Al-Rafidain J Med Sci. 2025;8(1):168-172.
DOI: https://doi.org/10.54133/ajms.v8i1.1671

AJMS

Online ISSN (2789-3219)

Research Article

Prevalence of Congenitally Missing of Anterior Teeth and Premolars in Selected People Attending Dental Clinic in Basrah

Shams Kadhum Mohammed*, Adil Ghalib Fadil, Nadia Azzam Abdulwahab
Department of Pedodontics, Orthodontics and Preventive Dentistry, College of Dentistry, University of Basrah, Basrah, Iraq
Received: 5 January 2025; Revised: 15 February 2025; Accepted: 27 February 2025

Abstract

Background: Hypodontia is distinguished by the innate absence of one or more teeth. The cause of this anomaly is multifactorial and related to environmental and genetic factors. ***Objective***: To assess the prevalence of congenitally missing permanent teeth, excluding molars, in a sample of patients attending different private dental clinics in Basrah city, as early detection and treatment minimize the aesthetic and functional problems associated with it. ***Methods***: A cross-sectional study was conducted by examining 530 patients clinically and radiographically, those attending private dental clinics for a period from November 2022 to March 2023. The proposed selection criteria were applied to filter the panoramic X-ray (OPG), which was then subjected to statistical analysis. ***Results***: A total of 485 OPGs that met the method of selection were involved. Patients aged 9-30 years old: 18% of the sample showed congenitally missing teeth, including 68 females and 21 males. Statistical analysis detected that most of the congenitally missing teeth in this study were the maxillary lateral incisor right (18.18%), left (14.77%), followed by mandibular second premolar right (12.50%), left (9.09%), and maxillary right and left second premolars (7.95%), about canine and central incisors showing the least ratio. ***Conclusions***: The absence of teeth usually results in remarkable problems affecting aesthetics and function, so regular examination of individuals for early detection is important. According to this study, the prevalence of hypodontia was 18% of females, showing a higher prevalence than males.

***Keywords*:** Congenitally missing teeth, Esthetic, Hypodontia, Orthodontics, O.P.G.

انتشار فقدان الأسنان الأمامية والضواحك خلقيا لدى أشخاص مختارين يترددون على عيادات الأسنان في البصرة

الخلاصة

الخلفية: يتميز نقص الأسنان بالغياب الفطري لواحد أو أكثر من السن. سبب هذا الشذوذ متعدد العوامل ويرتبط بالعوامل البيئية والجينية. **الهدف**: تقييم انتشار الأسنان الدائمة المفقودة خلقيا ، باستثناء الأضراس ، في عينة من المرضى الذين يترددون على عيادات الأسنان الخاصة المختلفة في مدينة البصرة ، حيث يقلل الكشف المبكر والعلاج من المشاكل الجمالية والوظيفية المرتبطة بها. **الطرائق**: أجريت دراسة مقطعية من خلال فحص 530 مريضا سريريا وشعاعيا، أولئك الذين يترددون على عيادات الأسنان الخاصة لمدة من نوفمبر 2022 إلى مارس 2023. تم تطبيق معايير الاختيار المقترحة لتصفية الأشعة السينية البانورامية (OPG)، والتي خضعت بعد ذلك للتحليل الإحصائي. **النتائج**: تم إشراك ما مجموعه 485 OPGs التي استوفت طريقة الاختيار. المرضى الذين تتراوح أعمارهم بين 9-30 عاما: أظهر 18٪ من العينة أسنانا مفقودة خلقيا ، بما في ذلك 68 أنثى و 21 ذكرا. اكتشف التحليل الإحصائي أن معظم الأسنان المفقودة خلقيا في هذه الدراسة هي القواطع الجانبية الفكية اليمنى (18.18٪) ، اليسرى (14.77٪) ، تليها الضواحك الضاحك الثانية للفك السفلي (12.50٪)، واليسار (9.09٪)، والضواحك اليمنى واليسرى الثانية للفك العلوي (7.95٪)، حول القواطع المركزية التي تظهر أقل نسبة. **الاستنتاجات**: عادة ما يؤدي غياب الأسنان إلى مشاكل ملحوظة تؤثر على الجماليات والوظيفة، لذلك من المهم الفحص المنتظم للأفراد للكشف المبكر. وفقا لهذه الدراسة، كان انتشار نقص الأسنان 18٪ من الإناث ، مما يدل على انتشار أعلى من الذكور.

* ***Corresponding author***: Shams K. Mohammed, Department of Pedodontics, Orthodontics and Preventive Dentistry, College of Dentistry, University of Basrah, Basrah, Iraq; Email: shams.muhammed@uobasrah.edu.iq
Article citation: Mohammed SK, Fadil AG, Abdulwahab NA. Prevalence of Congenitally Missing of Anterior Teeth and Premolars in Selected People Attending Dental Clinics in Basrah. *Al-Rafidain J Med Sci*. 2025;8(1):168-172. doi: https://doi.org/10.54133/ajms.v8i1.1671

INTRODUCTION

Hypodontia is a moderately common dental disorder that interferes with tooth development and causes one or more teeth to fall off. According to studies, up to 20% of the population may be affected by this disorder, which can affect both primary and permanent teeth [1]. Congenital missing teeth (CMT) can result in masticatory, occlusal, speech, and esthetic problems, like excessive spacing and shifting adjacent teeth [2], causing malocclusion leading to temporomandibular disorders [3] and associated with abnormal craniofacial morphology. Early diagnosis results in a better evaluation and treatment, avoiding occlusal, periodontal, and alveolar ridge developmental problems [4]. The actual cause of hypodontia is unknown, but it is thought to have environmental and genetic factors [5]. Hypodontia can manifest as a single, non-syndromic symptom or as a component of a complicated illness that also includes problems in the development of other ectodermal organs [6]. Genetics plays an important role in congenital dental aplasia, as proved by research on monozygotic twins [7,8]. Tooth agenesis is a phenotypic feature of conditions such as Vander Woude and Down's syndrome, ectodermal dysplasia, and cleft palate and lip [9]. Mutations in the MSX1, PAX9, AXIN2, EDA, and WNT10A genes have been related to non-syndromic hypodontia [10]. Hypodontia can be a consequence of environmental factors, such as trauma, chemotherapy, or radiation [11]. Therefore, non-syndromic hypodontia can exist sporadically or in a familial form. Trauma to tooth

buds, such as an accident or infection, can harm the tooth buds and lead to hypodontia [1]. Hormonal disturbances and nutritional deficits may play major roles. Thyroid hormone imbalances are one imbalance that contributes to the development of hypodontia [7]. The prevalence of hypodontia can indeed vary based on ethnic and sex differences. One review found that Australian Caucasians had the highest prevalence at 6.3%, followed by European Caucasians at 5.5%, and then North American Caucasians at 3.9% [1]. However, this does not directly confirm the statement about Asian populations having a higher prevalence than Caucasian populations [12]. The severity of hypodontia can vary based on the number of missing teeth [13]: mild, 1–2 missing teeth; moderate, 3–5 missing teeth; and severe, 6 or more missing teeth. In contrast, some authors have proposed that when there are missing teeth from one to six teeth, it is described as hypodontia, while more than six teeth are known as oligodontia [1]. The situation is diagnosable; the dentist will visually examine the teeth and oral cavity during a clinical examination to look for any indications of missing or undeveloped teeth. An ideal CMT diagnostic method needs clinical and radiographic examinations. Orthopantomography is mostly favored for this purpose [14]. The age of CMT detection has an important effect on the results. Mineralization of the permanent crown, excluding third molars, started at 1-3 years old and was established at the age of 6 years old. Since radiographic recognition of dental buds needs some amount of calcification, examination at an early age can result in incorrect diagnosis. This is more significant in the mandibular premolars. According to that, several researchers have advised neglecting children younger than 9 years old [7]. These variations between different studies can be caused by different inclusion and exclusion criteria and racial differences [7]. As hypodontia is frequently inherited, it is also crucial to take the family history of dental issues into account to find any underlying genetic problem that might be causing hypodontia; genetic testing may occasionally be advised. The treatment of hypodontia will depend on the specific case, the site, and the number of missing teeth. The common treatment options include the following: 1) Orthodontic treatment: In some cases, orthodontic treatment can be used to close or open gaps caused by missing teeth. This is typically done with braces or clear aligners [13]; 2) Dental implants: Dental implants are often used as a replacement for the missing tooth to get a typical esthetical appearance without restoring the neighboring teeth; implant-retained prostheses can be used [15]; 3) Removable dentures: It's the most efficient option in treating patients with severe hypodontia [16]; and 4) Cosmetic contouring: In some cases, cosmetic contouring can be used to reshape the remaining teeth to improve their appearance and fill in the gaps caused by missing teeth [17,18]. Few studies were found in the literature regarding the prevalence of congenital missing teeth in Basrah city. The aim of this study was to examine the prevalence and distribution in the permanent dentition in a sample of patients attending a private dental clinic for treatment.

METHODS

Study design and sampling

A cross-sectional study was established by examining 530 patients attending two private dental clinics in Basrah for the period from November 2023 to March 2024. These patients were examined clinically and radiographically by taking O.P.Gs for diagnostic and treatment purposes using the VAT Tec. Digital panoramic X-ray system PAX400. The inclusion criteria include an age range from 9 to 30 years old, while the exclusion criteria include patients with cleft palate/lip, poor radiographic image quality, and patients with orthodontic treatment or previous dental extraction.

Interventions and outcome measurement

After the exclusion criteria of 45 OPGs (9 not within the age range, 27 with non-congenital missing teeth, 8 with blurred OPG, and 1 with cleft palate). The number of OPGs then became 485, of which 164 were males and 321 were females. Three investigators evaluated all OPGs. All data, including gender, age, clinical finding of missing teeth, and site of agenesis (upper or lower, left or right side), were determined and recorded in a specially designed data chart. A tooth was fixed as CMT when there was no clue that it had been extracted and no tooth mineralization could be detected on the OPG; if a correct diagnosis of hypodontia couldn't be made, the OPG was neglected.

Ethical Consideration

This study protocol was approved by the scientific ethical committee, College of Dentistry, University of Basrah with a reference number 4-15-24-3. Informed consent was obtained from patients or their parents.

Statistical analysis

The Statistical Packages for Social Sciences, version 27 (SPSS-27), was used to analyze the data. Simple frequency and percentage were used for data presentation. The Chi-square test was used to determine the significance of distinct percentage differences. The statistical significance was achieved when the *p*-value was less than 0.05.

RESULTS

A total of 485 patients' records that accomplished the selection criteria were involved. Patients' ages ranged from 9 to 30 years old. About 18% of the sample showed congenitally missing teeth (Figure 1), including 21 (23.60%) males and 68 (76.40%)

females, and there are significant differences between females and males ($p< 0.05$).

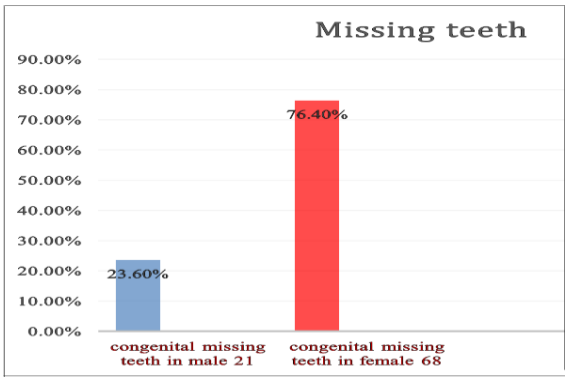

Figure 1: distribution of hypodontia according to gender.

The statistical analysis detected that most CMTs in this survey were the maxillary right lateral incisor 16 (18.18%), followed by the maxillary left lateral incisors 13 (14.77%), mandibular right second premolar 11 (12.50%), mandibular left second premolar 8 (9.09%), then maxillary right and left second premolars 7, 11 (7.95%), maxillary left first premolar 7 (7.95%), while right first premolar recorded 6 (6.82%), maxillary left canine 5 (5.68%), and maxillary right canine 3 (3.41%). Regarding maxillary central incisors, the mandibular left central incisor, the mandibular lateral incisor, and the mandibular right first premolar have the same percentage (1.14%). Mandibular canines exhibited no type of teeth agenesis in this survey (Table 1).

Table 1: Distribution of congenitally missing teeth for upper and lower jaw per side

Jaw	Side	Teeth	Missing teeth n(%)	Missing teeth quadrant n(%)	*p*-value
Upper	Right	Second premolar	7(7.86)	33(37.07)	0.679
		First premolar	6(6.74)		
		Canine	3(3.37)		
		Lateral incisor	16(17.97)		
		Central incisor	1(1.12)		
	Left	Central incisor	1(1.12)		
		Lateral incisor	13(14.60)		
		Canine	5(5.61)		
		First premolar	7(7.86)		
		Second premolar	7(7.86)		
Lower	Right	Second premolar	11(12.35)	13(14.60)	0.169
		First premolar	1(1.12)		
		Canine	0(0.00)		
		Lateral incisor	1(1.12)		
		Central incisor	0(0.00)		
	Left	Central incisor	1(1.12)		
		Lateral incisor	1(1.12)		
		Canine	0(0.00)	10(11.23%)	
		First premolar	0(0.00)		
		Second premolar	8(8.98)		
Total				89	< 0.05

The upper jaw had a higher percentage of hypodontia than the lower jaw. On the other hand, the right side of the lower jaw exhibited a higher percentage of missing teeth in comparison with the left side and equal for the upper jaw; there is a significant difference noted between the upper and lower jaws (p value < 0.05).

DISCUSSION

All OPGs of the 485 patients were studied; 164 (23.60%) patients were males, and 321 (76.40%) were females aged 9-30 years old. This study did not include children younger than 9 years, which might raise the accuracy of findings in comparison with other studies, as mineralization of mandibular premolars' crowns couldn't be detected radiographically till 9 years old, and involvement of kids younger than this age might result in overestimation of missing premolars [19]. In addition to that, above 30 years old, the extraction of teeth rose mainly due to tooth decay and its complications or periodontal diseases [19]. The prevalence of congenital missing teeth in this survey was 18%, which is less than that recorded by Alhaddad *et al*. in Iraq (30.61%) [20] and higher than others recorded by Hashim and Al-Said in Qatar (7.8%) [21] and Jasim in Iraq (10.37%) [22]. This difference could be attributed to the size of the sample, the studied teeth, and regional and ethnical variation [23]. Regarding the gender, there is a significant difference ($p< 0.05$); hence, the prevalence of hypodontia in females was 76.40%, which is higher than in males (23.60%). This agrees with a study performed by Jasim (2022) that reported 8.2% female and 6.9% male [21] and agrees with a study by Alhaddad *et al*., 12.17% males, 18.43% females [20], and agrees with Liu *et al*. (2023), which showed 59.18% female and 40.82% male [3], and Arif *et al.* [24]. The current results disagree with those of a study by Bozga *et al*., in which males have a higher prevalence [25]. Regarding the greater number of hypodontia in females, it may be caused by biological variation [26] or a larger sample of females since the women are more anxious about dental visits than men, leading to a higher prevalence of hypodontia for them. Regarding the most CMT in this study, the maxillary lateral incisors were 18.18%; this agreed with other studies. The results disagree with another study where the mandibular second premolar is the

most congenitally missing tooth (18.1%) [29] and disagree with that study, which records the mandibular central incisor as the most common tooth involved in hypodontia (13.7%) [30]. In (2017), AL-Ani *et al*. [31] confirmed that maxillary lateral incisors, mandibular second premolars, and central incisors agenesis related to their site of development in the zone of initial union of the jaw; for example, upper lateral incisors formed in the zone where the lateral maxillae and medial nasal bone processes unite, while the lower second premolars developed in another delicate zone [32]. The survey indicated that the prevalence of congenital missing teeth was higher in the maxilla than the mandible; there is a significant difference ($p< 0.05$). This agrees with Gracco *et al*. [29]. On the other hand, other surveys declared that most of these absences were in the lower jaw [33]. Polder stated that the prevalence of hypodontia in upper and lower teeth is nearly equal [1]. In this study, the right side of the lower jaw showed a higher percentage of missing teeth. This coincided with the findings [33] and disagreed with a study by Mohammed *et al*. [26] and a study by Amin, which showed more frequent hypodontia on the left side [34]. There were no significant differences in hypodontia between the right and left sides of both jaws. The present results coincide with the results of Sisman *et al*. in Turkey [35] and Fekonja *et al*. in Slovenia [36]. While Silva *et al*. in Mexico [37] and Endo *et al*. in Japan [38] convened that the incidence of hypodontia is equal on both sides.

Study Limitation

Inability to include the entire society, since OPG can't be taken randomly. Suggestion for further studies including an equal sample of females and males for more precise estimation. And doing surveys on the school and colleges.

Conclusion

The prevalence of hypodontia in this study was 18%. Females are more frequent than males. The most congenitally missing teeth in this study were the maxillary lateral incisors, then mandibular second premolars. The lower canine showed no type of teeth agenesis. Considerably more hypodontia was recorded in the upper than in the lower jaw.

Conflict of interests

No conflict of interest was declared by the author.

Funding source

The author did not receive any source of funds.

Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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