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Original Article

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The Prevalence of Impacted Third Molar, Impaction Angulation, and Impaction Depth in Patients Visiting Dental Clinics and Private Offices in Ghaemshahr, Iran, in 2016

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Abstract

***Background & Aims*:** The present study aimed to determine the prevalence of impacted third molar as well as impaction angulation and depth.

***Materials & Methods*:** In this cross-sectional descriptive study, 261 panoramic radiographs belonging to patients visiting dental clinics and offices in Ghaemshahr, Iran, were evaluated and the presence of impacted wisdom teeth was examined. Moreover, the angulation of impacted teeth, impaction depth, and the relationship of the tooth to the mandibular ramus were recorded. The data were recorded, collected, and statistically analyzed in SPSS 22 using the non-parametric chi-square test. $p < 0.05$ was considered significant.

***Results*:** Of the 261 patients entering the study, 52 (17.69%) had at least one impacted tooth. Of the total number of patients with impacted teeth, 31 were women (mean prevalence of 19.87% of the total population of women) and 21 were men (15.22% of the total population of men), showing no significant difference ($p=0.29$). In terms of impaction depth based on Pell and Gregory' classification, Class C impaction depth was the most prevalent in the maxilla, while Class A was the most prevalent in the mandible. The most prevalent impaction in terms of angulation in relation to the second molar was vertical in the maxilla and vertical and mesioangular in the mandible.

Conclusion: Based on results, the prevalence of impacted wisdom teeth in patients was 17.69%. This may not be a striking amount, but it is still of significance since the possible complications of impacted teeth are costly and problematic.

***Keywords*:** Wisdom tooth, Tooth impaction, Panoramic radiography

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Introduction

An impacted tooth is one that has not erupted due to the presence of a physical barrier on its eruption path (1). All teeth can be impacted, but the most commonly involved teeth are mandibular third molars, maxillary canines, maxillary third molars, mandibular and maxillary second premolars, and maxillary central teeth (2). Tooth impaction is often diagnosed when a tooth has a long delay in eruption (3). The natural eruption of the third molar in terms of angulation is as follows: First, it grows from a horizontal position to a mesioangular one, then grows vertically, and eventually erupts (4). Survival analysis for third molar eruption confirmed that severely angulated third molars have a significantly lower chance of eruption over time, compared to third molars with small angulations (5). A reason why molar teeth are impacted is failing to change from the mesioangular to the vertical position (6).

Impacted mandibular third molars have the most distal position in the arch and their close proximity with the pericoronal flap has made this area the least accessible for dental hygiene. Mesioangular and horizontally impacted teeth lead to the accumulation of plaque on the distal surface of second molars, predisposing this region to distal cervical caries (7).

Moreover, the presence of an impacted tooth part which is exposed to the oral cavity causes distal pockets in the second molar, followed by acute pericoronitis (8). The term pericoronitis refers to the inflammation of gingiva around the crown of a partially erupted tooth which may be acute, sub-acute, or chronic. A partially erupted or impacted third molar is the most prevalent place for pericoronitis (9).

A relationship was observed between the presence of the unerupted third mandibular molar and mandibular fracture. The presence of the third molar reduces the bone's cross-section, leading to the further incidence of mandibular angle fracture. Therefore, the removal of the unerupted third molar reduces the risk of mandibular angle fracture (10-15).

Due to its importance, tooth impaction is discussed in most branches of dentistry, including surgery, pediatrics, orthodontics, and prosthesis, so that an accurate and timely treatment plan would be adopted and correct therapeutic decisions would be made in order to prevent further complications such as periodontal problems, caries in the adjacent tooth, root resorption in the adjacent tooth, crowding, cysts, tumors (16-18), and idiopathic pains (19).

Considering the effects of an impacted tooth on treatment methods, complications, higher treatment costs which put a burden on patients as well as the healthcare system, and the lack of accurate statistics, the present study aimed to determine the prevalence of impacted third molar and impaction angulation and depth in patients visiting dental clinics and private offices in Ghaemshahr, 2016.

Materials & Methods:

In the present cross-sectional descriptive study, panoramic radiographs of patients visiting the dental clinics and private offices of Ghaemshahr in 2016 were utilized. An observer examined these panoramic radiographs and recorded the age and sex of patients.

In order to determine the sample size, according to the study conducted by Hashemipour et al. (24), who reported a prevalence of 57% and based on the confidence limits and error rate of 5%, 261 patients were determined in clusters for each year. 294 subjects were included in the study.

Subjects above 20 years of age were included in study, and exclusion criteria were history of extracting the second molar, dentofacial anomalies such as cleft lip and cleft palate, congenital syndromes such as Down syndrome, hyperdontia, history of wisdom tooth extraction, and missing of a wisdom tooth which was recorded as hypodontia. Subjects with immature teeth with open apices were also excluded. Teeth were considered impacted if they did not have a functional occlusion and the roots were completely formed. Pell and Gregory's classification was used to examine the depth of impaction, as follows: Class A: Not buried in bone, or the occlusal plane of the impacted tooth is at the same level as the adjacent tooth; Class B: Partially buried in bone, or the occlusal plane of the impacted tooth is between the occlusal plane and the cervical line

of the adjacent tooth, and any part of the cemento-enamel junction is lower than the bone level; Class C: Completely buried in bone, or the occlusal plane of the impacted tooth is apical to the cervical line of the adjacent tooth.

Moreover, based on Pell and Gregory's classification, the position of the tooth in relation to the anterior border of mandibular ramus is classified as follows: Class I: Situated anterior to the anterior border of the ramus; Class II: Crown is half-covered by the anterior border of the ramus; Class III: Crown is fully covered by the anterior border of the ramus (20).

To determine the angulation of the impacted wisdom tooth, Winter's classification was used as follows based on the angle between the vertical plane of the wisdom tooth and the second molar: Vertical impaction: Angle of -10 to 10°, mesioangular impaction: Angle of 11 to 72°, distoangular impaction: Angle of -11 to -72°, and horizontal impaction: Angle of 80 to 100° (21). Based on the noted criteria, the samples were examined. First, radiographs belonging to children or those aging below 20 years were separated from the sample. Then, based on patient files, the existence of problems or illnesses which would lead to their exclusion was examined. After this screening phase, eligible cases were included in the study. The radiographs belonging to the remaining patients were investigated. In this step, panoramic radiographs of those with impacted wisdom teeth were evaluated and recorded in a checklist. Panoramic radiographs of patients in offices were assessed after examination and screening, and the presence of impacted wisdom teeth was examined and recorded. Finally, the data were recorded, collected, and statistically analyzed in SPSS 22 using the non-parametric chi-square test at the level of 0.05.

Results

The total number of panoramic radiographs equaled 261, of which 156 belonged to women (53%) and 138 to men (47%). The total number of patients with at least one impacted tooth was 52 (17.69%) (CI: 13.5-22.5%). Moreover, 31 women (mean prevalence of 19.87% of the total population of women) and 21 men (15.22% of the total population of men) had impacted teeth, showing no significant difference (p=0.29) (Table 1).

Table 1. Frequency of patients with impacted teeth

	Number of individuals	Individuals with an impacted tooth	Impacted tooth percentage
Men	138	21	22.15
Women	156	31	87.19
Total	261	52	69.17

The total number of impacted teeth was 86. Of this, 35 teeth belonged to the maxilla (40%) and 51 to the mandible (60%). Moreover, 47 teeth were on the left (55%) and 39 were on the right (45%) (Table 2).

Table 2. Frequency of impacted teeth divided by side and jaw

	Right	Left	Percentage
Mandible	15	20	40
Maxilla	24	27	60
Percentage	45	55	

In terms of impaction depth based on Pell and Gregory's classification, Class C impaction depth was the most prevalent in the maxilla, while Class A was the most prevalent in the mandible. In terms of the angulation of the impacted tooth to the second molar, the most prevalent cases were vertical impaction (18 teeth, 51% of the total maxillary impacted teeth) and vertical and mesioangular impaction (each 19, 37.25% of the total mandibular impacted teeth) (Table 3).

Table 3. Frequency of impaction depth

	Class I	Class II	Class III
Number	9	40	2
Percentage	17.64	78.43	03.92

In terms of the relationship to ramus (for mandibular teeth), the most prevalent case was Class II impaction (40 teeth, 78% of the total mandibular impacted teeth; 18 teeth of 25 right mandibular impacted teeth; and 22 teeth of 27 left mandibular impacted teeth) (Table 4).

Table 4. Relationship of mandibular impacted teeth to the ramus

	Impaction depth A	Impaction depth B	Impaction depth C	Total	Mesioangular	Distoangular	Vertical	Horizontal	Total
Maxilla	-	2	33	35	5	11	18	-	34
Percentage	0	05.7	94.3	100	14.2	31.42	51.42	-	04.97
Mandible	19	15	17	51	19	-	19	13	51
Percentage	37.25	29.41	33.34	100	37.25	-	37.25	25.5	100
Percentage of the total	22.09	19.76	58.13	100	27.90	12.79	43.02	15.11	100

Discussion

In the present study, the total prevalence of tooth impaction was 17.69%, of which the mean prevalence was 19.87 in women and 15.22% in men. In addition, among patients with impacted teeth, 59.61% of impacted teeth belonged to women and 40.38% belonged to men. Different results in terms of the prevalence of impacted teeth divided by sex have been obtained by different studies conducted in various regions. The total prevalence reported by Bokhari et al. (7) was 18.76% which is close to the value reported in the present study. However, the prevalence divided by sex was 84.7% for men and 15.3% for women, inconsistent with the results reported here. Abdorazzaghi et al. (3) reported the total prevalence of impacted teeth to be 41.5% (38.3% for men and 49.4% for women). Moreover, Hekmatian et al. (23) reported the total prevalence of impacted teeth to be 38.7% (41.08% for men and 58.91% for women). Moreover, Hashemipour et al. (24) reported the total prevalence of impacted wisdom teeth to be 57.3% (35.1% for men and 64.9% for women). Based on the noted values, it is clear that the prevalence of impacted wisdom teeth differs across different populations, probably because of the racial difference among them.

Except for the study of Bokhari et al. (7) in which the prevalence of impacted teeth was higher in men, in other studies the prevalence of impacted teeth was higher in women.

In terms of the difference between the two jaws, results of the present study indicated a 60% prevalence for mandibular and 40% for maxillary impacted teeth. Moreover, 55% of impacted teeth were on the left, while 45% were on the right. In the study by Abdorazzaghi et al. (3), the prevalence of mandibular impacted teeth was 59.9% and that of maxillary impacted teeth was 36.9%. Prevalence was 51% for left and 45.8% for right wisdom teeth. The study by Hekmatian et al. (23) reported a prevalence of 21.8% for the left and 22.73% for the right side. Nevertheless, as the maxilla was not examined in this study, the difference between upper and lower jaws could not be investigated.

Results reported by Hashemipour et al. (24) suggest a higher prevalence of mandibular (54.9%) compared to maxillary impacted wisdom teeth (28.8%). Prevalence equaled 50.2% on the left and 49.8% on the right, and this difference was not significant. According to Bokhari et al. (7), a difference was observed between the two jaws, where the prevalence of impacted wisdom teeth was 49.4% for the mandible and 18.4% for the maxilla. In this study, the difference between left and right sides is not discussed.

Various factors affect the surgery of impacted wisdom teeth, including the determination of impaction depth, angulation, and relationship to ramus in the mandible.

In terms of wisdom tooth impaction angulation, in the present study, the most prevalent angulation was mesioangular and vertical in the mandible with equal prevalence, and vertical in the maxilla. Results reported by Abdorazzaghi et al. (3) on the angulation of impacted teeth suggested that mesioangular and vertical angulations were the most prevalent in the mandible and maxilla, respectively. Results reported by Hashemipour et al. (24) as well as Bokhari et al. (7) were in line with those of Abdorazzaghi et al. (3). On the other hand, according to Hekmatian et al. (23) who studied only the mandible, the prevalence of vertically impacted teeth was the highest, inconsistent with other studies but consistent with the present study in which vertical and mesioangular angulations were the most prevalent.

Another point related to tooth impaction is impaction depth which is examined in the present study based on the Pell and Gregory's classification. The most prevalent impaction depth was Class A in the mandible and Class C in the maxilla. According to Abdorazzaghi et al. (3), the most prevalent depth in both jaws is Class B, which is completely different from our results. In the study by Hashemipour et al. (24), the most prevalent impaction depth in both jaws was Class A which is consistent with our results for the mandible.

In terms of the impaction of the mandibular third molar in relation to the ramus, the Pell and Gregory's classification was utilized in this study, where the most prevalent impaction turned out to be Class II which is in line with results reported by Hashemipour et al. (24).

Conclusion

Based on results, the prevalence of impacted wisdom teeth in patients visiting dental clinics and private offices in Ghaemshahr in 2016 was 17.69%. This may not be of considerable value, but it is still of significance since the possible complications of impacted teeth are costly and problematic. Moreover, it must be kept in mind that the prevalence of impacted wisdom teeth was higher in the mandible. Therefore, this must be taken into consideration during treatments. Nevertheless, the difference between men and women was not significant, thus resolving concerns regarding the higher prevalence of impacted teeth in either sex.

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Conflict of interest

The authors have no conflict of interest in this study.

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Ethical Statement

Ethical approval for this study was obtained from the Ethics Committee of the Mazandaran University of

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