

Prevalence and Pattern of Mandibular Third Molar Impaction: A Retrospective Radiographic Study

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ABSTRACT

Introduction

Mandibular third molars are the most commonly impacted teeth in the oral cavity and are frequently associated with various pathological conditions such as pericoronitis, dental caries, periodontal defects, cyst formation, and root resorption of adjacent teeth. The prevalence and pattern of third molar impaction vary among different populations due to racial, genetic, and environmental influences. Radiographic assessment of impacted mandibular third molars plays a crucial role in diagnosis, treatment planning, and prediction of surgical difficulty.

Aim

To evaluate the prevalence and pattern of mandibular third molar impaction among the Chennai population and to assess the association between gender and type of impaction using panoramic radiographs.

Materials and Methods

This retrospective radiographic study included 200 orthopantomograms comprising 100 males and 100 females who reported to Saveetha Dental College and Hospitals. Mandibular third molar impactions were classified according to Winter's classification as horizontal, mesioangular, vertical, and distoangular impactions. The angulation of impaction was assessed using Quek et al. measurements. Data were analyzed using SPSS version 23.0. Descriptive statistics, Chi-square test, and Odds Ratio analysis were performed to evaluate the association between gender and impaction pattern. A p-value less than 0.05 was considered statistically significant.

Results

Horizontal impaction was found to be the most prevalent type of mandibular third molar impaction (39.5%), followed closely by mesioangular impaction (37%), vertical impaction (13%), and distoangular impaction (10.5%). Among females, mesioangular impaction was the most common type (44%), whereas horizontal impaction predominated among males (53%). Chi-square analysis demonstrated a statistically significant association between gender and type of impaction ($\chi^2 = 16.63$, $p = 0.001$). Odds Ratio analysis revealed that males were approximately 3.4 times more likely to exhibit horizontal impaction compared to females (OR = 3.38).

Conclusion

Horizontal impaction was the most prevalent type of mandibular third molar impaction in the studied Chennai population. Significant gender variation was observed in impaction patterns, with males showing a greater tendency toward horizontal impaction and females demonstrating higher prevalence of mesioangular impaction. Early radiographic assessment of impacted mandibular third molars is essential for accurate diagnosis, prevention of associated complications, and effective surgical treatment planning

Keywords: Mandibular third molar, impacted third molar, Winter's classification, panoramic radiograph, horizontal impaction, mesioangular impaction, retrospective study

INTRODUCTION

The third molar is the most frequently impacted tooth, with a frequency of occurrence generally reported to be from 18% to 32%. When a tooth doesn't fully erupt by the projected age of about 20 and its eruption into a proper functional occlusion has been impeded by neighbouring teeth, overlying bone, or soft tissue, it is said to be impacted. When the third molar did

not fully erupt to its presumed typical functional position in the occlusal plane, it was regarded as having an impact. (1)The majority of studies employed the emergence of any part of the crown through the oral mucosa as their criteria for eruption. Because many mandibular third teeth stop erupting and stay impacted in a partially erupted position, this could lead to misleading results.(2)(3,4)

The pathologies that are usually associated with an impacted tooth include caries development in the impacted or adjacent teeth, pericoronitis, periodontitis, cysts, tumours, root resorption of the adjacent teeth.(7)(8) Many recent studies have suggested that the presence of an impacted third molar weakens the angle of the mandible and makes it more prone to fracture and impacted third molars have also been associated with lower arch crowding, TMJ disorders, orofacial pain and neuralgias. (9)It is well acknowledged that racial and demographic differences in patterns of face growth, jaw size, and tooth size likely exist. The condition of mandibular third molars in the Indian population is still mostly unknown.(10)(11)

The gold standard of examination for third molars that have become infected is still radiographs, either IOPA or OPG(14). The treatment option for third molars that are impacted is transalveolar extraction under local anaesthesia. The aim of the present study is to assess the prevalence of different types of mandibular third molar impaction in chennai population, and its incidental prevalence based on gender.

MATERIALS AND METHOD

DATA COLLECTION

A total of 200 clinical and radiographic records [orthopantomogram], 100 male and 100 female that reported to Saveetha Dental College and Hospitals, Chennai, Tamil Nadu were assessed and selected for the study. Consent of the patients was taken before using the radiograph for the study. Records with bilateral mandibular third molar impaction were studied. They were evaluated for the frequency among the various age groups (18 to 40 years) and gender.

The exclusion criteria of the study were;

1. Patients who were below 20 years of age
2. Any previous history of dentoalveolar trauma
3. Incomplete root formation of the third molars.
4. Absence of adjacent second molars
5. Presence of poor quality of OPGs

Classification was done on the basis of Winters Classification:

1. Vertical impaction
2. Mesioangular impaction
3. Distal-angular impaction
4. Horizontal impaction

RADIOGRAPHIC ANALYSIS

The angulation of the impacted teeth was assessed using Quek et al, measurement of the angulation of impaction where the angle formed by the intersection of the long axis of the second and third molars are measured. According to this classification an angulation between 11-79 degree were classified as Mesioangular, Horizontal 80-100°, Vertical 0-10° and Distoangular -11 to - 79°.

STATISTICAL ANALYSIS

The data was collected and worked on SPSS version 23 for statistical analysis and obtaining bar graphs. For comparison of proportions among the different groups, Chi- Square test was applied. Statistical significance was observed at p value <0.05

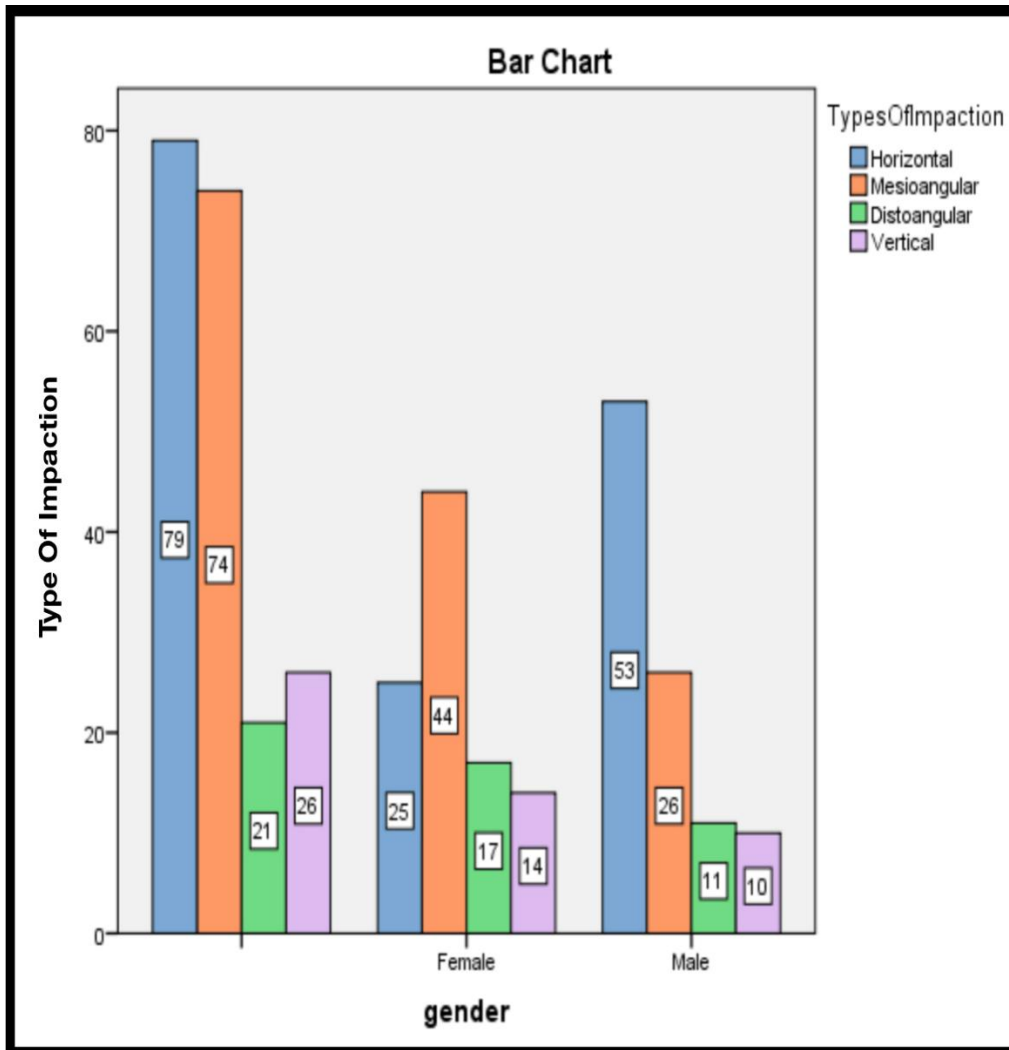
RESULTS

Table 1: Distribution of Study Population

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	100	50%
	Female	100	50%
Total Sample Size	Total	200	100%

In the present study, bar graphs were analysed to obtain the results. Graph 1.1 depicts the prevalence of all 4 types of impaction in both male and female gender and overall on both sides. According to the graph, overall, horizontal impaction was 39.5%, mesioangular impaction was 37%, followed by vertical impaction 13%, and distoangular impaction 10.5%. In females, mesioangular impaction was most common with 44%, followed by horizontal 25%, distoangular 17% and vertical

14%. Whereas in males, most common impaction was observed to be horizontal impaction with 53%, followed by mesioangular 26%, distoangular 11%, and vertical 10%.

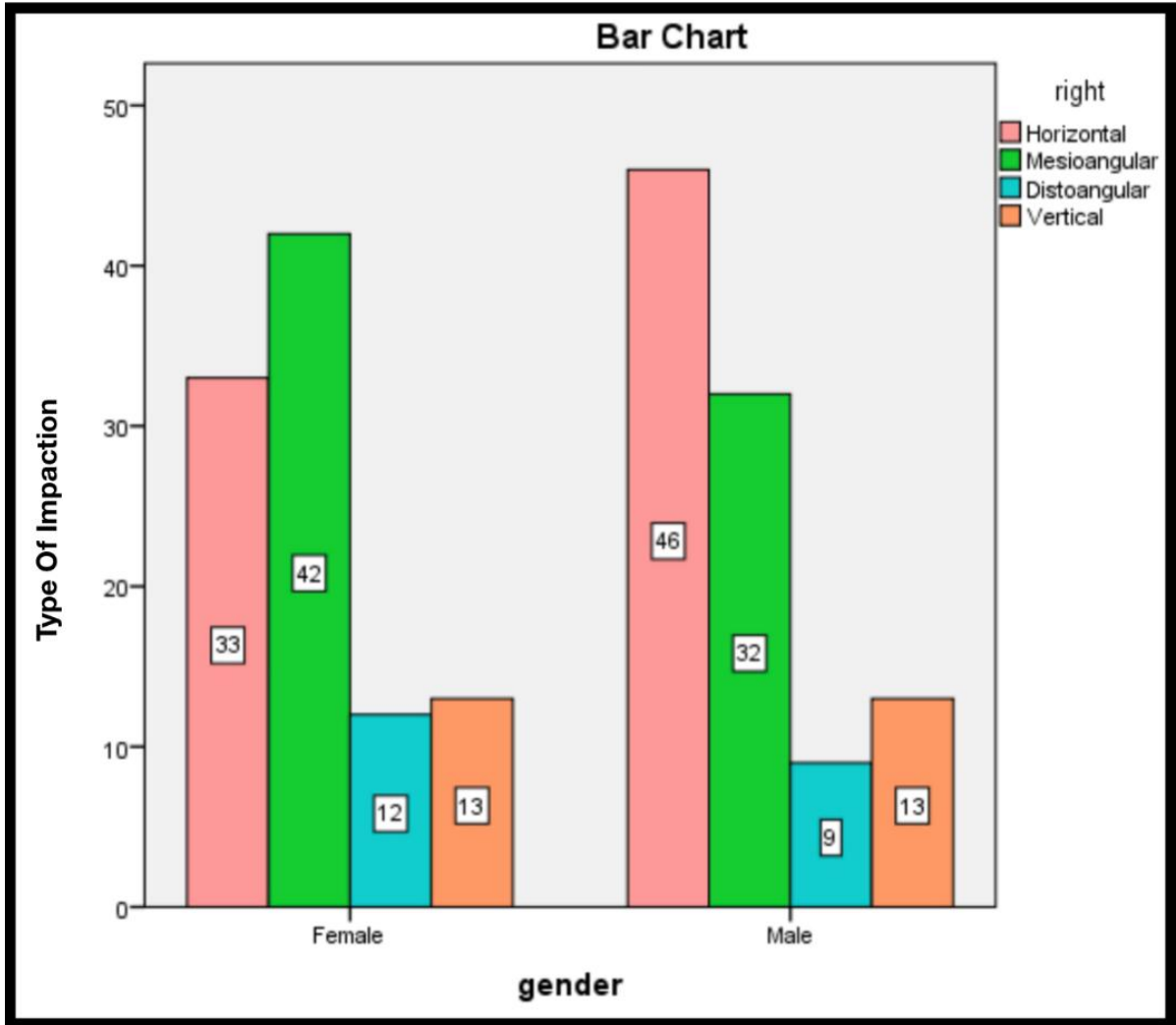


GRAPH 1.1: graph depicting distribution of type of impaction in males and females. The X axis represents count of type of impaction and y axis represents genders. Blue bar represents horizontal, orange bar represents mesioangular, green bar represents distoangular, and pink bar represents vertical impaction.

Table 2: Overall Distribution of Impaction Types

Type of Impaction	Frequency (n)	Percentage (%)
Horizontal	79	39.5%
Mesioangular	74	37%
Vertical	26	13%
Distoangular	21	10.5%

In graph 1.2, depicting the type of impaction in females and males on the right side. On analysis of the graph, it is observed that in females on the right mandible, the most common 3rd molar impaction was found to be mesioangular impaction with 42%, followed by horizontal 33%, vertical 13%, and distoangular 12%. While in males on the right side mandibular third molar, the most common impaction was found to be horizontal impaction with 46%, followed by mesioangular 32%, vertical 13%, and distoangular 9%.

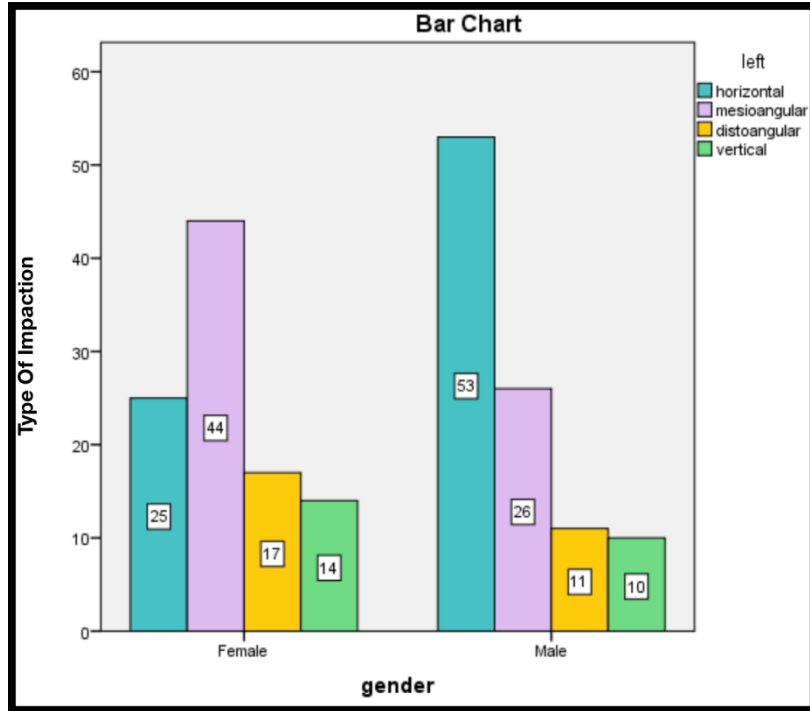


GRAPH 1.2: graph depicting distribution of type of impaction in males and females on the right side. The X axis represents count of type of impaction and y axis represents genders. Pink bar represents horizontal, green bar represents mesioangular, light blue bar represents distoangular, and orange bar represents vertical impaction.

Table 4: Right Side Distribution

Type of Impaction	Female Right (%)	Male Right (%)
Horizontal	33%	46%
Mesioangular	42%	32%
Vertical	13%	13%
Distoangular	12%	9%

Graph 1.3 depicts the percentage types of impaction found in females and males on the left side. According to the graph, the most common type of mandibular third molar impaction in females on the left side was mesioangular with 44%, followed by horizontal 25%, distoangular 17%, and vertical 14%. Whereas in males, the most common type of impaction on the left mandibular third molar was observed to be horizontal impaction with 53%, followed by mesioangular 26%, distoangular 11% and vertical 10%.



GRAPH 1.3: graph depicting distribution of type of impaction in males and females on the left side. The X axis represents count of type of impaction and y axis represents genders. Light blue bar represents horizontal, purple bar represents mesioangular, yellow bar represents distoangular, and green bar represents vertical impaction.

Table 5: Left Side Distribution

Type of Impaction	Female Left (%)	Male Left (%)
Horizontal	25%	53%
Mesioangular	44%	26%
Vertical	14%	10%
Distoangular	17%	11%

Chi-square test analysis

Gender	Horizontal	Mesioangular	Distoangular	Vertical
Female	25	44	17	14
Male	53	26	11	10

A Chi-square test using SPSS version 23.0 was performed to evaluate the association between gender and the type of mandibular third molar impaction.

Among females, mesioangular impaction was the most commonly observed type (44%), followed by horizontal impaction (25%), distoangular impaction (17%), and vertical impaction (14%). In males, horizontal impaction was the most prevalent type (53%), followed by mesioangular impaction (26%), distoangular impaction (11%), and vertical impaction (10%).

The Chi-square test revealed a Chi-square value (χ^2) of 16.63 with a p-value of 0.001. Since the p-value was less than 0.05, the association between gender and type of mandibular third molar impaction was found to be statistically significant.

These findings indicate that the pattern of mandibular third molar impaction differs significantly between males and females in the studied population.

Odds ratio (OR) analysis

An Odds Ratio (OR) analysis was performed to evaluate the likelihood of horizontal mandibular third molar impaction among males compared to females.

The calculated Odds Ratio was found to be 3.38.

This indicates that males were approximately 3.4 times more likely to exhibit horizontal mandibular third molar impaction when compared to females. The elevated Odds Ratio further supports the statistically significant association observed in the Chi-square analysis.

Overall, the present study demonstrated that horizontal impaction was the predominant type of mandibular third molar impaction in the Chennai population, with significant gender variation in impaction patterns.

DISCUSSION

Impacted mandibular third molars are developmental pathologic medical deformities characteristic of a modern civilization. According to Mead, an impacted tooth is defined as a tooth that is prevented from erupting into position because of malposition, lack of space or other impediments.[\(15\)](#) In the present study, the most common type of impaction overall was found to be horizontal impaction with 79% closely followed by mesioangular impaction with 74%, and then vertical impaction 26%, distoangular impaction 21% which was similar to the result obtained by Sateesh et al, in their study that horizontal impaction is common in the mandible, though overall including maxilla, mesioangular was found to be most common type of impaction[\(16\)](#), whereas other studies reported mesioangular impaction as the most common impaction.[\(17\)](#), [\(2,14\)](#)

The high prevalence of horizontal impaction observed in the present study may be attributed to inadequate retromolar space and altered eruption path of the mandibular third molars. Horizontal impactions are often considered clinically significant because they are more frequently associated with surgical difficulty, distal caries of the second molar, periodontal bone loss, and root resorption of adjacent teeth. The increased prevalence of horizontal impaction among males observed in the present study may be related to variations in mandibular growth pattern and jaw dimensions between genders.

The present study demonstrated a statistically significant association between gender and type of mandibular third molar impaction. Similar findings have been reported in previous radiographic studies evaluating impaction patterns in different populations. However, variations in prevalence among studies may be influenced by racial differences, dietary habits, genetic factors, environmental influences, and differences in sample size and methodology.

Mesioangular impaction was found to be more prevalent among females in the present study. Previous authors have suggested that reduced mandibular arch length and smaller jaw size in females may contribute to inadequate eruption space, thereby increasing the occurrence of mesioangular impactions. Such findings further support the influence of craniofacial morphology on mandibular third molar eruption patterns.

In a study by Ferhat et al[\(24\)](#), in the Turkey population, vertical impaction (28.4%) was found to be the most common type of impaction in the mandibular third molar on both sides. Studies by Ali H. Hasan et al[\(25\)](#), and Sateesh et al[\(16\)](#), found there was no significant difference between Right and a Left side in both jaws but Nasrren et al[\(26\)](#) reported that third molar impactions were more frequently observed in the right side of the jaws.

CONCLUSION

Within the limitations of the present retrospective radiographic study, horizontal impaction was found to be the most prevalent type of mandibular third molar impaction in the Chennai population, followed closely by mesioangular impaction. Vertical and distoangular impactions were comparatively less common. Significant gender variation was observed in the pattern of impaction, with horizontal impaction predominating among males and mesioangular impaction being more frequently observed among females.

Chi-square analysis demonstrated a statistically significant association between gender and type of mandibular third molar impaction, indicating that impaction patterns vary according to gender in the studied population. Odds Ratio analysis further revealed that males were approximately 3.4 times more likely to exhibit horizontal impaction compared to females.

The findings of the present study emphasize the importance of early radiographic assessment of mandibular third molars for timely diagnosis and treatment planning. Understanding the prevalence and angulation patterns of impacted third molars can aid clinicians in predicting surgical difficulty, preventing associated pathologies, and minimizing postoperative complications during extraction procedures.

The present study also highlights the value of panoramic radiography as an effective diagnostic tool for evaluating impacted mandibular third molars and their angulation patterns. Further multicentric studies with larger sample sizes and additional classification systems are recommended to better understand the epidemiology and clinical implications of mandibular third molar impactions in different populations.

CONFLICT OF INTEREST

The author declares that there were no conflicts of interests in the present study..

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