Hypodontia prevalence with distribution pattern of orthodontic patients in middle Euphrates, Iraq

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ABSTRACT
The aim of this study was to explore the effect of permanent teeth hypodontia prevalence and distribution in Iraqi orthodontic patient and to compare the finding with other previous studies. A digital panoramic radiograph of 2500 orthodontic patients for 2 years (2018-2019) were used in this study to diagnose 84 hypodontia: 25 males and 59 females. Whole permanent teeth were included except 3rd molar. Statistics analysis was done by using SPSS. The hypodontia prevalence in a group of Iraqi orthodontic patients was 3.36%. The most often missing tooth was the maxillary lateral incisors and to a less degree the mandibular second premolars then the least was the maxillary first premolars and maxillary canine. Most of the cases had hypodontia of two teeth followed by one tooth missing and the hypodontia in females more than in males. In conclusion, the hypodontia prevalence in a group of Iraqi orthodontic patients was 3.36% and was within the average rate of most studies were published. Hypodontia was significantly more common in females rather than in males. Most of patient show missing one or two teeth. The maxillary lateral incisors found to be the most frequently missing teeth, the mandibular second premolar were pursuing the second missing tooth followed by maxillary second premolar. The early detection of hypodontia is very important to understand of their etiology and to offer preventive modality of management.

Keywords: Prevalence, Hypodontia, Distribution, Tooth agenesis, Orthodontic


Introduction
The hypodontia is considered as a common developmental dental anomalies and ranges in severity from lack of a single tooth to absence of the entire dentition. Agenesis of five or fewer permanent teeth (excluding the third molars) is usually described as hypodontia, six or more permanent teeth as oligodontia, and of all teeth as anodontia (1,2). The prevalence of hypodontia varies among populations studied (2.7–11.6%) (3–5). The most commonly missing tooth is the third molar which is found to be absent in 20% of community (6). The second most often missing tooth is the maxillary lateral incisor (7). Other studies found that the mandibular premolars are the most often missing teeth (8).
The least missing tooth is the lower central and lateral incisors and the missing maxillary permanent molars is very rare \(^9\). The genetic & environmental factors consider the contributing elements of etiology of hypodontia \(^{10,11}\).

The aim of this study was to explore the effect of permanent teeth hypodontia prevalence and distribution in Iraqi orthodontic patient and to compare the finding with other previous studies.

**Material and Methods**

A Digital panoramic radiograph (Orthopantomogram) of 2500 orthodontic patients were used in this study which considered a reliable method for detection of hypodontia \(^{12,13}\). The sample represent examined patients who visit the Orthodontic & pediatric dentistry Clinics in middle Euphrates from 2018 till 2019 & they were aged between 12 and 40 years. This age was selected to avoid misconception due to delay of eruption or due to un-eruption of permanent teeth in young patients.

The selection criteria were:
1. No history of medical problem.
2. No history of any syndromes or developmental anomalies.
3. Whole the permanent teeth were examined except 3rd molar.
4. Good quality of panoramic radiograph.

Information was gathered from the patients in a questionnaire format. Whole the permanent teeth were selected except 3rd molar as usually show variation in their anatomy and position. Also any blurred OPG image were excluded. Hypodontia was diagnosed based on history, clinical examination & OPG. A tooth was considered missing when not be identified clinically or even detected in the OPG and there was no any evidence of extraction.

Data analysis were done by using the SPSS (version 21.0). T-test was settled to analyze the male & female ages, also used Chi-square to analyze the difference in gender of the patients. The data quality was tested by using 10% of whole the data were randomly selected then reexamine by another investigator after two weeks from the first examination so verify that 100% reproducibility was guaranteed. The 0.05 value was considered a significance.

**Result**

Among the 2500 digital radiographs examined, a total of 84 had hypodontia. The Prevalence of patients with hypodontia constitutes 3.36% (Table 1) (Fig. 1). In this study, a total of 84 cases were congenitally missing (25 males & 59 females) (Table 1). Of these 84 hypodontia, 32 cases occurred in the age group 12–18 years (8 males, 24 female), 32 cases in age 19-25 (9 males, 23 females), 11 cases in 26-32 years (3 males, 8 females), & 9 cases in more than 33 years age (5 males, 4 females) (Fig. 2). The most often missing tooth was the maxillary lateral incisors & to a less degree the mandibular second premolars then the least was the maxillary first premolars & maxillary canine (Fig. 3). Most of the cases had hypodontia of twoteeth followed by one tooth missing and the hypodontia in females more than in males (Fig. 4).
<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Gender</th>
<th>No. of patients with Hypodontia</th>
<th>Total No. of missing teeth</th>
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<tr>
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<td>M</td>
<td>8</td>
<td>13</td>
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</tbody>
</table>

**Table 1:** Distribution of patients with hypodontia according to age groups and gender.

**Figure 1** Prevalence of patients with hypodontia.
Figure 2 Distribution of patients with hypodontia according to age groups and gender.

![Figure 2](image_url)

Figure 3 Distribution of teeth agenesis according to the tooth type.

![Figure 3](image_url)

Figure 4 Distribution of missing teeth according to the No. of missing teeth and age.

![Figure 4](image_url)

Discussion

Etiology of hypodontia is usually disturbance during the initial phases of tooth development \(^{(13)}\). Crown calcification starts at the age of 3 years and usually completes at the age of 6 years \(^{(14,16)}\). However, there is variation in the development of some teeth (e.g. Premolars) \(^{(17)}\). Therefore, it is very difficult to decide whether the tooth is missing or not before the age of 9 years, especially among males \(^{(18)}\). This study was conducted to determine the prevalence of permanent teeth hypodontia in Iraqi orthodontic patients (excluding 3rd molar). The age range of the population was 12-40 years. Most patients seeking orthodontic treatment to restore their facial esthetic more than the function.
However, esthetic issues, malocclusion, periodontitis, and alveolar bone insufficiency are an important complication due to hypodontia. The anterior hypodontia has serious consequence on skeletal relationships (14). Each of these issues can be considered for orthodontic treatment (19).

The hypodontia prevalence in our study of the Iraqi orthodontic patients was 3.36%, which considered as a normal for many other populations. The prevalence of hypodontia found in other studies varied from 2.2 to 11.3% (20, 21). These variations could be explained due to differences in the ethnic background for the population who examined, size of the sample used in the research, methodologies & diagnostic criteria that used. All these differences might play an important role in these various reported results of hypodontia. However, many research has concentrate in their study on patients have orthodontic treatment (21, 22). While other research has conducted the overall populations (8, 23). There were significant differences reported more hypodontia in females rather than in males. This finding is in accordance with the reports of other studies (8, 24). The prevalence found in this study was higher in females than males may be associated with biological considerations and the higher ratio of female patients seeking for orthodontic treatment. Anyhow few studies show similarity between males & females (5, 25).

The maxillary lateral incisors found to be the most frequently missing teeth & the mandibular second premolar were pursuing the second missing tooth followed by maxillary second premolar. This agree with other previously studies that stated that the most oftenlack tooth was the maxillary lateral incisor (26, 27) then to lesser degree the mandibular second premolar (28), and approve that the distal tooth of any proposed group will be more prone to hypodontia (2, 5). Hypodontia of the lateral incisors was significantly more frequent in the upper than in the lower arch, this is consistent with previous studies (29). On other side, many data from previous studies reported that the lower second premolar is more frequent missing teeth (26, 30, 31). Other studies stated that the most affected tooth is mandibular lateral incisor especially in Asian community (32).

The variations may be due to ethnic background or patient’s selection criteria. Sometime the patients selected from orthodontic clinics and some time from the general community. Ex. the maxillary lateral incisor often be missing in orthodontic clinic as compared what found in the general community (33). Moreover, differences between populations of patients having orthodontic treatment may probably reflect different psycho-social aspects among regions. It is thus possible that in many countries where smile aesthetics are greatly demand, lateral incisor agenesis may provoke the patients to pursue orthodontic treatment.

On the other hand, others have reported the difference in the sequence of most frequently affected teeth. They reported that the most frequent missing tooth was the mandibular second premolar, less the maxillary second premolar and the least the maxillary lateral incisor & the mandibular central incisor (2). Furthermore, the result of our study revealed that the agenesis of second molars were very rare. The same result was consistent with other reported previous investigations (34, 35).
The majority of individuals had one or two teeth agenesis. This agree with previous studies\(^8, 22, 28\). In spite of tooth agenesis was more frequent in maxilla, but there no considerable difference was noticed between the maxillary & mandibular teeth. This finding is agree with most previous studies\(^5\). Our finding disagrees with other studies that found the hypodontia in the mandibular teeth was higher than maxillary teeth\(^30\). The end result is to improve the esthetic & function and keep the self-esteem of the patient. Therefore, by early identification of missing teeth, proper diagnosis and treatment plan can be accomplished with a multidisciplinary treatment.

**Conclusion**

1- Prevalence of hypodontia was 3.36 % and was within the normal value of many previous studies.

2- The hypodontia in females higher rather than in males.

3- Most of patient show missing one or two teeth.

4- The maxillary lateral incisors found to be the most frequently missing teeth, the mandibular second premolar were pursuing the second missing tooth followed by maxillary second premolar.

5- The early detection of hypodontia is very important to understand of their etiology and to offer preventive modality of management.

**Conflict of interests**

The authors of this study declare that there is no conflict of interests regarding the publication of this paper.

**References:**


