Prevalence of Developmental Dental Anomalies in Patients Attending Guilan Dental School

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Abstract

Introduction:
The number, size, shape, and structure of teeth in humans show very wide variation among different populations and sometimes within the same population. The aim of the present study was to determine the prevalence of developmental dental anomalies among patients attending the faculty of dentistry in Rasht, Iran over a period of seven months.

Materials and methods:
This cross-sectional study was carried out on 154 dental patients (aged 10 to 30 years) attending dental school in the city of Rasht during 2015–2016. Patients were examined clinically and radiographically for the presence of dental anomalies. The prevalence of four types and 24 subtypes of dental anomalies were evaluated in this study. Descriptive statistics was performed using SPSS 21, and the value of significance was obtained using the Chi-square test. The significance level was set to a p-value of 0.05.

Results:
The prevalence of dental anomalies was 71.4%, and the prevalence of Carabelli Cusp was 40.3%. The most common anomaly was Talon Cusp (31.8%) followed by Enamel defects (28.5%), Root Dilaceration (26.6%), Dens Invaginatus (16.2%), Hypodontia(8.4%), Microdontia (7.8%), Taurodontism (3.24%), and Hyperdontia (3.2%).

Conclusion:
Anomalies of tooth shape were the most common type of dental anomalies, and size anomalies were the least. Because these anomalies may cause various dental problems, it seems essential to diagnose these anomalies to prevent future problems.

Key words:
•*Tooth Abnormalities* •*Radiography, Panoramic* • *Prevalence*

Introduction

Abnormalities in tooth shape, size, and structure result from disturbances during the morpho differentiation stage of tooth development.[1] Dental disorders may be isolated or associated with different types of syndromes.[2] Dental anomalies are less

prevalent but treated within a more complicated course of treatment compared to other common dental disorders, such as dental caries and periodontal diseases, because they may result in aesthetic problems, malocclusion, and other oral diseases.[1] Aberrations in the normal number of teeth include supernumerary teeth (hyperdontia), hypodontia, anodontia, while oligodontia is a developmental absence of six or more teeth excluding the third molars.

Anomalies of size of teeth include microdontia and macrodontia. Anomalies of shape include talon cusp, dens invaginatus, dens evaginatus, gemination, fusion, root dilacerations, ectopic enamel, taurodontism, and concrescence. Anomalies of the structure of teeth include Enamel hypoplasia, Enamel Opacity, Amelogenesis Imperfecta, Dentinogenesis Imperfecta, and Dentin dysplasia.[2]

Various studies have reported different percentages of the varieties of dental anomaly in different populations. The difference in study results is attributed to the difference in races, sampling techniques, and diagnostic criteria used in studies.[3,4] The common point of the studies is the inevitable frequency of developmental dental anomaly in each population.[4]

The early diagnosis of dental anomalies is very important, as they can cause many abnormalities that can be prevented by an early diagnosis. Furthermore, the prevalence and incidence rate of these anomalies can provide valuable information for genetic studies and help with understanding the differences within or between populations.[5] These anomalies not only affect the esthetic appearance of teeth but also pose difficulties during dental treatment.

This study was conducted to examine the frequency of developmental dental anomalies in patients attending Dental School in Rasht, Guilan Province, Iran.

Materials and Methods

The subjects of this cross-sectional study were patients who attended the pediatric and oral medicine department of the Guilan faculty of Dentistry during 2015–2016. A total of 154 patients aged 10–30 years old, comprised of 96 female and 58 male, were included. A trained examiner clinically examined all the subjects.

Each patient was examined on a dental unit using a dental mirror and explorer. The panoramic views of these patients were carefully analyzed. The patients' demographics and history of diseases were recorded. Patients with a history of tooth extraction, a history of special medical conditions or syndromes, such as Down syndrome, ectodermal dysplasia, and cleft lip and palate;Patients with a history of traumas to joints and teeth were excluded.[6,7] The varieties of developmental anomalies examined in this study included disorders in size, number, shape, and structure. The ethical approval number of this research was IR.GUMS.REC.1394.412 (registered by Guilan University of Medical Sciences). The statistical analysis was performed using the SPSS 21. The Spearman's correlation coefficient and Chi-square test were used to determine the correlation between studied variables and dental development in the patients ($p < 0.05$).

Results

Of the 154 patients, 58 patients (37.7%) were male and 96 patients (62.3%) were female. Dental anomalies were observed in 110 patients (71.4%) of whom 42 patients (38%) and 68 patients (62%) were male and female, respectively. Frequency of types and subtypes of dental abnormalities among the study population are shown in Table 1. The most prevalent anomaly was talon cusp (31.8%) seen respectively in the maxillary central incisor (44.9%), lateral incisor (28%), and canines (26%). The second prevalent anomalies included enamel defects (Enamel hypoplasia 21.4% and Enamel opacity 7.1%). Enamel defects were observed mostly in maxillary central incisors. The prevalence of cusp of carabelli, which was studied as a normal variation, was 40.3% mostly seen in the maxillary permanent first molar.

Of the studied anomalies, only hyperdontia significantly correlated with gender (P = 0.047) with higher frequency in males (Table 1).

No cases of anodontia, oligidontia, gemination, supernumerary root, dentinogenesis imperfecta, and dentin dysplasia were detected in this study. Of the total patients, 44 patients (28.6%) had no dental anomalies, and the number of patients with one dental anomaly, two dental anomalies,

and more than two dental anomalies respectively comprised 43 (27.9%), 49 (31.8%), and 18 (11.7%) (Table 2).

The number of patients with anomalies in shape, structure, number, and size respectively comprised 130 (62.2%), 47 (22.5%), 18 (8.9%), and 14 (6.7%), as the most prevalent and the least prevalent anomalies were observed in the shape and size, respectively (Table 3).

Table 1. Frequency of types and subtypes of dental abnormalities among study population

Types and subtypes of anomalies		Males(%)	Females(%)	Total(%)	P-value
Shape	Fusion	0 (0)	2 (2.1)	2 (1.3)	0.269
	Concrescence	0 (0)	1 (1.04)	1 (0.6)	0.435
	Talon Cusp	16 (27.6)	33 (34.4)	49 (31.8)	0.381
	Dens Evaginatus	2 (3.4)	2 (2.1)	4 (2.6)	0.606
	Dens Invaginatus	7 (12.1)	18 (18.8)	25 (16.2)	0.276
	Ectopic Enamel	0 (0)	2 (2.1)	2 (1.3)	0.269
	Taurodontism	3 (5.2)	2 (2.98)	5 (3.24)	0.525
	Hypercementosis	0 (0)	1 (1.04)	1 (0.6)	0.435
	Dilaceration	16 (27.6)	25 (26)	41 (26.6)	0.834
Size	Macrodontia	1(1.7)	1(1.04)	2(1.3)	0.717
	Microdontia	5(8.6)	7(7.3)	12(7.8)	0.766
Number	Hypodontia	5(8.6)	8(8.3)	13(8.4)	0.950
	Hyperdontia	4(6.9)	1(1.04)	5(3.2)	0.047
Structure	Enamel Hypoplasia	19(19.8)	14(24.1)	33(21.4)	0.524
	Enamel Opacity	8(8.3)	3(5.2)	11(2.1)	0.461
	Molar Incisor Hypomineralization	1(1.04)	0(0)	1(0.6)	0.435
	Amelogenesis Imperfecta	2(2.1)	0(0)	2(1.3)	0.269

Table 2. Distribution of dental anomalies among study population by age and gender

Description	Age (10-20years) (%)	Age (20-30 years)(%)	Females(%)	Males(%)	Total (%)
No dental anomaly	30 (26.7)	14 (33.3)	28 (29.1)	16 (27.6)	44 (28.6)
One dental anomaly	34 (30.35)	9 (21.4)	25 (26)	18 (31)	43 (27.9)
Two dental anomalies	33 (29.5)	16 (38.1)	32 (33.3)	17 (29.3)	49 (31.8)
≥ three dental anomalies	15 (13.4)	3 (7.1)	11 (11.45)	7 (12)	18 (11.7)
Total	112 (100)	42 (100)	96 (100)	58 (100)	154 (100)

Table 3. Distribution of dental anomalies among study population

Anomalies	Frequency
Number abnormalities	18 (8.6)
Shape abnormalities	130 (62.2)
Size abnormalities	14 (6.7)
Structure abnormalities	47 (22.5)

Discussion

In this study, 154 patients aged 10–30 years attending the School of Dentistry were examined clinically and radiographically. The females and males comprised 62.3% and 37.7% of the study population, respectively. The most prevalent and the least prevalent anomalies were observed in the shape (62.2%) and size (6.7%), respectively. The prevalence rate of dental anomalies in this study was 71.42%. However, the prevalence of dental anomalies as reported by previous studies was inconsistent. The prevalence of dental anomalies was reported to be 40.8%, 29% and 73.1% by Ardekani et al.[8], Shokri et al.[9] and Guttal et al.[10] respectively. The differennces in their results might be attributed to the diagnostic criteria used for identifying and classifying dental anomalies, genetic and racial factors, the study population and nutrition.[9,11]

Macrodontia

In this study, macrodontia was observed only in two patients (1.3%), in accordance with Kositbowornchal S's study performed in Thailand.[11] and obtained a frequency of 1.4% for macrodontia. The prevalence of macrodontia in this study was higher than the prevalence rate of 0.5% reported in Ghaznawi J's study in Saudi Arabia[12],

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0.2% in Ardekani et al.'s study in Iran [8], and 0.6% in VenkataVani N's study in Saudi Arabia [13] and lower than the prevalence rate of 1.9% in Ooshima T's study in Japan. [14]

Microdontia
The prevalence of microdontia in this study was 7.8%. Microdontia was seen mostly in maxillary lateral teeth and then the maxillary third molar tooth. The prevalence of microdontia in Ghaznawi J's study in Saudi Arabia [12], Ardekani et al.'s study in Iran [8], and Ghapanchi et al.'s study [15] was reported respectively as 5.35%, 2.5%, and 2.89%, which were lower than that obtained in this study. However, the prevalence of microdontia in Kositbowornchal's study in Thailand [11] and Guttal KS's study in India [10] was, respectively, 13.7% and 9.14% and were higher than that obtained in this study.

Hypodontia
The prevalence of hypodontia in this study was 8.4% and was more prevalent in the maxilla than in the mandible. The teeth most affected by hypodontia were the maxillary lateral tooth and the mandibular second premolar tooth. The prevalence of hypodontia in Ghaznawi J's study in Saudi Arabia [12] was 9.14% which was similar to the present study. It was reported as 26.1% and 4.19%, respectively, in Kositbowornchal's study in Thailand [11] and Guttal KS's study in India. [10]

Hyperdontia
The prevalence of hyperdontia in this study was 3.2% and was more prevalent in the maxilla (four teeth) than in the mandible (two teeth). One mesiodens was observed, and the frequent supernumerary teeth were distomolar and comprised four teeth (40%). The results obtained in this study were close to those obtained in Ardekani et al.'s study in Iran with hyperdontia prevalence of 3.5%. [8] The prevalence of hyperdontia in Ghapanchi et al.'s study [15], Kositbowornchal's study in Thailand [11], and Moons H.S's study [16] was reported, respectively, as 2.4%, 2.7%, and 2.19%.

Fusion
The prevalence of fusion in this study was 1.3%. The Kositbowornchal's study in Thailand [11], Guttal KS's study in India [10], and Shashirekha A.J's study in India [17] reported the prevalence of fusion, respectively, as 0.7%, 0.27%, and 0.18%, which were lower than that obtained in this study.

Cusp of Carabelli

The prevalence of cusp of carabelli in this study was 40.3%. Cusp of carabelli was more prevalent in the maxillary first molar (85.5%) than in the second molar (1.6%). The prevalence of cusp of carabelli in Shethri S.A's study in Saudi Arabia [18] and Falomo O.O's study in Nigeria [20] was respectively 57.6% and 17.43%. Moreover, Mosharaf et al. in Iran [20] and Bazkhan in Pakistan [21] reported the prevalence of cusp of carabelli as 96.6% and 24.4%, respectively.

Talon Cusp
In this study, the prevalence of talon cusp was 31.8%. Talon cusp was more prevalent in the maxillary central incisor (43.8%) than in the lateral tooth (14.6%). The prevalence of talon cusp in Kathariya MD's study in India [22] and VenkataVani N's study in Saudi Arabia [13] was, respectively, 6.3% and 1.5%.

The prevalence of dens invaginatus was 16.2%. Dens invaginatus affected mostly the maxillary lateral tooth. Ghapanchi et al. in Iran [9], Shethri S.A in Saudi Arabia [18], Nemati et al. in Iran [5], Gündüzin Turkey [23], and Hamasha in Jordan [24] reported the prevalence of dens invaginatus as 1.44%, 0.18%, 10.9%, 2.5%, and 2.95%, respectively.

Taurodontism
In this study, the prevalence of taurodontism was 3.24%. Taurodontism was more prevalent in the maxilla rather than in the mandible with the highest prevalence in the maxillary first molar. Ghapanchi et al. in Iran [15], Ardekani et al. in Iran [8], Darwazeh in Jordan [25], and Ghaznawi in Saudi Arabia [12] reported the prevalence of taurodontism as 0.96%, 7.5%, 8%, and 8.61%, respectively.

Dilaceration
In this study, the prevalence of dilaceration was 26.6%. Dilaceration was more prevalent in the mandible rather than in the maxilla with the highest prevalence in the mandibular first premolar tooth. Ghaznawi in Saudi Arabia [12], Shokri et al. in Iran [9], and Çolak in Turkey [26] reported the prevalence of dilaceration as 1.19%, 21.11%, and 16%, respectively.

Enamel Hypoplasia
The prevalence of enamel hypoplasia in this study was 21.4%, and the maxillary central incisor was mostly affected by enamel hypoplasia with prevalence of 25%. Good man AH in Mexico [27] and Daneshkazem AR in Iran [28]

reported the prevalence of enamel hypoplasia as 46.7% and 32.7%, respectively.

Enamel Opacity

The prevalence of enamel opacity was 7.1% in this study. Slayton RL [29] and Yussof N in Malaysi [30] reported the prevalence of enamel opacity respectively as 27% and 90.7%, which were higher than that obtained in the present study.

Amelogenesis Imperfecta

The prevalence of amelogenesis imperfecta in this study was 1.3%. Guttal KS in India [10], Shokri et al. in Iran [9], Gupta in India [3], and Altug in Turkey [4] reported the prevalence of amelogenesis imperfecta respectively as 0.27%, 0.24%, and 0.43%, which were lower than that obtained in the present study.

The difference might arise from difference in the study population. In the present study, we examined patients attending to dental school, and we predicted to see higher frequencies of anomalies affecting esthetics.

In this study, the anomalies of anodontia, oligidontia, gemination, supernumerary root, dentinogenesis imperfect, and dentin dysplasia were not detected because of the rarity of these anomalies. If the sample size were sufficiently larger, these dental anomalies might have been detected. Despite this weakness, this study had a number of strengths. We evaluated all types of dental anomalies that might be detected by panoramic radiographs and we used a single radiographic machine to increase the reliability of the diagnosis.

Since the prevalence of dental anomalies vary within and between populations, knowledge about types of anomalies and their prevalence by age, gender, and can help clinicians perform a better diagnosis and in planning timely treatment measures.

Conclusion

In conclusion, anomalies of tooth shape were the most common type of dental anomalies and size anomalies were the least. The results of the present study, as compared with those of other studies, indicate that these anomalies occur at different frequencies among various countries and communities, confirming the role of racial factors in the prevalence of dental anomalies.

Because these anomalies may cause various dental problems, it seems essential to diagnose these anomalies to prevent future problems.

Acknowledgement

Conflict of Interest

The authors declare that they have no conflict of interest.

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