Original Article

Prevalence of Dental Anomalies in Patients from a Teaching Dental Hospital in the UAE

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Abstract

Context: The occurrence of dental anomalies varies between different populations. Knowledge of regional occurrence and prevalence of dental anomalies is important for proper diagnosis and patient management. **Aims:** This study was intended to determine the prevalence of developmental dental defects in patients from a teaching hospital in the United Arab Emirates. **Settings and Design:** A retrospective study was performed using 2925 radiographs from the database of the radiology department at RAK College of Dental Sciences. **Subjects and Methods:** Panoramic radiographs of 400 patients between 17 and 60 years of age were presented anomalies in teeth number, shape, size, and position. The patient general information, type of anomaly, and affected tooth was determined. **Statistical Analysis:** Data were summarized and analyzed using nonparametric tests. $P < 0.05$ was considered significant. **Results:** The prevalence of developmental dental defects was 14.7% ($n = 400$) out of which 170 cases were further analyzed. The anomalies were evenly distributed among both genders and were most prevalent and diverse in the Syrian subpopulation. The most common anomalies were tooth hypodontia (19%) and root dilaceration (16%). The least common anomalies were hyperdontia (3%), taurodontism (3%), and retained primary teeth (1%). The most affected teeth were the maxillary and mandibular third molars. **Conclusions:** The high prevalence of dental defects suggests the need for proper diagnosis, intervention, and treatment. Further research into etiological factors for dental defects could create awareness and guide preventive strategies to assist in minimizing the associated dental problems.

Keywords: Dilacerations, hypodontia, impaction, taurodontia

INTRODUCTION

A variety of anomalies in tooth size, shape, and number can occur during development of the dentition. These anomalies can cause defects in tooth number, shape, size, structure, or position.[1] Anomalies of tooth number include hypodontia (decreased number of teeth) or hyperdontia (increased number of teeth; supernumerary).[2] Anomalies of tooth shape include germination (teeth sharing the same pulp chamber), taurodontism (tooth with a large pulp chamber and short roots), root fusion (multi-rooted teeth with separate pulp canals but with roots joined at the dentin), or root dilacerations (angulation of the dental root). Anomalies of tooth size include microdontia (tooth smaller than normal) and macrodontia (tooth larger than normal). Anomalies of tooth position include transposition (exchange in the position of two adjacent teeth), impaction (insufficient eruption of a tooth), ectopia (eruption of a tooth in an abnormal course), or rotation.[3]

Dental anomalies can present as part of a syndrome or isolated and can be caused by recessive or multifactorial inheritance, new mutations or stochastic events.[3] They can be a result of genetic disturbances before birth or during postnatal tooth development.[4] Postnatal factors that can affect tooth development include trauma to the primary dentition or the alveolar bone, nutrition.[5,6] Dental anomalies tend to occur more in the permanent dentition and can be correlated to gender, socioeconomic status, and body mass index.[6] Furthermore, a correlation between size and shape defects has been suggested.[1]

Dental anomalies can be identified through clinical or radiographic examination. Traditional radiographs are useful

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How to cite this article: Zakaria H, Duarte C, Al Baloushi W. Prevalence of dental anomalies in patients from a teaching dental hospital in the UAE. Int J Orofac Res 2018;3:32-6.

Access this article online

in the diagnosis of shape, size, and position anomalies; however, tools such as cone-beam computed tomography offer a better visualization of tooth position anomalies.[7] Complete radiographic examination is a routine practice in dentistry and allows the clinician to identify dental anomalies in patients, that should be taken into consideration during treatment planning.

This study assessed the prevalence and characteristics of dental anomalies in a specific population. The study also determined the correlation between the dental anomalies and gender or ethnicity.

SUBJECTS AND METHODS

A retrospective study was performed from 2925 radiographs of patients between 17 and 60 years of age collected from the database of the Diagnostic Clinic at RAK College of Dental Sciences. The study was approved by the RAK Medical and Health Sciences University Research Ethics Committee (RAKMHSU-REC-05–15-UG-D). The exclusion criteria included patients with syndromes that could cause developmental dental defects; soft-tissue defects; and nondevelopmental dental defects; radiographs belonging to patients younger than 17 years were excluded to avoid misinterpretation caused by delayed eruption of permanent teeth in young patients; radiographs belonging to patients older than 60 years were excluded to avoid misinterpretations due to the regressive alterations or other dental diseases in older individuals to reduce radiographic misinterpretation; incomplete files; and blurred radiographs.

All radiographs were taken using the same X-ray device and the same standardized method. The panoramic images were examined under good lighting conditions with standardized screen brightness and resolution. Repeatability was tested on 20 randomly selected radiographs examined at least 2 weeks after the initial examination. The selected radiographs were reviewed for the following dental defects: hypodontia, hyperdontia, germination, taurodontism, root fusion, root dilacerations, microdontia, macrodontia, transposition, impaction, ectopia, rotation, and any other unusual dental conditions. The universal numbering system was used to label the affected teeth. Third molar impaction was not considered in this study.

The data were analyzed using descriptive statistics to assess prevalence and distribution of the anomalies. Comparison of the prevalence of specific anomalies was performed using Chi-square test, with a level of significance set at 5% ($P < 0.05$).

RESULTS

A total of 400 (14.7%) of the radiographs screened presented dental anomalies. Within the 400 radiographs examined, a total of 170 (5.8%) of the cases were included in the statistical analysis after application of the exclusion criteria. From the 198 cases, 11 types of defects were detected [Figure 1a and b].

Anomaly	n	Proportion	P	Significance
Hypodontia	37	0.19	0.0000	***
Hyperdontia	5	0.03	0.0013	**
Fusion	18	0.09	1.0000	NS
Gemination	9	0.05	0.0261	*
Taurodontism	5	0.03	0.0013	**
Root dilaceration	31	0.16	0.0013	**
Microdontia	12	0.06	0.1380	NS
Impaction	13	0.08	0.5131	NS
Ectopia	18	0.09	1.0000	NS
Rotation	20	0.10	0.6210	NS
Retained Primary	2	0.01	0.0001	***
Total	170			

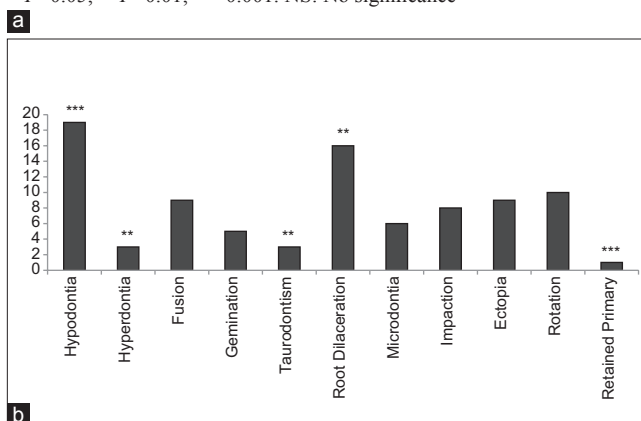*$P<0.05$; **$P<0.01$; ***0.001. NS: No significance

Figure 1: Prevalence of developmental defects. A significantly high prevalence of hypodontia and root dilaceration, and a significantly low prevalence of hyperodontia, taurodontism and retained primary teeth were observed among the anomalies identified

Anomalies of tooth shape, position, number, and size had a prevalence of 32%, 26%, 21%, and 6%, respectively. Macrodontia and transposition were not found in any of the studied cases; however, retained primary teeth were observed. The most common anomalies observed were hypodontia ($n = 37$; 19%) and root dilaceration ($n = 31$; 16%) [Figure 1b]. The least common anomalies were hyperdontia ($n = 5$; 3%), taurodontism ($n = 5$; 3%), and persistence of primary teeth in permanent the dentition ($n = 2$; 1%) [Figure 1a].

There was no significant divergence in the gender distribution of the reported anomalies [Table 1]. Gemination was the only anomaly which a relatively higher occurrence in males than in females. A significant higher incidence of dental anomalies was observed in Syrian and Pakistani patients. A greater variety of anomalies were observed in the Syrian section of the studied population where all the reported anomalies were observed. The distribution of the observed anomalies by specific tooth number is detailed in Table 2. The teeth that were found to be most affected by dental anomalies were the maxillary third molars. The right and left maxillary third molars accounted for 23% of the anomalies observed. The tooth most affected by hypodontia was the right maxillary third molar (24%) whereas the teeth most affected by hyperdontia were the

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Table 1: Distribution of developmental dental defects by patient gender and nationality

Anomaly	Gender		Nationality														
	Male	Female	UAE	US	Pakistan	Egypt	Jordan	Bangladesh	Syria	Morocco	Palestine	Iran	Iraq	Yemen	India	Sudan	Ethiopia
Hypodontia	0.51	0.48	0.05	0.05	0.19	0.08	0.08	0.08	0.22	0.03	0.08	0.03		0.03	0.03	0.03	0.03
Hyperdontia	0.60	0.40	0.20		0.40			0.20	0.20								
Fusion	0.56	0.44		0.06	0.22	0.11	0.11		0.28		0.22						
Gemination	0.77	0.22			0.22				0.56		0.22						
Taurodontia	0.60	0.40					0.40		0.20	0.40							
Root dilaceration	0.52	0.48	0.16	0.03	0.32	0.06	0.10	0.16	0.13	0.03							
Microdontia	0.50	0.50				0.17	0.17		0.25	0.08	0.17			0.17			
Impaction	0.61	0.39	0.12	0.05	0.29	0.07	0.05	0.02	0.15	0.02	0.05	0.02	0.02	0.07	0.02		
Ectopia	0.39	0.61	0.06	0.11	0.33	0.17		0.06	0.17	0.06					0.06		
Rotation	0.55	0.45	0.15		0.30	0.10		0.06	0.25		0.15						0.05
Retained primary	0.50	0.50			0.50				0.50								
Total	0.56	0.44	0.09	0.04	0.25	0.09	0.07	0.06	0.21	0.04	0.08	0.01	0.01	0.03	0.02	0.01	0.01

>Proportion of cases observed of each nationality relative to the total number of the specific anomaly. The row labeled "Total" is the proportion of cases relative to the total number of anomalous teeth (*n*=198). Data adjusted to the variation in total population distribution of nationalities

Table 2: Distribution of developmental dental defects by affected tooth

Anomaly	1	2	3	6	7	9	10	11	15	16	17	18	19	20	21	22	23	25	26	27	28	29	30	31	32
Hypodontia	0.24				0.05		0.03			0.22	0.19				0.05							0.03			0.22
Hyperdontia						0.20								0.40							0.20	0.20			
Fusion	0.33	0.17							0.11	0.39		0.33													
Gemination	0.11	0.11							0.11	0.11	0.11													0.11	
Taurodontia												0.40	0.20										0.20		
Root dilaceration	0.03			0.03						0.03				0.13	0.23	0.10				0.10	0.19	0.16			
Microdontia		0.25								0.42								0.08					0.20		
Impaction				0.15		0.08		0.23			0.08				0.08	0.15				0.15		0.08	0.08		
Ectopia	0.17		0.06																0.06	0.15	0.05				0.17
Rotation				0.20			0.05	0.15						0.11	0.05		0.05		0.05	0.15				0.20	
Total	0.12	0.02	0.01	0.04	0.01	0.01	0.01	0.03	0.02	0.11	0.08	0.03	0.01	0.03	0.06	0.05	0.01	0.01	0.01	0.04	0.04	0.04	0.01	0.01	0.07

>Proportion of cases observed on each tooth number relative to the total number of the specific anomaly. The row labeled "Total" is the proportion of cases relative to the total number of anomalous teeth (*n*=198)

mandibular premolars (80%). Fusion and microdontia were seen frequently in the left and right maxillary third molars, germination was observed in the maxillary and mandibular molar region, and taurodontism was observed mostly in the mandibular molar region. Dilacerations were frequent in the right and left mandibular canines and premolars. The most commonly impacted or rotated teeth were the maxillary and mandibular canines. The most frequently ectopically erupted tooth was the left lower third molar (33%).

DISCUSSION

A low prevalence of dental anomalies was observed in the studied population. The prevalence of dental anomalies is relatively high in other populations where 20%–32% of the population has been reported to have a dental anomaly.[8-11] Most of the reports of dental anomalies are done in young populations where the risk of tooth extraction is lower; however, our population is more heterogeneous due to the geographic area and general oral health needs. In addition, this study focuses on less common dental anomalies and did not take into consideration third molar impaction as the prevalence of this anomaly is known to be high.[8,9,11]

Hypodontia and tooth dilaceration were the most frequent dental anomalies in the present study, which is in agreement with various studies done in different ethnic groups.[8-11] The diagnosis of hypodontia relies not only on the clinical and radiographic analysis but also on a detailed dental history.[12] Tooth agenesis is more common in the most distal tooth of a given series (lateral incisor, second premolar, and third molar).[13] In our study, the most commonly absent teeth were third molars. The prevalence of hypodontia of up to 16.2% has been observed in Asian populations;[13] however, our study reports a slightly greater prevalence of 19%. The prevalence of root dilacerations may vary depending on the parameters used to diagnose it; however, most studies report low prevalence of this root deformity which coincides with our current findings.[14-16]

Supernumerary teeth and taurodontism are not highly prevalent dental anomalies.[8-10,17-20] The majority of supernumerary in our data were parapremolars, although the most commonly found supernumerary tooth tends to be mesiodens.[19,20] Taurodontism can have a variable distribution among different teeth and tends to occur in more than one teeth on the same patient when associated with syndromes.[18,21] The studied sample excluded syndromic patients which further explains the low prevalence of the anomaly.

Significant differences between genders have not been observed in comprehensive prevalence studies.[8-10] Although specific anomalies can present predominantly in one gender, the vast majority of studies in nonsyndromic patients do not report significant associations of dental anomalies with gender.[17-22] The prevalence of certain anomalies may be significantly associated with ethnicity, especially when observing specific teeth affected by an anomaly. However, the general tendency of dental anomaly prevalence is similar throughout a number of studies done in a variety of ethnical groups in different geographic settings.[8-22]

The limitations of this study include the heterogeneity of the studied population and the limited information on possible etiological factors. In addition, this study was limited to the analysis of panoramic radiographs and patient history. The possibility of misdiagnosis of dilaceration is greater with panoramic radiographs as it is difficult to identify the root angulation in labial and lingual directions. Structural anomalies were not considered in this study, as it would be difficult to detect them in panoramic radiographs.

CONCLUSIONS

The prevalence of dental anomalies in the studied population is relatively low and evenly distributed among genders. The most commonly affected teeth are the maxillary and mandibular third molars. In the studied population, the incidence and diversity of anomalies were greater in patients who identified themselves as Syrians. Knowledge of the prevalence of dental anomalies and their distribution can contribute to accurate diagnosis and treatment planning in dental clinics of the region.

Financial support and sponsorship

Conflicts of interest
There are no conflicts of interest.

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