

Prevalence of Dental Developmental Anomalies: A Radiographic Study

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Abstract: ***Objectives:** To evaluate the prevalence of dental developmental anomalies on digital panoramic radiographs and to evaluate the frequency of anomalies regarding the disorders in shape, position and number. **Materials and Methods:** A total of 1000 panoramic radiographs from 496 males and 504 females, aged over 15 years were obtained from the digital database between the years of 2016 and 2017. The selected radiographs were evaluated in terms of the anomalies such as dilacerations, taurodontism, supernumerary teeth, congenitally missing teeth, fusion, gemination, tooth impaction, tooth transposition, dens invagination, and peg lateral. Then, the anomalies were compared to each other regarding the frequency of the anomaly type (morphological, positional and numerical). Data were evaluated using descriptive statistics such as frequency and percent, and statistical tests such as Chi-square (X^2) at 0.05 significant level using the Statistical Package for the Social Sciences (SPSS) version 20.0. **Results:** The prevalence of dental anomaly was 181 (18.1%), which was slightly higher in females 92(9.2%) than males 89 (8.9%), however, this difference was not statistically significant ($P > 0.05$). The prevalence of dilacerated teeth was 52 (5.2%), taurodontism 53 (5.3%), supernumerary teeth 5 (0.5%), congenitally missing teeth 11 (1.1%), fusion 9 (0.09%), gemination 9 (0.09%), impaction 34 (3.4%), transposition 1 (0.1%), dens invagination 13 (1.3%) and peg lateral was 7 (0.7%). **Conclusions:** Dental anomalies are relatively common; though their occurrence is not symptomatic, they can lead to several clinical problems in patients. Detailed clinical and radiographic assessment and counselling during patient visits is a critical factor in assessing the patient's degree of difficulty to help the dentist for better preparedness for the treatment.*

Keywords: Dental anomaly, panoramic, prevalence

1. Introduction

Dental anomalies are a series of the human dental structure changes that result from disturbances during tooth formation which can be congenital, developmental, or acquired. They consist of changes in the tooth number, size, shape, and position in the jaws.^[1] Congenital anomalies are inherited through genetics whereas acquired anomalies are caused by the changes occurring during tooth formation. Developmental anomalies are cases that occur during tooth developmental stages. This anomaly can be simply an isolated defect or can be associated with various syndromes.^{[2],[3]} Compared to other common diseases and disorders of the oral cavity, such as dental caries and periodontal diseases, dental anomalies are less common; however, their treatment and control is often associated with difficulty and complexity.^{[4],[5]} These disorders can cause malocclusion, beauty challenges, and can make root canal therapy or tooth extraction difficult. Morphological anomalies such as dilacerations, taurodontism, fusion, germination, and dens invagination, in addition to the impact on the person's appearance, could influence the root canal system. Hence, successful endodontic treatment requires careful and special attention to their unusual anatomy. Anomalies in the number and position of teeth in the jaws are associated with beauty and occlusion-related challenges.

The prevalence of dental anomalies has been investigated in different communities and ethnic groups via several studies. Prevalence of dental anomalies in panoramic radiographs was reported to be 31.55% by Yamunadevi *et al.*^[6] The most common findings were anomalies in shape (22.1%), followed by size (8.6%) and number (3.2%). In western

Saudi Arabia, the prevalence of dental anomalies was reported to be 45.1%. The most common anomalies were congenitally missing teeth and impaction.^[7] Ardakani *et al.* stated that the prevalence of dental anomalies in Yazd was 40.8% and the most common findings were dilaceration, impaction, taurodontism, and supernumerary tooth.^[8] Thongudomporn and Freer showed that 74.77% of patients had at least one anomaly. The most common anomaly was dens invagination whereas dilaceration and supernumerary teeth had the lowest prevalence.^[9]

Epidemiological studies have shown that missing teeth is more in Caucasians than the Blacks and in Asians than Caucasians,^[10] and can be seen more in women than men.^[10]

2. Materials and methods

1000 OPG's were randomly selected. This study was reviewed and approved by the ethics committee. Inclusion criteria were patient's age above 15 years and without the history of permanent tooth extraction. Exclusion criteria were low quality radiographs, Patients under fixed orthodontic treatment, cleft palate and any type of disease, traumatic injuries or jaw fractures that affect the natural eruption of permanent teeth, crown restorations, and caries or root canal treatment that interfere with the detection of some anomalies such as taurodontism. To reduce the error of radiographic interpretation, maxillary molars in terms of dilacerations and third molars in terms of impaction and dilaceration were excluded. Panoramic radiographs were evaluated in terms of having anomalies of dilacerations, taurodontism, supernumerary teeth, congenitally missing teeth, fusion, gemination, impaction, transposition, dens

invagination, and peg lateral. Data were analyzed using descriptive statistics including frequency and percent. X^2 test was used to compare differences between groups at 0.05 significance level using Statistical Package for the Social Sciences version 20.0 software

Results

From a total of 1000 selected records, 181 (18.1%) had at least one dental anomaly. Of these, 89 were males (8.28%) and 92 were females. Table 1 shows the summary of the prevalence of dental anomalies. The prevalence of anomalies in females was higher, although the difference was not significant ($P > 0.05$).

Table 1: Prevalence of different types of anomalies

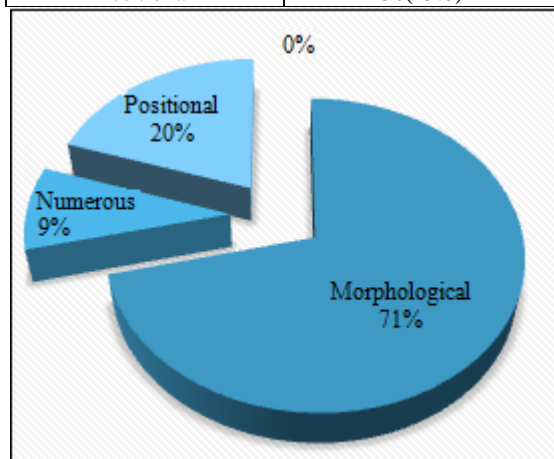
Anomalies	No. of cases (%)
Supernumerary	5(0.5)
Dilaceration	52(5.2)
Taurodontism	53(5.3)
Transposition	1(0.1%)
Impaction	34(3.4)
Missed tooth	11(1.1)
Fusion	9(0.09)
Gemination	9(0.09)
Peg lateral	7 (0.7%)
Dens invaginatus	13 (1.3)



Taurodontism was the most prevalent dental anomaly, followed by dilacerations and tooth impaction. Gemination and fusion each with a prevalence of 0.09% and transposition with 0.1% prevalence were the least common. According to Table 2, the most common type of dental anomalies was morphological (dilaceration, taurodontism, fusion, gemination, peg lateral and dens invagination), followed by positional (tooth impaction and transposition) and numerical (supernumerary and congenitally missing teeth) anomalies.

Table 2: Comparison of anomalies by the frequency of anomaly type

Anomaly type	n(%)
Morphological	129(71.2)
Numerous	16(8.8)
Positional	36(19.8)



3. Discussion

This study investigated the prevalence of dental anomalies with the associated problems. Based on our data, the prevalence of dental anomalies was 18.1% and was higher in females rather than males, however, the difference was not significant ($P > 0.05$).

The most commonly type of dental anomaly was morphological followed by positional and numerical anomalies. Taurodontism was the most common recorded anomaly. Taurodontism is the change in tooth shape. The characteristic features are vertically elongated pulp chamber, apical displacement of the pulpal floor and lack of the constriction at cemento enamel junction level.^[12]

Sarr *et al.* reported the prevalence of taurodontism using panoramic radiographs of the first and second molars of 150 cases aged between 15 and 19 years. Taurodontism was seen in 48% of their cases.^[13] The prevalence was much higher than the present study. Taurodontism in examined panoramic radiographies of oligodontia patients in the study by Schalk *et al.* was 28.9%,^[14] whereas the prevalence of taurodontism in normal subjects was 9.9%. Findings supported the hypothesis that taurodontism could be the result of an ectodermal defect in oligodontia patients. The different results in different studies may be due to racial differences or differences in the type, method, and place of study.

The second anomaly in terms of prevalence in this study is dilaceration. This developmental anomaly is an abrupt change in the axial inclination between the crown and the

root of a tooth. The diagnosis is possible only through X-ray, and it is very important to identify before initiation of root canal treatment. Only a few publications have reported the prevalence of dilacerations, with the frequency ranging from 0.32% to 98% of teeth.^[15] Although Chohayeb has reported that the frequency of dilaceration in upper lateral incisors is 98%,^[16] it is highly questionable whether 98% of teeth can be classified as having a large enough deviation to be classified as a dilaceration. Though a diagnostic criterion of dilaceration is variously noted in different papers, the two possible reasons are traumatic injuries and developmental disorders of the tooth bud.^[15] The prevalence of fusion and gemination in the present study was 0.09% which is similar to those reported in other studies. Reported prevalence of these anomalies in different studies varied from 0 to 0.8% and did not differ in the two genders.^{[17],[18],[19]} Because of the low incidence of these anomalies, their importance is often overlooked. Occurrence of these anomalies in the oral anterior region created esthetic problems because of unpleasant shape and these teeth are highly susceptible to decay and periodontal disease. Root canal therapy in some cases is associated with complexities.^[20]

The prevalence of peg lateral in the present study was 0.7%; it has been reported to be 0.3% in American population, 0.6% in Swedish schoolchildren, and 0.4% in children of Saudi Arabia.^{[21],[22],[23]} The prevalence of hypodontia or congenitally missing teeth in the present study was 1.1%. The most commonly involved tooth was the maxillary lateral incisor followed by mandibular second premolar and mandibular lateral incisor. A meta-analysis conducted by Polder *et al.* showed that the prevalence of tooth agenesis for both the sexes was higher in Europe and Australia than for North-American Caucasians; thus, the agenesis differs by continent.^[10]

The prevalence of dens invagination was 1.3% in our study and was found in the maxillary lateral incisors. 75% of the cases were involved bilaterally. This anomaly is in the range of 0.3–10% reported by other studies,^[24] and the differences is contributed to the geographical differences, the diagnostic criteria, and research method. Endodontic treatment of the teeth is difficult because of the irregularities of the root canal system and the fact that the burs hardly penetrate into the root canal system through invagination. If pulpal necrosis occurs before the apical closure, apexification becomes necessary.

The prevalence of tooth impaction in the present study was 3.4%. The present study was performed on permanent teeth, and the maxillary canine was the most impacted tooth. The incidence of canine impaction was found to be 3.58% in a study by Aydin.^[25] The prevalence of supernumerary teeth in permanent dentition ranges from 0–3.8%.^[26] Similarly, our data showed the prevalence of 0.5% for supernumerary teeth which was the same as these rate.

In the present study, the prevalence of tooth transposition was 0.1%, and both were observed in the lower jaw. Men and women are equally involved. The prevalence of tooth transposition was 0.38% in a recent investigation and maxillary canine-lateral incisor transposition was found to have a higher frequency than the maxillary canine- first

premolar transposition.^[27] Thoma reported that the mandibular canines are rarely involved^[28] and the study was indicative of mandibular canine transposition, most are limited to the case reports.^[29] Abnormal displacement of dental lamina, presence of obstacles though small in the eruptive route, mandibular fracture adjacent to the canine, and mandibular anterior teeth proclination have been reported as the possible causes of canine displacement in the lower jaw.^{[29],[30]}

Future studies should be designed using periapical instead of panoramic radiographs that show more details regarding dental anomalies, especially along with clinical examination that reveals the cases that are not detectable in X-ray radiographs.

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