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Original Research Article

Incidental Dental Anomalies in Pediatric Dental Patients Detected by Panoramic Radiographs – A Retrospective Study

Maram Bawazir[1*], Tamara Alyousef[2], Azza A. El-Housseiny[3]
[1]BDS, Oral and Maxillofacial Pathology Demonstrator, Oral Diagnostic Sciences Department, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia
[2]BDS, General Dentist, Yanbu National Hospital, Yanbu, Saudi Arabia
[3]BDS, MSc, PhD, Professor, Pediatric Dentistry Department, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia, and Professor, Pediatric Dentistry Department, Faculty of Dentistry, Alexandria University, Egypt

***Corresponding author:** Maram Bawazir
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Abstract

Objective: The purpose of this study was to identify the frequency, type and location of dental anomalies accidentally detected in children attending pediatric dentistry clinics. ***Materials and Methods:*** A retrospective cross sectional study based on collecting diagnostic records: panoramic radiographs, medical and dental histories of patients during a one-year period (from September 2013 to September 2014). Records were evaluated by two calibrated examiners for the following developmental dental anomalies; Number (Supernumerary Teeth**,** Hypodontia), size (Macrodontia, Microdontia), position (transposition, impaction), shape (Fusion, Taurodontism, Dilaceration, Dwarfed root, Hypercemntosis, Dense Invaginatus, Dense Evaginatus, Talon cusp, Enamel pearls), Acquired pathological conditions (External resorption, Hypercementosis). Descriptive statistics were performed for the data. ***Results:*** A total of 1311 records met the inclusion criteria, 682 were males (52 %) and 629 were females (48%) of age range from 6 to 20 years. The frequency of developmental dental anomalies detected was 29.8% and the highest at age of 14 (9.1%). The distribution of dental anomalies had no significant difference between genders. The most prevalent dental anomaly was Hypodontia (9.7%) followed by canine impaction (9%), Dilaceration (7.1%) and other teeth impaction (3.2%) (except the 3rd molar). The occurrence of Fusion, Dwarfed root and Odontoma were less frequent than other dental anomalies with percentage of 0.1%. ***Conclusions:*** Most of the dental anomalies present in childhood. Dental examination with radiographic screening of developmental dental anomalies in early childhood should be emphasized as part of routine dental care to allow early detection, intervention and eventually an appropriate management.

Keywords: Dental anomalies; Panoramic radiograph; Epidemiology.

INTRODUCTION

Dental anomalies may be congenital, developmental, or acquired and may include variations in the normal number, size, morphology, or eruptive pattern of the teeth. Congenital abnormalities are typically genetically inherited anomalies and developmental anomalies occur during the formation of a tooth or teeth. While acquired abnormalities result from changes to teeth after normal formation [1]. Diagnosis of dental anomalies is obtained through medical and dental histories, clinical examination and panoramic radiographs.

Radiographic examination plays an important role in assessing and observing the anomalies, and lead to discovering incidental findings that was not involved in the patient's chief complaint [2]. Karadas *et al.*, [3] reported that prevalence rates of hypodontia, oligodontia and hyperdontia were 3.67%, 0.21% and 0.96% respectively. Furthermore, Gupta *et al.*, [4] reported that prevalence of positional anomalies was significantly higher than the prevalence rates of shape, number and structural anomalies in an Indian population. Another study were done at the State University of New York at Buffalo investigated the prevalence of dental anomalies in orthodontic patients and stated that approximately 80% of the subjects had no dental anomalies [5]. According to Cunha *et al.*, [6] dental anomalies have shown higher prevalence among females with a prevalence rate of 56.72%. A prospective study done in Jordan stated that 16.69% of subjects had dental anomalies; 8.83% had congenitally missing teeth, 4.5% had supernumerary teeth and 3.28% had molar incisor hypomeneralization [7]. Another study done in Brazil to investigate dental anomalies in primary dentition in comparison to permanent teeth

have shown that 1.8% of children had dental anomalies in their primary teeth, 54.8% of them had anomalies in their succedaneous permanent [8].

The distribution of dental anomalies is frequent in many populations. Most of the dental anomalies present in childhood and due to lack of dentists' experience to diagnose these anomalies; it will be left untreated or misdiagnosed. These dental anomalies may lead to discrepancies in dental arches and eventually affect the dental occlusion [5]. Delaying the treatment can complicate the treatment and may cause psychological problems [9]. The purpose of this retrospective study was to identify the frequency, type and location of dental anomalies accidentally detected in children attending pediatric dentistry clinic at King Abdulaziz University Dental Hospital using their panoramic radiographs and records.

MATERIALS AND METHODS

This is a retrospective cross sectional study based on collecting diagnostic records: panoramic radiographs, medical and dental histories of patients during a one-year period (from September 2013 to September 2014). The subjects' data were drawn from the archive files of King Abdulaziz University Dental Hospital. The King Abdulaziz University Dental Hospital is one of the largest and main dental centers at Jeddah that is receiving wide diversity of Saudi and no-Saudi patients. Ethical approval was obtained from the Ethical Committee of King Abdulaziz University. The study included dental records of children age from 6 to < 21 years [10].

Inclusion Criteria

Dental records of patient 6 to less than 21 years old, panoramic radiographs with good quality contrast and minimum distortion.

Exclusion Criteria

Records of patients: less than 6 years old and 21 years old or older, patients with incomplete records, images with low resolution, and any radiographs demonstrating significant artifacts (such as metallic artifacts), patients with a history of tooth extraction, records of patients with syndromes such as Down's syndrome, ectodermal dysplasia or having cleft lip and palate.

All permanent teeth except thirds molar were investigated using panoramic radiographs previously taken to the patients. The images were exported and saved without adjustment of contrast, brightness or magnification. Data obtained was recorded according to age, gender, medical status, type of anomaly, location, number, and relation of dental anomalies to the presented chief complaint of the patient. Assessment of the digital panoramic radiographs was performed directly on the same monitoring independently by 2 calibrated examiners (Kappa=80%). In case of disagreement discussion was made to reach a consensus. If agreement was not reached, a third examiner was consulted to resolve the disagreement.

The Following types of dental anomalies were identified on the panoramic radiograph according to the descriptive criteria mentioned by White and Pharoah [1]:

Developmental Dental Anomalies

Number of Teeth

- Supernumerary teeth: which determined by "Identifying and counting of the teeth present in the jaw, it might be normal in size and shape or small in size and conical".
- Missing tooth: It was determined by "Identifying and counting teeth present and there was no history of extractions of the missing teeth".

Size of Teeth

- Macrodontia: which appear as "Abnormal increase in the tooth size that might result in crowding or impaction of the adjacent teeth".
- Microdontia: which appear as "Malformed small teeth".

Eruption of Teeth

- Transposition: defined as "The teeth that are not in their normal sequence in the arch".
- Impacted teeth: which can be recognized by either cessation of the eruption of a tooth caused by a radiographically detectable physical barrier in the path of eruption, loss of space or because of an abnormal position of the tooth.

Morphology of Teeth

- Fusion: which appear as "Unusual shape and size of the fused teeth with two pulp and reduced number of teeth in the arch".
- Concrescence: "It is the fusion of roots of two or more teeth by their cementum".
- Gemination: It's defined as "A tooth that is partially divided but with single or partially divided pulp chamber, and radiopaque enamel that outlines the clefts in the crowns".
- Taurodontism: appear as "An elongated pulp chambers with the furcation positioned more apically and short roots".
- Dilaceration: "It is a sharp bend or curve anywhere in the tooth, if it's mesially or distally it will be easily detected in the radiograph but if it is buccally or lingually it will appear as a round radiopaque area with central radiolucency (bull's eyes)".
- Enamel pearls: appear as "smooth and round radiopacity".
- Talon cusp: which appears as "A superimposed cusp on the crown of the involved incisor".

Acquired Pathologic Condition

As External resorption; when it starts from the apex it appears as "blunting in the root apex". Hypercementosis; is defined as "excessive build-up of cementum around the root".

Statistical analysis of data was performed using Statistical Package for Social Sciences program (SPSS, version 22.0, Chicago, IL, USA). Data was represented as numbers and percentages. The Pearson's Chi-square test was conducted to determine the statistical significance in frequency of dental anomalies between genders. *P* values less than 0.05 were considered significant.

RESULTS

In this study 6000 records were reviewed and examined. Total of 1311 records met the inclusion criteria in which 682 were males (52.0%) and 629 were females (48.0%). The mean age of the patients were 13.77 ± 3.96 years old, with age range from 6-20 years. Most of the patients (93%) had no medical condition. A total of 391 (29.8%) individuals had developmental dental anomalies. The distribution of dental anomalies had no significant difference between males and females (P value = 0.31) (Figure-1). The highest percentage (9.1%) of dental anomalies was found at age of 14 as shown in Figure-2. The frequency of different types of dental anomalies per gender was illustrated in Table-1. The most frequent dental anomalies founded were Hypodontia (9.7%), canine impaction (9%), Dilaceration (7.1%) and other teeth impaction (3.2%) (except the 3rd molar). Canine impaction as shown at Table-2 was more frequently seen in the maxilla (8.2 %) with unilateral distribution (5.1 %). The most commonly displayed missing tooth was the lateral incisor (4.0%), followed by the 2nd premolar (3.8%) as shown in Table-3.

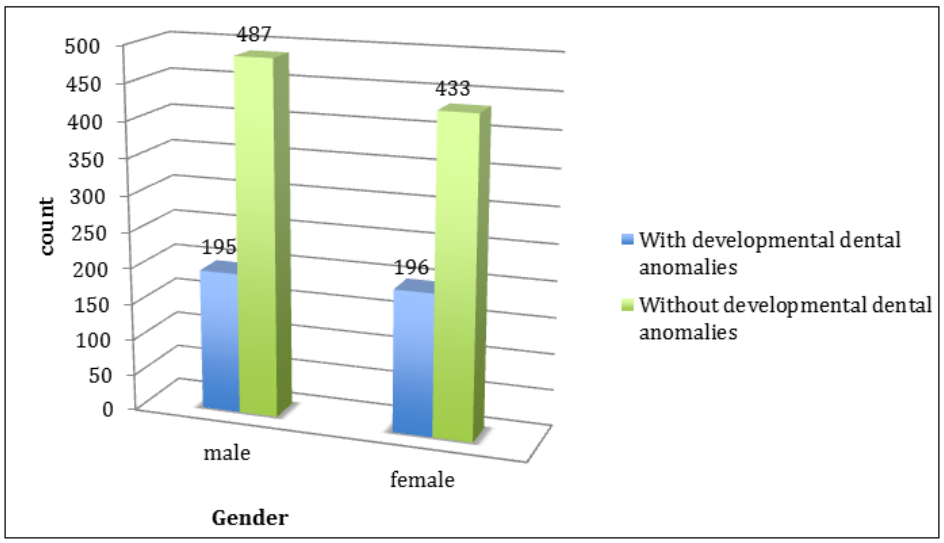

Fig-1: Distribution of Anomalies by Gender

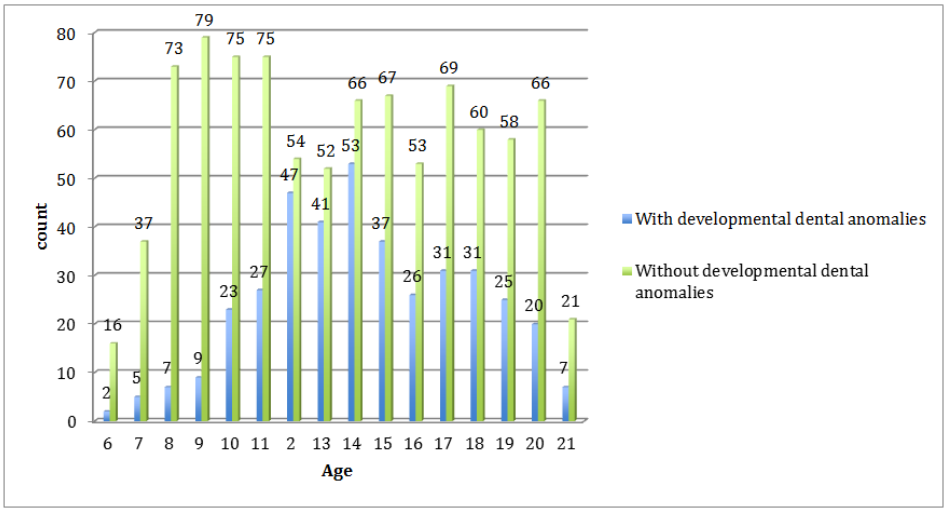

Fig-2: Distribution of Anomalies by Age

Table-1: The Frequency of Different Types of Dental Anomalies

Dental Anomalies	Female N= 629 N (%)	Male N= 682 N (%)	Total N= 1311 N (%)	*P* Value
Hypodontia	69 (11.0)	58 (8.5)	127 (9.7)	0.132
Canine Impaction	58 (9.2)	60 (8.8)	118 (9.0)	0.789
Dilaceration	53 (8.4)	41 (6.0)	94 (7.1)	0.090
Impaction	22 (3.5)	20 (2.9)	42 (3.2)	0.562
Microdontia	12 (1.9)	13 (1.9)	25 (1.9)	0.998
Supernumerary Teeth	6 (1)	8 (1.2)	14 (1.1)	0.700
Taurodontism	4 (0.6)	6 (0.9)	10 (.8)	0.612
Enamel Pearl	4 (0.6)	6 (0.9)	10 (.8)	0.612
Transposition	6 (1.0)	1 (0.1)	7 (.5)	0.045
Hypercementosis	3 (0.5)	4 (0.6)	7 (.5)	0.786
Talon Cusp	1 (0.2)	3 (0.4)	4 (.3)	0.357
Macrodontia	0 (0.0)	2 (0.3)	2 (.2)	0.174
External Resorption	0 (0.0)	2 (0.3)	2 (.2)	0.174
Fusion	1 (0.2)	0 (0.0)	1 (.1)	0.298
Dwarfed Root	0 (0.0)	1 (0.1)	1 (.1)	0.337
Odontoma	0 (0.0)	1 (0.1)	1 (.1)	0.337

Table-2: Distribution and Location of Canine Impaction

Location of the Impacted Canine	Male (N=682) N (%)	Female (N=629) N (%)	Total (N=1311) N (%)	*P* Value
Unilateral	33 (4.8%)	34 (5.4%)	67 (5.1%)	0.642
Bilateral	26 (3.8%)	25 (4%)	51 (3.9%)	0.879
Maxillary	53 (7.8%)	54 (8.6%)	107 (8.2%)	0.591
Mandibular	12 (1.8%)	7 (1.1%)	19 (1.4%)	0.328

Table-3: Distribution of Hypodontia by tooth type

Missing Teeth	Male (N=682) N(%)	Female (N=629) N(%)	Total (N=1311) N(%)
Central	3 (0.43%)	3 (0.47%)	6 (0.45%)
Laterals	25 (3.6%)	27 (4.29%)	52 (4.0%)
Canines	1 (0.15%)	4 (0.63%)	5 (0.38%)
1st premolars	13 (1.9%)	10 (1.59%)	23 (1.75%)
2nd premolars	23 (3.4%)	27 (4.3%)	50 (3.8%)
1st molars	3 (0.43%)	6 (0.95%)	9 (0.68%)
2nd molars	0 (0.0%)	8 (1.3%)	9 (0.61%)

DISCUSSION

This study was done to identify the frequency, type and location of dental anomalies accidentally detected in patients attending pediatric dentistry clinic over one year using their panoramic radiographs and records. The present study found that (29.8%) of the subjects had developmental dental anomalies which was relatively similar to the result found by earlier studies conducted by Haugland *et al*., among Norwegians population and Kathariya *et al*., among Indian population with percentage of 28.2% and 25.8% respectively [11, 12]. A similar study done by Afify and Zawawi [13] in the Western Region of Saudi Arabia among age grope 12-30 years old found that 45.1% of the population had at least one dental anomaly, which was slightly relatively high compared to the average of the current study. This difference can be attributed to the inclusion of third molar anomalies in their study, and different age group from 12 to 30 years old involved in the sample.

Several studies [13, 5, 14, 4, 3, 15] concluded that there is no significant difference between genders in the prevalence of dental anomalies that goes along with our results. In contrast, a study was done in Brazil [6] reported that females had higher prevalence of dental anomalies compared to males, this dissimilarity might arise from greater percentage of the females 52.96% included in their sample, racial differences, local environment effect and nutrition.

Hypodontia was the most frequent dental anomaly 9.7% in the present study as well as in other previous studies [13, 16, 7, 14, 6, 3, 17]. Although, Al-amiri *et al.*, [5] reported that delayed eruption and impaction were the most prevalent dental anomalies in buffalo New York followed by Hypodontia, while Gupta *et al.*, [4] reported the rotation as most frequent dental anomaly followed by ectopic eruption followed

by hypodontia with percentages of 10.24%, 7.93% and 4.19% respectively. In this study, the most commonly missing tooth was the lateral incisor followed by the second premolar; this were similar to the findings of several studies conducted among Iranian, Turkish and Indian populations [16, 4, 15].

Root dilaceration was reported as the third most frequent dental anomaly 7.1% which is consistent with the findings of Shokri et al and Goncalves-Filho et al, while it was less frequently seen in Afify and Zawawi study 1.1% [13, 18, 15]. Impaction was reported as the fourth most common dental anomaly in the present study 3.2% which is in the contrary found to be the second most common by Cunha *et al*., 8.60% and Afify and Zawawi 21.2% [13, 6]. This inconsistency with Afify and Zawawi's results might be attributed to inclusion of third molar anomalies which has reported to be the highest impacted tooth in the mouth and adulthood age group enrolled in the study.

The number of remarkable developmental dental anomalies that reported in this study suggested that dentists have an important role in early detection of these anomalies through routine dental radiographs and examination, and further role in interceptive treatment to avoid subsequent complications. The panoramic radiograph is widely applicable in dentistry because structures over a large area are shown in their relative position. According to the American academy of pediatric dentistry [19] scheduling for initial radiographic examination should not be based on child age and each patient should be evaluated individually after reviewing the child's medical and dental histories and thorough clinical examination. For a screening of new patients, it is recommended to include panoramic radiographic examination for child with mixed dentition after eruption of the first permanent molar. Consequently, use its diagnostic utility to recognize any developmental dental anomalies.

The panoramic radiograph is a complex image with multiple superimposition and distortion which may be exacerbated by faulty technique of untrained technician. This study has some limitations in which numerus panoramic radiographs were poor in quality with presence of artifacts ending by excluding a large number of panoramic radiographs. Also, some patients' records did not contain complete information that needed in the present study for inclusion/exclusion criteria like chief complaints, progress notes and medical histories that would have been helpful for our study.

CONCLUSIONS

It is concluded that:

- About one third of the examined panoramic radiographs showed one or more developmental dental anomalies.
- Most dental anomalies can be detected in childhood.
- Dental examination with radiographic screening of developmental dental anomalies in early childhood should be emphasized as part of routine dental care to allow early detection, intervention and eventually an appropriate management.

Conflicts of interest: None

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