

Relationship between skeletal malocclusion and dental anomalies in Nepalese population

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ABSTRACT

Introduction: Teeth eruption is important for the development of alveolar process which increases vertical height of the face and third molar is the last tooth to erupt in the oral cavity after birth. The aim of this study was to determine relationship between skeletal malocclusion and dental anomalies in Nepalese population.

Materials & Method: A sample of 170 patients with agenesis of at least one third molar was divided into four groups according to the third-molar agenesis pattern. Panoramic radiographs, lateral cephalograph and cast models were used to determine the skeletal malocclusion and associated dental anomalies. The Pearson chi-square test was used for statistical analysis.

Result: Among 170 patients more than half of the patients were female with the average age being 18.15 ± 3.64 years. Majority of the patients had Class I skeletal malocclusion followed by Class II and III but on group wise comparison of patients with different skeletal patterns Class I skeletal malocclusion had highest prevalence of dental anomalies followed by Class III and Class II malocclusion.

Conclusion: Prevalence of third-molar agenesis was more in skeletal class I malocclusion followed by class II and III but skeletal Class I malocclusions had more dental anomalies followed by class III and class II malocclusion.

Keywords: Hypodontia, Skeletal malocclusion, Tooth agenesis.

INTRODUCTION

Tooth agenesis is the congenital absence of at least one permanent tooth, because it never formed.¹ The order of decreasing frequency of agenesis is third molar, mandibular second premolar, and maxillary lateral incisor, suggesting that it is the most distal tooth in each group that disappears.^{2,3} Ageneses do not appear in isolation,⁴ they are usually associated with development anomalies such as delayed tooth formation, late exfoliation of deciduous teeth, retention of deciduous teeth, agenesis of other teeth, poor development of the alveolar bone and crown-size reduction, particularly crown size reduction of the upper lateral incisors and second premolar. Garn⁵ reported that when a third molar is absent, agenesis of the remaining teeth is thirteen times more likely to occur and frequency of third molar agenesis ranges from 14% to 51.1%.⁶

The third molar is a tooth that develops after birth and is also the last tooth to erupt. It has variability in the time of formation, varying crown and root

morphology, and its varying presence or absence in the oral cavity.⁷ Variations in tooth morphology are associated with tooth agenesis, including reduced mesiodistal crown diameter and conical or tapered crowns.⁸ Corresponding contralateral teeth are often accompanied by imperfect morphologic formation.⁹

The alveolar process, the portions of the mandible and the maxilla that surround and support the dentition, dependent on crown completion and root formation.¹⁰ Third molars are important in assessing the dental age of juveniles and also provide forensic specimens.^{4,11} Orthodontic treatment planning is also affected by third molar agenesis, especially when arch distalization is planned.

MATERIALS AND METHOD

The subjects for the study were selected from Pretreatment records of patients who had undergone various orthodontic treatments in the Department of Orthodontics and Dentofacial Orthopedics, Peoples Dental College and Hospital Kathmandu, Nepal.



Figure 1: Orthopantomograph



Figure 2: Lateral Cephalogram



Figure 3: Study Model

From the pretreatment records of patients aged between 13-25, who had at least one third molar agenesis. The database for evaluation was obtained retrospectively from Orthopantomograph, cephalograms and study model to determine skeletal malocclusion and associated dental anomalies. Patients having congenital anomalies like cleft lip and palate, previous history of orthodontic and orthognatic surgery and surgical removal or extraction of any third molars or permanent teeth were excluded in this study.

Based on inclusion and exclusion criteria 170 (115 female and 55 male) records were selected for this study. Patients having at least one third molar agenesis was taken and noted the skeletal pattern and other dental anomalies such as Hypodontia, Hyperdontia, Impaction, Dilaceration, Microdontia and Transposition.

Data were entered, edited and coded in Microsoft excel. Obtained data were transferred to Statistical Package for Social Sciences (SPSS) 17.0 for further

analysis. The numerical variables were summarized with the help of mean, median, standard deviation and range. The categorical variables were expressed in frequency and percentages. The Pearson chi-square test was used to determine the differences in the distribution of the associated dental anomalies between the group, sex and skeletal malocclusion and level of significance is set at 5 %.

RESULT

Among 170 patients more than half of the patients were female. Majority of the patients had Class I skeletal malocclusion followed by Class II and III (Table 2). The results showed that Class I skeletal malocclusion had highest prevalence of dental anomalies followed by Class III and Class II malocclusion (Table 3). This difference in proportion among the patients reached statistical significance with p value less than 0.001. Thus, there is a significant association between skeletal malocclusion and occurrence of dental anomalies. The results are summarized in tables 1, 2, 3 and 4.

Table 1. Age distribution and association of dental anomalies between genders

Gender	Number	Dental Anomalies		Chi Squared Value	P value
		Presence	Absence		
Male	55 (32.4%)	18 (28.6%)	37 (34.6%)	0.654	0.419
Female	115 (67.6%)	45 (71.4%)	70 (65.4%)		
Total	170 (100%)	63 (37.1%)	107 (62.9%)		

Table 2: Characteristics of the skeletal malocclusion and third molars agenesis

Characteristics	Categories	Number	Percent
Skeletal Malocclusion	Class I	90	52.9%
	Class II	44	25.9%
	Class III	36	21.2%

Table 3: Association of skeletal malocclusion with presence of dental anomalies

Skeletal Malocclusion	Dental Anomalies		Chi Squared Value	P value
	Presence	Absence		
Class I	27 (42.9%)	63 (58.9%)	20.853	<0.001*
Class II	11 (17.5%)	33 (30.8%)		
Class III	25 (39.7%)	11 (10.3%)		
Total	63 (100%)	107 (100%)		

* Statistically Significant

Table 4: Association of presence of dental anomalies with skeletal malocclusion - Odds ratio estimates

Skeletal Malocclusion	Odds Ratio	Lower Estimate	Upper Estimate	Chi Squared Value	P value
Class I (Reference)	-	-	-	-	-
Class II	1.286	0.567	2.913	0.363	0.546
Class III	0.182	0.081	0.436	16.506	<0.001*

* Statistically Significant

DISCUSSION

Third molar is a tooth that develops after birth and also the last tooth to erupt. It is characterized by the variability in the time of its formation, its widely varying crown and root morphology, and its varying presence or absence in the oral cavity.⁷ The purpose of this study was to determine the association between skeletal malocclusion and dental anomalies in Nepalese population. One hundred seventy sample of adolescent patients aged between 13 to 25 years with agenesis of at least one third molar was selected from the files of orthodontic patients undergoing treatment in Department of Orthodontics, Peoples dental college and hospital, Kathmandu, Nepal.

In this study minimum age was set at 13 years because third molar crypt formation starts at 3 to 4 years of age, calcification begins from 7 to 10 years, crown calcification completes at 12 to 16 years of age and eruption occurs between 17 to 25 years of age.^{12,13} Upper age limit was set at 25 years because upto this age complete eruption of 3rd molar occurs in the oral cavity. If any patient had undergone surgical removal of a third molar, those patients were excluded from the study. The clinical implications of the associated dental anomalies are relevant, since early detection

of a single dental anomaly may call the attention of professionals to the possible development of other associated anomalies in the same patient or in the family, allowing timely orthodontic intervention.

Females presented a higher prevalence of third molar agenesis than males. As the dimensions of dental arch of females were generally smaller than males and growth of maxilla and mandible in females were slower after 12–13 years but in case of male growth continues until age of 16 years.¹⁴ Racial variations, dietary habit, masticatory function and genetic inheritance can effect jaw size and facial growth. In an animal study, Yamada and Kimmel¹⁵ reported that diet and masticatory function had a direct relationship with craniofacial growth, specifically effecting the mandible, which could in turn affect the presence/agenesis of third molar.

Prevalence of third-molar agenesis was more in skeletal class I malocclusion followed by class II and III which was not in accordance with Celikoglu,⁶ who reported that the prevalence of third molar agenesis was more in skeletal class III followed by class I and II, this may be due to polygenetic inheritance on formation of third molar germs that control maxillary and/or mandibular dimensions which was different in different

population. Present study also shows that skeletal Class I malocclusions had more dental anomalies followed by class III and class II malocclusion which was statically significant.

CONCLUSION

Prevalence of third-molar agenesis was more in skeletal class I malocclusion followed by class II and III but skeletal Class I malocclusions had more dental anomalies followed by class III and class II malocclusion.



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