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Relationship Between Agenesis of Third Molars Skeletal Malocclusion

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Abstract

Background and Aim: Among the agenesis of permanent teeth the most affected tooth is the third molar Mandibular third molar is an unusual tooth characterized by considerable variability in formation, timing, variation in crown and root morphology and not infrequently, by agenesis. Our aim of this study is to find the frequency of third molar agenesis as well as correlation of skeletal malocclusion and third molar agenesis.

Material and Methods: A total of 594 patients (242 males, 352 females) aged between 11 and 25 years were reviewed retrospectively. A tooth was considered developmentally missing when there was no evidence of surgical tooth extraction, when there was no any sign of tooth crown mineralization or crypt development with radiolucency on panoramic radiographs. Patients were divided into five groups according to agenesis of third molars: Patient's skeletal malocclusion was determined by SNA, SNB and ANB angles as well as Wit's appraisal and divided into class I, II, III malocclusion.

Results: Third Molar Agenesis was more common in maxilla than in mandible. Third Molar Agenesis was more common in females than males. Significant association was observed between Molar tooth agenesis and Gender. Highest number was observed in females at only 1 third molar was missing followed by 2 third molar missing. Prevalence of third-molar agenesis was more in skeletal class III malocclusion followed by class II and I and it was significant statistically.($p \leq 0.05$).

Conclusion: Third molar agenesis was most commonly observed in maxillary arch than in mandibular arch and more common in skeletal Class III followed by Class I and Class II. It was also observed that Third Molar Agenesis was more common in females than males. Significant association was observed between Molar tooth agenesis and Gender.

Keywords: Third molar agenesis, Maxilla, Mandible, Skeletal Malocclusion.

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Introduction

The most common anomaly in the development of human dentition is tooth agenesis, which is defined as the congenital absence of one or more deciduous or permanent teeth.[1] Agenesis of this tooth is frequent, although its frequency ranges widely, varying from zero among an unspecified sample of craniums in Tasmania to 49% in an unspecified sample of Hungarian craniums.[2]

Among the agenesis of permanent teeth the most affected tooth is the third molar (Larmour et. al., 2005).[3] Mandibular third molar is an unusual tooth characterized by considerable variability in formation, timing, variation in crown and root morphology and not infrequently, by agenesis.[4]

Genetic factors play a role in tooth agenesis as suggested by familial occurrence, different prevalence data between populations, strong association with hereditary syndromes and defects found in several genes by molecular studies.[5] Specific gene polymorphisms in Msx 1, Pax 9, TGFA are reported for their association to tooth agenesis.[6] Besides genetic factors, environmental factors, systemic diseases, and dietary habits can play an etiological role in the occurrence of dental anomalies including agenesis.[7]

There was an inter-relationship between sagital skeletal malocculusion and third molar agenesis among orthodontic patient sample.[8] Third molars are the best biological indicator for assessment of juvenile age and they also provide forensic specimens.[9,10]

Our aim of this study is to find the frequency of third molar agenesis as well as correlation of skeletal malocclusion and third molar agenesis.

Material and Method

A total of 594 patients (242 males, 352 females) aged between 11 and 25 years were reviewed retrospectively. A tooth was considered developmentally missing when there was no evidence of surgical tooth extraction, when there was no any sign of tooth crown mineralization or crypt development with radiolucency on panoramic radiographs. Radiographs which show pathologies such as cysts or tumors were excluded from the study. Panoramic images reflecting any artifact, and evident orthodontic treatment or surgery in the past were also excluded from the study.

Ethical approval was taken from the institutional ethical committee and written informed consent was taken from all the participants.

Out of 594 patients 423(71.21%) patient showed no any third molar tooth agenesis whereas 171(28.79%) patients shows third molar agenesis. Among 171 patients 76 patients showed 1third molar agenesis, 40 patients showed 2 third molar teeth agenesis, 21 patients showed 3 third molar teeth agenesis and 34 patients showed all 4 third molar teeth agenesis. Patients were divided into five groups according to agenesis of third molars:

Group A (35 males and 41 females), patients with agenesis of 1 missing third molar;

Group B (14 males and 26 females), patients with agenesis of 2 missing third molars;

Group C (11 males and 10 females), patients with agenesis of 3 missing third molars;

Group D (16 males and 18 females), patients with agenesis of 4 missing third molars and

Group E (166 males and 257 females), patients without agenesis of missing third molar

Out of 594 patients 423(71.21%) patient showed no any third molar tooth agenesis whereas 171(28.79%) patients shows third molar agenesis. Among 171 patients 76 patients showed 1third molar agenesis, 40 patients showed 2 third molar teeth agenesis, 21 patients showed 3 third molar teeth agenesis and 34 patients showed all 4 third molar teeth agenesis. Patient's skeletal malocclusion was determined by SNA, SNB and ANB angles as well as Wit's appraisal and divided into class I, II, III malocclusion.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

Table 1 Describes Distribution of Third Molar Agenesis in Maxilla and Mandible. Third Molar Agenesis was more common in maxilla than in mandible

Table 1: Distribution of Third Molar Agenesis in Maxilla and Mandible

	Frequency	Percentage
Maxilla	102	59.64
Mandible	69	40.35
Total	171	100

Table 2: Distribution Third Molar Agenesis according to Gender

Gender	Number	Percentage
Male	74	43.27
Female	97	56.72
Total	171	100

According to Table 2 Third Molar Agenesis was more common in females than males.

Table 3: Association of Molar tooth agenesis by Gender

Variable	Male N (%)	Female N (%)	Frequency N (%)	P value
1Third molar tooth agenesis	32 (42.10)	44 (57.8)	76 (44.4)	0.02*
2Third molar teeth agenesis	19 (47.5)	21 (52.5)	40 (23.39)	
3Third molar teeth agenesis	10 (47.6)	11 (52.3)	21 (12.28)	
4Third molar teeth agenesis	13 (38.23)	21 (61.76)	34 (19.88)	

Test applied: Chi square test, *p ≤ 0.05 statistically significant

Chi-square value: 5.59, df = 5

Table 3 Describes Association of Molar tooth agenesis by Gender. Significant association was observed between Molar tooth agenesis and Gender. Highest number was observed in females at only 1 third molar was missing followed by 2 third molar missing.

Table 4: Distribution of Molar tooth agenesis by Malocclusion

Variable	Total no of patients	Male no of patients with teeth agenesis N (%)	Female no of patients with teeth agenesis N (%)	no of patients with teeth agenesis N (%)	P value
Class I	214	20 (41.6)	28 (58.33)	48 (28)	0.001*
Class II	195	26 (44.06)	33 (55.93)	59 (34.5)	
Class III	185	28 (43.75)	36 (56.25)	64 (37.4)	
Total	594	74 (43.27)	97 (56.72)	171 (100)	

Test applied: Chi square test, *p ≤ 0.05 statistically significant

Chi-square value: 12.04, df = 6

According to table 4 it was observed that Prevalence of third-molar agenesis was more in skeletal class III malocclusion followed by class II and I and it was significant statistically.(p≤0.05)

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.[11] A total of 594 patients (242 males, 352 females) aged between 11 and 25 years were reviewed retrospectively.

In this study minimum age was set at 11 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 Kimmel[15] 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.

Significant association was observed between Molar tooth agenesis and Gender. Highest number was observed in females at only 1 third molar was missing followed by 2 third molar missing which is similar to the studies done by Banks[16] and Afzal et. al.[17] In Contrast, other studies found the order of frequency of Molar agenesis to be one, two, three and four respectively.18,19 In addition, there was a significant difference in the occurrence of Molar agenesis between upper and lower jaw (p=0.001).

According to table 4 it was observed that Prevalence of third-molar agenesis was more in skeletal class III malocclusion followed by class II and I and it was significant statistically.($p \leq 0.05$). This findings were in accordance with Celikoglu[16] 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.

Conclusion

Third molar agenesis was most commonly observed in maxillary arch than in mandibular arch and more common in skeletal Class III followed by Class I and Class II. It was also observed that Third Molar Agenesis was more common in females than males. Significant association was observed between Molar tooth agenesis and Gender.

Ethical approval was taken from the institutional ethical committee and written Informed consent was taken from all the participants.

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