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# PREVALENCE OF IMPACTED THIRD MOLARS AND ITS ASSOCIATED PATHOLOGIES AMONG POPULATION IN SANAA-YEMEN

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## Abstract

The objective of the present study was to determine the prevalence of impacted third molars and its associated pathologies in a random sample of Yemeni population in Sana'a.

This study represents retrospective orthopantomogram (OPG) analysis of 1900 patients chosen randomly from digital x-rays centers in Sana'a, Yemen. Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 25.

Among 1900 OPG's, impacted third molars were found in 741 (39%), most commonly noticed in female 467 (63.1%), mandibular jaw 325 (43.86%), mesioangular 510 (55.9%) in mandible and distoangular 316 (52.5%) in maxilla, class IB 633 (41.84%). Associated pathology was dental caries in the second or third molar 67 (9%). Pathologies mostly affects mandible 197 (91.6%); they occur in mesioangular 98 (45.6%), class I 125 (58.1%), level B 96 (44.7%) position.

As a conclusion, impacted third molar is a common problem that affects nearly one third of Yemeni population.

**Keywords:** Third molar – panoramic – dental caries – pathology.

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# PRÉVALENCE DES TROISIÈMES MOLARS INCLUSES ET LEURS PATHOLOGIES ASSOCIÉES AUPRÈS DE LA POPULATION À SANAA-YÉMEN

## Résumé

L'objectif de la présente étude était de déterminer la prévalence des dents de sagesse incluses et des pathologies associées dans un échantillon aléatoire de la population yéménite à Sana'a.

Cette étude représente une analyse orthopantomographique rétrospective englobant 1900 patients choisis au hasard dans des centres de radiographie numérique à Sana'a, au Yémen. Les données collectées ont été analysées à l'aide du logiciel « Statistical Package for Social Sciences (SPSS) version 25 ». Parmi les 1900 panoramiques, des troisièmes molaires incluses ont été trouvées chez 741 (39%) participants, le plus souvent observées chez les femmes 467 (63,1%) et à la mandibule.

La pathologie la plus fréquemment associée aux troisièmes molaires incluses était la carie dentaire de la deuxième ou de la troisième molaire (9%). Les pathologies touchent principalement la mandibule (91,6%).

En conclusion, la troisième molaire incluse est un problème courant qui affecte près d'un tiers de la population yéménite.

**Mots-clés:** dent de sagesse – panoramique – carie dentaire – pathologie dentaire.

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## Introduction

According to WHO, an impacted tooth is any tooth that is prevented from reaching its normal position in the mouth by tissue, bone or another tooth. Tooth impaction is a pathological situation in which a tooth cannot or will not erupt into its normal functioning position [1]. The most often congenitally missing as well as impacted teeth are the third molars, which are present in 90% of the population, with 33% having at least one impacted third molar [2]. They account for 98% of all the impacted teeth [3]. According to Othman et al., the mandibular third molars are the most frequently impacted teeth in the humans and surgical extraction has become one of the most common dentoalveolar surgeries [4]. Impacted teeth may be associated with periodontal disease, dental caries, odontogenic cyst and tumors, pain of unexplained origin, jaw fracture, and resorption of root of the adjacent tooth [5]. Svendsen and Maertens [6] have reviewed in detail the etiology of third molar impactions. Two of the cited causes are:

Lack of space: insufficient anterior-posterior dimension, transverse distance of the alveolar process in the third molar region.

Late third molar mineralization and early physical maturation.

It has also been found that the modern diet does not offer a decided effort in mastication, resulting in loss of growth stimulation of jaws, and thus the modern man has impacted and unerupted teeth. Also systemic causes of prenatal (heredity and miscegenation) and postnatal (Rickets, anemia, congenital syphilis, tuberculosis, endocrine dysfunctions, malnutrition) pathologies can cause tooth impaction.

## Materials and methods

This non-interventional, descriptive, cross-sectional study involved 1900 panoramic radiographs obtained from different digital panoramic x-ray

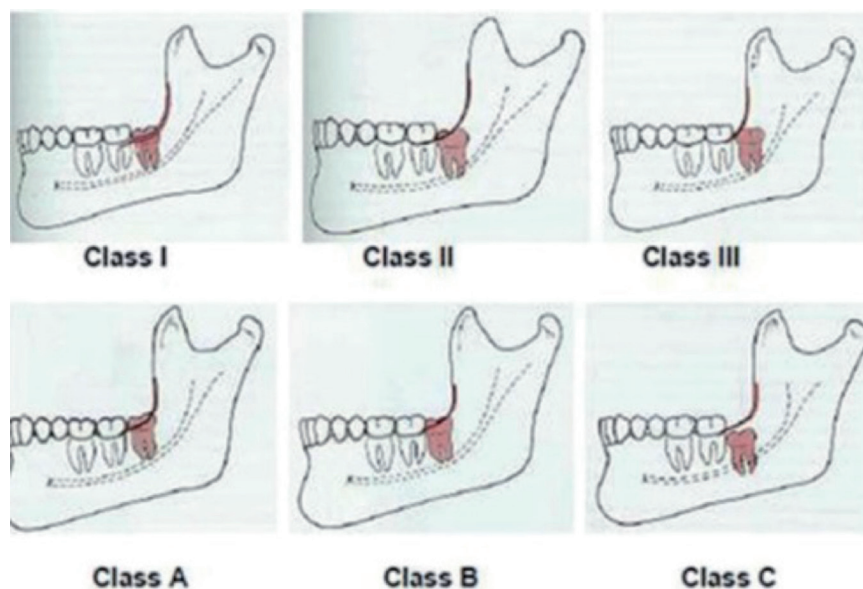


Fig. 1: Pell & Gregory's classification diagram.

centers in Sana'a, Yemen from January 2018 to February 2020. This study was conducted over a period of 4 months from December 2019 to March 2020. Patients with age less than 20 years, history of maxillofacial trauma, presence of any craniofacial anomaly or syndrome (Down's syndrome or Clediocranial Dystosis), incomplete data, poor quality of orthopantomogram (OPG), incomplete formation of root were considered as exclusion criteria. An individual panoramic radiograph was used for each patient which recorded multiple variables including gender (male/female), number of impacted third molars (1,2,3,4), side (left/right), jaw (maxilla, mandible), angle according to Archer & Kruger's (mesioangular, distoangular, horizontal, vertical, buccoangular, linguangular and inverted) and pattern according to Pell & Gregory's (Class I, II, III and Position A, B,C) (Fig.1) and associated lesions that appears radiographically (caries in the second or third molar, caries with periodontal pocket in the second or third molar, periodontal pocket, dentigerous cysts, root resorption of second molar). The collected data were verified, coded and analyzed for descriptive statistics using

Statistical Package for Social Sciences (IBM, SPSS Statistics, version 25.0). Results of variables relations were assessed and displayed by frequency and percentage, p-value assessed through Pearson Chi-square test. Level of significance was set at 0.05.

The present study was approved by the head of department of community medicine, Sana'a University and conducted according to the declaration of Helsinki principles. All data including patient's demographic information were kept confidential.

## Results

The present study showed that out of 741 cases, there was a female predilection in impacted third molars (n=467; 63.1%); the male to female ratio was 1:1.7.

About 306 (41.3%) subjects had at least one impacted third molar, and 117 (15.8%) had all four third molars impacted. The proportion of impacted mandibular third molars was 325 (43.86%), significantly more than that of impacted maxillary third molars 148 (19.97%), with the ratio of maxilla to mandible being 1:2.2.

Jaw level	Right side	Left side	Total	Asymp. Sig. (2-tailed)
<b>Maxilla</b>	281 (46.7%)	321 (53.3%)	602 (100%)	0.103
<b>Mandible</b>	459 (50.4%)	452 (49.6%)	911 (100%)	0.187
<b>Total</b>	740 (48.9%)	773 (51.1%)	1513 (100%)	0.290

Table 1: Distribution of third molars by side of impaction

Class	Level			Total	Asymp. Sig. (2-tailed)
	A	B	C		
<b>I</b>	131 (12.5%)	633 (60.3%)	285 (27.2%)	1049 (100%)	0.018
<b>II</b>	135 (35.5%)	159 (41.8%)	86 (22.7%)	380 (100%)	0.017
<b>III</b>	9 (10.7%)	37 (44.1%)	38 (45.2%)	84 (100%)	0.017
<b>Total</b>	275 (18.2%)	829 (54.8%)	409 (27%)	1513 (100%)	0.052

Table 2: Distribution of third molar impaction by level according to Pell & Gregory's classification.



Fig. 2. Dental caries communicated with periodontal pockets.



Fig. 3. Periodontitis.



Fig. 4. Dentigerous cyst.



Fig. 5. Root resorption.

The distribution of third molars by side of impaction is presented in table 1. Out of 741 cases and 1513 impacted third molars there was a negative significant difference between the right and left sides in both the maxilla and the mandible. The chi-squared test output had a "Asymp. sig. (2-tailed)". Correlation is statistically not significant at  $p > 0.05$ .

The mesioangular was the most dominant angulation ( $n=558$ ; 36.9%), followed by distoangular ( $n=319$ ; 21.1%), vertical ( $n=269$ ; 17.8%), horizontal ( $n=199$ ; 13.2%), buccoangular ( $n=135$ ; 8.9%), inverted angulation ( $n=33$ ; 2.2%), with no signs of linguangular presence.

The distribution of third molar impaction by level according to Pell & Gregory's classification is presented in table 2. Most patients exhibited class I ( $n=1049$ ; 69.3%), followed by class II ( $n=380$ ; 25.1%) and class III ( $n=84$ ; 5.6%). The most common level of impaction was level B ( $n=829$ ; 54.8%), followed by level C ( $n=409$ ; 27%) then level A ( $n=275$ ; 18.2%). The chi-squared test output had a "Asymp. sig. (2-tailed)". Correlation is statistically significant at  $p < 0.05$ .

We selected pathologies that can be determined by radiograph. The analysis showed that only 215 (29%) patients were affected. The most common pathology was dental caries

detected on the distal surface of the second molar or the third molar itself in 67 (9%) cases. Also, there was a relation between the occurrence of dental caries and periodontal pocket in 58 (7.8%) cases (Fig. 2). Periodontitis alone was also spotted in 50 (6.8%) cases (Fig. 3); dentigerous cyst was found in 21 (2.8%) cases (Fig. 4), and distal root resorption of second molar was observed in 19 (2.6%) cases (Fig. 5).

The mandible was the most affected jaw by dental pathologies ( $n=197$ ; 91.6%). The relation between the tooth position and pathologies associated to impacted third molars showed high prevalence to mesial angulation

(n=98; 45.6%) ( $p>0.05$ ), class I (n=125; 58.1%) ( $p<0.05$ ), level B (n=96; 44.7%) ( $p>0.05$ ).

## Discussion

The prevalence of impacted third molars was assessed among 1900 Yemeni citizens. 741 (39%) patients had impacted third molars, which is in the same line of a study conducted in Bosnia and Herzegovina (38%) [7], Jordan (33.6%) [8]. Higher prevalence of impacted teeth was found in the study of Morris and Jerman conducted in USA on 5000 subjects (65%) [9]. The difference might be attributed to the age groups included in both studies since in our study only patients less than 20 years old were excluded.

Our study showed female predilection in distribution of impacted third molars by 63.1%. Many studies reported a higher gender predilection in female in China (56%), Jordan (53.4%), Iraq (53%), Iran (62.7%), Bosnia and Herzegovina (64%), KSA (84.7%), Sweden and Spain [7,8,10,11-15].

Moreover, the results of our study are in agreement with previous reports, since there is a statistical significance in distribution of impacted teeth between females and males ( $p<0.05$ ). The higher frequency reported in females is due to the consequence of difference between the growth of males and females, females usually stop growing when the third molars just begin to erupt, whereas in males, the growth of the jaws continues during the time of eruption of the third molars, creating more space for third molar eruption [16].

Concerning the number of impacted third molars per person, 41.3% of the participants had at least one impacted third molar, which is in accordance with findings of other authors: 40% in KSA [17], 38% in Bosnia [7], 33% in Jordan [8] and 44% in South Iran [13].

The proportion of impacted mandibular third molars (43.86%) was significantly more than that of impacted maxillary third molars and more than that of impacted upper and lower third

molars together. Many other studies reported mandibular predilection such as those conducted in Pakistan, KSA, India, Iran, Bosnia and Herzegovina, China and Kenya [7,10,13,14,18-20]. Most common causes of the impaction of mandibular third molar are the abnormal positioning of the tooth bud, lack of space in the dental arch, supernumerary tooth ankylosis of the deciduous or permanent tooth, non-resorbing bone due to local or systemic causes, etc. [21,22]. It is mainly due to bony obstruction in the pathway of eruption or the local adjacent tooth causes hindrance [23].

In the present study, there was no significant difference between the right and left sides in both the maxilla and the mandible. This was also noted by numerous studies [12, 13, 19, 24-26].

The most dominant angle in our study was mesioangulation (36.9%), followed by distoangular position (21.1%). Our findings are conformed to the previous reports from Pakistan (58%), Jordan (50%), Kenya (62.4%), China (80%), Thailand (62.5%), Iraq (39%), South Iran (48.3%), India (58%) [1,8,10,12,13,18,20,27]. However, some studies showed that vertical impaction is the most common form such as the study in Bosnia and Herzegovina (65%), and in Jordan (61.4%) [7,28]. This may be partly due to different methods and types of angulation classification that was used in those studies.

The study showed that most patients exhibited class IB (60.3%) regarding Pell and Gregory classification. Consequently, these findings are not in agreement with reports cited in the literature. Other studies showed that most impacted third molars were at Class II position where half of the crown was in the ramus; however the position of the highest portion of third molar was between the occlusal plane and cervical line of the second molar, which is position B, in agreement with the present study. In other studies conducted in Bosnia and Herzegovina and Spain [7,15], the most common type of impaction regarding Pell and

Gregory classification was found to be IIB (13.6%).

The most common pathology assessed was dental caries which can be detected on the distal surface of the second molar or the third molar itself in 9% of the cases; a relation between the occurrence of dental caries and periodontal pocket was observed in 7.8% of the cases, a periodontitis alone was also spotted in 6.8% of the cases, dentigerous cyst was found in 2.8% of the cases, and distal root resorption of second molar was found in 2.6% of the cases. These results are in agreement with other results reported from Kenya where 32.9% of patients had caries on the impacted and symptomless teeth. In a study conducted in Bosnia and Herzegovina, the most common pathology associated with impacted third molars is dental caries in the second or third molar; it was observed in 17% of cases [7, 18].

## Conclusion

Within the limitations of the present study, we can draw the following conclusions:

Impacted third is a common problem among Yemeni population: 39% of patients presented with at least one impacted third molar, with female predilection.

Mandibular arch happens to be the most hosting arch of impacted third molars. Mesial angulation was the most common pattern of impaction, and majority of patients presented with class I of level B of impaction.

The most common pathology associated with impacted third molars was dental caries in the second or third molar, while the most common affected arch of dental pathologies was the mandible. Moreover, there was a relation of tooth position and the occurrence of pathological lesions most likely with mesioangular class IB.

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