

PREVALENCE AND DISTRIBUTION OF DENTAL ANOMALIES IN A SUBPOPULATION OF THE WEST REGION OF TURKEY

Cahide Aglarci¹, Bilge Gulsum Nur^{2*}, Osman Sami Aglarci³, Ferhan Dikmen¹, Gulsen Ilgen²

1. Department of Orthodontics, Faculty of Dentistry, Sifa University, Izmir, Turkey

2. Department of Pedodontics, Faculty of Dentistry, Sifa University, Izmir, Turkey

3. Department of Oral and Maxilla Facial Radiology, Faculty of Dentistry, Sifa University, Izmir, Turkey

Abstract

The aim of this study was investigate the prevalence and distribution of dental anomalies among 10- to 25-year-old patients by using panoramic radiographs. A total of 3600 patients (2200 male, 1400 female; mean age: 19.2±6.3) panoramic radiographs were evaluated. Dental anomalies were divided into five types: position anomalies, number anomalies, size anomalies, shape anomalies and structure anomalies. All permanent teeth were investigated except third molar teeth. The percentages of these anomalies were evaluated and compared between gender. Developmental dental anomalies prevalence in Turkish population was 6.8%. The prevalence of dental anomalies females were higher than in males (female: 3.9%, male: 2.9%). The most frequently observed anomaly was hypodontia (4.3%) followed by Peg-shaped teeth (0.5%). Amelogenesis imperfecta (0.03%) was the rarest anomaly in the total group. The most common type of dental anomalies were number anomalies. Distribution of dilaceration statistically significantly differed between genders ($p=0.01$), whereas distribution of others did not. The types and the frequency of dental anomalies have varied in populations. For this reason, identification of the types of dental anomalies and their prevalence by age, gender and jaw can help clinicians perform a better diagnosis of dental anomalies especially for esthetic and orthodontic treatment planning.

Clinical article (J Int Dent Med Res 2016; 9: (1), pp. 39-44)

Keywords: Abnormalities, hypodontia, prevalence.

Received date: 07 March 2016

Accept date: 11 March 2016

Introduction

Developmental dental anomalies can be classified into five different anomalies according to tooth position, tooth number, tooth shape, tooth structure and tooth size anomalies.¹ Anomalies in tooth shape, size and structure result from disturbances during the morpho-differentiation phase of tooth development.² Local and systemic factors may be cause for these developmental disturbances and also these factors may be effect to single tooth or

more teeth.^{3, 4} The etiology of these conditions are usually attributed to certain genes and also some etiological events in the prenatal and postnatal periods that may result in anomalies of tooth size, shape, position, number and structure.^{5, 6}

Undiagnosed or untreated dental anomalies not just affect esthetic appearance of teeth but also may lead to problems in maxillary and mandibular arch length and occlusion, which may cause difficulties during orthodontic treatment planning.^{3, 6, 7} Furthermore, many of these dental anomalies may ultimately present complex treatment challenges in the areas of endodontics, prosthodontics and restorative dentistry.⁸⁻¹¹

The prevalence and frequency of dental anomalies can also provide notable information for phylogenic and genetic studies and provide variations within and between populations.¹²

*Corresponding author:

Dr. Bilge Gulsum Nur
Department of Pedodontics,
Faculty of Dentistry, Şifa Üniversitesi,
Ankara Cad. No: 45 35100 Bayraklı /Izmir/ Türkiye

E-mail: dtbilgenur@hotmail.com

In the literature several studies reported the frequencies of dental anomalies in different populations,^{7, 13-15} however, the results of these studies were inconsistent between and within populations. These differences may be related to variations in race, sampling methods, and different diagnostic criteria. Previously published studies evaluated a different types or subtypes of dental anomalies among a limited and particular region of Turkish population. However there is no study about evaluation of tooth number anomalies in a subpopulation of the west region of Turkey yet.

The aim of this retrospective study was to determine the prevalence, distribution and characteristics of developmental dental anomalies in west region of Turkey.

Materials and Methods

This retrospective study was performed through an examination of panoramic radiographs of 7808 patients totally from the database of Izmir Sifa University. Ethical approval was not received for the retrospective study because patients were not exposed to additional radiation and not subjected to additional treatment. Only 3600 panoramic radiographs were selected according to inclusion criteria (2200 male, 1400 female). The mean age was 19.26 ± 6.36 years, ranging from 10 to 25 years.

Inclusion criteria

- Turkish ethnicity,
- Age range from 10 to 25 years old,
- Good quality of orthopantomogram images were included.

Exclusion criteria

- Patients with a history of tooth extraction of any permanent tooth except third molars,
- No history of endodontic treatment or trauma to any tooth,
- Orthodontic treatment,
- Cleft lip and palate patients,
- Image deformity of orthopantomogram were excluded.

All radiographs were obtained by an experienced X-ray technician using an orthopantomography device (Planmeca Proline

CC 2002, Helsinki, Finland); 60–80 kVp, 8–10 mA, 12.8 s exposure time and 1.2 magnification settings. The study included patients who underwent radiological examination from 2012 to 2015.

Panoramic radiographs were evaluated to assess developmental dental anomalies according to 5 subgroups: size anomalies (peg-shaped teeth, macrodontia), shape anomalies (root dilaceration and taurodontia), number anomalies (hypodontia, oligodontia, hyperdontia), position anomalies (transposition, ectopic eruption, inversion) and structure anomalies (amelogenesis imperfecta). All permanent teeth were investigated except third molar teeth. The percentages of these anomalies were evaluated and compared between gender.

Dental anomalies were evaluated by two observers, who have at least 5 years of professional clinical experience, in a darkened room with a radiographic illuminator. During examination, third researcher was consulted when needed. Then for assess reliability, 350 randomly selected radiographs were reexamined 30 days after the initial examination by the same observers, and inter- and intra-observer agreement was determined using the paired t-test.

Statistical analysis

Statistical analyses of data were performed using Statistical Package for Social Sciences program (SPSS, version 21.0, Chicago, IL, USA). Student's t-test was used to compare the chronological ages between male and female patients. The Pearson's Chi-Square and Fisher exact tests were used to determine differences in the distribution of dental number anomalies between genders. It was tested at the 5% level of significance.

Results

Repeated scorings of a subsample of 350 radiographs indicated no significant intra- and inter-observer differences ($p > 0.05$). Intra and inter-observer consistencies were rated at 93% and 91%, respectively.

The study consisted of female (141; 3.8%) and male patients (106; 2.8%) with no statistically significant difference between the females (19.3 ± 6.2 years) and males (19 ± 6.5 years) according to chronological ages. (Table 1)

According to our study, 247 subjects had at least one type of developmental dental anomaly, this means dental anomaly prevalence of the sample was 6.7%. Frequencies of dental anomalies, gender distribution and statistical differences between genders are shown in Table 1.

Dental anomalies	Male	Female	Total	P value	
	n:106 (%2.9)	n:141 (%3.9)	n:247 (%6.8)		
<i>Size anomalies</i>					
Peg-shaped teeth	8	12	20	0.5	0.506
Macrodonia	1	0	1	0.03	-
<i>Shape anomalies</i>					
Taurodontism	2	1	3	0.08	
Root Dilaceration	2	14	16	0.4	0.01*
<i>Number anomalies</i>					
Hypodontia	63	90	153	4.3	0.423
Hyperdontia	15	10	25	0.7	0.52
Oligodontia	4	4	8	0.2	-
<i>Position anomalies</i>					
Transposition	5	3	8	0.2	-
Ectopic eruption	2	0	2	0.05	-
Inversion	1	3	4	0.1	-
<i>Structure anomalies</i>					
Amelogenesis imperfecta	0	1	1	0.03	-

Table 1. Distribution and frequency of developmental dental anomalies in study group of 3600 patients.

According to these results, the most frequently observed anomaly was hypodontia (4.3%) followed by hyperdontia (0.7%), peg-shaped teeth (0.5%), root dilaceration (0.4%). Distribution of root dilaceration statistically significantly differed between genders (p=0.01), whereas distribution of others did not. Peg-shaped teeth, hypodontia and dilaceration were the most frequently among female rather than male, while it was opposite for hyperdontia and transposition.

The distribution of different congenital missing tooth by gender and the percentage is presented in Table 2. The most frequently observed hypodontia was maxillary lateral incisors (1.9%) followed by mandibular premolar (1.4%), whereas only two patients have congenital missing of mandibular canine and maxillary canine has no congenital absence in this sample of the Turkish patients. Furthermore, the distribution of the number of missing teeth by gender and the percentage is shown in Table 3.

Totally, 259 congenitally missing teeth were detected in 153 patients. Out of total 153 patients with missing teeth, 134 patients (88.2%), 81 females and 53 males, had got missing either one tooth (50%) or two teeth (38.2%)(table 3). Oligodontia which means there were at least 5 missing teeth except third molars; was found only 8 patients. The distribution of gender was four both females and males.

	Maxillary lateral incisors		Mandibular lateral incisors		Mandibular canine		Maxillary second premolar		Mandibular second premolar	
	n	%	n	%	n	%	n	%	n	%
Male	61	1.7	5	0.2	1	0.04	23	0.6	60	1.7
Female	46	1.3	6	0.4	1	0.07	13	0.4	44	1.2
Total	106	3	11	0.6	2	0.05	36	1	104	2.9

Table 2. Distribution and location of hypodontia (congenitally missing teeth).

	Male		Female		Total	
	n	%	n	%	n	%
1 tooth	31	21.4	44	28.6	75	50
2 teeth	22	14.1	37	24	59	38.2
3 teeth	5	3.1	5	3.1	10	6.2
4 teeth	5	3.1	4	2.5	9	5.6
Total	63	41.2	90	58.8	153	100

Table 3. Distribution of the number of missing teeth by gender.

In the present study, the second most frequent anomaly was hyperdontia, which was detected in 15 males and 10 females (totally 0.7%) of patients. The percentage of males with hyperdontia was higher than that of females, but not statistically significant between gender (p=0.52) Four patients exhibited multiple supernumerary teeth. The most common supernumerary teeth were the premolars followed by the mesiodens [8 males and 4 females (between the maxillary central incisors)], maxillary incisors (table 1).

The prevalence of patients with peg-shaped teeth of teeth in this study was 0.5% (12 females and 8 males). All of these patients had peg-shaped maxillary lateral incisors, peg-shaped lateral incisors were distributed as unilateral (8 teeth) or bilateral (4 teeth).

Of 3600 patients, two male and 14 female patients teeth had root dilaceration (totally 0.4%). Statistically significant gender differences were found for this anomaly (p=0.01). Totally, 10

transpositions were detected in 8 patients (3 females and 5 males). The most frequently seen transposition was the maxillary lateral incisor-canine, followed by the mandibular canine-first premolar and then the mandibular lateral incisor-canine.

Inversion, taurodontism, ectopic eruption and macrodontia incidences were lower from 0.03 to 0.1% (Table 1). The frequencies of macrodontia and amelogenesis imperfecta were both calculated to be 0.03%, making them the rarest anomalies in the present study and each anomalies observed only one patient in total group.

Discussion

Diagnosis of a patient with dental anomalies is important for dental treatment especially early orthodontic treatment.⁸ If dental anomalies area diagnosed before the occlusion settled, alternative treatment possibilities can be arranged and evaluated to multidisciplinary treatment strategies.¹⁶ Several studies have focused on dental anomalies among Turkish populations and these studies reported different prevalence values compared with former data derived from population.¹⁶⁻¹⁹

However there is no study about evaluation of tooth number anomalies in a subpopulation of the west region of Turkey yet. For these reason we assessed the prevalence of all types and subtypes of developmental dental anomalies in a subpopulation of the west region of Turkey.

Karadas et al¹⁷ investigated the prevalence of dental anomalies in 2722 dental patients ranging in age from 8 to 16 and they found the prevalence of tooth number anomalies were 4.8% (in 132 patients).

Kazanci et al⁸ reported that tooth number anomalies were in 452 of 3165 Turkish patients (14.3%). Additionally Altug-Atac and Erdem²⁰ found that tooth number anomalies were in 166 of 3043 Turkish patients (5.4%). In 247 (6.8%) of 3600 dental patients at least one permanent tooth number anomaly was determined in our study. On the other hand, Shokri et al¹⁵ investigated the prevalence and distribution of dental anomalies in 1649 (range from 7 to 35-year-old) Iran patients and reported that the prevalence of tooth number anomaly was (134; 8.1%) higher than our findings. These conflicting

results can be explained by racial differences, selected age groups, and different sample size.

The frequencies of hypodontia prevalence of 4.3% in dental patients with no statistically significant difference between the genders in this study, this result was consistent with previously reported prevalence rates (3-10%).^{19,21,22} When compared in terms of prevalence of hypodontia our results were higher than the findings of Karataş et al (3.6%)¹⁷, whereas prevalence of hyperdontia (0.9%) was lower than the findings of them.^{8,17} These results can be explained by different sample size and selected age groups or local environmental influences.

The types of congenital missing teeth vary in within and different ethnic groups.^{8,15,17, 20,23-26} Some studies reported that the mandibular second premolars were most commonly missing teeth^{25,26}, while others declared that maxillary lateral incisor was the most prevalence missing tooth.^{8,15,17,24} In the present study, the maxillary lateral incisor is clearly the most frequently missing tooth, followed by the mandibular second premolar.

According to our results, the prevalence of hyperdontia was estimated to be 0.7% (11 females and 15 males), while the results reported by previous studies were inconsistent with our result and varied from 1.3%⁸ to 2.4%¹⁵. On the basis of our results, we concluded that mesiodens, incisors and mandibular premolars were the most common supernumerary teeth, this result confirm to others studies.^{15,22,27}

While the small buccal and lingual curvature cannot be observed on radiographs, radiographic dental images have been introduced as the best way to detect root dilacerations.²¹ In this study root dilacerations anomaly have been found about 0.4% dental patients with statistically significant difference between the genders ($p=0.01$). The prevalence of dilacerations was reported 7.5% by Shokri et al¹⁵, 15% by Ezoddini et al²⁸, 1.4% by Ghabanchi et al²⁹, and 5.6% by Dalili et al.³⁰ This inconsistency might be attributed to the settings of these studies, racial factors as well as the accuracy of the methods and different sample size that were used.

The frequency of peg-shaped teeth which are defined as conical crown-size reduction or the mesiodistal width of an incisor tooth being shorter than the cervical width of the tooth crown 0.5% (12 females and 8 males) was lower than

previous study.⁸ Similarly to the previous studies, our study found, macrodontia and amelogenesis imperfecta were the rarest anomalies of the teeth and each anomalies observed only one patient in total group.^{8, 20}

In the present study, the prevalence of transposition was 0.2% and the most frequently seen transposition to be the maxillary canine-lateral incisor, this result was similar to findings of previous studies which were varied from 0.2% to 0.3%.^{8,31,32}

In this study, the anomalies of fusion, gemination, dentin dysplasia, dens invagination and dentinogenesis imperfecta were not detected because of the scarce of these anomalies. If the sample size were sufficiently larger, these dental anomalies might have been detected.

Despite limited of this study had a number of strengths, all types of dental anomalies might be detected by panoramic radiographs. The prevalence and types of anomalies vary within populations, thus knowledge about the types of anomalies particularly important. Since dental anomalies can complicate dental treatment, it should be investigated a better diagnosis at early stages.

Conclusion

In conclusion, number anomalies were the most common types of dental anomalies and structural anomalies were the least in the Turkish subpopulation in our study. A better diagnosis with radiographic screening of dental anomalies fairly significant at early stages in order to planning timely treatment.

Acknowledgements

The authors deny any conflicts of interest related to this study.

References

1. Campoy MD, Gonzalez-Allo A, Moreira J, Ustrell J, Pinho T. Dental anomalies in a Portuguese population. *Int Orthod*. 2013; 2(11): 210-20.
2. Kathariya MD, Nikam AP, Chopra K, Patil NN, Raheja H, Kathariya R. Prevalence of Dental Anomalies among School Going Children in India. *J Int Oral Health*. 2013; 5(5): 10-14.
3. Guttal KS, Naikmasur VG, Bhargava P, Bathi RJ. Frequency of Developmental Dental Anomalies in the Indian Population. *Eur J Dent*. 2010; (4): 263-69.
4. Winter G, Brook A. Enamel hypoplasia and anomalies of the enamel. *Dent Clin North Am*. 1975; 1(19): 3-24.
5. Kotsomitis N, Dunne MP, Freer TJ. A genetic aetiology for some common dental anomalies: a pilot twin study. *Aust Orthod J*. 1996; 3(14): 172-8.
6. Afify AR, Zawawi KH. The prevalence of dental anomalies in the Western region of Saudi Arabia. *ISRN Dent*. 2012; 2012: 837270.
7. Thongudomporn U, Freer TJ. Prevalence of dental anomalies in orthodontic patients. *Aust Dent J*. 1998; 6(43): 395-8.
8. Kazanci F, Celik M, Miloglu O, Ceylan I, Kamak H. Frequency and distribution of developmental anomalies in the permanent teeth of a Turkish orthodontic patient population. *J Dent Sci*. 2011; 6: 82-89.
9. Tsesis I, Steinbock N, Rosenberg E, Kaufman A. Endodontic treatment of developmental anomalies in posterior teeth: treatment of geminated/fused teeth—report of two cases. *Int Endod J*. 2003; 5(36): 372-79.
10. Imirzalioglu P, Uckan S, Haydar SG. Surgical and prosthodontic treatment alternatives for children and adolescents with ectodermal dysplasia: a clinical report. *J Prosthet Dent*. 2002; 6(88): 569-72.
11. Abatini C, Guzmán-armstrong S. A conservative treatment for amelogenesis imperfecta with direct resin composite restorations: a case report. *J Esthet Restor Dent*. 2009; 3(21): 161-69.
12. Jukić J, Škrinjarčić I, Glavina D, Ulovec Z. The prevalence of oral and dental anomalies in children with developmental disturbances. *Acta Stomatol Croat*. 2002; 1(36): 79-83.
13. 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; 2(6): 87-94.
14. al-Emran S. Prevalence of hypodontia and developmental malformation of permanent teeth in Saudi Arabian schoolchildren. *Br J Orthod*. 1990; 2(17): 115-8.
15. Shokri A, Poorolajal J, Khajeh S, Faramarzi F, Kahnnamoui HM. Prevalence of dental anomalies among 7-to 35-year-old people in Hamadan, Iran in 2012-2013 as observed using panoramic radiographs. *ISD*. 2014; 1(44): 7-13.
16. Uzuner D, Celik MM, Toy E, Turkdonmez CO. Assessment of hypodontia in the Turkish patients referring to the orthodontic clinic: A retrospective study. *Eur J Dent*. 2013; Suppl 1(7): 9-14.
17. Karadas M, Celikoglu M, Akdag MS. Evaluation of tooth number anomalies in a subpopulation of the North-East of Turkey. *Eur J Dent*. 2014; 3(8): 337-41.
18. Celikoglu M, Miloglu O, Oztek A. Investigation of tooth transposition in a non-syndromic Turkish Anatolian population: characteristic features and associated dental anomalies. *Med Oral Patol Oral Cir Bucal*. 2010; 5(15): 716-20.
19. Cantekin K, Dane A, Miloglu O, Kazanci F, Bayrakdar S, Celikoglu M. Prevalence and intra-oral distribution of agenesis of permanent teeth among Eastern Turkish children. *Eur J Paediatr Dent*. 2012; 1(13): 53-6.
20. Altug-Atac AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. *Am J Orthod Dentofacial Orthop*. 2007; 4(131): 510-4.
21. White SC, Pharoah MJ. *Oral radiology: principles and interpretation*. 6th ed. St. Louis: Mosby Elsevier; 2009.
22. Gupta SK, Saxena P, Jain S, Jain D. Prevalence and distribution of selected developmental dental anomalies in an Indian population. *J Oral Sci*. 2011; 2(53): 231-38.
23. Celikoglu M, Kazanci F, Miloglu O, Oztek O, Kamak H, Ceylan I. Frequency and characteristics of tooth agenesis among an orthodontic patient population. *Med Oral Patol Oral Cir Bucal*. 2010; 5(15): 797-801.
24. Hedayati Z, Dashlibrun YN. The prevalence and distribution pattern of hypodontia among orthodontic patients in Southern Iran. *Eur J Dent*. 2013; 1(7): 78.
25. Kim YH. Investigation of hypodontia as clinically related dental anomaly: prevalence and characteristics. *ISRN dentistry*. 2010; 2011.

26. Nordgarden H, Jensen JL, Storhaug K. Reported prevalence of congenitally missing teeth in two Norwegian counties. *Community dental health*. 2002; 4(19): 258-61.
27. Fardi A, Kondylidou-Sidira A, Bachour Z, Parisi N, Tsirlis A. Incidence of impacted and supernumerary teeth-a radiographic study in a North Greek population. *Med Oral Patol Oral Cir Bucal*. 2011; 1(16): 56-61.
28. Ardakani FE, Sheikhha M, Ahmadi H. Prevalence of dental developmental anomalies: a radiographic study. *Community dental health*. 2007; 3(24): 140.
29. Ghabanchi J, Haghnegahdar A, Khodadazadeh S, Haghnegahdar S. A radiographic and clinical survey of dental anomalies in patients referring to Shiraz dental school. *Journal of Dentistry, J Den Shiraz Univ Med Sci*. 2010; 10: 26-31.
30. Nemati S, Dalili Z, Dolatabadi N, Javadzadeh A, Mohtavipour S. Prevalence of developmental and acquired dental anomalies on digital panoramic radiography in patients attending the dental faculty of Rasht, Iran. 2013:24-32
31. Aydin U, Yilmaz H, Yildirim D. Incidence of canine impaction and transmigration in a patient population. *Dentomaxillofac Radiol*. 2014.
32. Aras MH, Büyükkurt MC, Yolcu Ü, Ertaş Ü, Dayi E. Transmigrant maxillary canines. *Oral Surg Oral Med Oral Pathol Oral Radio End*. 2008; 3(105): 48-52.