



## Impaction prevalence of permanent teeth pattern from orthodontic view

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### Abstract

The aim of this study is to investigate the prevalence and distribution of impaction permanent teeth among orthodontic patient samples and to compare the present results with findings of other populations. A digital panoramic radiograph of 2500 orthodontic patients, age 12-40 years, for two years duration (2018-2019) were used in this study to identify 157 patients with impacted teeth. Whole permanent teeth were included except 3rd molar. The presence, number and depth of all the impacted teeth either soft-tissue impaction (STI) and bony-impactions (BI) were recorded and a statistics analysis was done by using SPSS. The results of present study show that the prevalence of impacted teeth was 6.28%. The teeth impaction was more commonly in younger population and the impaction in females more than in males. The maxillary canine was the most frequently impacted tooth and most of the patients had unilateral impacted teeth. The bony impaction was more than soft tissue impaction. It can be concluded that the Impacted teeth prevalence in a group of the orthodontic patients was within the average value of the majority of published studies in the literature. the impaction was significantly more prevalent in females. In orthodontics, the impacted teeth play a critical part in aesthetics, occlusion and arch development. The early recognition of these dental anomalies is very important to offer preventive modalities of management.

**Keywords:** impaction, prevalence, orthodontic, developmental anomalies, radiographic study, panoramic radiographs

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## INTRODUCTION

Impacted teeth are defined as those are partially or completely embedded in the jawbone or mucosa after their normal eruption time (Gunduz et al. 2011). The permanent teeth pass through a series of events, most of them are genetically determined and because the eruption process is complex, it is some time the problems may occur which cause tooth to be impacted (Sridharan et al, 2010; Thilander et al. 1968). Tooth impaction may cause many problems like esthetics and function complication (Bedoya et al. 2009; Mesotten et al. 2005; Muchun, et al, 2018). The permanent maxillary canine is a common tooth failed to erupt in to the occlusion and consider the second most impacted tooth after the third molars and usually this is happening in females (Cooke et al. 2006).

The diagnosis of impacted teeth could be accomplished by using radiographic evaluation that utilized for early detection and prevention of tooth impaction. the panoramic radiography (OPG) is used for

this purpose and it is of a great clinical significance (Vasconcellos et al. 2003; De Oliveira et al. 2008).

A panoramic radiograph is a primary routine investigation for many patients. Hence, the variable visible on that radiograph could be used diagnostically to predict the teeth impaction. This early diagnosis of an impaction can be used to determine the advantages, disadvantages, success rates, and clinical benefits of any operative technique.

The aim of this study was to investigate the prevalence and distribution of impaction permanent teeth among a group of Iraqi sample which would aid for enhance understanding of impacted teeth and to compare the present results with findings from other populations.

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**Table 1.** Distribution of patients with impacted teeth according to age groups and gender

| Age (Years) | Gender | No. of patients with Impaction | otal No. of Impacted teeth |
|-------------|--------|--------------------------------|----------------------------|
| 12-18       | M      | 28                             | 43                         |
|             | F      | 45                             | 71                         |
|             | T      | 73                             | 114                        |
| 19-25       | M      | 10                             | 12                         |
|             | F      | 24                             | 29                         |
|             | T      | 34                             | 41                         |
| 26-32       | M      | 8                              | 12                         |
|             | F      | 6                              | 8                          |
|             | T      | 14                             | 20                         |
| ≥ 33        | M      | 17                             | 19                         |
|             | F      | 19                             | 22                         |
|             | T      | 36                             | 41                         |
| Total       | M      | 63                             | 86                         |
|             | F      | 94                             | 130                        |
|             | T      | 157                            | 216                        |

## MATERIALS AND METHODS

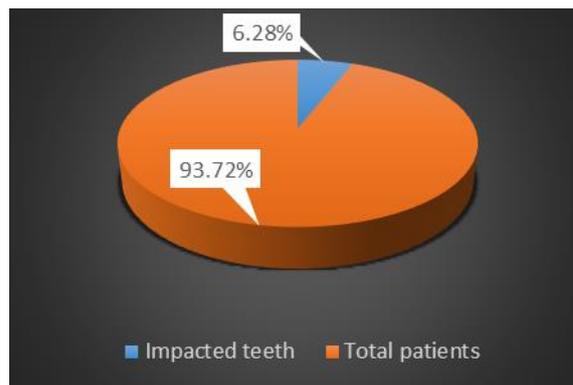
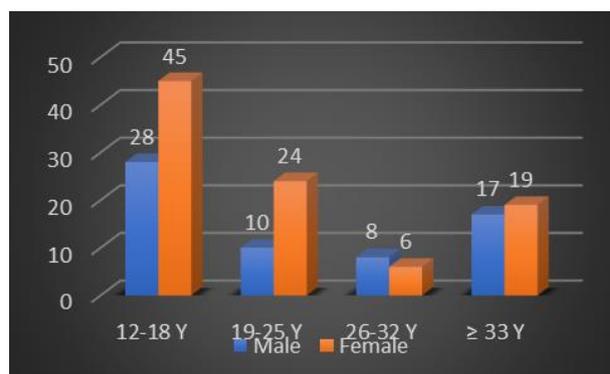
A Digital panoramic radiograph (Orthopantomogram) of 2500 orthodontic patients were used in this study which considered a reliable method for detection of Impacted teeth (Osuji et al. 2002; Permberton et al. 2005). The sample represent examined patients who visited the Orthodontic Dentistry Clinics in middle Euphrates from year 2018 till 2019 and their age were 12 and 40 years. This age was selected to avoid misconception due to delay of eruption of permanent teeth in young patients.

The selection criteria were:

- 1-No history of medical problem.
- 2-No history of orthodontic treatment.
- 3-No history of any syndromes or developmental anomalies.
- 4-Whole the permanent teeth were examined except 3rd molar.
- 5- Good quality of panoramic radiograph.

Information was gathered from the patients in a questionnaire format. Impacted teeth was diagnosed based on history, clinical examination and OPG. The digital panoramic radiograph was examined to expose any sign of impacted teeth, any OPG with Poor quality or blurred image were excluded. Whole the permanent teeth were selected except 3rd molar as usually show variation in its eruption time and in its anatomy and position. The presence, number and depth of all the impacted teeth were noted. Teeth were considered impacted when they are not fully erupted to the supposed normal functional position in the occlusal plane and when detected in the OPG as bony or soft tissue impacted.

Based on the overlying tissue above the impacted tooth, the depth of impaction was considered as follows: soft-tissue impaction (STI) and bony- impactions (BI). In ST impaction, the maximum height of the tooth's contour is above the level of the surrounding bone and the superficial portion is covered by ST. In hard-tissue

**Fig. 1.** Prevalence of patients with impacted teeth**Fig. 2.** Distribution of patients with impacted teeth according to age groups and gender

impaction, the teeth fail to erupt due to obstruction by the overlying bone (Santosh, 2015; Gbotolorun et al. 2007).

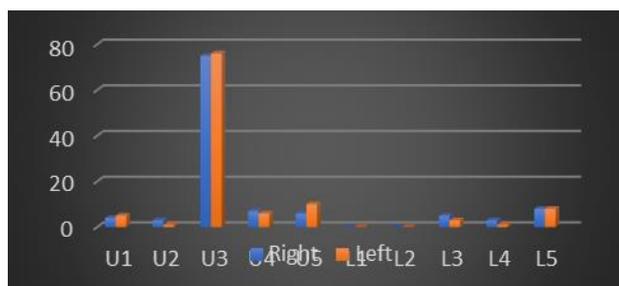
The OPG radiographs were examined by two expertise examiners to identify impacted teeth. Data were analyzed by use the SPSS program (version 21.0). t-test was settled to analyze the male and female ages, also used Chi-square to analyze the difference in gender of the patients. The 0.05 value was considered significance.

## RESULTS

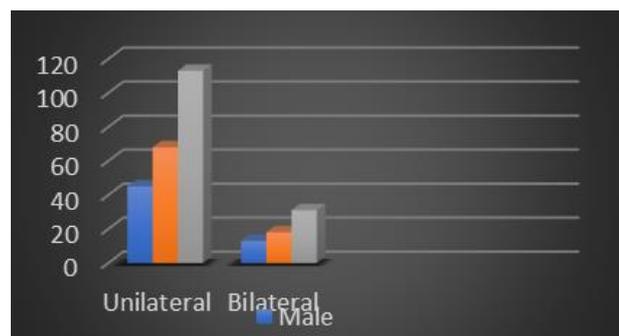
Among the 2500 radiographs examined, a total of 157 patients had impacted teeth (**Table 1**). The Prevalence of patients with impacted teeth was 6.28% (**Fig. 1**).

In our study, a total of 157 cases were impacted teeth, 63 male and 94 females (**Table 1**). Of these impacted teeth, 73 cases occurred in the age group 12–18 years (28 males, 45 females), 34 cases in age 19-25 (10 males, 24 females), 14 cases in 26-32 years (8 males, 6 females), and 36 cases in more than 33 years' age (17 males, 19 females) and impaction in females more than in males (**Fig. 2**).

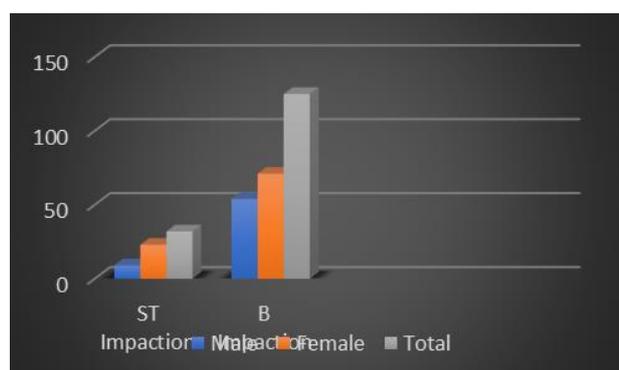
The maxillary canine was the most frequently impacted tooth, followed by the maxillary and mandibular second premolars and to a lesser degree maxillary first premolar, finally the least was the



**Fig. 3.** Distribution of impacted teeth according to the tooth type



**Fig. 4.** Impacted teeth distributed according to the gender and impaction side



**Fig. 5.** Patients distributed according to the gender and impaction depth

maxillary central incisor and mandibular canine (**Fig. 3**). Most of the cases had unilateral impacted followed by bilateral impaction (**Fig. 4**). In concern with type of impaction, our study shows that the bony impaction was more than soft tissue impaction.

## DISCUSSION

Teeth impaction was recorded in 6.28% of the digital OPGs examined in the current study. Literature reports the incidence of impacted teeth (except 3<sup>rd</sup> molars) within the range of 5.6%–18.8% (Fardi et al. 2011; Mushtaq et al. 2019). Third molars were not included in the present study because of high variation in the age of eruption.

Prevalence of impaction teeth in Iranian population was as 18.5% (Amir et al. 2018). Saglam et al. reported

impacted teeth prevalence to be 11% in Turkey (Saglam et al. 2003). Nagahara et al. in Japan reported a prevalence of 4.9% (Nagahara et al. 1989). While Saeed et al. study on a Panoramic x-rays of an Iraqi population for detection of maxillary canine impaction was 6.28% (Saeed et al. 2015).

The differences in ratios among different studies could be related to several factors like racial differences among samples, or may be due to the size of the sample which could be affecting the results. Also differences in the methodology and age range could result in these variations. The Early diagnosis of impacted teeth will reduce the time and expense demand for predictable orthodontic. Our finding show that the teeth impaction was more commonly in younger population. This in consonance with Mushtaq et al. (2019).

In the present study, both maxillary and mandibular impactions were common in females as found in a majority of studies (Sarmad et al. 2020; Juodzbalys et al. 2013; Hou et al. 2010). This may be due to the small size of jaws in females when compared to males, and this result was compatible with studies done by Hou et al. in China and Mustafa AB in Saudi Arabia (Mustafa, 2015; Quek et al. 2003).

Also Altaee in her study on patients from Ramadi city in Iraq stated that female: male ratio was 2:1 (Altaee, 2014).

The difference between genders related to fact that the sizes of skull, maxilla and mandible are larger in males than in female with less adequate space for tooth eruption (Archer, 1975)

The most commonly impacted tooth in the present study was the maxillary canines followed by maxillary and mandibular 2<sup>nd</sup> premolars. This in consonance with other studies that shows the maxillary canine impaction is more frequent than mandibular canine impaction (Ahlqwist et al. 1991; Sandhu et al. 2008). Also this is in consonance with the published literature where the third molars were not taken into consideration (Fardi et al. 2011; Devashish et al. 2020). The impaction of the canine is deserving of consideration as the canine has a principle role in esthetics and occlusal stability.

The maxillary canine is last tooth develop and it had to travel for a long pathway to reach for its final position so there were high chances for mechanical obstruction (Becker et al. 2015). There are several factors effect on the etiology of canine impaction either generalized or localized (Bishara, 1992; Bedoya et al. 2009). The generalized factors consist of endocrine disorder, abnormal muscle tonicity, radiation and vitamin D deficiency. The localized factors consist of tooth size-arch length inconsistency, early loss of deciduous canine, prolonged retention of deciduous canine, ankylosis, cystic formation, root dilacerations, lateral incisor missing (Becker et al. 2015; Bishara, 1992). The incidence of mandibular canine impaction in the Turkish population was 1.29% as reported by Yavuz et al.

(Yuvuz et al. 2007). McNamara et al. reported a few cases of mandibular second premolar impaction (McNamara et al. 2001). However, in our study impaction of premolars was to less degree and there no impacted for lower central or lateral incisors. Kamberous et al. and Haug et al. revealed similar findings (Kamberous et al. 1988; Haug et al. 2005).

Our result shows the prevalence of impacted maxillary canines were more in females rather than in males, this finding in consistence with previous studies (Sajnani et al. 2014; Gashi et al. 2014; Kifayatullah et al. 2015; Sharmila, 2016). This may be due females are more interested with their esthetic appearance and so become more interested to seeking for orthodontic treatment.

Unilateral impaction was higher than bilateral impaction. this result was in agreement with other studies (Hou et al. 2010; Patil et al. 2014; Gashi et al. 2014; Hassan et al. 2017).

Aqeel Ibrahim stated that the unilateral impaction was seen in 94.3% of the patients. So, our study results are in consistence with other studies researching the impacted teeth especially the dominant in females (Aqeel, 2016).

Comparing gender with the depth of impaction, females had more BI as compared to males and B impaction were more than ST impaction and this agree

with previous studies (El-Khateeb et al. 2015). This variation could be due to smaller arch width in females as compared with males.

But our result disagrees with Ravikumar et al. who found the ST impaction more than B impaction (Ravikumar et al. 2019).

The results of our study helps dentists to add more knowledge about teeth impaction and to focus on the importance of early diagnosis and referral. If this done properly, the interdisciplinary treatment could have avoided the patient numerous complication and preserve the esthetic and functional aspects.

## CONCLUSION

1-Prevalence of impacted teeth was 6.28 % without considering impaction 3<sup>rd</sup> molars.

2-impaction was more commonly seen in younger population and it was more in female than in male.

3-The high prevalence of impacted teeth suggests the need to increase the understanding of their etiology and also aid for better management, intervention and prevention.

4-The maxillary canines play an important role in aesthetics and occlusal function. So, the early detection is very important to offer preventive modality of management.

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