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PREVALENCE OF IMPACTED THIRD MOLARS AMONG DIFFERENT SAGITTAL SKELETAL RELATIONSHIPS IN UPPER EGYPTIAN PATIENTS

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ABSTRACT

Aim: Our investigation aimed to evaluate the prevalence and patterns of impacted third molars in a sample of Upper Egyptian patients and explore their association with different sagittal skeletal relationships.

Materials and methods: A total of 352 pre-treatment panoramic radiographs (OPGs) and lateral cephalograms were retrospectively reviewed. The patients, aged 18 to 40 years, were classified into three skeletal groups based on the ANB angle. The number and angular position of impacted third molars were assessed. We used Winter's classification to find out impacted third molars angulation.

Results: Compared to Class I and Class III, the results disclosed a higher prevalence of third molar impaction in Class II malocclusions. Additionally, Class II individuals exhibited a higher prevalence of mesioangular and distoangular impactions, while Class III patients showed a greater tendency for horizontal impactions in the mandible. Vertical impactions were more common in Class II individuals. Furthermore, gender differences were observed, with females exhibiting a higher percentage of impacted molars across all skeletal classes.

Conclusion: Class II malocclusions had higher mesioangular and distoangular impaction rates, while Class III malocclusions were prone to mandibular horizontal impactions. Gender-related differences showed females had a higher incidence of impacted molars across skeletal classes. Understanding the link between skeletal class and third molar impactions is vital for improved orthodontic planning.

KEYWORDS: Impacted third molars, skeletal relationships, prevalence, angular impaction, Upper Egypt.

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INTRODUCTION

Third molars, commonly named wisdom teeth, are the final teeth with regards to development and eruption in the oral cavity. However, they often do not have enough space to properly erupt leading to impaction. The prevalence of third molar impaction fluctuates greatly between populations and has been found to range from 18% to 70%.[1] This is due to racial differences in the pattern of face growth, jaw size, and tooth size, all of which are important factors of the eruption pattern.[2]

Third molar impaction is a common dental problem that affects a significant portion of the population worldwide. The impaction of third molars can lead to various dental complications such as dental caries, periodontal disease, and even cysts or tumors.

Panoramic radiograph (OPG) is the technique of choice for assessing the status of third molar impaction in terms of angulation, level of impaction, and amount of overlying bone. Furthermore, OPG is utilized to assess the relation between third molars and the inferior alveolar canal.

The third molar is a crucial aspect to be considered from an orthodontic standpoint due to its potential impact on various factors such as crowding in the anterior part of the dental arch, relapse in the anterior region, uprighting and distalization of first and second molars, impediment in the anchorage preparation, caries, and pericoronitis.[3]

The third molar impaction prevalence may oscillate based on different orthodontic skeletal classes, with some studies suggesting a higher prevalence in Class II malocclusions. Therefore, understanding the wisdom tooth impaction prevalence and its association with orthodontic skeletal classes is essential for developing effective treatment plans and improving oral health outcomes.[4]

In this study, we aimed to investigate the prevalence of third molar impaction in Upper Egypt and explore its relationship with different orthodontic skeletal classes.

MATERIALS AND METHODS

The ethical committee of the Faculty of Dentistry, Al-Azhar University, Assiut approved this retrospective investigation. The sample size was determined using Epi info software. Given the substantial variation in the prevalence of third molar impaction across different populations, ranging from 18% to 70% [1], we assumed an expected prevalence of 50%. With a 95% confidence level and a 5.5% margin of error, the minimum necessary sample size was calculated to be 317. To account for potential incomplete records, we increased the sample size by 10%, resulting in a total of 349 cases.

This study was carried out on a group of patients who came to the Orthodontic clinic, Faculty of Dentistry, Assiut University for treatment at the Orthodontic Department. A total of 352 pre-treatment OPGs and lateral cephalograms were chosen from the record for review, and the patients' ages ranged from 18 to 40 years, as third molars have been found to erupt between the ages of 18 and 21 years.[5] There were 170 men and 182 females among the 352 patients.

Participants in this study had to be at least 18 years old and had at least one impacted 3rd molar, had no previous orthodontic or orthognathic surgical treatment, had no extracted permanent teeth, and had no history of medical disorders that could have affected jaw growth.

Individuals with second and third molar pathology, including cysts or severe caries, were excluded.

According on their ANB angle, the patients were separated into three groups:

Skeletal Class I (ANB 0-4 degrees)— The average ANB angle was 2.42 ± 1.15 degrees (2.40 ± 1.13 and 2.45 ± 1.19 in females and males, respectively).

Skeletal Class II (ANB greater than 4 degrees)— The average ANB angle was 6.22 ±1.33 degrees (6.11 ± 1.15 in females and 6.4 ± 1.42 in males).

Skeletal Class III (ANB less than 0 degree)— The average ANB angle was -2.21 ±2.62 degrees (-1.92 ±1.87 and -2.35 ±3.02 in females and males, respectively).

The following criteria were used to all OPGs: number of impacted third molars and angular position of impaction.

The third molar was considered to be impacted when it has not fully erupted to its assumed normal functioning position in the occlusal plane.[6]

Winter's classification[7] was used to determine the angulation of the impacted third molar in relation to the angle created by the intersected longitudinal axes of the second and third molars. Third molars were classed as follows according to Winter's classification: (Figure 1)

Mesioangular angulation occurs when the third molar's long axis intersects the long axis of the second molar at or above the occlusal plane.

When the long axes of the third and second molars tilt away from each other, this is referred to as distoangular angulation.

Horizontal angulation occurs when the third molar's long axis intersects the long axis of the second molar at a right angle.

Vertical angulation occurs when the third molar's long axis runs parallel to the long axis of the second molar.

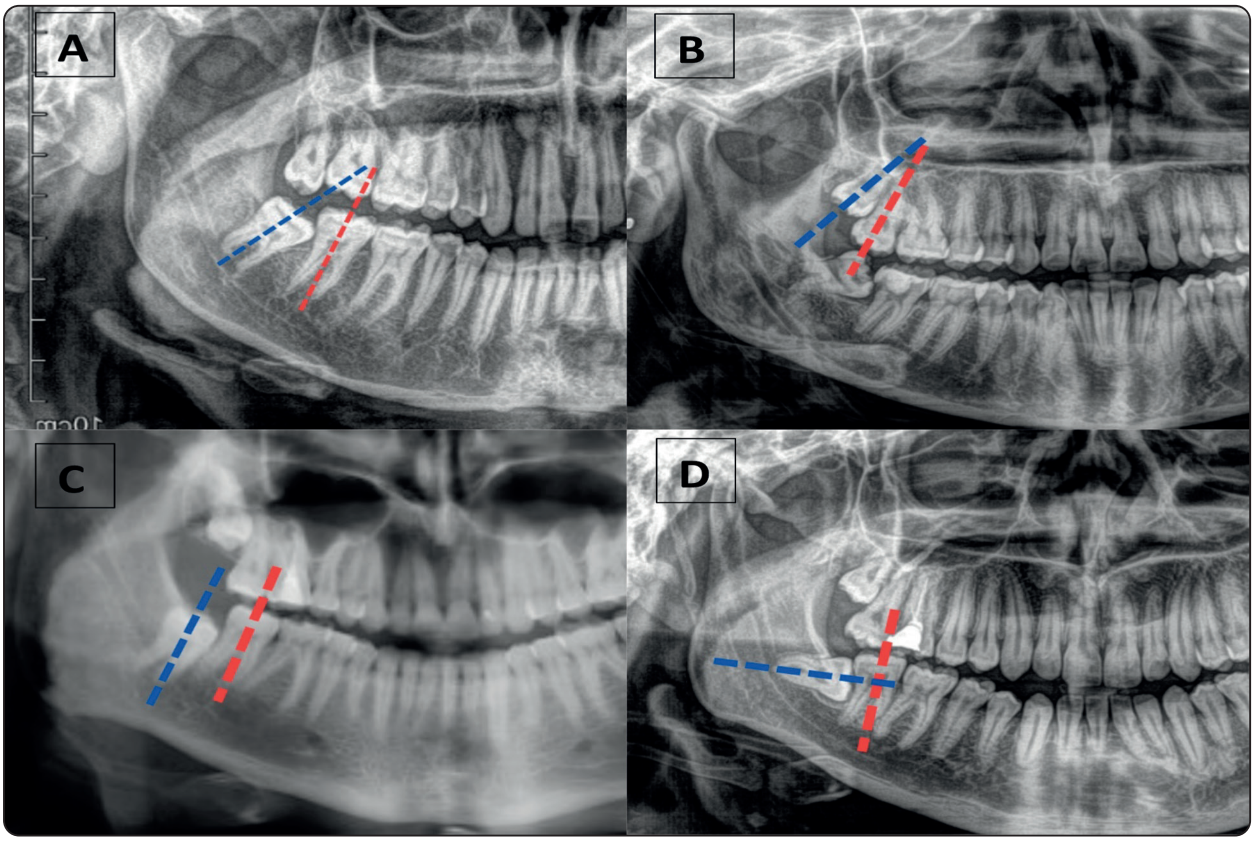

Fig. (1) Winter's angulation classification of third molars: A, Mesioangular impaction; B, Distoangular impaction; C, Vertical impaction; D, Horizontal impaction; Red dotted line, 2nd molar long axis; Blue dotted line, 3rd molar long axis.

Statistical analysis

To analyze the data, Statistical Package for the Social Sciences software was used (SPSS, Windows version 26, SPSS Inc., Chicago, Illinois, USA). The data were demonstrated descriptively as mean, standard deviation, and frequency. Mann-Whitney U test was used to detect the difference in age variable between males and females in each group; and Kruskal–Wallis test was employed to detect and difference in age among the three classes. We use chi-square test to detect any difference among groups with reference to gender and eruption/ impaction condition of wisdom teeth.

RESULTS

A total of 352 patients were included in this study of which 105 were class I, 157 were class II, and 90 were class III. There were no statistically significant differences regarding age among the three groups; as well as no statistically significant differences were observed in age between males and females in each group (Table 1).

In terms of gender, there appeared to be a trend, although not statistically significant (p=0.066), where Class II had a higher percentage of males and females (42.3% and 46.6%, respectively) compared to Class I (26.4% and 32.8%, respectively) and Class III (31.3% and 20.6%, respectively) (Table 2).

With regards to the presence of erupted or impacted maxillary and mandibular third molars, the data showed that there was no statistically significant difference among the classes, as indicated by the p-values (0.100 for maxillary and 0.097 for mandibular third molars) (Table 2).

For the mesioangular angulation, both in the maxilla and mandible, Class II had the highest percentage (52.6% and 51.5%, respectively), while Class I showed the lowest (42.1% and 23.5%, respectively). These differences were statistically significant for the mandible (p<0.001) but not for the maxilla (p=0.017) (Table 2).

Similarly, for the distoangular angulation, Class II exhibited the highest percentage in both the maxilla (62.6%) and mandible (52.9%), whereas Class I showed the lowest (27.3% for maxilla and 41.25% for mandible). These differences were statistically significant for both the maxilla and mandible (p<0.001 and p=0.047, respectively) (Table 2).

Concerning the horizontal angulation, the majority of cases fell into Class III for both the maxilla (63.6%) and mandible (44.0%), while Class I and Class II had relatively lower percentages. However, these differences were not statistically significant for the maxilla (p=0.103) but were significant for the mandible (p=0.047) (Table 2).

With respect to the vertical angulation, Class II had the highest percentage in both the maxilla (42.5%) and mandible (50.0%), whereas Class III had the lowest (27.6% for maxilla and 15.6% for mandible). These differences were statistically significant for both the maxilla and mandible (p=0.030 and p=0.003, respectively) (Table 2).

TABLE (1) Mean age of the included patients according to class and gender.

	Class I				Class II				Class III				
Gender	**Mean**	**SD**	**n**	**P-value^**	**Mean**	**SD**	**n**	**P-value^**	**Mean**	**SD**	**n**	**P-value^**	**P-value^^**
Male	30.09	5.88	43	0.695	29.32	4.76	69	0.107	30.16	4.24	51	0.259	0.852
Female	30.53	5.66	62		30.97	4.84	88		31.21	4.39	39		
Total	30.35	5.72	105		30.24	4.86	157		30.61	4.32	90		

^ Mann–Whitney test was used ***^^ Kruskal–Wallis test was used***

TABLE (2) Distribution of gender and impacted third molars across different sagittal skeletal classes.

	Class I (n=105)	Class II (n= 157)	Class III (n= 90)	P-value^
Gender				
Male	43 (26.4%)	69 (42.3%)	51 (31.3%)	0.066
Female	62 (32.8%)	88 (46.6%)	39 (20.6%)	
Maxillary 3rd molars				
Erupted	101 (32.5%)	145 (46.6%)	65 (20.9%)	0.100
Impacted	91 (26.8%)	156 (45.9%)	93 (27.4%)	
Mandibular 3rd molars				
Erupted	85 (28.6%)	122 (41.1%)	90 (30.3%)	0.097
Impacted	95 (28.2%)	163 (48.4%)	79 (23.4%)	
Mesioangular				
Maxillary	8 (42.1%)	10 (52.6%)	1 (5.3%)	0.017*
Mandible	32 (23.5%)	70 (51.5%)	34 (25.0%)	<0.001*
Distoangular				
Maxillary	27 (27.3%)	62 (62.6%)	10 (10.1%)	<0.001*
Mandible	7 (41.25)	9 (52.9%)	1 (5.9%)	0.047*
Horizontal				
Maxillary	2 (18.2%)	2 (18.2%)	7 (63.6%)	0.103
Mandible	33 (28.0%)	33 (28.0%)	52 (44.0%)	0.047*
Vertical				
Maxillary	54 (29.8%)	77 (42.5%)	50 (27.6%)	0.030*
Mandible	22 (34.4%)	32 (50.0%)	10 (15.6%)	0.003*

^ Chi-square test was used
**Significant p-value*

Across all classes, females (57.7%) had a higher percentage of impacted molars compared to males (42.3%), indicating a statistically significant difference ($p < 0.001$) (Table 3).

When examining each class separately, similar patterns emerge. In class I, females (72.6%) had a significantly higher percentage of impacted molars compared to males (27.4%), with a p-value of less than 0.001. Similarly, in class II, females (57.7%) had a higher percentage of impacted molars compared to males (42.3%), with a p-value of 0.006. In class III, males (58.1%) had a higher percentage of impacted molars compared to females (41.9%), and this difference was statistically significant ($p = 0.033$) (Table 3).

Table (3) Distribution of impacted third molars in males and females across different sagittal skeletal classes.

	Males (n=163)	Females (n= 189)	P-value^
All classes	286 (42.3%)	391 (57.7%)	<0.001*
Class I	51 (27.4%)	135 (72.6%)	<0.001*
Class II	135 (42.3%)	184 (57.7%)	0.006*
Class III	100 (58.1%)	72 (41.9%)	0.033*

^ Chi-square test was used
****Significant p-value***

DISCUSSION

The present study scrutinized the prevalence of wisdom teeth impaction in Upper Egyptian patients and explored its relationship with different sagittal skeletal relationships. The findings of this study provided worthy discernments into the association between the angulation and impaction of third molars and different skeletal classes, shedding light on the clinical implications for orthodontic treatment planning and oral health management.

The study's results revealed a prevalence of third molar impaction in Upper Egyptian patients, with varying degrees of angulation and impaction. Understanding the prevalence of impacted third molars is essential for orthodontists and oral surgeons when planning treatment and addressing potential complications associated with impaction.

The relationship between skeletal classes and third molar impaction was a key focus of this study. The data showed that Class II malocclusions exhibited a higher prevalence of third molar impaction compared to Class I and Class III malocclusions. This finding is in line with earlier results that have reported a higher prevalence of impaction in Class II individuals.(1) The increased prevalence in Class II patients may be attributed to factors related to facial growth patterns and tooth size, which can affect the eruption path of third molars.(5)

The angulation of impacted third molars was also examined in this study using Winter's classification. Mesioangular and distoangular angulations were the most common types of impaction, both in the maxilla and mandible. Class II malocclusions had the highest percentage of mesioangular and distoangular impactions, which were statistically significant. This suggests that Class II individuals may be more prone to these types of impactions, potentially due to the altered spatial relationships between the molars and the limited space in the dental arch.(3)

Horizontal angulation was most prevalent in Class III malocclusions, particularly in the mandible, although the difference was statistically significant only for the mandible. This finding indicates that Class III individuals may be at a higher risk of horizontal impaction in the mandibular third molars, which could impact their orthodontic treatment and overall oral health.(6)

Vertical angulation of impacted third molars also showed significant differences among the skeletal classes. Class II individuals had a higher percentage of vertical impactions in both the maxilla and mandible. This suggests that Class II malocclusions may be more susceptible to vertically impacted third molars, which could pose challenges in orthodontic treatment planning, especially when considering the need for molar distalization.(8)

Additionally, gender differences were observed in the prevalence of impacted third molars. Females exhibited a higher percentage of impacted molars across all skeletal classes, indicating a significant difference. This gender-related variation in impaction prevalence aligns with previous research and may be attributed to factors such as genetic and hormonal influences.(4) It is noteworthy that these gender differences persisted within each skeletal class, emphasizing the importance of considering gender-related factors in treatment planning.

The findings of this study underscored the complexity of third molar impaction and its relationship with sagittal skeletal classes. Orthodontists and oral surgeons should take into account these associations when assessing patients and planning treatment strategies. Class II malocclusions may require particular attention and monitoring for third molar impaction, given their higher susceptibility to mesioangular and distoangular impactions. Similarly, Class III individuals may need careful evaluation of the potential for horizontal impaction in the mandible.

CONCLUSION

Class II malocclusions demonstrated a higher prevalence of third molar impaction, especially with mesioangular and distoangular impactions. Class III malocclusions exhibited a higher likelihood of horizontal impactions in the mandible.

Gender differences were observed, with females showing a higher percentage of impacted molars across all skeletal classes. These findings underscore the need to consider gender-related factors in treatment planning.

Understanding the complex relationship between skeletal class and third molar impaction is essential for orthodontists and oral surgeons to develop effective treatment strategies and minimize complications during orthodontic care.

REFERENCES

1. Bishara SE. Third molars: a dilemma! Or is it? Am J Orthod Dentofacial Orthop. 1999;115(6):628-633.

2. Pillai AK, Thomas S, Paul G, Singh SK, Moghe S. Incidence of impacted third molars: A radiographic study in People's Hospital, Bhopal, India. J Oral Biol Craniofac Res. 2014;4(2):76-81.

3. Richardson ME. Late lower arch crowding: the role of the transverse dimension. Am J Orthod Dentofacial Orthop. 1995;107(6):613-617.

4. Abu Alhaija E, AlBhairan H, AlKhateeb S. Mandibular third molar space in different antero-posterior skeletal patterns. Eur J Orthod. 2011;33(5):570-576.

5. SILLING G. Development and eruption of the mandibular third molar and its response to orthodontic therapy. Angle Orthod. 1973;43(3):271-278.

6. Gümrükçü Z, Balaban E, Karabağ M. Is there a relationship between third-molar impaction types and the dimensional/angular measurement values of posterior mandible according to Pell & Gregory/Winter Classification? Oral Radiol. 2021;37:29-35.

7. Primo FT, Primo BT, Scheffer MAR, Hernández PAG, Rivaldo EG. Evaluation of 1211 third molars positions according to the classification of Winter, Pell & Gregory. Int J Odontostomat. 2017;11(1):61-65.

8. Pell GJ. Impacted mandibular third molars: classification and modified techniques for removal. Dent Digest. 1933;39:330-338.