Developmental Dental Anomalies in Indian Population Using Panoramic Radiographs: A Cross-Sectional Study

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ABSTRACT

Introduction: Developmental dental anomalies are an important category of dental morphologic variations. The abnormal variations that occur in relation to the dentition and jaws could be attributed to the genetic, environmental, social, ethnic and pathological factors. Dental anomalies are a frequent finding on routine oral examination.

Objective: The study was conducted to assess the prevalence of the developmental dental anomalies in the Indian population and to assess the gender predilection of dental anomalies.

Materials and Method: This cross sectional study was based on clinical examination and evaluation of panoramic radiographs of 1500 Indian subjects, who visited the Department of Oral Medicine and Radiology, PDM dental College and Research Institute, Bahadurgarh, Haryana, India between May 2015 and March 2016.

Result: Among 1500 patients, 528 (35.2%) patients had at least one dental anomaly. Highest prevalence was of Impacted teeth 282 (18.8%), 12.8% had congenitally missing teeth, 1% had supernumerary teeth, Microdontia prevalence was 1.0%. Other anomalies were found at lower prevalence ranging from transposition 1 (0.07%) to ectopic eruption 9 (0.6%). Females have greater prevalence of impacted teeth and congenitally missing teeth were found to be greater in male population.

Conclusion: While the overall prevalence of these anomalies may be low, early diagnosis is imperative for the patient management and treatment planning. The present study showed that the prevalence of various dental anomalies shows variations from other similar studies. The dissimilarities may be attributed to the sample selection, method of the study and area of patient selection, which suggest racial and genetic differences.

Keywords: Anomalies; congenital; developmental; panoramic radiographs.

INTRODUCTION

Developmental anomalies of the dentition are frequently observed by the dental practitioner. Their incidence and degree of expression in different population groups can provide important information for phylogenic and genetic studies and help in the understanding of variations within and between the different population.[1]

Dental anomalies are related to mild developmental delay to the most severe tooth agenesis; they may be expressed as microdontia, changes in dental shape, structure and ectopias.[2] The etiology of these conditions is usually attributed to certain genes in addition to some etiological events in the prenatal and postnatal periods that may result in anomalies in size, shape, position, number, structure, color and eruption pattern of the teeth.[3,4]

The discrepancies in results of the study conducted by Shah RM et al were attributed to racial differences, variable sampling techniques, and different diagnostic criteria.[5, 6]

The abnormal variations that occur in relation to the dentition and jaws could be attributed to the genetic, environmental, social, ethnic and pathological factors. Dental anomalies are a frequent finding on routine oral examination.[7]

While the overall prevalence of each of these anomalies in the dental clinic or population group may be low, their presence may, in some cases create a management problem or complicate treatment options for patients. The logic in screening radiographs is that the radiation risk will be justified by the early identification of a reasonably significant number of treatable conditions. This plays a vital role in reducing the morbidity associated with anomalies in structure namely den's invaginatus and impacted teeth. The anomalies of the teeth may be inherited or acquired.[8, 9]

Careful diagnosis simplifies the treatment plan and reduces complications. Diagnosis could be made at the radiological level; the earlier the diagnosis, the less risks related to treatment. They may be either localized to single tooth or generalized to involve the entire dentition. The various dental disturbances can create disturbances in the maxilla and mandibular arch lengths, occlusions and can lead to aesthetically compromised conditions further complicating the orthodontic treatment planning and aesthetics corrections. Though the prevalence of anomalies is comparatively less than the common oral diseases like dental caries and periodontal diseases, but the challenges that accompany the clinical management is noteworthy.[10]

The objective of this study was to assess the prevalence of the developmental dental anomalies in the Indian population and to assess the gender predilection of dental anomalies.

MATERIALS AND METHOD

The study was based on clinical examination and evaluation of panoramic radiographs of 1500 Indian subjects, who visited the Department of Oral Medicine and Radiology, PDM dental College and Research Institute, Bahadurgarh between May 2015 and March 2016, after obtaining their informed consent and written consent. Exclusion criteria of the subjects included any significant medical history, history of extraction or orthodontic treatment, patients belonging to the pediatric age group (under the age of 14 years) and patients having cleft lip and palate. Only subjects of Indian origin among the age group of 14-60 years were selected. A comprehensive clinical examination was carried out to identify the presence of selected anomalies.

Exclusion criteria: Teeth missing as a result of caries, periodontal disturbances, and trauma/ extraction were excluded from the study. Patients with significant systemic medical history, trauma to joints, metabolic disorders, extractions before orthodontic treatment and patients who received previous orthodontic treatment were also excluded.

Panoramic radiographs were taken. The orthopantomographs (OPGs) and dental records were examined for any unusual finding such as congenitally missing teeth, impactions, ectopic eruption, supernumerary teeth, odontoma, dilacerations, and taurodontism, dens in dente, germination and fusion, transposition among others. Radiographic examination of panoramic radiographs were meticulously observed by experienced team of radiologists using magnifying lens and X ray viewers in an ambient atmosphere, and findings were interpreted and recorded.

The findings of the study were entered into a spreadsheet (Excel 2000; Microsoft Office, Microsoft Corporation, USA) and analysed subsequently using the Statistical Package for Social Sciences (Windows version 9.0; SPSS Inc., Chicago, IL, USA). Chi-square test was used for statistical analysis.

RESULT

In this cross sectional study, the sample group comprised of 1500 patients. Among which 528 (35.2%) patients had at least one dental anomaly .Impacted teeth had highest prevalence of 282(18.8%). Congenitally missing teeth had prevalence of 192 (12.8%), Supernumerary teeth and Microdontia both had prevalence of 15 (1.0%). Other anomalies were found at lower prevalence ranging from transposition 1 (0.07%) to ectopic eruption 9 (0.6%). In our study, it was observed that females have greater prevalence of impacted teeth whereas other developmental anomalies like congenitally missing teeth were found to be greater in male population.

Table 1: Prevalence of dental anomalies present.

Dental Anomalies	Male(n)	Female(n)	Total Prevalence Percentage
Impacted teeth	132	150	18.8
3rd molar	108	120	15.2
Canine	15	18	2.2
Premolar	1	2	0.2
Other	8	10	1.2
Congenitally missing	99	93	12.8
3rd molar	72	66	9.2
Premolar	10	8	1.2
Canine	6	3	0.6
Other	11	16	1.8
Supernumerary teeth	9	6	1.0
Microdontia	8	7	1.0
Ectopic eruption	4	5	0.6
Dilaceration	4	2	0.4
taurodontism	2	1	0.2
Odontoma	2	1	0.2
Macrodontia	0	2	0.14
Transposition	1	0	0.07
Total	261	267	35.2

DISCUSSION

Many epidemiological surveys have been done in the recent past in different parts of the world to determine the prevalence of dental anomalies. The results of these studies have shown that variations in the prevalence of dental anomalies could be due to regional and racial differences.

The prevalence of dental anomalies reported in this study was quite high due to a large number of the anomalies of the wisdom teeth (18.8%).

The present findings showed that the prevalence of impaction was found to be 18.8%, which is higher than the findings of the previous studies.[1,12-14] Afify and Zawawi reported a higher prevalence of impacted teeth (21.2%).[3] In this study, third molars were the most commonly impacted teeth, with the prevalence of 15.2%, which is much lower than the studies of Fardi et al.[15] who reported a prevalence of 8.8% in the Greek population. In a similar study, 4898 Saudi patients aged 13 years and older were examined, who showed a prevalence of 3.6% with at least one impacted cuspid.[16] Another study that

analysed 1858 patients of the 11-18 year age group presented for orthodontic treatment, revealed 101 cases of impacted canines with a prevalence of 5.43%.[17] One limitation to the findings of the present study is that the impactions were not classified as partial or fully impacted and the angulation of impaction was also not taken into consideration. The Japanese have shown to have the lowest frequency as reported in the literature, where the anomaly occurred in only 0.27% of the study population.[19] Similar to these findings, study[20] of a large series of full mouth dental radiographs in the USA revealed a figure of 0.92%. While Brin et al.[21] in their study of an Israeli population, found a level of 1.5%. Very few studies have been done regarding impacted premolars. It has been concluded from these studies that premolar impaction is rare, with the prevalence ranging from 2.1-2.7%.[13,19,21] The results of the present study are however lower, with a prevalence of 1.2%.

Supernumerary teeth are a frequent finding in dental practice. Supernumerary teeth or hyperdontia describes an excess in tooth number. The prevalence of hyperdontia is reported to lie between 1-3% in permanent dentition and is rarely seen in the primary dentition. The aetiology is unknown, and several theories have been suggested. The prevalence of 1.0% of supernumerary impacted teeth as reported in the present study falls within the range of 0.1-3.8% as reported earlier.[15, 23] Bäckman and Wahlin found 14 cases with one supernumerary tooth in a study in the Caucasian population.[23] They also noted that the majority of the supernumerary teeth were mesiodens, similar to the present study.

Zhu et al[24] reported the prevalence of supernumerary teeth by race; the prevalence among the white population ranged from 1% to 3% while in the Turkish population,[25] the total percentage was 0.36%. Other studies stated that 90% to 98% of all supernumerary teeth occur in the maxilla, most commonly in the premaxilla region.[25, 26] Many studies reported that the most common type of hyperdontia is mesiodens; in the present study also, we found that the mesiodens was most common (0.89%), followed by maxillary premolars. Among the 1123 subjects, there were no individuals with supernumerary molars (paramolars), although they are reported as the second most common supernumeraries.[24] Most supernumerary teeth are impacted and asymptomatic and diagnosed incidentally during radiographic examinations. Panoramic radiograph is thus essential for the early detection of supernumerary teeth. However, clinical complications are not uncommon in patients with supernumerary teeth.

Throughout human evolution, reductions in the number of teeth and size of the jaws have occurred, along with a decrease in the surface area needed for mastication. It is believed that evolution with regard to reduction in tooth numbers will continue.[25] In our study, the prevalence of congenitally missing teeth was 12.8%. The types of teeth reported missing vary in different ethnic groups. In American children, mandibular second premolars are commonly missing;[26] in Saudi Arabian children, it is maxillary lateral incisors;[27] in European children, it is maxillary second premolars.[28] In the Turkish population, similar to the American population,[29] the maxillary lateral incisors are most frequently missing, followed by premolars.

In 1997, Proffit[30] mentioned that the most common abnormality is variation in size, particularly in the maxillary lateral incisors. The prevalence of this condition ranges from 0.8% to 8.4% in various populations.[31]

In the present study, the prevalence of microdontia was 1.0% and 0.2% of the patients showed taurodontism. The prevalence of taurodontism was found to be 1.0% in a recent study of various malocclusions.[32] Darwazeh et al[33] found a higher rate of 8.0% in Jordanian dental patients; Shifman and Chanannel[34] reported a prevalence of 5.6% in Israeli patients, whereas MacDonald-Jankowski and Li[35] reported an even higher rate (46.4%) of taurodontism in an adult Chinese population. The difference might arise from racial differences or differences in diagnostic criteria. Maxillary second molar was the most commonly affected in current study.

CONCLUSION

While the overall prevalence of these anomalies may be low, early diagnosis is imperative for the patient management and treatment planning. The present study showed that the prevalence of

various dental anomalies shows variations from other similar studies. The dissimilarities may be attributed to the sample selection, method of the study and area of patient selection, which suggest racial and genetic differences.

CONFLICT OF INTEREST

NIL

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