Prevalence of lower third molar angulations in Duhok Province of Kurdistan region- Iraq

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Abstract

Aims: The current retrospective radiographic study aimed to find the prevalence of lower third molar impactions and angulations in a sample population of Duhok Province -Kurdistan region, Iraq. Materials and Methods: The study included randomly chosen Orthopantomograms (OPGs) of 1316 adults; “682 males and 634 females” with ages ranging between (21 – 50 years) old who were referred to the College of Dentistry / Oral and Maxillofacial Surgery Department / University of Duhok between the years (2020 and 2023). A total of 502 OPGs were included in the study with impacted lower wisdom teeth (344 bilateral impactions, 158 uni-lateral impactions). Analysis was made according to the classifications of Pell and Gregory and Winter’s categories of radiographic images (OPGs) to determine the prevalence and angulations of impacted lower wisdom teeth. Results: The data was collected from 502 patients “183 males and 319 females” OPGs, with a total of (846) impacted lower wisdom teeth (344 bilateral impactions, 158 uni-lateral impactions). The prevalence of mesioangular impactions was 28.2% being the most common. Vertical angulations were significantly lower than other impactions 3.7%. There was a significant difference between female and male impacted third molars “18.8% in females and 10.4% in males” (577 teeth in females and 269 teeth in males). Conclusion: Mesioangular lower wisdom teeth impactions were recorded to be the most common type found with females being more than in males.

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INTRODUCTION

An impacted tooth is a tooth that does not reach its normal jaw position after passing it’s time for normal eruption. Impacted lower third molars are widespread in ordinary dental practice. The impacted lower third molars rate is greater than other teeth (1). An impacted tooth is outside of the physiological eruption stage and has a fully developed root that is partly or entirely covered by hard or soft tissues (2).

The lower wisdom teeth are the most frequently impacted teeth overall, with the mandibular second premolar and maxillary canine coming in second place (3). This is especially true of teeth located in the jaw. Numerous systemic and local causes, including cleidocranial dysplasia, down syndrome, and arch-length inadequacy, could be the cause of this eruption's failure (4). There is a connection between the emergence of caries, cystic lesions, and pericoronitis in teeth that are impacted by Al-Anqudi (3).

The etiology of impaction is unclear, but some theories imply that systemic and local genetic variables may be involved (5). Third molar impaction can be caused locally by crowding, by having too many teeth, or by lesions related to different pathologies like odontomas, and ameloblastic fibro-odontogenic tumors (6). Consequently, the extraction of lower wisdom teeth is the most frequent surgical operation performed by dentists (7).

Impacted teeth classifications allow for the definition of kind and degree of impactions, in addition to the assessment of the procedure's complexity (8). Impacted molars can be analyzed by using the Pell and Gregory classification which is based on the depth level of the impacted tooth and its connection to the occlusal surface of the neighboring second molar (9). Radiological evaluations are thought to be crucial in determining problems during and after surgery (6).

MATERIALS AND METHODS

The study was approved at the Oral and Maxillofacial Surgery Department -College of Dentistry / University of Duhok by the Commission of Ethics and Research. The study included males and females born in the city of Duhok / Duhok province / Kurdistan region. The retrospective data was reviewed using orthopantomogram (OPG) radiographs of 1316 OPGs “males 682 and females 634 OPGs” ages between (21–50) years old who were referred to the Oral and Maxillofacial Surgery department / College of Dentistry / University of Duhok between the years (2020 and 2023). Out of 1316 OPGs, 814 OPGs were excluded for the following reasons;
1- Showing fully erupted lower third molars.
2- Poor quality images.
The remaining radiographs (502 OPGs) were included in the study belonging to genders of “183 males and 319 females”. These (OPGs) were taken and analyzed using a portable Carestream CS 8100 OPG Machine (manufactured in India).

1. Analysis of impactions was done using Winter’s Classification and Pell and Gregory's classification as follows:

2. **Winter's Classifications**
   This classification is based on the relationship of the long axis of the impacted lower wisdom tooth to the long axis of the second lower molar tooth to determine the type of angulation (Figure 1)

![Winter's Classifications](image)

- **Mesioangular impaction**: The long axis of the impacted lower wisdom tooth is tilted toward the long axis of the second molar in a mesial direction (Figure 2)
- **Horizontal impaction**: The long axis of the lower wisdom is horizontal (Figure 3)
- **Vertical impaction**: The long axis of the wisdom is parallel to the long axis of the second molar (Figure 4)

![Figure 2: Mesioangular impaction](image)
3. **Pell and Gregory classifications** (Figure 5)

   This classification specifies the level and type of impaction lower third molar in the horizontal and vertical dimensions.

   i. **According to the occlusal plane: (vertical dimension)**

   - A: Occlusal surface of lower third molars is either higher or at the level of the occlusal plane.
   - B: Occlusal surface of the lower third molar is located between the occlusal plane and the second molar's neck.
   - C: Occlusal surface of lower third molar lies below the second molar's neck.

   ii. **According to mandibular ramus: (horizontal dimension)**

   - Class 1: The anteroposterior dimension of the crown of the third lower molar is bigger than the distance between the distal surface of the second molar and the anterior edge of the mandibular ramus.
   - Class 2: The anteroposterior dimension of the crown of the third lower molar is shorter than the distance between the distal surface of the second molar and the anterior edge of the mandibular ramus.
   - Class 3: The lack of space between the distal surface of the second molar and the anterior border of the mandibular ramus \(^{(12)}\).
SPSS for Windows release 16.0 (10) was used for statistical analysis. Descriptive statistics were obtained. To assess differences and correlations between groups, the student’s t-test and Pearson's Correlations test (r) were utilized. Significance was set at $P \leq 0.05$. The total number of Duhok city population according to the last statistic from the Duhok health directorate was 1,772,367 individuals.

RESULTS

The data was collected from 502 patients' OPGs; the numbers of impacted lower third molars were 846 teeth (577 female and 269 males) with “158 unilateral and 344 bilateral” impactions. The ages of patients ranged between “21 and 50 years”. The prevalence of impacted lower wisdom teeth was 38.14%. According to population, mesioangular impactions recorded the majority (28.2%) of cases followed by horizontal impactions (6.2%) with vertical impactions being the least (3.7%) as in (Table 1)
Table (1): Prevalence of impacted lower wisdom teeth distribution of Angulation.

<table>
<thead>
<tr>
<th>Lower third molar impaction</th>
<th>Mesioangular</th>
<th>Horizontal</th>
<th>Vertical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male and female</td>
<td>629</td>
<td>135</td>
<td>82</td>
<td>846</td>
</tr>
<tr>
<td>Prevalence in the study</td>
<td>74.1%</td>
<td>16.1%</td>
<td>9.8%</td>
<td>100%</td>
</tr>
<tr>
<td>*Prevalence in Duhok population</td>
<td>28.2%</td>
<td>6.2%</td>
<td>3.7%</td>
<td>38.14%</td>
</tr>
</tbody>
</table>

*Prevalence means the ratio of this study to the total number of patients included in the current study (1316).

According to the sample study, the prevalence of mesioangular impactions (74.1%) was significantly higher than all other angulations as revealed by the t-test (Table 1, P ≤ 0.05). Lower wisdom teeth impactions more likely occurred at the mesioangular position. This was followed by horizontal impactions (16.1%) with vertical impactions being the least common (9.8%), (Table 1). In the current study, the angulations and the number of impacted lower third molars according to gender showed significant differences with “577 in females (65.5%) and 269 in males (35.5%)” as in (Table 2).

Table (2): Angulation and gender distribution of lower third molars impactions

<table>
<thead>
<tr>
<th>Gender</th>
<th>Mesioangular</th>
<th>Horizontal</th>
<th>Vertical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>201</td>
<td>42</td>
<td>26</td>
<td>269</td>
</tr>
<tr>
<td>Female</td>
<td>428</td>
<td>93</td>
<td>56</td>
<td>577</td>
</tr>
<tr>
<td>Total</td>
<td>629</td>
<td>135</td>
<td>82</td>
<td>846</td>
</tr>
</tbody>
</table>

According to the Duhok population, the prevalence of impacted lower wisdom teeth and angulations showed significant differences in gender with “female 24.6% and male 13.5%” as in (Table 3).

Table (3): Angulation and gender distribution of lower third molars impactions in (Duhok population)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Mesioangular</th>
<th>Horizontal</th>
<th>Vertical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10.4 %</td>
<td>2.4 %</td>
<td>1.7 %</td>
<td>13.5%</td>
</tr>
<tr>
<td>Female</td>
<td>18.8 %</td>
<td>3.8 %</td>
<td>2 %</td>
<td>24.6%</td>
</tr>
<tr>
<td>Total</td>
<td>28.2 %</td>
<td>6.2 %</td>
<td>3.7 %</td>
<td>38.1%</td>
</tr>
</tbody>
</table>

DISCUSSION

Based on the population sample and to the best of our knowledge, it is the first study conducted to evaluate the prevalence of impacted lower wisdom teeth in the Duhok City population / Kurdistan Region. The evaluation of impacted lower third molars should be investigated radiographically together for accuracy. Radiographic evaluation should include determining the angulation of impacted wisdom teeth by winter’s classification (13) and
the tooth's spatial connection to the mandibular ramus and the second molar, as well as the third molar's relative depth in the bone according to the Pell and Gregory classification (12). Clinically, evaluation of any pain, infection, edema, and the presence of soft tissue overlaying the impacted teeth should be investigated (1). The current study investigated the prevalence of impacted lower wisdom teeth in a sample population and the results assume that several etiological reasons for this disease are hypothesized. This investigation should assist in evaluating whether tooth impaction is merely a result of the population's ethnic heritage, or if it is a new concern. In the current study, the prevalence of impacted lower wisdom teeth was 38.14%. In a regional study conducted in the Saudi Arabia – Asir region, a high prevalence was also recorded at 18.76% (14). According to gender, the current study disclosed significant differences between females 18.8% and males 10.4%. The higher prevalence of impactions in females might be caused by the small jaw size in females compared to the larger male jaw size (15,16). According to angulation, mesioangulation of lower wisdom teeth was predominant, and similar studies from the United States of America, Europe, Singapore, China, and Turkey showed the same findings (17,18). Vertical impactions in the current study were found to be significantly less common at 3.7%. In a sample Swedish population, for example, vertical impactions were found to be most common indicating varying regional and ethnic backgrounds (19). In addition, other studies in Turkey and India showed that vertical impactions were the most common and this disagreed with the current study (16,20-22).

CONCLUSION
The patterns of impactions in the current study on a sample population of Duhok City / Kurdistan region revealed that mesioangular impaction was found to be the most common at 28.8%, horizontal impactions at 6.2% with vertical impaction being the least (3.7%) with a higher percentage of recorded impactions in females compared to males.

Conflicts of Interest
The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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