The prevalence and distribution of hypodontia in a sample of Qatari patients

Hayder Abdalla Hashim and Sozan Al-Said

ABSTRACT

Objective: The aims of this study were to determine the prevalence of hypodontia in the permanent dentition in a sample of Qatari patients attending a dental center and to compare the results with the reported findings of other populations.

Materials and Methods: Orthodontic files including orthopantomographs of 1000 patients (655 females and 345 males, 11–36-year-old) were examined and inspected for evidence of hypodontia.

Results: The prevalence of hypodontia in the present Qatari sample was 7.8%; 6.9% was in males and 8.2% in females. Hypodontia was found more frequently in the maxilla than in the mandible. The distribution of missing teeth was noticed in the left side more than the right side. The most frequently missing teeth were the maxillary lateral incisors followed by the mandibular second premolars, maxillary second premolars, and mandibular left lateral incisor. The majority of patients with hypodontia had one or two teeth missing, but rarely more than four teeth were missing in the same patient. Bilateral missing teeth in the current study was commonly seen in the maxillary lateral incisor (14.1%) followed by mandibular second premolar (12.8%) and maxillary second premolar (6.4%).

Conclusions: The prevalence of hypodontia in a sample of Qatari individuals was within the range reported in the literature for other populations. The incidence of hypodontia in the anterior segment requires multidisciplinary team approach (orthodontic and prosthodontic) to restore the esthetic and function and improve patient self-esteem.

Key words: Hypodontia, prevalence, Qatari

INTRODUCTION AND REVIEW OF THE LITERATURE

Hypodontia is generally defined as the developmental absence of one or more teeth, excluding the third molars, either in primary or permanent dentition. Researchers have used a variety of terminology to describe the condition, such as a reduction in teeth number, teeth aplasia, congenitally missing teeth, the absence of teeth, agenesis of teeth, and lack of teeth.[1-11] The missing teeth are those which have failed to erupt clinically in the oral cavity and had no sign of appearance in radiographs. The cause is usually disturbance during the early stages of tooth development.[3,12] Hypodontia is one of the most common human dental developmental anomalies.[12-15]

Many methods of classification have been reported in the literature.[12-14,16-23] Some researchers have found the congenital absence of teeth to occur either as an isolated family form or as an inherited form. The inherited form could be autosomal-dominant, autosomal-recessive or an X-linked

Department of Orthodontics, Dental Centre, Rumailah Hospital, Doha, Qatar

Address for correspondence: Prof. Hayder Abdalla Hashim, Dental Centre, Rumailah Hospital, P. O. Box 3050, Doha, Qatar.
E-mail: hahashim78@yahoo.com

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trait.[20] Others have defined the congenital absence of teeth according to the number of missing teeth.[17,21,23-25]

Hypodontia refers to the condition where there is an absence of fewer than six teeth. However, the term oligodontia is usually used to describe a larger number of missing teeth (six or more). Anodontia is the complete absence of teeth.

Dhanrajani[5] classified hypodontia according to the severity of the condition following the method of previous researchers.[13,26] He used "mild to moderate hypodontia" to denote agenesis of two to five teeth, and referred to the absence of six or more teeth, excluding the third molars, as "severe hypodontia." He defined the term oligodontia as the absence of multiple teeth, usually associated with systemic disorders.[5]

Many other researchers have used similar methods of classifying the congenital absence of teeth.[19,27] In general, they identified three categories of hypodontia, excluding third molars, as follows: Mild with one or two missing teeth, moderate with 3–5 missing teeth and severe with six or more missing teeth.

Hypodontia is also classified as either isolated hypodontia or syndromic hypodontia. Isolated hypodontia refers to those cases without syndrome.[28,29] Thus, hypodontia can occur either as part of a syndrome or as a nonsyndromic, familial form. In the latter form, it occurs as an isolated trait, affects variable numbers of teeth and appears either sporadically or as an inherited condition within a family pedigree.[23,29]

The prevalence of agenesis of permanent teeth has been reported in different races and countries.[30-37] After third molars, agenesis of lower second premolars and upper lateral incisors is the most common type of hypodontia.[35] The reported prevalence of hypodontia in orthodontic patients was different between studies, ranging from 2.7%[35] to 11.3%.[36] According to Jorgenson,[3] the mandibular second premolar is the tooth most frequently absent after the third molar, followed by the maxillary lateral incisor and maxillary second premolar, for Europeans.

The data for hypodontia, excluding the third molars, in both genders combined varies from 0.3% in the Israeli population[38] to 11.3% in the Irish[39] and 11.3% in Slovenian populations.[36] Al-Ajwadi[40] reported that the hypodontia in Iraqi is mostly seen in upper lateral incisors and lower second premolar followed by lower central incisors, upper central incisors, and finally the lower lateral incisors.

Recently, Hassan *et al*. reported that the prevalence of hypodontia of in Sudanese sample was 5.1%. Hypodontia was found considerably more frequently in the mandible than in the maxilla. The distribution of missing teeth was noticed in the left side more than in the right side. The most frequently missing teeth were the maxillary lateral incisors, followed by the mandibular second premolars, maxillary second premolars, and mandibular left lateral incisor. The majority of patients had two or three teeth missing, but rarely more than five teeth missing.[41]

More recent, Abdel Jawad *et al*. conducted a study of hypodontia among Qatari patients. They reported that the prevalence of hypodontia was 6.2% (females 8% and males 4.2%; $P < 0.05$). The majority of patients had one or two missing teeth. There were no significant differences between right and left sides for any particular tooth. The most frequently missing teeth were maxillary lateral incisors (36.2%), followed by mandibular second premolar (32.6%) and maxillary second premolar (20.2%). Hypodontia was more commonly found unilaterally than bilaterally (63.2% and 44.3%, respectively).[42]

Aims of the Study

Literature search revealed only one study was done to investigate the prevalence of hypodontia in the permanent dentition in Qatari population.[43] Therefore, the aims of this retrospective cross-sectional study were to document the prevalence, distribution of hypodontia in permanent dentition in a sample of Qatari patients selected from a dental center with different age range and to compare the results with the reported findings of other populations.

MATERIALS AND METHODS

Sample

The sample consisted of 1000 Qatari patients, of which 345 males and 655 females, who attended the Dental Center at Rumaila Hospital, Doha, Qatar. The patient file (panoramic radiograph, specific periapical radiographs, and anamnestic data) was considered the only source of information used to diagnose hypodontia in this study.

Criteria of Selection

- Qatari national
- Age range from 11 to 36 year.

Exclusion Criteria

- Patients with any syndrome and/or cleft lip/palate
- Poor radiographic image quality.

Methods

The second author evaluated all radiographs on a standard radiographic illuminated viewer. The radiographic findings were checked with patients` records to assure that the missing tooth had not been extracted. All information including age, gender, clinical findings were documented in the file, number, and type of missing tooth, the site of the agenesis (maxilla or mandible, right or left side), being unilateral or bilateral was determined and recorded in a special form. A tooth was identified as congenitally missing when there was no evidence that it had been extracted and no mineralization of the tooth crown could be recognized on the orthopantomogram.[21] If an accurate diagnosis of hypodontia could not be made, the file was excluded.

Statistical Analysis

To compare and evaluate the difference between male and female patients, maxilla and mandible, and right and left sides in both jaws Student's *t*-test was performed. The level of significance was set at 0.05.

RESULTS

A total of 1000 patients' records that fulfilled the criteria of selection were included. Patients age ranged from 10 to 26 years of age, 655 were females with an average age of 14.5-year-old, and 345 were males with an average age of 16.4-year-old.

Out of 1000 patient's records reviewed, 78 exhibited congenital absence of one or more teeth (24 male and 54 female). The prevalence of hypodontia in the studied Qatari population sample was 7.8% in which 6.9% was in male and 8.2% in female [Figure 1].

Figure 2 shows the distribution of missing one tooth as it was found in 11 (3.2%) males and 24 females (3.6%) patients, two missing teeth were noticed in 10 (2.9%) males and 18 (2.7%) females, three missing teeth were observed in 1 (0.3%) male and 6 (0.9%) in females and in patient with four teeth congenitally missing teeth were exhibited in 2 (0.6%) males and in 6 (0.9%) females [Figure 2]. This indicates that females were affected more than males, but no significant difference was observed ($P > 0.05$).

Figures 3 and 4 demonstrate the distribution of hypodontia in upper and lower jaw. The upper jaw revealed a higher percentage of hypodontia than the lower jaw. On the other hand, the left side in both jaws showed a higher percentage of missing teeth compared to the right side, but no significant difference was noted ($P > 0.05$).

Figure 5 exhibits the distribution of hypodontia in the right and the left side versus bilateral in upper and lower jaw. The bilateral hypodontia revealed a higher percentage for maxillary lateral incisor, maxillary second premolar, and mandibular second premolar; whereas, it was equal for maxillary first premolar and mandibular central incisor. On the other hand, the unilateral hypodontia of mandibular lateral incisor showed a higher percentage compared to the bilateral.

DISCUSSION

This is a descriptive cross-sectional study to determine the prevalence of hypodontia in a sample of Qatari patients.

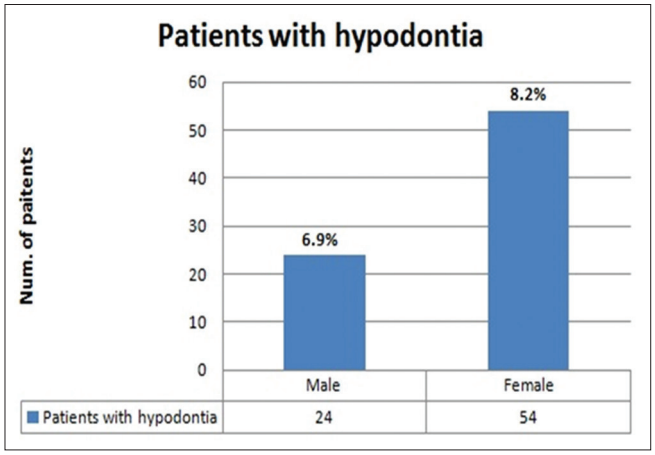

Figure 1: Number of patients with hypodontia and their distribution according to gender ($n = 78$)

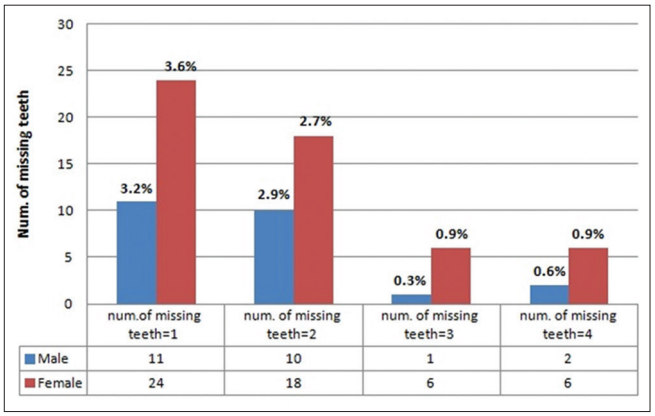

Figure 2: Congenitally missing teeth distribution among males and females patients with hypodontia

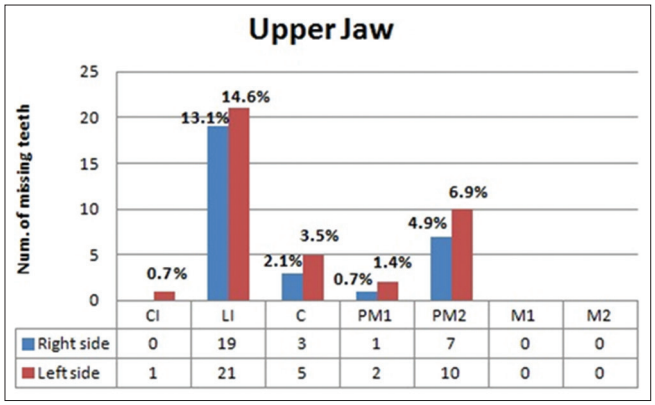

Figure 3: Distribution of congenitally missing teeth in the upper jaw

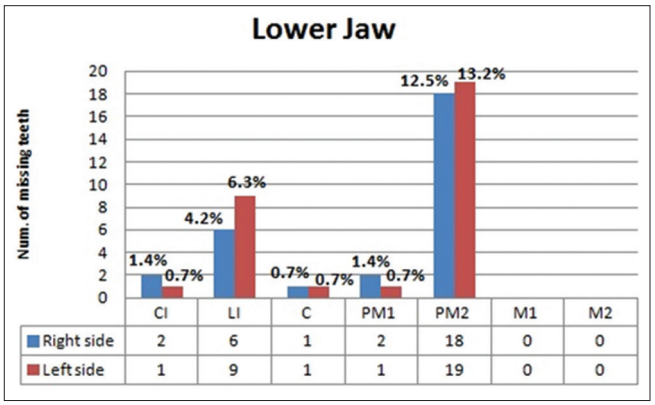

Figure 4: Distribution of congenitally missing teeth in the lower jaw

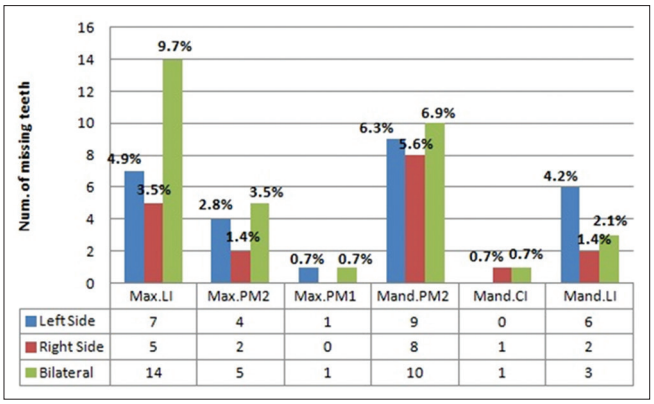

Figure 5: Distribution of hypodontia in the right, left side and bilateral

The etiology of hypodontia is usually disturbance during the early stages of tooth development.[3,12] Crown calcification starts at the age of 3 years and usually completes at the age of 6 years.[44-47] However, there is variation in the development of some teeth (e.g., premolars).[48] Therefore, it is very difficult to decide whether the tooth is missing or not before the age of 9 years, especially among males.[49] This was confirmed in an investigation conducted by Wisth *et al*.[50] They observed that the prevalence of missing teeth was higher at the age of 7 years (7.1%) compared when the same sample was re-examined at the age of 9 years (6.6%). This is the reason why in the present study, patients above 10 years of age were selected.

The prevalence of hypodontia in the primary dentition was found to be very low. The range has generally been between 0.1% and 0.9% of the population.[2] However, in the permanent dentition a wide range of prevalence values (4.6–12.6%) was reported. The results of this study revealed that hypodontia prevalence in the permanent dentition is 7.8% in Qatari sample, which falls within the range reported in the literature. Further, this finding is consistent with other reported prevalence values among Danish (7.8%) and Iceland (7.9%) populations.[51,52] However, slightly smaller value was observed among the Turkish population (7.5%).[53] Whereas, in Sudanese and Qatari samples, the prevalence was less (5.1% and 6.2%, respectively).[41,42] On the other hand, higher prevalence values were reported in two German studies (12.6%)[54] and (11.3%)[36] and very low prevalence value was noticed in French (1.9%)[55] and Malaysian studies (2.8%).[56]

Gender dimorphism was investigated and the result indicated that the hypodontia was higher in females than males. This finding is in agreement with several previous studies conducted in different populations.[52,57-59] However, Yildiray *et al*.[54] stated "although others reported a higher incidence in females than in males, even though we determined significant differences for some teeth." Further, the result of the present investigation revealed that females were dominant in cases with one tooth, two teeth, three teeth, and more than four missing teeth.

The comparison of the congenitally missing teeth between the right and left sides of the current study showed that the left side in the upper jaw was more affected than the right side. However, this was not observed in the lower jaw. This finding was in disagreement with the finding of Fekonja who reported that the missing teeth were more commonly absent on the right side than on the left side.[36]

Many studies have demonstrated that there is no consistent finding as to which jaw has more missing teeth.[31,35,40,51,52,61] This study supports the finding that more teeth were missing in the maxilla than in the mandible. However, other investigators reported more absence in the mandible.[7,42,60,62]

Most investigators observed the predominance of bilateral congenitally missing teeth to the extent as being as twice as unilateral missing.[31,63] However, this was not in line with the finding observed in this study. Bilateral missing teeth in the current study was commonly seen in the maxillary lateral incisor (14.1%) followed by mandibular second premolar (12.8%) and maxillary second premolar (6.4%). This finding was consistent with study carried out in Qatari orthodontic and pediatric patients.[43]

Further, the maxillary lateral incisor was the most frequently missing tooth, and the mandibular second premolar was in the second rank followed by the maxillary second premolar and mandibular lateral incisor. This coincides with the result conducted in Turkish population sample,[54] and in Qatari orthodontic patients.[43] 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, followed by the maxillary second premolar, the maxillary lateral incisor, and the mandibular central incisor.[50,52,53]

Furthermore, the result of this study revealed that the agenesis of maxillary and mandibular canines and second molars were very rare. Furthermore, the same result was consistent with other reported previous investigations.[35,55,62,63]

Hence, many studies were carried out to evaluate the prevalence of hypodontia among different populations.[30,32] A wide range of prevalence values (4.6–12.6%) was reported. This wide range could be attributed to geographic, gender, racial and genetic differences and also to the large differences in the sample sizes and the criteria of selection. All these difference might play an important role in these various reported results of hypodontia[31,32,36,54] and making the comparison of this study result very limited with other previous studies. The above-mentioned factors may justify the difference of the prevalence of hypodontia in Qatari sample (7.8%) in the present study and the previous study among Qatari orthodontic and pediatric patients collected from a different place (6.2%).[42]

Most patients seek orthodontic treatment to restore their facial esthetic more than the function. However, esthetic problems, periodontal damage, malocclusion, and alveolar bone deficiency are some of the complications following hypodontia. Some studies stated that also anterior hypodontia has a significant effect on skeletal relationships.[44] However, each of these problems can be an indication for orthodontic treatment. For example, agenesis of maxillary lateral incisor impairs dental esthetics and function from a very young age.[37]

Missing permanent teeth in the anterior or posterior region represents a clinical problem and requires a multidisciplinary approach to cover the needs of the patients. The end result of this approach is restoring the esthetic and function and improving the self-esteem of the patient. Therefore, by early detection of missing teeth, proper diagnosis and treatment plan can be performed with a multidisciplinary team approach.

CONCLUSIONS

- The prevalence of hypodontia in this study (7.8%) was within the range reported in the literature.
- The maxillary lateral incisor was the most frequently missing tooth, and the mandibular second premolar was in the second rank followed by the maxillary second premolar and mandibular lateral incisor.
- Hypodontia was found more frequently in the maxilla than in the mandible, and the distribution of missing teeth was noticed in the left side more than in the right side.
- Most common bilaterally missing tooth was maxillary lateral incisor (9.7%), followed by mandibular second premolar (6.9%) and maxillary second premolar (3.5%).

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Conflicts of Interest

There are no conflicts of interest.

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