Original Research

Evaluation of mandibular third molar impaction- A retrospective study

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ABSTRACT:
Introduction: In human dentition, the third molars are the teeth with the highest rate of impaction. Because of evolutionary changes in jaw size and diet, these teeth often do not have enough space for proper eruption, resulting in impaction. The present study was conducted to assess pattern of mandibular third molar impaction among study population. **Methodology:**This retrospective study consisted of 120 patients aged 18 to 27 years of both genders showing mandibular third molar impaction. The angulation and type of impaction of third molars were assessed using Winter's classification for angulation (mesioangular, distoangular, vertical, horizontal). Pell and Gregory classification was used for assessing both the depth of impaction (Level A, B, C) and relation to the ramus of the mandible (Class I, II, III). **Results:**Out of 120 patients, 48 (40%) belonged to 18-22 years (males- 20 (38.4%), females- 28 (41.1%) and 72 (60%) to 23-27 years (males- 32 (61.6%), females- 40 (58.9%). Among 72 mesio- angular impactions, 40 were of right side and 32 were of left side. Among 7 disto- angular impactions, 4 involved right side and 3 left side. Among 28 vertical impactions, 12 involved right side and 16 left side. Among 13 horizontal impactions, 8 involved right side and 5 left side. A non- significant difference was observed between sides (P> 0.05). A significant difference was observed between level of impactions (P< 0.05). A significant difference was observed between class of impactions (P< 0.05) **Conclusion:** Mesio- angular impaction was common impaction pattern followed by vertical. Maximum cases were noted in age group 23-27 years. Females exhibited higher impaction rate. Right side was commonly involved. Themost common depth of impaction was level B and ramus relationship was class II.
Keywords: impaction, mandibular third molar, vertical

INTRODUCTION
An impacted tooth is defined as one that fails to erupt into the dental arch within the expected developmental window due to obstruction by adjacent teeth, overlying bone, soft tissue, or an aberrant eruption path.Third molars, also known as mandibular and maxillary third permanent molars, are the last teeth to emerge in the human dentition, usually between the ages of 17 and 25 years.[1] In human dentition, the third molars are the teeth with the highest rate of impaction. Because of evolutionary changes in jaw size and diet, these teeth often do not have enough space for proper eruption, resulting in impaction.[2]

Third molar impaction prevalence varies greatly among populations and is affected by various factors, such as genetic predisposition, craniofacial morphology, dietary habits, and masticatory function.[3] These epidemiological parameters often vary depending on factors such as age, sex, ethnicity, and geographic region. In the Indian subcontinent, particularly in Rajasthan, unique skeletal and dietary traits may affect impaction patterns, highlighting the need for region-specific data to support clinical decision-making.[4]

Asymptomatic cases are common among impacted third molars; they may, however, manifest as pericoronitis, pain, trismus, swelling, or localized infection.[5] They can be involved in the development

of odontogenic cysts, including dentigerous cysts, as well as benign neoplasms like Odontogenic Keratocysts or Ameloblastomas. Furthermore, they may make neighbouring second molars more susceptible to periodontal disease, distal caries, or root resorption, necessitating an interdisciplinary approach to management.[6]

Clinically, impacted third molars are relevant to a range of dental specialties. Oral and maxillofacial surgeons evaluate them for surgical extraction, whereas orthodontists consider their potential role in dental crowding or relapse after treatment.[7] While periodontists assess the periodontal health of surrounding structures, conservative dentists may face complications due to inaccessible distal caries or pulpal involvement.[8] The present study was conducted to assess pattern of mandibular third molar impaction among study population.

MATERIALS AND METHODS

This retrospective observational study was conducted in the Department of Oral Medicine and Radiology at Surendera Dental College and Research Institute, Sriganganagar, Rajasthan. The study included Orthopantomograph (OPG) of 120 patients aged 18 to 27 years of both genders showingmandibular third molar impaction. Clinical records and radiographs were retrieved from the privateImaging center.

The demographic variables such as name, age and gender were recorded. The angulation and type of impaction of third molars were assessed usingWinter's classification for angulation (mesioangular, distoangular, vertical, horizontal).Pell and Gregory classification was used for assessing both the depth of impaction (Level A, B, C) and relation to the ramus of the mandible (Class I, II, III). Level A represents occlusal surface of third molar is level with the occlusal plane of second molar. Level B represents occlusal surface is between the occlusal plane and cervical line of second molar. Level C represents occlusal surface is below the cervical line of second molar (deep impaction).Class (Ramus Relationship) was divided into class I- Sufficient space between the ramus and distal of second molar for eruption. Class II- Space between the ramus and distal of second molar is less than the mesiodistal width of the third molar (partially impacted). Class III- All or most of the third molar is within the ramus (completely impacted). All radiographs were evaluated by a single experienced Oral and Maxillofacial Radiologist to eliminate inter-observer variability. The data was compiled and tabulated using Microsoft word and studied using the Statistical Package for the Social Sciences 22 software. A p-value < 0.05 was considered statistically significant.

RESULTS

Table- 1 Age & Gender wise distribution of patients

Age group (Years)	Male	Female	Total
18-22	20 (38.4%)	28 (41.1%)	48 (40%)
23-27	32 (61.6%)	40 (58.9%)	72 (60%)
Total	52 (43.3%)	68 (56.7%)	120 (100%)

Out of 120 patients, 48 (40%) belonged to 18-22 years (males- 20 (38.4%), females- 28 (41.1%) and 72 (60%) to 23-27 years (males- 32 (61.6%), females- 40 (58.9%). A significant difference was observed between both age groups (P< 0.05) (Table 1).

Table- 2 Type of impaction based on side and gender

Type	Side	Male	Female	Total
Mesio- angular (72)	Right (40)	22	18	0.71
	Left (32)	14	18	
Disto- angular (7)	Right (4)	1	3	0.94
	Left (3)	1	2	
Vertical (28)	Right (12)	5	7	0.85
	Left (16)	6	10	
Horizontal (13)	Right (8)	2	6	0.05
	Left (5)	1	4	
Total		52	68	

Among 72 mesio- angular impactions, 40 were of right side (males- 22, females- 18) and 32 were of left side (males- 14, females- 18). Among 7 disto- angular impactions,4 involved right side (male-1, females- 3) and 3 left side (male- 1, females- 2). Among 28 vertical impactions, 12 involved right side (males- 5, females- 7) and 16 left side (males- 6, females- 10). Among 13 horizontal impactions, 8 involved right side (males- 2, females- 6) and 5 left side (male- 1, females- 4). A non- significant difference was observed between sides (P> 0.05) (Table 2, Graph 1).
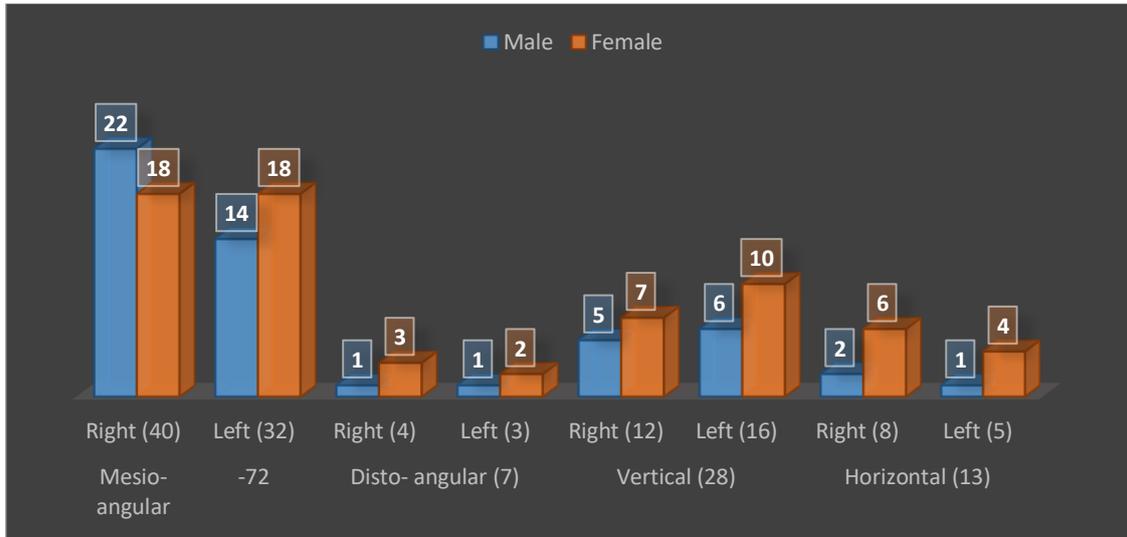
Graph 1-Type of impaction based on side and gender

Table-3 Level/ depth of impaction based on type of impaction

Level	Mesio- angular	Disto- angular	Vertical	Horizontal	Total
A	17 (23.6%)	3 (42.8%)	9 (32.1%)	3 (23%)	32 (26.7%)
B	49 (68.0%)	3 (42.8%)	15(53.6%)	8 (61.7%)	75 (62.5%)
C	6 (8.4%)	1 (14.4%)	4 (14.3%)	2 (15.3%)	13 (10.8%)
Total	72 (60%)	7 (5.8%)	28(23.3%)	13 (10.8%)	120 (100%)

Among 72 (60%) mesio- angular impactions, maximum 49 (68%) cases had level B followed by level A in 17 (23.6%) and level C in 6 (8.4%). Among 7 (5.8%) disto- angular impactions, maximum 3 (42.8%) had level A and B each and 1 (14.4%) had level C. Among vertical impactions, 15(53.6%) had level B, followed by level A in 9 (32.1%) and level C in 4 (14.3%) cases. Among horizontal impactions, 75 (62.5%) had level B, followed by level A in 32 (26.7%) and level C in 13 (10.8%) cases. A significant difference was observed between level of impactions ($P < 0.05$) (Table 3).

Table- 4 Ramus relationshipbased on type of impaction

Class	Mesio- angular	Disto- angular	Vertical	Horizontal	Total
I	18 (25.0%)	2 (28.6%)	10(35.7%)	4 (30.7%)	34 (28.3%)
II	45 (62.5%)	2 (28.6%)	13(46.4%)	6 (46.1%)	66 (55.0%)
III	9 (12.5%)	3 (42.8%)	5 (17.9%)	3 (23.2%)	20 (16.7%)
Total	72 (60%)	7 (5.8%)	28(23.3%)	13 (10.8%)	120 (100%)

In 66 (55.0%) patients, ramus relationship found to be class II, in 34 (28.3%) class I and in 20 (16.7%) class III. In mesio- angular impactions, class I was seen in 18 (25.0%), class II in 45 (62.5%) and class III in 9 (12.5%). In disto- angular impactions, class I and II was found in 2 (28.6%) cases each and class III in 3 (42.8%). In vertical impactions, class I was found in 10(35.7%), class II in 13(46.4%) and class III in 5 (17.9%). In horizontal impactions, class I was found in 4 (30.7%), class II in 6 (46.1%) and class III in 3 (23.2%) cases. A significant difference was observed between class of impactions ($P < 0.05$) (Table 4).

Fig- 1 Mesio- angular impaction in38, Vertical impaction in 48. Level C in 38 and B in 48. Class I in 38 and 48.

Fig- 2 Horizontal impaction in 38, Vertical impaction in 48. Level B in 38 and 48. Class I in 38 and 48.

DISCUSSION

The impacted mandibular third represents incomplete eruption because of its relatively inclined position to the adjacent tooth, the ascending part of ramus or their vertical position; the eruption is hindered due to space deficiency or overlying soft tissue hindrance.[9] The causes of impaction include both general and local factors. The general factors may consist of dietary habits, heredity factors, abnormality in genetic makeup, and malnutrition.[10] The local factors include adjacent 2nd molar tooth size and position, overlying dense bone, long path of eruption, and insufficient dental arch length. Studies have shown that impacted mandibular third molarweakens the angle area of the mandible and makes it susceptible to fracture and late lower arch crowding.[11]The present study was conducted to assess pattern of mandibular third molar impaction among study population.

Our study revealed that out of 120 patients, 48 (40%) belonged to 18-22 years (males- 20 (38.4%), females- 28 (41.1%) and 72 (60%) to 23-27 years (males- 32 (61.6%), females- 40 (58.9%). Yilmaz Set al[12] in their study found mean age: 30.58 ± 11.98 years, (range: 19-73). Passi et al[13] found that the 25–30 years of age group had the highest prevalence of tooth impaction (48.8%). Our results are in agreement with Sindhuja et al[14]who also found higher impaction in females (72) than males (32). Our results are in contrast with the findings of Doni et al[15] who found that out of 130 males, 112 (86.1%) had impaction and out of 118 females, 85 (72%) had impaction.

Our results showed that there were 72 mesio- angular impactions, 7 disto- angular impactions, 28 vertical impactions, and 13 horizontal impactions. A non-significant difference was observed between sides. Yilmaz et al[12] found that the most common angulation of impaction in both maxillae and mandibulae was vertical. Doni et al[15] found that mesio- angular impaction was seen in 58%, disto- angular in 6%, vertical in 24% and horizontal in 12%. Sinduja et al[14] type of impaction was vertical in 20, horizontal in 14, mesio- angular in 34, disto- angular in 12 and transverse in 6 cases.Passi et al[13]also found that the

prevalence of third molar impactions was almost the same on both the left (45.8%) and right (54.2%) sides as in our study.

Our findings revealed that among 72 (60%) mesio- angular impactions, 49 (68%) cases had level B followed by level A in 17 (23.6%) and level C in 6 (8.4%). Among 7 (5.8%) disto- angular impactions, maximum 3 (42.8%) had level A and B each and 1 (14.4%) had level C. Among vertical impactions, 15 (53.6%) had level B, followed by level A in 9 (32.1%) and level C in 4 (14.3%) cases. Among horizontal impactions, 75 (62.5%) had level B, followed by level A in 32 (26.7%) and level C in 13 (10.8%) cases. Our results are in agreement with the findings by Sindhuja et al[14] who also found level/ depth of impaction was level A in 34%, level B in 62% and level C in 4%. Doni et al[15] found that level A was seen in 20%, B in 65% and C in 15%.

We observed that in 66 (55.0%) patients, ramus relationship found to be class II, in 34 (28.3%) class I and in 20 (16.7%) class III. The most common class was class II seen in mesio- angular impactions, vertical impactions, and horizontal impactions whereas class III was common in in disto- angular impactions. Doni et al[15] found that class I was seen in 35%, II in 50% and III in 15%. Sindhuja et al[14] found that ramus relationship was class I in 30%, class II in 50% and class III in 20%.

The shortcoming of the study is small sample size. The other impacted teeth were not included in the study. Associated pathologies were also not considered in our study.

CONCLUSION

Mesio- angular impaction was common impaction pattern followed by vertical. Maximum cases were noted in age group 23-27 years. Females exhibited higher impaction rate. The most common side was right. Themost common depth of impaction was level B. The most common ramus relationship found to be class II.

REFERENCES

1. Akarslan ZZ, Kocabay C. Assessment of the associated symptoms, pathologies, positions and angulations of bilateral occurring mandibular third molars: is there any similarity? Oral Surg Oral Med Oral Pathol Oral Radiol. 2009;108:e26–e32.
2. Polat HB, Özan F, Kara I, et al. Prevalence of commonly found pathoses associated with mandibular impacted third molars based on panoramic radiographs in a Turkish population. Oral Surg Oral Med Oral Pathol Oral Radiol. 2008;105:e41–e47.
3. Almendros-Marqués N, Berini-Aytés L, Gay-Escoda C. Influence of lower third molar position on the incidence of preoperative complications. Oral Surg Oral Med Oral Pathol Oral Radiol. 2006;102:725–732.
4. Tuzuner Oncul AM, Yazicioglu D, Alanoglu Z, et al. Postoperative analgesia in impacted third molar surgery: the role of preoperative diclofenac sodium, paracetamol and lornoxicam. Med Princ Pract. 2011;20:470–476.
5. Malkawi Z, Al-Omiri MK, Khraisat A. Risk indicators of postoperative complications following surgical extraction of lower third molars. Med Princ Pract. 2011;20:321–325.
6. Hashemipour MA, Tahmasbi-Arashlow M, Fahimi-Hanzaei F. Incidence of impacted mandibular and maxillary third molars: a radiographic study in a Southeast Iran population. Med Oral Patol Oral Cir Bucal. 2013;18:e140–e145.
7. Doğan N, Orhan K, Günaydin Y, et al. Unerupted mandibular third molars: symptoms, associated pathologies, and indications for removal in a Turkish population. Quintessence Int. 2007;38:497–505.
8. Bataineh AB, Albashaireh ZS, Hazza'a AM. The surgical removal of mandibular third molars: a study in decision making. Quintessence Int. 2002;33:613–617.
9. Hugoson A, Kugelberg CF. The prevalence of third molars in a Swedish population. An epidemiological study. Community Dent Health. 1988;5:121–138.
10. Blondeau, F.; Daniel, N.G. Extraction of impacted mandibular third molars: Postoperative complications and their risk factors. J. Can. Dent. Assoc. 2007; 73: 325.
11. Meisami T, Sojat A, Sàndor GK, et al. Impacted third molars and risk of angle fracture. Int J Oral Maxillofac Surg. 2002;31:140–144.
12. Yilmaz S, Adisen MZ, Misirlioglu M, Yorubulut S. Assessment of third molar impaction pattern and associated clinical symptoms in a central anatolianturkish population. Medical Principles and Practice. 2016 Feb 1;25(2):169-75.
13. Passi D, Singh G, Dutta S, Srivastava D, Chandra L, Mishra S, Srivastava A, Dubey M. Study of pattern and prevalence of mandibular impacted third molar among Delhi-National Capital Region population with newer proposed classification of mandibular impacted third molar: A retrospective study. Natl J MaxillofacSurg2019;10:59-67.
14. Sindhuja DS, Bhargava R. Assessment of pattern of mandibular third molar impaction among Indian population. Journal of Advanced Medical and Dental Sciences Research. 2021 Dec 1;9(12):27-30.
15. Bharati R Doni, Shushma G. Assessment of prevalence and pattern of impacted third molar among known population: A retrospective analysis. International Journal of Applied Dental Sciences 2019; 5(4): 367-369.