ve fonksiyonel bir diş yapısı oluşturmak için multidisipliner bir ekip yaklaşımı içinde alternatif tedavi yöntemleri planlanıp uygulanabileceklerdir.

Keywords: Hypodontia; hyperdontia; number anomalies; prevalence; retrospective study

Anahtar Kelimeler: Hipodonti; hiperdonti; sayı anomalileri; prevalans; retrospektif çalışma

Dental anomalies can be caused by genetic and environmental factors, especially in the morphodifferentiation or histodifferentiation stages of a tooth development.¹ The most common ones are enamel

and dentin structure malformations. There are anomalies in the size, number, and shape of the teeth as well. Differences in the number of teeth occur due to tooth deficiency (hypodontics, oligodontics and an-

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Peer review under responsibility of Türkiye Klinikleri Journal of Dental Sciences.

Received: 10 Jan 2021

Received in revised form: 16 Jul 2021

Accepted: 28 Jul 2021

Available online: 12 Jun 2021

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odontics) or an excess in the number of teeth (hyperdontia, supernumerary teeth).²

Since the congenital tooth deficiency is the most common developmental anomaly in the world, it is a known clinical and public health problem.³ Congenital tooth deficiency is commonly associated with certain syndromes such as Down syndrome, ectodermal dysplasia, and cleft lip and palate.⁴ Although defined in different terms in the literature, the congenital deficiency of one to six teeth (excluding the third molars), the deficiency of more than 6 teeth, and the absence of all teeth (a very rare condition) are often referred to as hypodontia, oligodontia, and anodontia, respectively. The etiology of tooth deficiency has not been fully clarified, yet local, systemic, and genetic factors have been suggested. Congenital tooth deficiency can cause functional and esthetic problems as well as decrease in self-confidence in individuals.^{4,5}

Hyperdontia (supernumerary teeth) is a developmental anomaly that may occur in any region. A single hyperdontia in permanent dentition is usually seen in the anterior maxilla. Hyperdontia is named according to the region in which it occurs. Mesiodens is typically located between the two central upper incisors. In many cases, hyperdontia such as mesiodens, recur within the same family.⁶ Multiple supernumeraries are found in less than 1% and are part of pathological diseases in most cases. Hyperdontia is relatively frequent in cleft lip and palate, cleidocranial dysostosis, or Gardner syndrome. It is often discovered by pediatric dentists and is not merely an esthetic problem. It may cause malocclusion due to functional problems in the dental arch, which can prevent dental eruption, malposition, dentigerous cysts, and radicular resorptions.⁷

Concomitant hypo-hyperdontia (CHH) is a condition in which hypodontia and hyperdontia coexist in the same person. A multidisciplinary approach is required to treat of CHH and there is no standard treatment protocol. Like other dental anomalies, if hypo-hyperdontia is detected early by careful, rigorous intraoral and radiological examination, it can be managed using a multidisciplinary treatment plan to meet the functional, esthetic, and psychological needs of the patient.^{8,9}

Studies show that regional and racial differences significantly affect the results obtained. Evaluation on a few samples and in different gene pools creates difficulties in comparing studies. For this reason, examining a larger number of patients from different regions will provide more precise and detailed information to establish a data pool for children in Turkey. In this regard, this study will contribute to the literature by obtaining a current prevalence value in Turkish society, enabling more efficient comparisons for our country. This study aims to evaluate the anomalies of teeth number in children who were admitted to our faculty for various reasons and to determine the prevalence of this congenital condition in our region.

MATERIAL AND METHODS

We obtained legal permission required to use the retrospective record of the patients from the Dean of the Faculty of Dentistry of Recep Tayyip Erdoğan University on 10.30.2019 and numbered 61245112-915.03.03-E.1317. Ethical approval of the study was given by Recep Tayyip Erdoğan University, Faculty of Medicine, Non-invasive Clinical Research Ethics Committee, on 01.16.2020 with the decision number 2020/08. The study was conducted as per the principles of the Helsinki Declaration.

In this cross-sectional study, 7,011 orthopantomograms of apparently healthy pediatric patients were used to diagnose tooth deficiency and hyperdontia, as this approach has been considered reliable in diagnosing anomalies in the tooth number in several studies.¹⁰⁻¹³ The children were admitted to the Department of Pediatric Dentistry of Recep Tayyip Erdoğan University in Rize between January 2015 and October 2019. Patients aged 7-12 years with no history of the syndrome and good quality panoramic radiographs were included in the study. Two physicians reviewed all of the selected panoramic films in a dark room using a digital imager. One physician evaluated the first half of the patient list, and the other evaluated the second half. Patients diagnosed with tooth number anomaly were relisted and each physician reviewed the other physician's final list. The examination started from the upper left region on the panoramic film and ended at the lower-left region;

each tooth and tooth germ was carefully analyzed during the examination. We examined the patient records with anamnesis, clinical diagnosis, and procedural information; teeth that were not visible on radiography due to trauma and/or extraction were not considered deficient. Apart from these, if the mineralization of the dental crown could not be determined (except for the third molar), it was considered as congenitally deficient.

STATISTICAL ANALYSIS

The data were analyzed with IBM SPSS V23. The chi-square test was used to analyze the existence of hypodontia and hyperdontia according to gender and distribution of teeth absence by regions. The analysis results were presented as frequency and percentage. A $p < 0.05$ was considered significant.

RESULTS

Out of 7,011 patients, 360 (5.14%) were screened in our faculty and had congenital anomalies of tooth number; 173 patients (48.1%) were females. A total of 729 congenital tooth deficiencies were detected in 333 of them. The prevalence of tooth deficiency was 4.75% among all screened patients, with an incidence of 93.6% in females and 91.4% in males. Although congenital tooth deficiency was observed more frequently in females, there was no statistically significant difference between males and females ($p > 0.05$) (Table 1).

Congenital tooth deficiency was seen most in 12-year-old patients (20.7%) and least in 7-year-old patients (8.8%) (Table 2).

The percentage of deficiency of the left lower second premolar tooth, right lower second premolar tooth, and the right and left upper lateral teeth were 47.4%, 39.9%, and 23.7%, respectively (Figure 1, Figure 2). When the tooth deficiency was classified according to the number of teeth, 1 tooth was deficient in 144 patients (43.2%), 2 teeth were lacking in 125 patients (37.5%), 7 or more teeth were lacking in 12 patients, and both permanent and primary teeth were lacking in 1 patient (Figure 3).

A total of 35 hyperdontia were observed in 28 of the patients; 2 were primary teeth and the rest were

TABLE 1: Prevalence of tooth deficiency and hyperdontia.

		Female	Male	Total	p value
Tooth deficiency	%	93.6	91.4	92.5	0.555
	n	162	171	333	
	Total	173	187	360	
Hyperdontia	%	6.9	8.6	7.8	0.707
	n	12	16	28	
	Total	173	187	360	

TABLE 2: Distribution of congenital tooth deficiency by age.

Age	Frequency	%
7	64	8.8
8	110	15.1
9	116	15.9
10	144	19.8
11	144	19.8
12	145	19.9
14	6	0.8
Total	729	100.0

TABLE 3: Distribution of supernumerary tooth according to dental groups.

Tooth	n	Tooth %	Patient %
21	19	54.29	67.86
11	11	31.43	39.29
12	2	5.71	7.14
32	1	2.86	3.57
51	1	2.86	3.57
52	1	2.86	3.57
	35	100	125

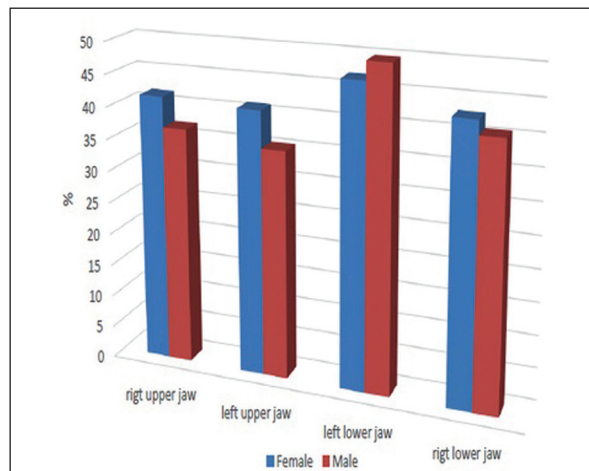


FIGURE 1: Distribution of congenital tooth deficiency according to gender and dental arches.

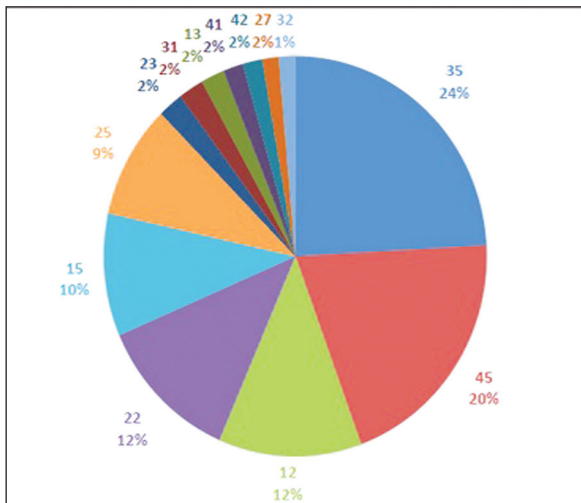


FIGURE 2: Distribution of congenital tooth deficiency in relation to affected tooth types.

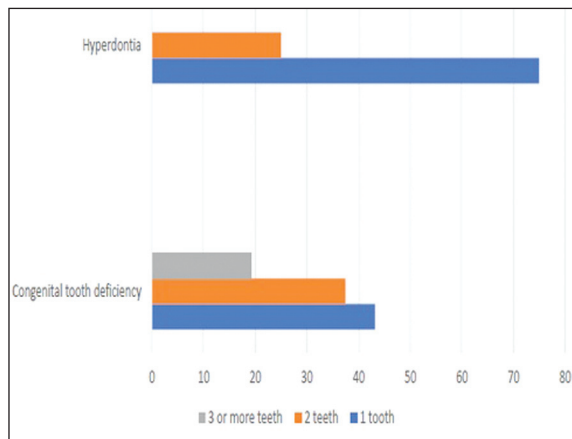


FIGURE 3: Distribution of patients according to severity of congenital tooth deficiency and hyperdontia.

permanent teeth. Although hyperdontia was more common in males (8.6%) than in females (6.9%), there was no statistically significant difference in gender (Table 1). The prevalence of hyperdontia was 0.4% among all screened patients. The prevalence of hyperdontia in the left upper central tooth ranked the first with 67.86% and the right upper central tooth was the second with 39.29% (Table 3). Hyperdontia was seen least in 9-year-old patients (7.1%) and most in 11-year-old patients (28.6%).

Only one patient had a CHH case, in which both hypodontia and hyperdontia were seen. The prevalence of CHH among all screened patients was

0.01%. In the patient with CHH, right upper permanent lateral and right upper lateral primary supernumerary teeth were observed in addition to the deficiency of the right lower second molar.

DISCUSSION

Although we screened a great number of patients, this study had limitations in that 2 experts reviewed the OPG images and scans. However, our study is innovative because we focused on dental number anomalies and gave their prevalence and we provided the most current and noteworthy values for each number anomaly.

Congenital tooth deficiency is a common problem in modern society today. Studies have shown that the prevalence of tooth deficiency in permanent dentition varies between 2.3-11.3%.^{10,11} Many studies have determined the prevalence of congenital tooth deficiency of the permanent dentition in different populations (except for the third molars).¹⁰⁻¹² In the studies of Candan et al. and Ayrancı where they looked at permanent tooth deficiency, the prevalence values were found to be 7.9% and 7.3%, respectively.^{11,12} The prevalence in another study looking at permanent tooth deficiency in children from the Black Sea Region was 8.5%.¹³ Prevalence studies on congenital tooth deficiency done out of country reveal that, the prevalence is 2.8% in the Malaysian population and it increases up to 12.6% in the German population.^{14,15} In our study, the prevalence of permanent deficiency of teeth was 4.75% when the third molar was excluded.

The distribution of tooth deficiency varies in the literature. In most studies, the deficiency of the second mandibular molars is seen in 40-50 % of cases, the lateral maxillary teeth in 25%, and then the premolars. Central mandibular tooth are at the end of the list with 6.5%.^{1,3,4} Muller et al. reported the teeth deficiency ranking as lower second premolars, upper second premolars, and the lower central incisors.¹⁶ In our study, the most common tooth deficiency was the lower second premolars. This result is consistent with many studies.^{11-13,17} The prevalence of upper lateral tooth deficiency ranked the second. As we see, lower second premolars and

upper incisors are the most common tooth deficiencies and account for more than half of the identified tooth deficiency. Second premolar tooth deficiencies are common because they are the last to develop in the segment.¹⁸

Oligodontia is a disability that affects the patient's function and esthetics. These features include a flat-concave profile, pointed jaw, low face height and altered tooth slopes, reduction in bone width and height, inclination of adjacent teeth, and eruption of antagonist teeth.⁶ Oligodontia is a relatively rare condition that affects approximately 0.1-0.2% of the population.⁷ In our study, 12 patients with seven or more teeth absences were identified as oligodontia (1.83%). In a meta-analysis, the prevalence of one to 2 teeth deficiency was reported to be 80.4%.¹⁹ In our study, the ratio of one to 2 teeth deficiencies was approximately 80.7%, similar to this study, ratio of more than 2 teeth deficiency was around 16% and more than 6 teeth deficiency was 3.3%. Our study also showed that the rate of those with more than two teeth deficiencies was too high to be underestimated.

Researchers state that hypodontia differs according to the primary and permanent dentition, tooth type, gender and racial groups.²⁰ While the prevalence of hypodontia in deciduous dentition ranges between 0.05-0.9%, oligodontia is rare with a prevalence of 0.25%. Some authors describe a higher prevalence of hypodontics in females, but other studies show no significant difference between the sexes.²¹ In our study, we observed that only one male patient had 19 permanent tooth deficiencies and ten primary teeth deficiencies. While the prevalence of primary teeth deficiency was 1.4% among all the congenital absence of tooth, the rate of having primary tooth deficiency was 0.3%.

Hyperdontia is an increase in the number of permanent teeth or deciduous teeth in the dental arch. The morphological appearance of supernumerary teeth varies from normal teeth (typical, complementary) to abnormal ones (atypical) form.^{6,7} Although it presented in both tooth structure, which has changed in permanent teeth among the most frequent incidence of 0.2-0.9%. In primary teeth, supernumerary

teeth are most often located in the upper jaw involving the lateral incisor. In permanent teeth, the frequency ranges between 0.1-3.6%, typically involving the second common side upper incisor, the third and fourth premolar teeth.^{7,22} Another study showed that the incidence of supernumerary teeth in primary dentition was 0.52-2%, and 0.1-4% in permanent dentition.^{23,24} In their study, Alberti et al.²⁵ found the frequency of supernumerary teeth as 0.38%, and Vahid-Dastjerdi et al.²⁶ as 0.74% in Iranian orthodontic patients. In Japan, 9,584 high school students were examined for the presence of dental anomalies by performing an oral examination, and supernumerary teeth were detected at a rate of 0.06% in boys and 0.02% in girls.²⁷ In their study evaluating dental anomalies and congenital tooth deficiencies, Yılmaz et al. determined the prevalence of hyperdontia as 0.4% in women and 1% in men.¹⁷ Compared to hypodontia, hyperdontia was found to be lower in all patients included in this study with a rate of 0.4%, which is similar to that in previous studies.^{23-25,28} The prevalence of hyperdontia in primary teeth was 0.26% among all teeth with number anomalies. Atypical hyperdontic teeth, which is usually found in the permanent dentition, most often appear as atypical teeth localized in between or in the central upper incisors-mesiodens. Mesiodens is the most frequent supernumerary tooth, which is usually conical, between two maxillary incisors.⁸ In this study, most supernumerary teeth were in the premaxillary region, then the maxillary lateral incisor. In our study, the prevalence of mesiodens in permanent dentition was 85.72%. Of the two primary teeth with hyperdontia, one was mesiodens. Similar to our study, other studies have also reported that hyperdontia is more common in men, and the maxillary anterior region is the most affected area.⁶ The supernumerary teeth rarely erupt and generally, only one is found in the mouth. While one supernumerary tooth occurs in 76-86% of the cases, two are observed in 12-23%. Multiple numbers of supernumerary teeth occur only in less than 1% of patients.²⁹ In our study, one supernumerary tooth was observed in 75% of the teeth with hyperdontia, and two were observed in 25%. More than two supernumerary teeth were not observed in any patient.

The prevalence of patients with CHH among all screened patients was 0.01%. A study reveals that CHH prevalence varies between 0.002 and 3.1%.³⁰ In a previous study on orthodontic patients, the prevalence of CHH was 0.7%.³¹ CHH is more common in permanent dentition than in primary dentition and mixed dentition.³² In our study, CHH was observed in a mixed dentition patient. In previous studies, CHH was more common in the maxillary arch than in the mandibular arch, in males more than in females, and teeth with hyperdontia are most commonly mesiodens.^{8,30,33,34} In our study, there was a supernumerary in primary and permanent lateral teeth in the maxillary arch. Studies suggest that the most common tooth deficiency was a mandibular second molar tooth.^{30,35} Similar to the literature, we observed the deficiency of the lower second molars.

CONCLUSION

Within the limits of our study, regular and timely referral of children to a dentist will help diagnose tooth number anomalies early. Although the data we obtained only gives information about the dental number anomaly of the children who applied to the Faculty of Dentistry of Recep Tayyip Erdoğan University, the present study will contribute to the literature by increasing data comparing the prevalence of tooth number anomaly in children of Turkey. Particularly, the results will add to the different prevalences of CHH in children in our country. Examining a larger number of patients from

different regions will provide more precise and detailed information to establish a data pool for children in Turkey. The data obtained in the present study meet its purpose in terms of supporting and enriching the literature on this subject for Turkey. Further studies should be done on the etiological factors causing numerical anomalies and treatment of problems arising from numerical anomalies in children of this region.

Acknowledgement

I would like to express my gratitude to Emine Çuvalcı, who contributed to the language editing of my article.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Ayça Kurt; **Design:** Ayça Kurt; **Control/Supervision:** Ayça Kurt; **Data Collection and/or Processing:** Ayça Kurt, Pakize Kara; **Analysis and/or Interpretation:** Ayça Kurt, Pakize Kara; **Literature Review:** Ayça Kurt, Pakize Kara; **Writing the Article:** Ayça Kurt; **Critical Review:** Ayça Kurt.

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