

Prevalence of tooth agenesis in orthodontic patients at Islamic International Dental Hospital

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Abstract

Introduction: Non-syndromic tooth agenesis has been occasionally described in literature and data available for its prevalence is rare in Pakistan. The purpose of the present retrospective radiographic study was to provide data concerning the prevalence of non-syndromic hypodontia in patients reporting to the Orthodontic Department at Islamic International Dental Hospital.

Material and Methods: Five hundred consecutive patients who met the inclusion criteria were selected from the records. The radiographic records included at least one clear adequate quality Orthopantomogram (OPG), which was supplemented when necessary by a periapical radiograph.

Results: A prevalence of 9 percent hypodontia was seen in the sample.

Conclusions: It was concluded that hypodontia is prevalent in Pakistan with a 9% incidence which is on the higher limit of the global range (1.6 - 9.6%). However further studies should be conducted on a larger non-orthodontic sample to determine accurately this incidence of hypodontia.

Key Words: Hypodontia, dental anomaly, congenital facial dysplasia

Introduction

The term 'tooth agenesis' or commonly referred to as hypodontia describes the developmental absence of one or more teeth, either in primary or permanent dentition¹ and is the most frequently encountered of all oral alterations.²⁻⁵ It is a multi-factorial dental anomaly⁶ and is commonly associated with syndromes and other specific congenital facial dysplasias such as cleft lip and palate.⁷ Non-syndromic hypodontia may be the result of numerous etiologic factors such as changes of the dental lamina formation, failure of tooth germ to develop at the optimal time, space limitation, systemic condition and genetic factors.⁸ The prevalence of agenesis in the permanent dentition shows great variation

between populations. The reported prevalence of missing teeth, excluding the third molars in both sexes combined, varies from as high as 10.1% in the Norwegian population^{9,10} and as low as 0.3% in the Israeli population.¹¹ A higher incidence of missing teeth is observed in Chinese^{12,13} and Japanese populations^{14,15} than in Caucasian population. The incidence of tooth agenesis varies with tooth type. Third molar agenesis is the most common with an incidence of 20% in population studies.¹⁶ Opinions vary on the second most commonly missing tooth. Some investigators believe that it is the maxillary lateral incisor,¹⁷ whereas others believe that mandibular second premolar¹⁸ agenesis has a higher incidence.

Tooth agenesis is an important condition and early diagnosis is critical because aesthetic, physiological and functional problems such as malocclusion, periodontal damage and a lack of alveolar growth can be caused by hypodontia.¹⁹

Accurate diagnosis of a missing tooth requires radiographic,²⁰ clinical and dental cast examinations to distinguish whether the tooth is extracted, impacted or congenitally

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absent. It is often difficult to accurately distinguish the missing tooth from adjacent similar tooth. For those cases, meticulous examination of dental casts is helpful. Comprehensive management often requires a multidisciplinary approach.

Non-syndromic tooth agenesis has been occasionally described in literature but data available for its prevalence is rare in Pakistan. The purpose of the present retrospective radiographic study was to provide data concerning the prevalence of non-syndromic hypodontia in patients reporting to the Orthodontic Department at Islamic International Dental Hospital who sought orthodontic treatment and to compare present results with the specific findings of other populations. The occurrence was evaluated in relation to gender, specific missing teeth, the location and pattern of distribution in both arches and between right and left sides.

Material and Methods

Five hundred consecutive patients who met the inclusion criteria were selected from the records of the Orthodontic Department, Islamic International Dental Hospital. Using a confidence level of 95%, the sample size from the population of 3500 patients was calculated by the sample size calculator (MaCorr Research, Toronto, Ontario, Canada). Patients included in the study ranged between 8-16 years of age having complete records. Informed written consent was taken from all patients who agreed to participate in the study. The radiographic records included at least one clear adequate quality image. Orthopantomogram (OPG) was supplemented when necessary by a periapical radiograph. Patients with any systemic anomaly, ectodermal dysplasia, cleft lip/palate, Down's syndrome and a history of previous orthodontic treatment, extraction of a tooth due to trauma or pathological reasons were excluded.

The OPGs were placed on an illuminator with a light intensity of 60 Lux and observed with

a magnifying glass with a magnification factor of 5X. A tooth was labeled to be congenitally missing if it could not be identified radiographically and there was no history of extraction. The findings of the study were collected on a data collection proforma. A tooth was labeled to be congenitally missing if it was absent on the radiograph, cast and there were no signs of mineralization of the tooth crown or a presence of a tooth crypt on the location of the suspected tooth on the OPG. All permanent teeth were investigated including third molars.

Two of the authors examined the records twice on two different occasions to reduce the likelihood of misinterpretation. If there was a disagreement on the presence/ absence of a tooth, the records were examined by the third author and his decision was considered final.

Results

500 patients included 179 males and 321 females (Figure 1). The descriptive statistics including the frequency of congenitally missing teeth were analyzed on SPSS version 18 (Table 1).

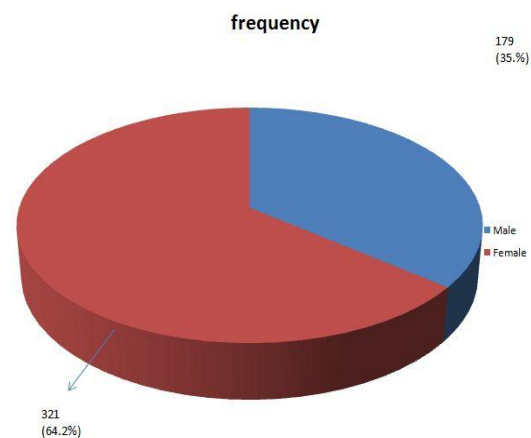


Figure 1: Gender Distribution.

Table 1: Frequency of congenitally missing teeth (n = 500)

Tooth Type	Maxilla	Maxilla	Maxilla	Mandible	Mandible	Mandible
	Right	Left	Total	Right	Left	Total
Central Incisor	0	0.17	0.17	1.0	1.5	2.5
Lateral Incisor	2.0	2.16	4.16	0	0	0
Canine	0	0	0	0	0	0
First Premolar	0.17	0.5	0.67	0	0	0
Second Premolar	0.66	0.67	1.33	3.33	3.50	6.83
First Molar	0	0	0	0	0	0
Second Molar	0	0	0	0	0	0

Discussion

The results showed a prevalence of 9 percent tooth agenesis exclusive of the third molars in the patients. This study suggests the absent number of teeth in the subsequent descending order; mandibular second premolar, maxillary lateral incisor, mandibular lateral incisor, maxillary second premolar and maxillary central incisor. This prevalence is higher than that reported in other similar studies. The prevalence of hypodontia researched in Australian orthodontic patients was 8.1 percent²¹ while in Japanese orthodontic patients the prevalence was 8.5 percent.¹⁴ In contrast the prevalence in Mexican orthodontic patients was 2.7 percent,²⁰ much lower than the prevalence observed in this study. The wide range of prevalence values (1.6-9.6 percent) observed in population studies has indicated geographic differences.^{16,22-24,31-33} On the other hand, these reports are mostly for European, Australian and North American populations,²⁵ signifying the need for studies in further geographic locations in order to confirm these differences.

The elevated prevalence of tooth agenesis in this study might partly be because of the fact that the evaluation was performed retrospectively on Pakistani orthodontic population rather than from a prospectively planned random sampling of the general population.

The mandibular second premolar (excluding third molars) was found to be the most frequently missing tooth in this study. There is some variation in the literature concerning the description of the most frequently missing tooth, excluding third molars. The mandibular second premolar is normally the most frequently missing tooth reported.^{14,15,17,21,26,30,34} However, other studies have also shown the permanent upper lateral incisor to be the most affected tooth.²⁰ Müller observed that in a North American population, the maxillary lateral incisor was the most frequently missing tooth in individuals with agenesis of only one or two teeth, while in those with more than two absent teeth, the second premolar was most commonly missing.¹⁷ In addition, differences between populations of patients seeking orthodontic treatment may possibly reflect different psycho-social aspects between regions. It is thus probable that in countries where smile aesthetics are highly valued, lateral incisor hypodontia may motivate parents and patients to seek orthodontic treatment.

The findings of the present study are in concordance with the Bolk's theory of terminal reduction. According to that theory, when only one to four teeth are missing the absent tooth will be the most distal tooth of a given type i.e lateral incisor, second premolar and third molars.

Conclusions

The prevalence of 9 percent hypodontia in the patients is in the higher limit of the global range (1.6 – 9.6 percent). However this study should be conducted on a larger non-orthodontic population to determine accurately the incidence of hypodontia in the Pakistani population.

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