Eruption Status of Third Molars in South Indian City

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ABSTRACT

Aim: The aim of the present study is to determine the number of third molars per person, angulation, level, amount of space for eruption of third molar between ramus of mandible and second molar status of root and also to study the difficulty index.

Objective: To study the eruption status of third molar in South Indian population.

Materials and methods: The study conducted at Department of Oral Medicine and Radiology, Maratha Mandals NG Halgekar College of Dental Sciences and Research Centre, Belgaum, Karnataka, India. A total of 150 patients (54 females and 96 males) visiting outpatient department between the age group of 17 and 30 with a mean age of 23.5 years were selected. Before starting the study, ethical concern taken from the ethical committee and informed consent from each patient who underwent radiographic examination.

Results: The results showed approximately 94.66% of the subjects had all four third molars, 8.6% had three third molars, 4.6% had two third molars and 2% had one third molars with 3.3% having agenesis of all third molars. Third molar agenesis showed predilection for upper jaw with higher proportion in females (5.5%) than males (2%). Angular position seen maximum with vertical position (66.16%) with least being horizontal impactions. Level of occlusal plane of third molar similar to that of adjacent tooth seen in 52.65%. Below the occlusal plane in 19.61%, totally impacted teeth noted in 27.73%. More than 75% of the teeth had complete root formation. Among total number of teeth, 518 (91.51%) teeth were easy to extract and remaining 33 (5.8%) were difficult to extract.

Conclusion: Radiological and clinical findings have correlated to assess whether teeth were easy to extract or difficult. Because of the increasing incidence of unerupted third molars and the association of numerous complications with these retained teeth, assessment of germ position and prognosis of third molar eruption is necessary for better patient management.

Keywords: Impaction, Prevalence, Third molar.

INTRODUCTION

An impacted wisdom tooth is one of the most common findings, and is the tooth of concern by all departments. The third molars are the last teeth to erupt in all races despite racial variations in the eruption sequence. This late eruption is responsible for the third molar being the most frequently impacted tooth. Facial growth, jaw size and tooth size differ among different races and population groups and exhibit definite inheritance patterns. Agenesis of one or more third molar vary substantially in persons from different races with prevalence of approximately 1% in African Negro and Australian aboriginal samples, 10 to 25% in whites, difference in sex distribution. Gorgani found that the rate of agenesis of third molar for black and white population ranged from 7 to 10% with bilateral agenesis occurring in 79% of the sample.

An unerupted or partially erupted tooth can cause mild to severe symptoms. Patients, who have unerupted teeth, seek dental treatment because of pain or swelling or for other reasons. The literature shows that tooth impaction is a frequent phenomenon. However, there is considerable variation in the prevalence and distribution of impacted teeth in different regions of the jaw.

Even with the presence of latest imaging modalities of concern for assessing the status of third molars. Orthopantomography or panorama still remains ‘an old friend’ to all oral diagnosticians, oral and maxillofacial surgeons, orthodontists, epidemiologists and other dentists, panoramic view is superior to periapical X-rays in its coverage when third molar status has to be assessed.

To date, there are very few documentations are reported regarding pattern of third molar eruption status in the South Indian population. The objective of the present study is to determine the number of third molar per person (impacted or agenesis), angulation, level, amount of space for eruption of third molar between ramus of mandible, number of third molars with occlusal caries, periodontal lesions, pericoronal and periapical lesions, status of root and to study the difficulty index.
MATERIALS AND METHODS

A total of 150 consecutive patients (54 females and 96 males) visiting outpatient department between the age group of 17 and 30 were selected. Entire study conducted for the duration of 5 months. All these outpatients had some or the other problems related to teeth. The details regarding study were explained for each of the patient and informed consent was taken. The exclusion of those cases that had history of extraction of any of the teeth or who refused to give consent was done. To avoid bias, all patients were examined by two well-trained dental specialist and intra and interobserver kappa correlation ranged from 0.8 to 0.76. On an average three patients per day were examined. All patients were examined clinically to see the status of third molar and, based upon their clinical status, they were classified as completely erupted, partially erupted and unerupted. The eruption status was assessed by using visual method with the help of probe.

The patients, who had problems related to third molar teeth, were classified as asymptomatic and symtomatic cases. All patients underwent thorough extraoral and intraoral examination. When examined clinically, the status of the surrounding tissue of third molar was examined to find out, whether source of any inflammation, pocket ulcers or any white lesion. Later third molar was classified as partially erupted or completely erupted or unerupted. To avoid bias, all the patients were examined by single observer.

The teeth, which were partially erupted and unerupted, were subjected for radiographic examination. Each patient after clinical examination was subjected for panoramic radiography. The standard OPG machine (Panaray PC-1000 with 70-90 Kvp and 6-10 mA) was used to study the detailed status of each third molar. The teeth radiographically noted are divided as mesioangular, distoangular, vertical and horizontal impactions.

Erupted and partially erupted teeth were further clinically examined for any pathology, like caries, periodontal pathology, pericoronal or periapical pathology, etc. After thorough clinical examination, all patients were subjected for radiographic examination, where orthopantomograph was taken (Panaray PC-1000 with 70-90 Kvp and 6-10 mA).

After both clinical and radiographic examination, the impacted teeth noted were divided as mesioangular, distoangular, vertical and horizontal, transverse and bud stages of impactions. The level of eruption, space of eruption of third molar (the criteria to classify these third molars followed, according to Textbook of Oral Surgery by Petersson) and the root completion and the difficulty indexes were also calculated.

ANGULAR POSITION

The angular position of the lower third molars was determined on the panoramic radiographs by drawing a line through the midpoint of the occlusal surface and bifurcation of the second molar and the third molar. These lines represent the long axes of the teeth. The angle formed between the intersected long axes gave either a mesial or distal inclination of third molar in relation to second molar. The inclination angle was then read in increments of 5° to a maximum of 65° above which the tooth was considered to be horizontally impacted.

LEVEL OF ERUPTION

Level of eruption was grouped as level A, where the occlusal plane of the third molar was on the same level or above the occlusal plane of adjacent second molar. In level B, the occlusal plane was below the occlusal plane but above the cervical line of the second molar. In level C, the occlusal plane was beneath the cervical line of the second molar.

THIRD MOLAR SPACE

Third molar space was measured as the distance between the distal surface of second molar crown and anterior border of the ramus on the occlusal plane in proportion to the width of third molar crown.

- **Class I:** Sufficient space available between the anterior border of the ascending ramus and distal side of the second molar for the eruption of the third molar
- **Class II:** The space available is less than the mesiodistal width of the crown of the third molar
- **Class III:** The third molar is totally embedded in the bone from ascending ramus because of absolute lack of space.

ROOT DEVELOPMENT

The upper and lower third molars were classified according to the stage of formation, namely, completed or non-completed. The noncompleted were divided into one-third or two-third complete formation.

Difficulty Index for Removal of Impacted Third Molars

If sum of difficulty index is 8 then the extraction is difficult.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Difficulty index value</th>
</tr>
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<tbody>
<tr>
<td>Angulation</td>
<td>Mesioangular horizontal/ transverse vertical/ distoangular</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>Level A</td>
</tr>
<tr>
<td></td>
<td>Level B</td>
</tr>
<tr>
<td></td>
<td>Level C</td>
</tr>
<tr>
<td>Ramus relationship or space available</td>
<td>Class I</td>
</tr>
<tr>
<td></td>
<td>Class II</td>
</tr>
<tr>
<td></td>
<td>Class III</td>
</tr>
</tbody>
</table>

Collected data were subjected for different types of analysis, i.e. Chi-square test, t-test, Pearson correlation coefficient and analysis of variance approach.

RESULTS

Among total 150 consecutive patients visiting our department for some or the other dental problems, only 22 cases (17 males and 5 females) were symptomatic cases, whereas remaining 128
cases were asymptomatic. The mean age of the study group was 23.5 years (±2.9079). Among complaints related to third molar cheek bite, lymphadenopathy, ear pain, difficulty in swallowing, food lodgment, pericoronitis, excessive salivation, ulcer and trismus were noted. Four of them had one or more complaints together. Gingival polyp noted in one patient. Among anamolies related to teeth, three patients had microdontic upper and lower third molars and hypoplasia with lower both side third molar. In pathology related to third molar, 17 (11.33%) of teeth were showing occlusal caries, one patient (0.66%) had periodontal pocket and three (2%) patients had pericoronitis pathology. Among total number of teeth, 518 (91.51%) teeth were easy to extract and remaining 33 (5.8%) were difficult to extract.

Table 1 shows 94.66% subjects had all four-third molars, 8.66% had three-third molars, 4.66% had two-third molars and 2% had one-third molar. Only 3.3% of the subjects had agenesis of all third molars.

Table 2 shows the angular position of upper and lower third molars. The lower third molars, showed a higher frequency of vertical inclination (56.72%), followed by mesioangular (21.09%), with distal inclination of (6.18%) and followed by horizontal (7.1%). The angular position of upper jaw showed a higher frequency of vertical angulations (76.15%), followed by buccoversion (10.38%) with distoangular (6.15%), with mesioangular position third in frequency (2.69%). Pearson’s correlation coefficient was applied to find the relationship between left and right side angulations which showed a significant relationship (p < 0.001).

Table 3 shows the level of eruption of third molars in the upper and lower teeth. Out of the 566 teeth, 298(52.65%) were positioned with their occlusal surfaces on the same level or above the occlusal plane of adjacent second molar (level A). Females demonstrate a higher frequency (56.93%) of level A eruption than males (Table 4). The upper jaw is predominant site (172 teeth) (55.30%) over the lower jaw (126 teeth) (49.41%) (Table 3). The difference was statistically significant. Males had 17.91% more third molar at level B eruption than females (Table 4). Level B eruption was the least frequent in occurrence among the other levels of eruption. Level B eruption showed a higher frequency in upper jaw (67 teeth) (21.53%) than in the lower jaw (44 teeth) (17.25%). The difference was not statistically significant. Males (87 teeth) (25.14%) had higher level C frequency than females 70 (31.81%). Only 57 third molars (27.73%) were erupted to level C. The difference was highly significant (p < 0.001), indicating that level of eruption and type of jaw (upper or lower) were related.

**ROOT COMPLETION**

More than 77% of the roots in upper right molar teeth had complete root formation and 11.27% had only 1/3rd or 2/3rd root completed. Whereas more than 87% of the upper left third molar had complete root formation with least showing 2/3rd of root formation (5.8%). In lower left side (83%), these were

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of third molars per person</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>83 (86.45%) 7 (7.29%) 4 (4.1%) 0 (2.08%) 96</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>39 (72.22%) 6 (11.11%) 3 (5.58%) 3 (5.55%) 54</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>122 (94.66%) 13 (8.66%) 7 (4.66%) 3 (2%) 5 (3.33%) 150</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site</th>
<th>Angular position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BV</td>
</tr>
<tr>
<td>Upper</td>
<td>27 (10.38%)</td>
</tr>
<tr>
<td>Lower</td>
<td>0 (56.72%)</td>
</tr>
<tr>
<td>Total</td>
<td>27 (5.04%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site</th>
<th>Level of eruption</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Upper</td>
<td>172 (55.30%)</td>
</tr>
<tr>
<td>Lower</td>
<td>126 (49.41%)</td>
</tr>
<tr>
<td>Total</td>
<td>298 (52.65%)</td>
</tr>
</tbody>
</table>

BV—buccoversion, V—vertical, DA—distoangular, MA—mesioangular, TV—transversion, H—horizontal
showing complete root formation. The lower right side 7% of the roots were completely formed, whereas least showing more than 2/3rd root formation (4.32%). There was more tendency for males to have incomplete root formation than females.

**DISCUSSION**

The third molar is the most frequently impacted tooth with a frequency of occurrence generally reported to be from 18 to 32%. As racial variation, nature of diet, degree of use of masticatory apparatus and genetic inheritance can affect the jaw size and tooth size, studies of prevalence and incidence of impacted third molars have been carried out on different population groups.

Although various complaints are related to third molars, acute pericoronitis is most commonly found among young adults with erupting lower third molars. In our study, only 14% of the patients had painful symptoms related to third molar similar to study by Peterson and males were showing more symptoms than females similar to Geoffrey hoe in 1985.

In our study, majority of patients with vertical impaction and level A had symptoms followed by distoangular level Bimpactions. Whereas, Wallace in 1966 also stated that pericoronitis seen with vertical impaction and position A.

In a study in naval recruits, it was shown that the teeth at greater risk in relation to acute pericoronitis are vertically impacted third molars with level A. Kay has shown that the occurrence of pericoronitis in relation to lower third molars varies seasonally. Peak age of occurrence varies from 21 to 25 years, the findings were similar to our study.

The mean age of our study group was 23.5 years (± 2.9079), in African races, the timing of eruption ranges from 13 to 20 years. Sandhu et al, Quek et al and Schersten et al studies have shown mean age of their subjects were 19.3, 26.5 ± 5 and 20 to 25 years respectively. The proportion of students having all four, third molars was higher (94.66%) than a study by Sandhu et al (76%) in Indian population and Hattab et al (73%) in Jordanians.

In the present study, 3.3% teeth had agenesis of all third molars, which are slightly higher than results obtained from Hattab et al (1.7%) and Hugoson and Kugelberg in Swedish population (2%). But our observation is considerably less than that for the Scandinavian population (10-13%) and Americans (7-10%). The higher proportion of agenesis of third molars in our study for females (5.55%) than males (2.08%) which were higher to Sandhu et al [where Indian females showed (12.8%) and males (8.3%)], Shah et al but differ from those of Levesque et al Gorgani et al and Hattab et al.

Results show that lower jaw had agenesis was more common than the upper jaw which differ with results obtained from other authors. Their was no equal distribution between right and left side as noted by Hattab et al, Shah et al Results of our study showed that about three quarters of the subjects had all four-third molars which was similar to the results obtained by Hattab et al and Sandhu et al, but this proportion higher than found with American students and Schersten et al with Scandinavians, who also noted that one half of the persons had all four-third molars.

Our results showed differences in both male and female groups which were statistically significant (Chi-square test) and which was in agreement with the results obtained from Schersten et al but differ from Hattab et al, Dachi and Howell et al. The order of frequency for missing teeth in the present study is 1 (3 patients), 2 (7 patients), 3 (13 patients), 4 (142 patients) which were in accordance with Hattab et al, but differ from Kruger et al, where New Zealand population showed common for two-third molar to be missing, followed by 1, 4 and 3.

The mean age in our study was 23 years with 27.73% of the third molars were unerupted (level C eruption). This finding is in agreement with Sandhu et al (34% mean age 19.3 years), also with Venta et al (between 22.3 and 66.6% with age between 19.5 and 20.5 years).

In this study, 12.14% of the lower third molars were found to be in the mesioangular position. This number is less in proportion to that noted by Kruger et al (62.9%), Venta et al (71%) and Richardson et al. This number is close to the observations by Sandhu et al (49%), Hattab et al and Richardson et al. This number is considerably higher than that reported by Sewerin and Von Wovern et al (18%).

Our observation that 66.16% of the lower third molars were in vertical position, which higher than Hattab et al, Kruger et al, Venta et al and less than Sandhu et al (42%). The present study showed that 6.16% of the upper third molars were in the distoangular position. This value is similar to the results obtained from Venta et al (23%) but less than the results from Sandhu et al (48%) but higher than Kruger et al (12.2%). Our observation that 76% of upper third molars were in the vertical position which is more than Sandhu et al (43%), Venta et al (54%) and Kruger et al (18.1%).

The frequency of horizontal lower third molar in the present study (7%) which is more than Sandhu et al, Hattab et al, 13

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**Table 4: Level of eruption of third molars in males and females**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Level of eruption</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Male</td>
<td>197 (56.93%)</td>
<td>62 (17.91%)</td>
</tr>
<tr>
<td>Female</td>
<td>101 (45.90%)</td>
<td>49 (22.27%)</td>
</tr>
<tr>
<td>Total</td>
<td>298 (52.65%)</td>
<td>111 (19.61%)</td>
</tr>
</tbody>
</table>

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*Journal of Indian Academy of Oral Medicine and Radiology, July-September 2011;23(3):S328-S332*
Kruger et al.\(^\text{15}\) and Venta et al.\(^\text{26}\) The frequency of mesioangular upper third molars (2.69%) which is less than that reported by Venta et al.,\(^\text{26}\) Kruger et al.\(^\text{15}\) and Sandhu et al.\(^\text{12}\) (9%). The least upper third molars (2.69%) which is less than that reported by S332

**REFERENCES**

Agensis in our study noted in 3.33% of individuals, whereas in persons from different races had a prevalence of approximately 1% in African Negro and Australian aboriginal samples\(^2\) 10 to 25% in whites,\(^2\) 6\(^\text{th},\)\(^2\) 26\(^\text{th}\) 19 to 35% in Scandinavians,\(^14\) Grahnen\(^30\) and 30% in Japanese\(^31\) and Chinese. Levesque et al.\(^24\) reported 9% (422 persons of a total of 4640) bilateral agenesis of lower third molar without significant difference in sex distribution. Gorgani et al.\(^12\) found that the rate of agenesis of third molar for black and white population ranged from 7 to 10% with bilateral agenesis occurring in 79% of the sample. More than 75% of the teeth had complete root formation similar to study done by Hattab.\(^13\)

**CONCLUSION**

Radiographic diagnosis of the presence, position and degree of third molar formation is a crucial part of integral treatment planning. The frequent impaction of lower third molars can only be reliably predicted when the calcification of the crown or of one-third of the root has been completed. Early removal of impacted third molars is justified because of the possibility of increased complications at a later age. Removal of painless impacted third molars is indicated, if pathological problems are probable.

**REFERENCES**