The Incidence of Impacted Permanent Teeth: A Review Article

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ABSTRACT

**Background:** The impacted teeth can be considered as one of the most important problems that may present in the dental arch, which may cause bad consequences that negatively affect the function, occlusion, and harmony of teeth as well as aesthetics. In addition, the impacted teeth may contribute to the formation of some pathologies such as cysts.

**Aim of the study:** The review study aims to detect the incidence of impacted teeth in most previous studies of interest in this field.

**Materials and Methods:** The review study relied on most published researches that are interested to indicate the incidence of impacted teeth for different populations in different regions of the world. The review study observed the prevalence of impacted teeth in that of studies, in addition to evaluation of impacted teeth according to age and gender. Panoramic radiographs of orthopantomogram (O.P.G) had been used as a diagnostic tool in those studies to view impacted teeth in the jaws.

**Results:** The review study found that the incidence of teeth impaction was. The results showed that the incidence of impacted mandibular third molars was the highest among impacted teeth (40.98%), followed by maxillary canines (21.13%), maxillary third molars (19.33%), maxillary second premolars (8.50%), mandibular second premolars (8.32%), mandibular canines (7.60%), mandibular first premolars (1.96%), maxillary first premolars (0.85%), mandibular second molar (0.2%), maxillary second molars (0.1%), maxillary central incisors (0.05%), and maxillary lateral incisors (0.05%), respectively. The statistics also showed that the rate of teeth impaction was higher in females than in males. In addition, the teeth impaction was higher in the age group (21-30) years, followed by the age group (31-40) years.

**Conclusion:** The incidence of impacted teeth may be variable depending on age, gender, race, or genetics. The incidence of impacted teeth in the reviewed studies was 13.14%. The most commonly impacted teeth were mandibular third molars followed by maxillary canines and maxillary third molars, respectively.

**Keywords**
Incidence, Prevalence, Impacted teeth, Un-erupted teeth.

**Introduction**
Impacted teeth, as well named un-erupted teeth, are dentitions that are unable to emerge into the dental arch because of either loss of space in the dental arch, the abnormal situation in the dental arch, or an abnormal process of eruption [1-3]. All permanent teeth are subjected to this impaction. Many systemic and local conditions may cause dental impaction [4,5]. Cleft lip and palate, arch-length deficiency, prolonged primary tooth retention, odontogenic tumors, malposition of tooth germs, the density of overlying bone, and supernumerary teeth are included as local factors. Endocrine trouble, Down syndrome, febrile disorders, and Cleido-cranial
dysplasia are considered systemic factors but they are less frequent [6,7]. Many problems have been reported to be associated with dental impactions that interfere with function, movement of teeth, and esthetics such as crowding of teeth, oro-acial pain, inflammation, infection, the sensitivity of gingiva, halitosis, dental caries, periodontal problems, root resorption of close dentition, temporomandibular joint disorder, tumors, and cysts [3,7-9]. In addition, other studies had been reported additional factors increase the possibility of tooth impaction like the variation between age groups, ethnicity, and timing of eruption [8,10]. The integrated growth of permanent teeth includes the concurrent forward and lateral development of both jaws, which matches the variation in size of the teeth in both jaws. When the mechanism of eruption is complicated, the problems may originate, from an incomplete eruption process or retardation of teeth. The imperfection of permanent teeth eruption is considered a common anomaly in the dental arch. Tooth impaction or partial anodontia must be approved in case one or multiple absent teeth have been indicated on clinical examination with no history of tooth extraction [11-15].

Materials and Methods
The current study has been reviewed most of the researches published in the period between 2009 and 2020, which were done on different populations in different regions of the world to observe the incidence of impacted teeth. The current review study observed the incidence of impacted teeth incidence in that of studies according to age and gender. Panoramic radiographs of orthopantomogram (O.P.G) had been used as a diagnostic tool in those studies to view of affected teeth in the jaws - Figure 1. The total number of patients had been examined to indicate the incidence of impacted teeth in reviewed studies was 249,386.

Results
The statistical analysis for the results of reviewed researches in the current study showed that the total rate of teeth impaction was 13.14%. The statistical analysis found that the incidence of impacted mandibular third molars was the highest among impacted teeth (40.98%), followed by maxillary canines (21.13%), maxillary third molars (19.33%), maxillary second premolars (8.50%), mandibular second premolars (8.32%), mandibular canines (7.60%), mandibular first premolars (1.96%), maxillary first premolars (0.85%), mandibular second molar (0.2%), maxillary second molars (0.1%), maxillary central incisors (0.05%), and maxillary lateral incisors (0.05%), respectively (Table 1) and (Figure 2). The statistics also showed the rate of teeth impaction was higher in females (54%) than in males (46%) (Figure 3). In addition, the statistical analysis showed that the higher incidence of teeth impaction was 58.70% in the age group (21-30) yrs., followed by 20.63% in the age group (31-40) yrs., 13.31% in the age group (11-20) yrs., 5.40% in the age group (41-50) yrs., 1.75% in the age group (51-60) yrs., and 0.2% in the age group (61-70) yrs., respectively (Figure 4).

Table 1: Distribution of impacted teeth incidence according to the tooth type.

<table>
<thead>
<tr>
<th>Tooth Type</th>
<th>Tooth Impaction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandibular third molar</td>
<td>40.98%</td>
</tr>
<tr>
<td>Mandibular second molar</td>
<td>0.2%</td>
</tr>
<tr>
<td>Mandibular canine</td>
<td>7.60%</td>
</tr>
<tr>
<td>Mandibular first premolar</td>
<td>1.96%</td>
</tr>
<tr>
<td>Mandibular second premolar</td>
<td>8.32%</td>
</tr>
<tr>
<td>Maxillary third molar</td>
<td>19.33%</td>
</tr>
<tr>
<td>Maxillary second molar</td>
<td>0.1%</td>
</tr>
<tr>
<td>Maxillary canine</td>
<td>21.13%</td>
</tr>
<tr>
<td>Maxillary first premolar</td>
<td>0.85%</td>
</tr>
<tr>
<td>Maxillary second premolar</td>
<td>8.50%</td>
</tr>
<tr>
<td>Maxillary central incisor</td>
<td>0.05%</td>
</tr>
<tr>
<td>Maxillary lateral incisor</td>
<td>0.05%</td>
</tr>
</tbody>
</table>

Figure 1: Panoramic radiographs (left and right side) viewing the impaction of third molars (white arrows).

Figure 2: Distribution of impacted teeth according to the tooth type.

Figure 3: Distribution of impacted teeth incidence according to the gender.
However, a small jaw is more likely to cause the impaction of third molars [25,26].

But in contrast, Fardi et al reported that the canines are the most frequent impaction followed by molars impaction [8]. Patil and Maheshwari also reported that the canines impaction was the most frequent impaction [18]. Fardi et al. reported the incidence of canines impaction is 8.8% [8]. Rozsa et al. reported an incidence of 5.43% [27], and Aydin et al. found the impacted canines prevalence was 3.58% [28]. But studies on the Japanese population found to have less incidence of canines impaction (0.27%), as well as Dachi in the USA, reported a prevalence of 0.92% [14].

Röhrrer reported that mandibular canine impaction is less common than maxillary canine impaction [29]. This may be due to genetic causes [30]. Impaction of maxillary canines are more common than impaction of mandibular canines [7]. This also corresponded to several studies [11,12,15,31].

Regarding the premolars impaction, the incidence of impacted premolars found to be range from 2.1 to 2.7% and they are 2.2% in some studies [8,11-13]. Fardi et al., reported that impacted mandibular second premolars were more common than impacted maxillary second premolars [8]. Patil and Maheshwari also found that premolars impaction was the second impaction after the canines impaction [18].

Regarding the impaction of maxillary incisors, some studies reported that the rate of impactions for these teeth ranged from 0.06 – 0.2% [10,22,23].

This review study also showed that the rate of teeth impaction was higher in females (54%) than in males (46%). Many studies corresponded with this result [8,32,33]. But other studies found that the teeth impaction was more in males than females [18,20,21]. In addition, many researchers found no significant difference between both genders concerning the prevalence of tooth impaction [8,10,17,19,33]. Other studies reported an important difference, Quek et al. showed there is a significant increase in teeth impaction in females compared to males [34]. But Nurul et al. showed a significant increase in teeth impaction in males compared to females [21]. The increase in the incidence of impacted teeth in females over males may be a result of genetic factors [8,35].

Many studies reported that the prevalence of impacted teeth is more frequent in the maxilla than in the mandible [36]. Alamri A showed that 79.1% of teeth impactions were in the maxilla, and 20.8% of teeth impactions were in the mandible [33]. Sharma and Nagpal reported that the possibility of occurrence for maxillary impactions is about (10-20) times more commonly than mandibular impaction [37].

Regarding the age and the incidence of impacted teeth, the current review showed that the higher rate of teeth impaction was 58.70% in the age group (21-30) yrs., followed by 20.63% in the age group (31-40) yrs., 13.31% in the age group (11-20) yrs., 5.40% in age

Discussion

Teeth impactions had been studied in different regions of the world and their incidence had been varied from one individual to another. The incidence of teeth impaction was 28.3% in Hong Kong [16], 21% in Jeddah,[17] 16.8% in the northern side of India,[18] 13.7% in the Greek population [8], and in the central side of Iran, about 44.1% of studied cases had at least one tooth impaction [19].

The current review study explored the incidence of teeth impaction that relied on previous studies. The incidence of teeth impaction reported in this review was 13.14%. This ratio was very close to the result of Fardi et al. study,[8] which was 13.07%. Mushtaq et al. reported a high rate of teeth impaction which was 18.5%,[20] and in contrast, Anita reported a much lower rate of teeth impaction, which was 3.03%.

This review study found that the rate of mandibular third molars impaction was the highest (40.98%), followed by maxillary canines (21.13%), maxillary third molars (19.33%), maxillary second premolars (8.50%), mandibular second premolars (8.32%), mandibular canines (7.60%), mandibular first premolars (1.96%), maxillary first premolars (0.85%), mandibular second molar (0.2%), maxillary second molars (0.1%), maxillary central incisors (0.05%), and maxillary lateral incisors (0.05%), respectively.

Many studies concluded similar results regarding the high prevalence of impacted mandibular third molars in the dental arch [18,21]. Mushtaq et al. also concluded that the third molars showed the most frequently impacted teeth, followed by canines, premolars, and then incisors [20].

Others also found that the third molar impactions are most commonly impacted teeth followed by maxillary canine impactions [10,22,23].

The reason for the high incidence of impacted teeth can be explained as a result of not having enough space during the eruption time through the eruption time because the jaw has usually ceased growing and is very small to house the teeth [24]. Many times, when the wisdom teeth caused problems they are removed.
group (41-50 yrs.), 1.75% in age group (51-60) yrs., and 0.2% in age group (61-70) yrs., respectively. These results are close to the results of Nurul et al study, they found that the impacted teeth were most commonly present in the age group (21-30) yrs. (54.14%), followed by the age group (31-40) yrs. (23.69%) [21].

Pedro et al found strong effects between the number of impacted teeth and age, they are reported that the higher rate of impacted teeth presents in the age group (23-36) yrs., (significant correlation), followed by the age group ≤ 22 yrs., (significant correlation), but they found no significant correlation between the age group (37-51) yrs., as well the age group older than 52 yrs [10].

Conclusion
The incidence of impacted teeth may be variable depending on age, gender, race, or genetics. The most commonly impacted teeth were mandibular third molars followed by maxillary canines and maxillary third molars, respectively. The incidence of impacted teeth in the reviewed studies was 13.14%.

References
28. Aydin U, Yilmaz HH, Yildirim D. Incidence of canine


