Original Research Article

Prevalence of dental anomalies in patients visiting a tertiary care hospital

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ABSTRACT

Introduction: Changes in dental anatomy resulting from hereditary and environmental influences during tooth development are known as anomalies. Abnormalities in tooth number, shape, size and structure result from disturbances during different stages of tooth development. This study was conducted to assess the prevalence of dental anomalies among patients visiting a dental teaching hospital in Kathmandu. **Methods:** In this descriptive cross-sectional study, dental anomalies affecting tooth shape, number, and position were evaluated on digital orthopantomograms. Data was analyzed in SPSS version 24. Mean, standard deviation, frequency, and percentage were calculated for descriptive data analysis. **Results:** Among 200 radiographs observed, 20(10.00%) had at least one dental anomaly present. Anomaly affecting shape was observed in 9(4.50%), and anomaly affecting number in 12(6.00%). Impacted tooth was present in 150(75%). The third molar impaction was seen in 89(44.50%). Only 3(1.5%) of patients' radiographs showed canine impaction. Five (2.5%) teeth with dilaceration and 4(2.0%) peg-shaped laterals were observed. Eight (4.0%) patients had at least one missing tooth. Paramolar, distomolar, mesiodens and multiple supernumerary teeth were present in 1(0.5%). **Conclusions:** The findings of this study revealed that dental anomalies were present in a small yet notable proportion in radiographs of patients visiting a dental teaching hospital. Impaction was the most prevalent anomaly affecting tooth position, present in three-fourths of the radiographs, predominantly involving third molars. Routine radiographic evaluation, particularly panoramic radiographs, should be considered in young adults to detect impaction and other anomalies at an early stage.

Keywords: Dental anomaly, impaction, number, orthopantomogram, shape.

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INTRODUCTION

Changes in dental anatomy resulting from hereditary and environmental influences during tooth development are known as anomalies. Anomalies in tooth shape, size, number, and location may arise when environmental, genetic, or epigenetic factors impact dental development.[1] Developmental disturbances affecting teeth may be localized to a single tooth or involve systemic conditions. Abnormalities in tooth shape, size and structure result from disturbances during different stages of tooth development. In contrast, ectopic eruption, impaction and rotation of teeth result from disturbances in the eruption pattern of permanent teeth.[2] Apart from clinical observations, radiography is crucial for diagnosing these anomalies and plays an integral role in the differential diagnosis of these anomalies.[3]

Anomalies in tooth size, shape, position, number, and structure can lead to problems with arch length and occlusion. These dental irregularities can result in functional deficiencies, decreased efficiency, defective phonetics, impaired esthetics and decreased work productivity, ultimately impacting the quality of life.[4] The

clinical effects of dental anomalies are seen in many dental specialties, especially restorative dentistry, pediatric dentistry, orthodontics, and oral surgery. Diagnosis at early stages with knowledge of prevalence and distribution in various age groups and genders allows for optimal management of cases and the treatment planning of these conditions.[5]

Several studies have been conducted examining dental anomalies among defined populations,[1-3,5,6] although it is uncertain whether these are applicable to a Nepalese population. There are few studies conducted on the prevalence of dental anomalies among the Nepalese population.[4,7] This study was therefore conducted to evaluate the prevalence and distribution of dental anomalies in patients visiting a dental teaching hospital in Kathmandu.

METHODS

This descriptive cross-sectional study was conducted from June to September 2025 at Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, Nepal, among 200 patients requiring orthopantomograms (OPGs) for any reason. Digital orthopantomograms of patients aged 15 to 50 years were considered for evaluation of dental anomalies. Ethical approval was received from the Institutional Review Committee of the Institute of Medicine (Ref. No. 693,081/82, 6-11 E2). Radiographs of patients with clear imaging were included. Radiographs with incomplete records, or radiographs of patients with syndromic conditions known to influence dental development, those with a history of previous orthodontic treatment, history of trauma or missing tooth due to extraction were excluded. Informed consent was received from the study participants before taking an orthopantomogram for data collection.

Sample size was calculated in reference to the previous study conducted by Gupta and Rouniyar[7] in Nepalese patients using the formula $n = Z^2pq/e^2$, where Z= 1.96 at 95% confidence interval, p= prevalence of condition = 15.3%, q= 100-p, e= standard permissible error = 5%. Therefore, the estimated sample size was 199.13 = 200.

The radiographs were analyzed using image viewer software. The developmental anomalies affecting shape, number and position were identified according to the diagnostic criteria given by Alanzi et al.[8] Developmental disturbances affecting the shape of the teeth include fusion: the union of two dental germs that would normally be separated, resulting in a double tooth, the dental count reveals the lack of a tooth when the anomalous tooth is counted as one; gemination: duplication of a single dental germ, resulting in the partial or total formation of two teeth that, however, do not separate completely. Tooth counting is normal when the anomalous tooth is considered as one, root dilaceration: abnormal angulation or sharp curvature of the dental root, taurodontism: elongated crowns and pulp chamber accompanied by a more apical location of the bifurcation area of a multi-radicular tooth. Developmental disturbances affecting the number of teeth include dental agenesis: no sign of crown calcification on the radiograph, considering the chronological age of dental eruption; agenesis: absence of 1 to 6 teeth (excluding the third molars), oligodontia: absence of more than 6 teeth (excluding the third molars), anodontia: complete absence of teeth. If missing teeth were suspected, the patient's file was checked to ascertain that the patient had no history of extractions, syndromes, or craniofacial malformations, supernumerary teeth: teeth formed in excess of the normal dentition, regardless of whether they were impacted or erupted. A supernumerary tooth located between the central incisors was considered a mesiodens. Developmental disturbances affecting the position of the tooth: Transposition: the presence of positional interchange of two adjacent teeth, the development or eruption of a tooth in a position normally occupied by a nonadjacent tooth. Ectopic eruption: The eruption of a tooth in an abnormal position. Impacted tooth: A tooth whose eruption, in normal functional occlusion, was obstructed by other teeth, bone, or soft tissues. Dental ankylosis: A clinical condition whereby, after eruption, a tooth loses its ability to maintain the continuous eruptive potential as the jaws grow. This is radiographically and clinically diagnosed by the presence of loss of the periodontal ligament space accompanied by the presence of infra occlusion.

Panoramic radiographs were evaluated by two examiners to minimize radiographic misinterpretation. A sample of OPG showing congenitally missing 35 and 45 with over-retained 75 and 85 is presented in Figure 1. Data were entered into a Microsoft excel sheet and analyzed using SPSS version 24. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were computed.

Figure 1: OPG congenitally missing 35 and 45 with over-retained 75 and 85

RESULTS

The mean age of the study participants was 27.96±5.81 years, among which 73(36.50%) were males, and 127(63.50%) were females. Out of 200 radiographs, 20(10.00%) exhibited at least one dental anomaly, and 180(90.00%) did not have any anomaly. Anomalies affecting shape were detected in nine patients (4.50%), predominantly in 6(3.00%) females. However, anomalies affecting the number were observed equally in males and females, involving a total of 12(6.00%) patients. (Figure 2)

A total of 150(75.00%) radiographs showed at least one impacted tooth and showed female predominance, 93(46.50%). The third molar impaction was the most common finding 89(44.50%). Canine impaction was observed in only 3(1.50%) patients. (Table 1)

Regarding anomalies affecting shape, dilaceration was seen in five teeth (2.50%) with only female involvement, and peg-shaped lateral incisors in 4(2.00%) (Table 2). On analyzing anomalies affecting the number, at least one missing tooth was observed in eight patients (4.00%). Supernumerary teeth were relatively rare: paramolar 1(0.50%), distomolar 1(0.50%), mesiodens 1(0.50%), and multiple supernumerary teeth 1(0.50%). (Table 3) The right maxillary lateral incisor was the most commonly missed tooth 3(1.50%).

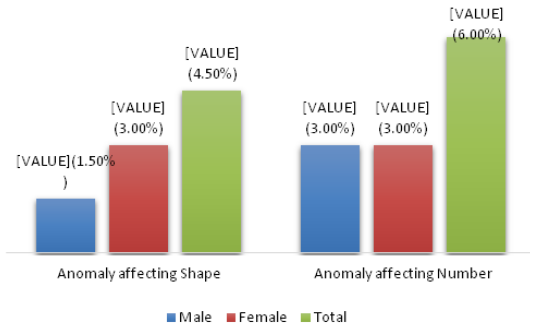

Figure 2: Distribution of study participants based on dental anomaly affecting shape and number of teeth (N=200)

Table 1: Distribution of study participants based on the presence of the number of impactions (N=200)

Variables	Number	Male n (%)	Female n (%)	Total n (%)
Impaction	1	8(4.00)	17(8.50)	25(12.50)
	2	32(16.00)	57(28.50)	89(44.50)
	3	9(4.50)	6(3.00)	15(7.50)
	4	7(3.50)	12(6.00)	19(9.50)
	5	1(0.50)	-	1(0.50)
	6	-	1(0.50)	1(0.50)
Third molar impaction	1	7(3.50)	17(8.50)	24(12.00)
	2	33(16.50)	56(28.00)	89(44.50)
	3	8(4.00)	7(3.50)	15(7.50)
	4	9(4.50)	13(6.50)	22(11.00)
Total	1-4	57(28.50)	93(46.50)	150(75.00)
Canine impaction	1	1(0.50)	1(0.50)	2(1.00)
	2	-	1(0.50)	1(0.50)
Total	1-2	1(0.50)	2(1.00)	3(1.50)

Table 2: Distribution of study participants based on the presence of anomaly based on shape (N=200)

Variables	Tooth involved	Male n(%)	Female n(%)	Total n(%)
Dilaceration	18	-	1(0.50)	1(0.50)
	22	-	1(0.50)	1(0.50)
	37	-	1(0.50)	1(0.50)
	38,48	-	1(0.50)	1(0.50)
	48	-	1(0.50)	1(0.50)
	Total	-	5(2.50)	5(2.50)
Peg lateral	12,22	2(1.00)	1(0.50)	3(1.50)
	22	1(0.50)	-	1(0.50)
	Total	3(1.50)	1(0.50)	4(2.00)

Table 3: Distribution of study participants based on the presence of anomaly based on number of teeth (N=200)

Anomaly	Male n(%)	Female n(%)	Total n(%)
Missing tooth			8(4.00)
Paramolar	-	1(0.50)	1(0.50)
Distomolar	1(0.50)	-	1(0.50)
Mesiodens	-	1(0.50)	1(0.50)
Multiple supernumerary tooth	1(0.50)	-	1(0.50)

DISCUSSION

Dental abnormalities may introduce significant functional and aesthetic issues in both jaws.[9] This study was conducted to assess the prevalence of dental anomalies and impacted teeth using panoramic radiographs. Panoramic radiographs were used for the assessment of dental anomalies as they are useful for identifying dental abnormalities that could otherwise go undetected.[10] Along with its non-invasive nature, orthopantomogram helps in easy identification of certain abnormalities, particularly those that are invisible during an intraoral examination, including dental agenesis or dental impaction.[11]

The present study demonstrated that 10.00% of patients aged 15-50 years had at least one dental anomaly affecting the shape and number of teeth. This finding contrasts with a study conducted in Kathmandu, Nepal, by Shrestha et al. among 13–42-year-old individuals, where they found a higher prevalence of 56.19%.[12] However, a study conducted by Gupta et al. on Nepali orthodontic patients aged 10-35 years, the prevalence of dental anomalies was 15.30%.[7] A study done by Adhikari et al. among 6-12-year-old children visiting Dhulikhel hospital reported 26.80% prevalence of dental anomalies.[4] In a study conducted among 14-50-year-old orthodontic patients in Ahvaz, 17.30% presented with a dental anomaly.[13] A study conducted by Wagner et al. in 6-12-year-old children's panoramic radiographs showed that 61.30% at least one dental anomaly.[14]

Interference with the fetus's normal growth and differentiation is the cause of any anomaly or defect. A wide range of determining variables, including genetic mutations, chromosomal abnormalities, teratogenic agents, and environmental factors, can cause these defects, which can occur at any stage of embryonic development and vary widely in form and severity.[15] In the current study, 12(6.00%) had an anomaly affecting the number, and 9(4.50%) had an anomaly affecting the shape of teeth. Significant clinical effects, including problems of occlusion and an increased susceptibility to caries and periodontal disease, can result from abnormalities in tooth size, shape, and structure. Additionally, the clinical management of patients may be affected by the existence of supernumerary teeth or the absence of a tooth in the oral cavity.[14]

Tooth impaction was observed as the most prevalent condition in this study, affecting 150(75.00%) of the study participants, predominantly females. The third molar was the most frequently impacted tooth, with nearly half (44.50%) of the cases presenting with two impacted third molars.

This aligns with previous studies that have highlighted third molar impaction as the most common developmental disturbance due to limited retromolar space and evolutionary reduction in jaw size. A study conducted by Salam et al. in Kerala, where 22% of total 330 subjects presented with at least one impacted tooth with mandibular third molars being the most commonly impacted tooth (17.46%).[16] A systematic review reported the pooled worldwide prevalence of impacted third molars as 36.9% [95% CI: 33.1–40.7%] per subject and 46.4% [95% CI: 36.7–56.1%] per tooth, with the highest rates in Asia(43.1% [95% CI: 34.6–51.7%]). Similar to the findings of the present study, this systematic review indicated a slightly higher likelihood of third molar impaction among women compared to men.[17] Similarly, a study conducted in a dental department of a tertiary care center of Nepal reported the prevalence of mandibular third molar impaction as 37.13% with female predominance (59.70%).[18]

In the present study, canine impaction was identified in only 1.5% of participants. However, two studies conducted among orthodontic patients in the hospital setting of Nepal reported slightly higher prevalence of impacted canines (4.37% and 5.6%).[19,20] Although relatively infrequent, impacted canines pose considerable clinical challenges for orthodontic management and prosthetic replacement.

Shape anomalies were less common in this study, with dilaceration observed in 5(2.5%) and peg-shaped laterals in 4(2.0%) cases. However, a study conducted by Wagner et al. reported radicular dilacerations as the most common (38.1%) dental anomaly in permanent dentition.[14] Among anomalies affecting number in the current study, hypodontia was the most commonly observed anomaly, affecting 8(4.0%) of the cases. Aligned to this study, a study conducted in Ahvaz observed hypodontia as the most common dental anomaly with a prevalence of 15%.[13] Similarly, in a study conducted in Nepal found a higher prevalence of hypodontia as 7.48%.[7] A literature review reported that in 35.7% cases (15/42), anomalies of the permanent successor teeth were present, of which permanent tooth agenesis was most commonly seen in 75% cases of hypodontia (3/4) and 85.7% cases of oligodontia (6/7).[21]

This study has certain limitations that should be noted. First, the sample was limited to 200 orthopantomographs of a single institution, which may not fully represent the prevalence of dental anomalies in the broader population. Secondly, as it was a completely radiographic study, clinical correlation with patient history and examination was not feasible. Lastly, genetic, environmental, and dietary influences, which may contribute to the occurrence of anomalies and impactions, were not assessed. Therefore, future studies with larger, more diverse populations and inclusion of genetic or environmental factors are recommended to enhance the understanding of the etiology and distribution of dental anomalies.

CONCLUSIONS

The findings of this study revealed that dental anomalies affecting the shape and number were present in a small yet notable proportion. The impaction was the most common anomaly affecting the position. Dilaceration was the most common anomaly affecting the shape, and hypodontia affecting the number of teeth. A few peg laterals and supernumerary teeth were observed in radiographs. Routine radiographic evaluation, particularly panoramic radiographs, should be considered in young adults to detect impaction and other anomalies at an early stage. Further multicenter studies with larger samples are recommended to better understand the epidemiological patterns of dental anomalies in the Nepalese population.

CONFLICTS OF INTEREST: None declared

SOURCE OF FUNDING: None

AUTHORS' CONTRIBUTIONS

RB designed the research, RB and DM collected data, SD2 performed statistical analysis, and interpretation. SD1 and

SD2 contributed to the literature review and manuscript preparation. All authors read and approved the manuscript.

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