EVALUATION OF THE RELATIONSHIP BETWEEN SAGITTAL ANOMALIES AND THE PRESENCE OF THIRD MOLARS IN TWO DIFFERENT PERIODS IN TURKISH ORTHODONTIC PATIENTS

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ABSTRACT
The purpose of this investigation was to evaluate the existence of third molar germs in orthodontic patients in Turkey, to examine the correlation between the presence of third molars and sagittal maxillomandibular jaw relationships and to compare the presence of third molars in individuals born in the 1970s and 1990s. The subjects were of 450 patients attending the orthodontic clinic Dicle University aged younger than 15 years. The subjects were divided into two groups: Group 1, consisted of 150 patients (50 males and 100 females) born between 1975 and 1979, and group 2 300 patients (124 males and 176 females) born between 1990 and 1997. Assessments were made from panoramic radiographs and lateral cephalograms. The chi square test was used to determine statistically significant differences. The following results were obtained: (1) all four third molar germs were present in 71.5 percent of subjects, (2) a non-significant decrease was determined in the level of third molars present in individuals group 2. (p>0.05) (3) mandibular third molars were present significantly more often than maxillary third molars (p<0.001), (4) no statistically significant difference was found among the prevalences of third molars in all Angle classifications in the sagittal plane (p>0.05) and (5) the percentage of skeletal Class II subjects who had all four third molars was higher than that of skeletal Class III subjects.

Keywords: Third molar germs, Sagittal anomalies, Third molars absence

Introduction
Post orthodontic maintenance of mandibular arch alignment is one of the more difficult retention problems facing the orthodontist.

A number of studies have attempted to determine whether unerupted third molars cause mandibular crowding. Vego (38) found more tooth crowding in subjects with erupting third molars than in those with congenital absence of third molars. Lindqvist and Thilander (22) reported less crowding in 70 percent of subjects on the side where unerupted third molars had been extracted than on the contralateral, non extraction side. After a review of the evidence presented in the literature, Richardson (32) implicated the presence of third molars as a cause of lower arch crowding.

Merrifield (25) expressed the importance of posterior crowding and suggested that orthodontists should consider the entire dentition. Richardson (30, 31) reported that molar crowding implies crowding at the distal of the first molar. It has been recognized that the third molars have a significant effect on posterior crowding.

Posterior crowding is thought to have an inhibitory effect on eruption of the second and third molars and may cause relapse after orthodontic treatment, regardless of whether or not premolars have been extracted. Inoue et al. (15) concluded that space maintenance was not necessary in patients with minimum posterior discrepancies and was not effective in those with severe discrepancies. Sato (34) suggested that posterior crowding due to the existence of third molars influenced the dentofacial skeleton and the development of malocclusions.

In contrast, Bjork and Skieller (5) could find no clear evidence that crowding was caused by the eruption of third molars. In study of patients treated orthodontically, Kaplan (18) concluded that the presence of unerupted third molars does not produce a greater degree of lower anterior crowding after retention. Shanley (35), who compared lower incisor crowding and protrusion in three groups of subjects with bilaterally impacted, erupted, and congenitally absent mandibular third molars, found no significant differences and concluded that mandibular third molars exert little influence on crowding or protrusion of mandibular anterior teeth. Ades et al. (1) reported no post retention differences in the crowding of mandibular incisors among subjects with functional third molars, third molar agenesis, third molar impaction or third molar extraction. Harradine et al. (12) stated that the principal conclusion drawn from this investigation is that removal of the third molars in an attempt to reduce the degree of late lower incisor crowding cannot be justified.

There have been many reports describing the congenital absence of third molars in European American (3, 7, 11, 27, 29) and Asian (13, 16, 17, 26) patients. Unfortunately, there have been few reports on chronological changes in third molar agenesis (9, 21).
In this study, the existence of third molar germs in Turkish orthodontic patients were investigated and the relationship between the existence of third molars and sagittal maxillomandibular jaw relationships were examined. Third molars or third molar germs refer to both impacted germs and erupted teeth.

Materials and Methods
The records of 450 patients (174 males and 276 females) were selected from the Dicle University Faculty of Dentistry Orthodontic Clinic. All subjects were less than 15 years of age when they were initially examined. Those with congenital deformities were excluded from the study. The subjects were divided into two groups. Group 1 consisted of 150 patients born between October 1975 and December 1979 and their initial examination ages were 10 years 10 months to 14 years 12 months. Group 2 of 300 patients born between August 1990 and October 1997 with an initial examination age of 7 years 9 months to 14 years 11 months.

Panoramic and lateral cephalometric radiographs taken at the initial examination were used to determine the presence of third molar germs and to measure the ANB angle, respectively. On radiograph where impossible to ascertain the presence of third molar germs from panoramic radiographs taken at the initial examination, subsequent panoramic radiographs taken before 14 years of age were used.

The percentage of subjects with all four third molars and the prevalence of each of the four third molars were calculated. The percentages in the two groups were then compared. The distribution of ANB angle of each subject measured on the lateral cephalograms is shown in Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (°)</th>
<th>Sd</th>
<th>Minimum (°)</th>
<th>Maximum (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>2.53</td>
<td>3.44</td>
<td>-8.00</td>
<td>9.00</td>
</tr>
<tr>
<td>Group 2</td>
<td>2.71</td>
<td>3.04</td>
<td>-8.00</td>
<td>9.00</td>
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<tr>
<td>Total</td>
<td>2.65</td>
<td>3.17</td>
<td>-8.00</td>
<td>9.00</td>
</tr>
</tbody>
</table>

The subjects were classified according to their sagittal maxillomandibular jaw relationships. Skeletal angle of 1 to 5 degrees were classified as skeletal Class I, Class II those with an angle of more that 5 degrees, and with an angle less than 1 degree as Class III. Gazilerli (8) defined skeletal Class I for children as an ANB angle of 1-5 degrees. The percentage of subjects in the three skeletal classification groups with all four third molars were also compared. The chi square test as used to determine statistical significance in differences between the groups 1 and 2. The maxilla and mandible, and skeletal Class I, II and III subjects. A probability value of less than 0.05 was considered significant.

Results and Discussion
The percentages of skeletal Class I, II and III subjects in group 1 and 2 are shown in Fig. 1.

The percentages of subjects with all third molars in groups 1 and 2 are shown in Fig. 2. The difference between the groups was not significant.

![Figure 1: Percentages of cases in skeletal Class I, II and III in the groups](image1)

![Figure 2: Percentages of cases with or 4 third molars and those with 1 or more third molars missing](image2)

Maxillary third molars were present in 78.9 percents of subjects and mandibular third molars in 82.4 percents of all subjects. The difference between the presence of maxillary and mandibular molars was significant (p<0.05). Maxillary third molars were present in 78.7 percents of the subjects in group 1 and in 79.0 percents of those in group 2; mandibular third molar genesis was determined in 83.3 percents and 82.0 percents of the subjects in group 1 and group 2, respectively. The frequencies of maxillary third molar genesis in group 2 were higher than those in group 1, although the level of mandibular third molars was greater in group 1. In conclusion, we determined that mandibular third molars had a statistically higher frequency than maxillary third molars in both groups and also in total (Table 2).

In all subjects, the percentages of skeletal Class I, II, and III subjects with all 4 third molars present were 71.9 percents, 75.4 percents and 67.7 percents, respectively. The percentage of skeletal Class III subjects with all third molars was lower than that of skeletal Class I and II subjects, and the percentage
Frequency of the existence of each third molar

<table>
<thead>
<tr>
<th>Group</th>
<th>Third molar</th>
<th>MAXILLA</th>
<th></th>
<th>MANDIBLE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existence %</td>
<td>N</td>
<td>Absence %</td>
<td>N</td>
<td>Existence %</td>
</tr>
<tr>
<td>Group 1</td>
<td>Right 80.7</td>
<td>121</td>
<td>19.3</td>
<td>29</td>
<td>86.0</td>
</tr>
<tr>
<td></td>
<td>Left 83.3</td>
<td>125</td>
<td>16.7</td>
<td>25</td>
<td>87.3</td>
</tr>
<tr>
<td></td>
<td>Right+Left 78.7</td>
<td>118</td>
<td>21.3</td>
<td>32</td>
<td>83.3</td>
</tr>
<tr>
<td>Group 2</td>
<td>Right 80.3</td>
<td>241</td>
<td>19.7</td>
<td>59</td>
<td>87.0</td>
</tr>
<tr>
<td></td>
<td>Left 82.0</td>
<td>246</td>
<td>18.0</td>
<td>54</td>
<td>85.7</td>
</tr>
<tr>
<td></td>
<td>Right+Left 79.0</td>
<td>237</td>
<td>21.0</td>
<td>63</td>
<td>82.0</td>
</tr>
<tr>
<td>Total</td>
<td>Right 80.4</td>
<td>362</td>
<td>19.6</td>
<td>88</td>
<td>86.7</td>
</tr>
<tr>
<td></td>
<td>Left 82.4</td>
<td>371</td>
<td>17.6</td>
<td>79</td>
<td>86.2</td>
</tr>
<tr>
<td></td>
<td>Right+Left 78.9</td>
<td>355</td>
<td>21.1</td>
<td>95</td>
<td>82.4</td>
</tr>
</tbody>
</table>

Frequency of third molar agenesis according to sagittal maxillomandibular jaw relationship

<table>
<thead>
<tr>
<th>Groups</th>
<th>Skeletal Class I</th>
<th></th>
<th>Skeletal Class II</th>
<th></th>
<th>Skeletal Class III</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All 4 Molars</td>
<td>1 or more</td>
<td></td>
<td>All 4 Molars</td>
<td>1 or more</td>
<td></td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td>F</td>
<td>M</td>
<td>28.2</td>
<td>73.5</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51</td>
<td>13</td>
<td>25</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td>F</td>
<td>M</td>
<td>28.1</td>
<td>76.3</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>32</td>
<td>58</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>F</td>
<td>M</td>
<td>28.1</td>
<td>75.4</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>151</td>
<td>35</td>
<td>83</td>
<td>27</td>
<td>88</td>
</tr>
</tbody>
</table>

F: Female M: Male

of skeletal Class I subjects with all third molars was lower than that of skeletal Class II subjects, although the differences were not significant (p>0.05). The prevalence of all 4 third molars in group 2 was higher than that in group 1, except for skeletal Class III (Table 3).

The high frequency of existence of third molars has led to a serious orthodontic problem, namely, posterior crowding. The influence of posterior crowding on orthodontic treatment and relapse, especially lower incisor crowding, has been discussed for more than 50 years. Some reports (10, 29, 33) indicate that third molars do not affect relapse, while other studies (22, 38) indicate that they do. It is possible that third molars do not affect relapse in many cases but that posterior tooth size/arch length discrepancies affect treatment. For instance, there are many Japanese Class II patients whose mandibular third molars do not erupt and impact in the ramus region. Therefore, consideration must be given to the extraction of either the second or third molars to eliminate posterior crowding when planning treatment, regardless of whether premolars have been extracted.

Massler et al. (24) reported that third molar crypt formation begins at 3 to 4 years of age; calcification starts at 7 to 10 years of age, calcification of the crown is completed at 12 to 16 and eruption begins at 17 to 21 years of age. This means that people younger than 15 will have had a third molar extracted because of dental disease such as pericoronitis. This was the reason for the selection of subjects younger than 15 for the present study. Investigations by Kajii et al. (16) and Gravely (11) suggest that the upper age limit for third molar genesis is 13 years. As there are some reports (3, 4, 29, 37) however, of third molar development as late as 14 or 15 years of age. The panoramic radiographs of patients up to 14 years of age were examined.
ANB angle was used to classify malocclusion based on sagittal maxillomandibular jaw relationships. Gazilerli (8) defined skeletal Class I for Turkish children as an ANB angle of 1 to 5 degrees. Therefore, we defined skeletal Class I as an ANB angle of 1 to 5 degrees, skeletal Class II as an ANB angle of more than 5 degree, and skeletal Class III as an ANB angle of less than 1 degree.

The presence of third molars was lower in the group 2 compared with the group 1. This level was higher in Classes I and II in group 2, but lower in Class III. However, these variations between the groups 1 and 2 were not statistically significant. A reduction in this level over the years is compatible with the findings of Kajii et al. (16). The prevalence of all third molars in the two groups in the current study was lower than that found by Kajii et al. (16). But in agreement with those of other Japanese researcher, such as Kawanashi (19). In the present investigation, the percentage of subjects with both mandibular third molar germs was significantly higher than the percentage with both maxillary third molar germ. Some reports have indicated that there is the same tendency in the Japanese (16, 19, 26) and Jordanian populations (13). On the other hand, many studies (3, 7, 11, 27, 29) have demonstrated that mandibular third molar agenesis is lower than maxillary third molar agenesis in the European American population. Thus, there seems to be a difference in third molar agenesis in the maxillary and mandibular arches between the Asian and European American populations. This suggestion is supported by the results of Hillson (14). This findings are compatible with the Asian population.

There are some reports comparing the existence of third molars in different races. Brothwell et al. (6) and Stewart (36) reported that third molar genesis in the Mongolian population, including Japanese, is lower than that in the European American population. They also reported that the highest frequency of third molar germs is found in black subjects. These racial differences are interesting and suggest that some polygenetic inheritance on formation of third molar germs may differ among populations and races.

The percentage of skeletal Class III subjects with all four third molars was lower than that of skeletal Class II subjects. This finding is compatible with those of Kajii et al. (16) and Kermani et al. (20). There seems to be a difference in third molar agenesis in the maxillary and mandibular arches between Asians and European Americans. Specifically, mandibular third molar agenesis is lower than maxillary third molar agenesis in Asians (13, 16, 17, 19, 26), but not in European Americans (3, 7, 11, 27, 29). This suggestion is supported by the results reported by Hillson (14) and Kajii et al. (16). However, the reason for this difference in third molar agenesis in the upper and lower arches between Asians and Europeans is not clear. Because skeletal Class II patients generally have a larger maxilla and/or small mandible (2) and skeletal Class III patients generally have a small maxilla and/or large mandible, these results also explain why the percentage of skeletal Class II patients missing one or more third molars is lower than that of skeletal Class III patients (16). Therefore, a space deficiency for eruption not only of mandibular third molars but also of mandibular second molars is often found in Class II patients (23, 28).

Conclusions
The prevalence of all four third molar germ is approximately 71.5 percent in Turkish orthodontic patients. The percentage of Turkish population who have all four third molars seems to have decreased slightly. The prevalence of mandibular third molar germs is higher than that of maxillary third molar germs in the Turkish population. The difference in third molar agenesis in the upper and lower arches in the Turkish population is in contrast to that of the European American population. In Turkish orthodontic patients, the percentage of skeletal Class II patients with all third molars is higher than that in skeletal Class III patients.

REFERENCES