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The Prevalence of Dental Anomalies among 12-18- Year- Old Patients Referred to the Orthodontics Department of Kerman Dental School

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Abstract

Background: Dental anomalies can lead to aesthetic and functional problems. This study was carried out to assess the prevalence of dental anomalies among the 12-18-year- old orthodontic patients who were referred to the orthodontics department of Kerman dental school, Iran, in a 5- year period.

Methods: This study was a retrospective research, performed on 299 records of patients referred to the orthodontic department. Patients' records from 2017-2021 were evaluated for the presence of hypotonia, microdontia, transposition, hyperdontia, macrodontia, impacted teeth except wisdom teeth and type of occlusion as well as the demographic characteristics (age, gender). The data were entered into a checklist and analyzed in SPSS statistical software using Chi-square and Fisher's exact tests at a significant level of 0.05.

Results: Out of 299 patients, 87 (29.1%) were male and 212 (70.9%) female. The mean age was 16.33 ± 2.90 years. One hundred and eighteen patients (39.5%) had class 1 occlusion. Fifty-two cases (17.39%) had dental anomalies. Hypodontia with 8% and impacted teeth with 7.7% were the two most common anomalies. The most common teeth with hypodontia was maxillary lateral incisor and the most common impacted teeth was maxillary canine. The highest number of anomalies was observed in class 1 occlusion. There was no statistically significant relationship between the type of occlusion and the type of dental anomaly, gender and age ($p>0.05$). The prevalence of dental anomalies in the maxilla was significantly higher than mandible.

Conclusion: The results of this study showed that the prevalence of dental anomalies was (17.39%). It is recommended to pay attention to the existence of dental anomalies in order to reduce aesthetic and functional problems.

Key Words: Dental anomalies, Hypodontia, Malocclusion, Orthodontics, Prevalence, Tooth abnormalities, Tooth agenesis.

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1- INTRODUCTION

Dental anomalies cause aesthetic and functional problems in the jaws (1).Genetic factors are responsible for dental anomalies in the jaws (2, 3). Disturbances during dental development can cause variations in the number (lack or increase), size, shape and location of tooth buds in both permanent teeth and deciduous teeth (4). Tooth agenesis (TA) is one of the most common dental anomalies that affects the number of teeth. TA may be observed in a syndromic form that is accompanied by the involvement of other organs or tissues, or a non-syndromic form that only affects the system (5). TA may be associated with other dental anomalies such as microdontia, delayed eruption and malocclusion of teeth (6). Recent research has shown that both genetic and environmental factors play a role in the etiology of hypodontia (7). Patients with hypodontia may suffer from improper articulation, infra-occlusion, reduced chewing power, and beauty problems that can affect their self-confidence and professional performance (8-10). TA is divided based on the number of missing teeth. Hypodontia is a term used to describe 1 to 5 missing teeth, oligodontia refers to the absence of 6 or more teeth, and the absence of all teeth is called anodontia (7). Genetic studies have shown that mutations in MSX1, PAX9 and AXlN2 genes have been seen in relatives with TA (11). Some studies have shown the relationship between hypodontia and other dental anomalies, including lateral peg-shaped, canine-lateral transposition, and taurodontism (12-14). Several factors may affect the normal development of tissues and lead to changes and defects in the shape and size of teeth. These anomalies can be congenital, developmental or acquired (15). Patients with hypodontia tend to show the smaller lower anterior part of the face and protruding lips. The typical appearance of patients with hypodontia is short height of the face with the large freeway space (7). It has been shown that severe hypodontia is associated with class 3 malocclusion (16, 17). Hirukawa et al. reported that maxillary hypodontia is more associated with class 3 occlusion and mandibular hypodontia is more associated with class 2 malocclusion (18). Most of the studies conducted on dental anomalies are limited to the prevalence of hypodontia in different populations and with different methods. Due to the lack of studies, the aim of the present study was to evaluate the prevalence of all dental anomalies and its relationship with the occlusion status in 12-18 years old patients who had referred to orthodontics department of Kerman dental school in a 5- year period using radiography, dental casts, and photography.

1-1. Definition of terms

Hypodontia: congenital missing of one or more than one tooth.

Hyperdontia: The presence of one or more teeth in addition to the normal number of teeth.

Transposition: Displacement of two adjacent teeth in a quadrant of the dental arch.

Impaction: absence of tooth eruption that has a physical barrier or an abnormal position of tooth eruption. It can be seen clinically or radiographically.

Microdontia: Tooth with dimensions smaller than normal teeth.

Macrodontia: Tooth with dimensions larger than normal teeth (19).

2- MATERIALS AND METHODS

This research was a retrospective study. The statistical population included the 12-18-year- old patients who had referred to the orthodontic department of the Kerman dental school during 2017 -

2021. Data was collected through a check list including demographic information (age, sex), type of occlusion (class 1, 2, 3), and type of anomaly (including hypodontia, hyperdontia, impacted teeth, microdontia, macrodontia, and dental transposition). Information was obtained from the patients' files, which included panoramic radiographs, photographs, and dental casts. The inclusion criteria included the patients in the age range of 12-18 years, having a panoramic radiograph, study dental cast, photograph of the mouth, and diagnosis of the type of occlusion. Incomplete files, patients with cleft palate and lip, and patients with diseases that could cause dental anomalies were excluded from the study. Impacted third molar teeth were excluded from the numbers of missing teeth. Data collection was done by a final year dental student who was trained and had sufficient skills. SPSS version 26 statistical software and T, Chi-square and ANOVA statistical tests were used for data analysis. The significance level was considered at <= 0.05.

3- RESULTS

In the present study 299 eligible records were reviewed .Two hundred and 12 (70.9%) of cases were girls. The mean age of patients was 16.33±2.90 years. The most prevalent type of occlusion was class 1(39.5%) and the least prevalent type was class 3 (21.4%) (**Table 1**).

Table-1: Frequency distribution of the patients based on gender and occlusion

Variable		Number	percent
Gender	Male	87	29.1
	Female	212	70.9
Type of occlusion	Class 1	118	39.5
	Class 2	117	39.1
	Class 3	64	21.4

Dental anomaly was seen in 52 cases (17.4%); and 24 cases (8.0%) had hypodontia. The most frequent tooth with congenital missing was maxillary lateral incisor (14 cases) followed by mandibular second premolar (5 cases) and mandibular first premolar (4 cases), respectively.

Tooth impaction was observed in 23(7.7%) of cases. The most frequently impacted tooth was maxillary canine with 16 (5.4%) of cases, followed by mandibular second premolar (5 cases) and mandibular canine (2 cases), respectively.

There were 3 cases of microdontia, an ll in the maxillary lateral. Dental transposition was seen in 2(0.7%) cases. There was 1 case of dental transposition in maxilla and 1 case in mandible. In the present study, no cases of macrodontia and hyperdontia were observed (**Table 2**).

It was revealed that 33 (66.46%) of dental anomalies were in the maxilla and 19 (36.54%) were in the mandible. There were significant differences between jaw and dental anomalies, while there was no significant difference between genders in regard to dental anomalies.

Cases with class 3 occlusion had the most frequent (14.1%) hypodontia. There was not significant correlation between type of occlusion and hypodontia (P=0.076).

The most frequent impacted teeth (11.9%) were in cases with class 1 occlusion. There was no significant correlation between type of occlusion and impacted teeth (p=0.179).

Furthermore, there was no significant correlation between dental anomalies and type of occlusion (p=0.163) (**Table 3**).

Table-2: Frequency distribution of dental anomalies based on gender and location

Variable			Number	Percent	P value
hypodontia	Gender	Male	8	9.2	0.634
		Female	16	7.5	
	Jaw	maxilla	14	58.4	0.051
		Mandible	10	41.6	
Impacted tooth	Gender	Male	9	10.3	0.270
		Female	14	6.6	
	Jaw	maxilla	16	69.6	0.261
		Mandible	7	30.4	
Microdontia	Gender	Male	1	1.1	0.100
		Female	2	0.9	
	Jaw	maxilla	3	100	0.023
		Mandible	0	0	
Dental transposition	Gender	Male	1	1.1	0.498
		Female	1	0.5	
	Jaw	maxilla	1	50.0	0.321
		Mandible	1	50.0	
Dental anomalies	Gender	Male	19	21.8	0.521
		Female	33	78.2	
	Jaw	Maxilla	33	63.4	0.035
		Mandible	19	36.6	

Table-3: correlation between dental anomaly and occlusion

Dental anomaly		Yes		no		P value
		Number	Percent	Number	Percent	
hypodontia	Occlusion class 1	9	7.6	109	92.4	0.076
	Occlusion class 2	6	5.1	111	94.9	
	Occlusion class 3	9	14.1	55	85.9	
Impacted teeth	Occlusion class 1	14	11.9	105	88.1	0.179
	Occlusion class 2	6	5.1	111	94.9	
	Occlusion class 3	3	4.7	61	95.3	
Total of dental anomalies	Occlusion class 1	27	22.9	91	77.1	0.163
	Occlusion class 2	14	11.9	103	88.1	
	Occlusion class 3	11	17.2	53	82.8	

4- DISCUSSION

In the present study, 52(17.39%) cases suffered from dental anomalies; however, Roslan et al. (20), reported a prevalence of 28.4% for dental anomalies, which is more than that of our study. This difference can be attributed to the methodology and population of the studies.

In the present study no significant correlation was found between dental anomaly and type of occlusion, although

cases with class 1 occlusion had the greatest number of dental anomalies. This finding is compatible with other studies such as those by Uslu et al. (21) Hedayati et al. (22) Karimi Afshar et al. (23) showing no correlation between hypodontia and type of occlusion. Similarly, Bauer et al. (24) found no significant correlation between congenital missing teeth and craniofacial growth.

However, these findings are not in line with those of Boric et al. (25), indicating that the cases with severe hypodontia had class 3 occlusion. This inconsistency may be due to the low number of congenital missing in our study.

In the present study, the prevalence of hypodontia was 8%. Prevalence of hypodontia in orthodontic patients in Sudan was reported to be 5.1% (26); in Italian 9-16 years children, it was 9% (27), and among Orthodontic patients in Southern Croatia 7.8% (28). In a study by Sella Tunis et al. (29), the congenital missing teeth were 9.3%; and another study reported a prevalence of 7.8% among Qatari male patients and 6.9% among females (30). In the studies by Karimi Afshar et al. (23) and Roslan et al. (20), the prevalence of hypodontia was reported to be 5.4% and 7.03%, respectively. Thus, the prevalence of hypodontia in the present study is almost similar to those reported in other studies.

In the present study, in agreement with other studies (31-33), the most common dental anomaly was hypodontia. And also, similar to the findings of various studies (12, 22, 29, 30, 34, 35), in our results maxillary lateral was the most common congenitally missing tooth. Some studies have, however, demonstrated that the most common congenital missing tooth was mandibular second premolars (23, 27, 36).

Certain regions have been shown to be more susceptible to epigenetic influences during tooth development, such as the lateral maxilla, which develops at the embryonic junction between the lateral maxillary and medial nasal processes. In the mandible, agenesis of permanent teeth occurs mostly in the region of the second premolar, which is associated with the distal end of the deciduous dental lamina (26).

In the present study, no statistically significant difference was found between the two genders in terms of the prevalence of hypodontia. The results are consistent with similar studies (12, 22, 36-38) that did not report a difference between genders in this respect.

In this study, the impacted teeth, after hypodontia, was the most common anomaly with 7.7% which is not consistent with the findings of Roslan et al. (20), who reported impacted teeth as the most common dental anomaly, observed in 14.32% of the population. The prevalence of impacted teeth was reported by Sella Tunis et al. (29) to be 14.9%, and by Uslu et al. (21) and Gupta et al. (39) to be 2.9% and 3.74%, respectively.

This inconsistency may be due to the difference in the study population or the study method, since the present study was conducted on 12-18-year-old orthodontic patients using radiography.

In the present study, the prevalence of maxillary canine impaction was 3.34% and mandibular canine had a prevalence of 2.0%. These results are similar to those of Celikoglu et al. (40) which showed that maxillary impacted canine in orthodontic patients was 4.9%, but its prevalence was higher than the mandibular canine; and also the study by Sella Tunis et al. (29) revealed that the prevalence of maxillary impacted canine was higher.

In the current study, the prevalence of microdontia was 1% (3 cases). In the study by Roslan et al. (20), microdontia was found in 4 cases (1.08%), and in the study by Sella Tunis et al. (29), peg-shaped

lateral (a form of microdontia) were found in 1.9% of the cases, which are all congruent with the findings of the current study. The prevalence of microdontia has been, previously, reported to be between 0.7% and 12.3% in orthodontic patients (21, 33, 41). In the current research, 2 cases (0.7%) of transposition were observed. And in the study by Tunis et al. (29), consistent with the current study, 0.6% transposition was reported.

In the present study, no statistically significant difference was observed between the age of the subjects and the prevalence of each of the anomalies. The results are consistent with those of Tunis et al. (29).

4-1. Limitations

Since this research was conducted on 12-18-year-old patients referred to the orthodontic department of Kerman dental school, the results of the study cannot be generalized to the entire population.

5- CONCLUSION

The results of the present study showed that the prevalence of dental anomaly was 17.9%. The most frequent anomaly was hypodontia (8.0%) followed by impacted tooth (7.7%).

The most common hypodontia was maxillary lateral, and the most common impacted tooth was maxillary canine .The prevalence of dental anomalies in the maxilla was significantly higher than in mandible. There was no statistically significant relationship between the type of occlusion, gender, age and dental anomaly.

6- ETHICAL CONSIDERATIONS

This study has been registered with the ethics code IR.KMU.REC.1400.417 in the Medical Ethics Committee of Kerman Medical University. Confidentiality of information was maintained in reviewing patients' files.

7- CONFLICT OF INTEREST

None.

8- REFERENCE

1. Fekonja, A. Prevalence of dental developmental anomalies of permanent teeth in children and their influence on esthetics. J. Esthet. Restor. Dent. 2017, 29, 276–283.

2. Vastardis H, Karimbux N, Guthua SW, Seidman J, Seidman CE. A human MSX1 homeodomain missense mutation causes selective tooth agenesis. Nat Genet. 1996; 13: 417–421.

3. Vitria EE, Tofani I, Kusdhany L, Bachtiar EW. Genotyping analysis of the Pax9 Gene in patients with maxillary canine impaction. F1000Res. 2019; 8: 254.

4. Ezzaldeen A, Watted N, Mai A, Borbély P, Abu-Hussein M. Tooth agenesis; Aetiological factors. J Dent Med Sci. 2017; 16: 75–85.

5. Yu M, Wong SW, HanD, Cai T. Genetic analysis: Wnt and other pathways in non-syndromic tooth agenesis. Oral Dis. 2019 April; 25(3): 646–651. doi:10.1111/odi.12931.

6. Santos DJS, Miguel JAM. Association between hypodontia of permanent maxillary lateral incisors and other dental anomalies. Dental Press J Orthod. 2020 Nov-Dec; 25(6):69-78, DOI: https:// doi.org/10.1590/2177-6709.25.6.069-078.bbo.

7. Al-Ani AZ, Antoun JS, Thomson WM,Merriman TR, Farella M. Hypodontia: An Update on Its Etiology, Classification, and Clinical Management. BioMed Research International Volume 2017, Article ID 9378325, 9 pages http://dx.doi.org/10.1155/2017/9378325.

8. Behr M, Proff P, Leitzmann M, Pretzel M, Handel G, Schmalz G, Schmalz G, Driemel O, Reichert TE, Koller M. Survey of congenitally missing teeth in

orthodontic patients in Eastern Bavaria. Eur J Orthod. 2011 Feb; 33(1):32-6.

9. Hvaring CL, Ogaard B, Stenvik A, Birkeland K. The prognosis of retained primary molars without successors: infraocclusion, root resorption and restorations in 111 patients. Eur J Orthod. 2014 Feb; 36(1):26-30.

10. Aktan AM, Kara I, Sener I, Bereket C, Celik S, Kirtay M, Ciftçi ME, Arici N. An evaluation of factors associated with persistent primary teeth. Eur J Orthod. 2012 Apr; 34(2):208-12.

11. Olsen TM, Kokich Sr VG. Post Orthodontic root approximation after opening space for maxillary lateral incisor implants. Am J Orthod Dentofacial Orthop. 2010 Feb; 137(2):158.e1; discussion 158-9.

12. Gomes RR, Da Fonseca JA, Paula LM, Faber J, Acevedo AC. Prevalence of hypodontia in orthodontic patients in Brasilia, Brazil. EurJ Orthod. 2010 Jun; 32(3):302-6.

13. Shapira Y, Kuftinec MM. Maxillary tooth transpositions: characteristic features and accompanying dental anomalies. Am J Orthod Dentofacial Orthop. 2001 Feb; 1; 119(2):127-34.

14. Peck S, Peck L, Kataja M. Mandibular lateral incisor-canine transposition, concomitant dental anomalies, and genetic control. Angle Orthod. 1998 Oct; 68(5):455-66.

15. Masood F, Benavides E. Alterations in tooth structure and associated systemic conditions. Radiol Clin North Am. 2018 Jan; 56(1):125-40.

16. Chung LK, Hobson RS, Nunn JH, Gordon PH, Carter NE. An analysis of the skeletal relationships in a group of young people with hypodontia. J Orthod. 2000 Dec; 27(4):315-8.

17. Acharya PN, Jones SP, Moles D, Gill D, Hunt NP. A cephalometric study to investigate the skeletal relationships in patients with increasing severity of hypodontia. Angle Orthod. 2010 Jul; 80(4):511-8.

18. Hirukawa K, Iwata R, Kurosawa M, Kondo T, Goto S. Statistical investigation about the prevalence of congenitally missing permanent teeth. Orthod Waves. 1999; 58:49–56.

19. Neville BW, Damm DD, Allen CM, Bouquot JE, Oral and maxillofacial pathology.3th ed, Philadelphia: W.B Saunders Co.; 2016.

20. Roslan AA, Rahman NA, Alam MK. Dental anomalies and their treatment modalities/planning in orthodontic patients. J Orthodont Sci 2018; 7:16.

21. Uslu O, Akcam MO, Evirgen S, Cebeci I. Prevalence of dental anomalies in various malocclusions. American Journal of Orthodontics and Dentofacial Orthopedics. 2009; 135(3):328-35. DOI:10.1016/j.ajodo.2007.03.030.

22. Hedayati Z, Nazari Dashlibrun Y. The prevalence and distribution pattern of hypodontia among orthodontic patients in Southern Iran. European Journal of Dentistry. 2013; 7(5):78-82.

23. Karimi Afshar M, Karbasi N, Torabi M, Haghani J, Karimi Afshar M. Hypodontia Prevalence in Permanent Dentition in Orthodontics Patients. Anatomical Sciences. 2017; 14(2):73-78.

24. Bauer N, Heckmann K, Sand A, Lisson JA. Craniofacial growth patterns in patients with congenitally missing permanent teeth. Journal of Orofacial Orthopedics. 2009; 70(2):139-51.

25. Borić DN, Radalj Miličić ZR, Bubica AK, Meštrović S. Prevalence and Pattern of Hypodontia among Croatian Orthodontic Patients. Acta stomatol Croat. 2020; 54(2):155-160. DOI: 10.15644 /asc54/2/5.

26. Hassan DA, Abu Affan AH, Hashim HA. Prevalence of hypodontia in a sample of Sudanese orthodontic patients. J Orthod Sci. 2014 Jul; 3(3):63-7. doi: 10.4103/2278-0203.137683.

27. Graco ALT, Zanatta S, Valvecchi FF, Bignotti D, Perri A, Baciliero F. Prevalence of dental agenesis in a sample of Italian orthodontic patients: an epidemiological study Progress in Orthodontics 2017; 18:33 DOI 10.1186/s40510-017-0186-9.

28. Badrov J, Gašpar G, Tadin A, Galić T, Govorko DK, Gavić L, Badrov R, Galić I.

Prevalence and Characteristics of Congenitally Missing Permanent Teeth among Orthodontic Patients in Southern Croatia .Acta stomatol Croat. 2017; 51(4):290-299. DOI: 10.15644/asc51/4/3.

29. Sella Tunis T, Sarne O,Hershkovitz I, Finkelstein T, Pavlidi AM, Shapira Y, Davidovitch M, Shpack N. Dental Anomalies' Characteristics. Diagnostics 2021; 11: 1161. https//: doi.org/10.3390/ diagnostics11071161.

30. Hashim HA, Al-Said S. The prevalence and distribution of hypodontia in a sample of Qatari patients. J Orthod Sci. 2016 Jan-Mar; 5(1):1-6. doi: 10.4103/2278-0203.176651.

31. Aren G, Güven Y, Tolgay CG, Ozcan İ, Bayar ÖF, Kose TE, Koyuncuoglu G, Ak G. The prevalence of dental anomalies in a Turkish population. J Istanbul Univ Fac Dent 2015; 49:23 8.

32. Khan SQ, Ashraf B, Khan NQ. Prevalence of dental anomalies among orthodontic patients. Pak Oral Dent J 2015; 35:224 7.

33. Altug Atac AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. Am J Orthod Dentofacial Orthop 2007; 131:510 4.

34. Amini F, Rakhshan V, Babaei P. Prevalence and pattern of hypodontia in the permanent dentition of 3374 Iranian orthodontic patients. Dental Research Journal (Isfahan). 2012; May; 9(3):245-50.

35. Reshitaj A, Krasniqi D, Reshitaj K, Milosevic SA. Hypodontia, Gender-Based Differences and its Correlation with other Dental Clinical Features in Kosovar Adolescents Acta stomatol Croat. 2019; 53(3):347-353. DOI: 10.15644/asc53/4/5.

36. Sola RA, Sola PA, De La Cruz Pérez J, Sánchez IN, Renovales ID. Prevalence of Hypodontia in a Sample of Spanish Dental Patients. Acta stomatol Croat. 2018; 52(1):18-23.DOI: 10.15644/ asc52/1/3.

37. 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 Sep; 7(Suppl 1): S9–S14.doi: 10.4103/1305-7456.119057.

38. Vahid-Dastgerdi E, Borzabadi-Farahani A, Mahdian M, Amini N. Non–syndromic hypodontia in Iranian orthodontic population .Journal of Oral Science. 2010; 52(3):455- 61. DOI:10.2334/josnusd.52.455.

39. Gupta SK, Saxena P, Jain S, Jain D. Prevalence and distribution of selected developmental dental anomalies in an Indian population. J Oral Sci 2011; 53:231 8.

40. Celikoglu, M.; Kamak, H.; Oktay, H. Investigation of transmigrated and impacted maxillary and mandibular canine teeth in an orthodontic patient population. J. Oral Maxillofac. Surg. 2010; 68: 1001–1006.

41. Al Jabaa AH, Aldrees AM. Prevalence of Dental Anomalies in Saudi Orthodontic Patients. J Contemp Dent Pract 2013; 14:724 30.