

# Pattern of Third Molar Agenesis among Patients with Different Skeletal Malocclusion

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## ABSTRACT

**Introduction:** The third molar tooth is of clinical interest to different specialties of dentistry. It is usually associated with different anomalies for example, malformation, impaction, agenesis etc. This tooth being the last tooth in its molar group; is the most commonly malformed teeth. Third molar agenesis is also associated with other dental anomalies and has significance from evolution point of view.

**Objective:** To investigate the frequency of third molar agenesis and its relationship with different skeletal malocclusion patterns.

**Materials & Method:** Pretreatment radiographs of 100 orthodontic patients between 12-17 years of age were collected. Third molar agenesis was calculated and patients' skeleton malocclusion pattern was determined. Descriptive statistics and chi square test was performed to determine the pattern and potential relation.

**Result:** Among 100 subjects, 26 were diagnosed with third molar (M3) agenesis, thus the overall prevalence was 26% in the given orthodontic patient sample. The frequency of M3 agenesis was shown to be greater in maxilla (61.5%) than that of mandible (11.5%) ( $p=0.001$ ). The prevalence of M3 agenesis in subjects with Class I, II and III skeleton malocclusion was 30.3%, 14.3% and 34.4% respectively. Similarly, the order of frequency of M3 agenesis was two (46.2%), one (34.6%), four (11.5%) and three (7.7%) M3's.

**Conclusion:** Agenesis of third molar is found to be most common in skeletal Class III malocclusion with the highest prevalence in maxillary arch. Hence proving the inter-relationship between sagittal skeletal malocclusions and third molar agenesis among orthodontic patient sample.

**Keywords:** agenesis, anomalies, skeletal malocclusion, third molar

## INTRODUCTION

One of the most common anomalies of human dentition is tooth agenesis or hypodontia, which is characterized by the developmental absence of one or more teeth.<sup>1</sup> Third molars (M3), commonly known as wisdom teeth are highly polymorphic teeth with highest incidence of being congenitally absent. The incidences of M3 agenesis although is frequent, its frequency ranges widely; varying from 14-51% in different populations.<sup>2-6</sup> This wide range of prevalence of M3 agenesis can be attributed to the differences in the distribution of age, gender, race, size of sampling, methods of sampling and examination of the subjects.

The M3 agenesis has variable pattern of occurrence.

According to Mok and Ho, the most frequent pattern of agenesis is of two M3s followed by one, four and then three.<sup>7</sup> However, according to Nanda, the most frequent pattern is one, two, three and four M3s respectively.<sup>8</sup> Besides, it has been suggested that in patients with M3 agenesis, agenesis of other teeth are also very common and it also predisposes delayed development and reduction of size of the certain teeth.<sup>8,9</sup>

Third molars are the best biological indicator for assessment of juvenile age and they also provide forensic specimens.<sup>10,11</sup> M3 agenesis is found to be related to a rare condition called hypohyperdontia,<sup>12</sup> Downs's syndrome and epilepsy like condition.<sup>13</sup>

Moreover, M3 agenesis brings a lot of dilemma on clinical setting and is sometimes difficult to manage. The complex anatomy of third molar is always a challenge to the endodontists. Oral surgeons often find it difficult to manage because of its varied morphology and position. M3 agenesis can also affect orthodontic treatment planning especially during the arch distalization.<sup>14</sup> There has been a faint linkage between the correlation of M3 and late mandibular crowding or relapse after active orthodontic therapy.<sup>9</sup> However, there are very few studies done on different skeletal malocclusion types and third molar agenesis. Our aim of this study is to find the frequency of third molar agenesis and its relationship with different skeletal malocclusion patterns.

**MATERIALS AND METHOD**

The study was undertaken with the pre-treatment records and panoramic radiographs of the orthodontic patients at the Department of Orthodontics in Dhulikhel Hospital, Kathmandu University Teaching Hospital. From the pre-treatment radiograph pool, 100 radiographs of the patients with skeletal Class I, II and III malocclusion were randomly selected and enrolled into the study. Patients with incomplete records, history of previous orthodontic treatment and below the age of 12 and above the age of 17 were excluded from the study. The radiographs of the subjects with the history of M3 extraction and poor quality radiographs were also excluded from the study. The age group range of 12-17 years were selected as the calcification of third molar is complete by the age of 17

and eruption starts at the age of 11 years. After 17 years of age there is a tendency to extract impacted third molars to avoid possible complications.

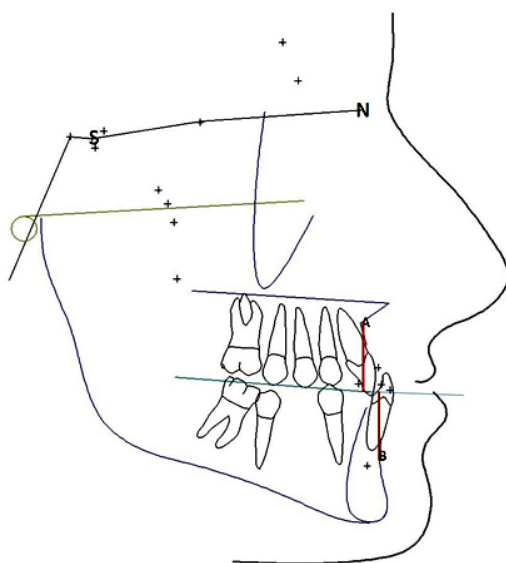
Patient's skeletal malocclusion was determined by SNA, SNB and ANB angles as well as Wit's appraisal (Figure 1). Descriptive statistics as well as Chi Square test was applied to find out the pattern and relation of third molar agenesis in different malocclusion types. P-value was kept 0.05 for the level of significance. SPSS 16.00 software was used for the statistical analysis.

**RESULT**

Among 100 subjects, 26 were diagnosed with M3 agenesis, thus the rate of M3 agenesis was 26% among the orthodontic patient group. Table 1 shows the frequency of M3 agenesis in maxilla, mandible and both, which was shown to be greater in maxilla (61.5%) than that of mandible (11.5%) ( $p=0.001$ ).

The prevalence of M3 agenesis in subjects with Class I, II and III skeleton malocclusion was 30.3%, 14.3% and 34.4% respectively (Table 2). The order of frequency of M3 agenesis was two (46.2%), one (34.6%), four (11.5%) and three (7.7%) (Table 1).

On the other hand, the most commonly missing M3 was right maxillary (18% of total patients) followed by left maxillary (16%), right mandibular (9%) and then left mandibular (8%). Figure 2 shows the variation of partial or complete M3 agenesis among different malocclusion groups.



**Figure 1: Cephalometric landmarks to determine skeletal malocclusion**

**Table 1 : Frequency and pattern of M3 agenesis**

Jaw/ Number of teeth	Frequency (n)	Percentage (%)	p-Value
Maxilla	16	61.5	0.001*
Mandible	3	11.5	
Maxilla & mandible	7	26.9	
1 teeth agenesis	9	34.6	
2 teeth agenesis	12	46.2	
3 teeth agenesis	2	7.7	
4 teeth agenesis	3	11.5	

\*Statistically significant at  $p \leq 0.001$

**Table 2: M3 agenesis in different skeletal malocclusion groups**

Malocclusion	No. of Patients	Patients with agenesis	Percentage
Class I	33	10	30.3
Class II	35	5	14.3
Class III	32	11	34.4

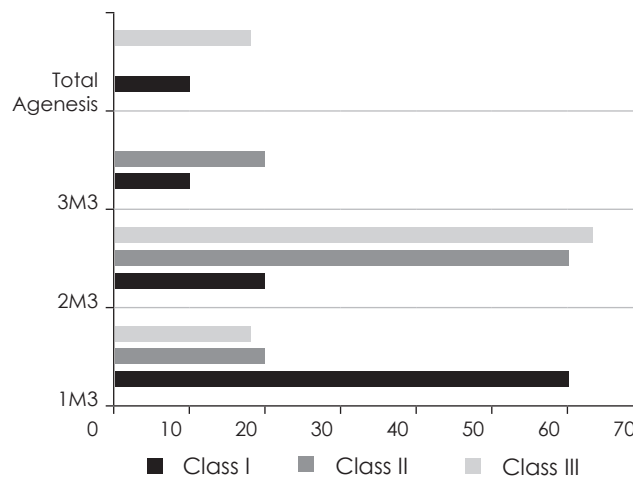


Figure 2: Partial and complete M3 agnesis in different skeletal malocclusion groups

## DISCUSSION

From the evolution point of view, M3 might be the first tooth to get extinct from human race. Primates still have third premolar in their mouth with dental formula of 2133. While coming into human race third premolar (P3) were lost during evolution. Recently, the frequency of M3 agnesis is also increasing. In the present study 26% of the samples had M3 agnesis, which is more than the reports of other studies done in French Canadian population (9%), New Zealand population (15.2%), American population (15%), Czech population (22.5%) and Asian Indian Populations (22%).<sup>15-19</sup> On the other hand, Afzal *et al* found M3 agnesis in 26.6% among the Pakistani patients, which is similar to our study.<sup>20</sup> Differences in the frequency of M3 agnesis among various studies on different population might be due to the variation in sample size, race, ethnicity, age, gender and diagnostic criteria. Moreover, on evaluation of the above findings, the frequency of M3 agnesis is found to be more in Asian population than that of European and American population.

In this study, the most common agnesis was two M3s (46.2%) followed by one (34.6%), four (11.5%) and three M3s (7.7%), which is similar to the studies done by Banks<sup>9</sup> and Afzal *et al*.<sup>20</sup> In Contrast, other studies found the order of frequency of M3 agnesis to be one, two, three and four respectively.<sup>21,22</sup> Furthermore, we observed higher frequency of M3 agnesis in maxilla (61.5%) compared to mandible (11.5%) which is similar to the study by Celikoglu and Kamak,<sup>9</sup> Kazanci,<sup>3</sup> Afzal *et al*<sup>20</sup> and Mok & Ho.<sup>7</sup> In addition, there was a significant difference in the occurrence of M3 agnesis between upper and lower jaw ( $p=0.001$ ).

Literature has limited reports on effect of M3 agnesis on skeleton sagittal relationship of the jaws. Few studies showed that hypodontia patients have higher tendency towards skeletal Class III pattern<sup>23,24</sup> followed by Class I.<sup>9</sup> This study also found the similar results with skeletal Class III patients having highest occurrence of M3 agnesis followed by skeletal Class I. In consistent with the study done by Celikoglu *et al*,<sup>25</sup> present study showed that the skeletal Class II malocclusion were less affected by M3 agnesis compared to other groups. However Afzal *et al*<sup>20</sup> found skeletal Class III patients had highest incidence followed closely by skeletal Class II.

In this study, agnesis of one M3 was most common in skeletal Class I malocclusion subjects, followed by Class II and Class III. Similarly, agnesis of two M3's was most common in skeletal Class III followed closely by Class II and Class I. Similarly, three teeth were missing more commonly in Class II followed by Class I but this pattern was not seen in Class III. Moreover, complete agnesis was found mostly on Class III subjects followed by Class I with no occurrence in Class II. Hence, Class III malocclusion had more agnesis of two M3's followed by four and one M3. This finding is in agreement with Celikoglu and Kamak.<sup>9</sup>

## CONCLUSION

Third molar agnesis was most commonly observed in maxillary arch than in mandibular arch. However, the occurrence of M3 agnesis was more common in skeletal Class III followed by Class I and Class II. Thus, M3 agnesis has interrelationship with sagittal skeleton malocclusion type among the orthodontic patient sample. Further large scale study on Nepalese population is recommended to assess the correlation.

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