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SHORT REPORT

Association between hypodontia and Angle's malocclusionBatool Ali,¹ Syed Sheeraz Hussain²**Abstract**

This study was planned to determine the prevalence of hypodontia in permanent dentition and to test whether an association was present between hypodontia and Angle's malocclusion. The retrospective study was conducted at a tertiary care hospital, Karachi, and comprised record of all patients visiting the orthodontic clinics of the hospital from 2005 to 2015. Orthodontic records of 790(79%) subjects, including 189(23.9%) males and 601(76.1%) females, were reviewed. Their mean age was 17 ± 5.06 years. A tooth was considered missing if no evidence of tooth germ was observed on orthopantomograms and dental casts. The total sample was distributed into three groups on the basis of Angle's classification. Chi-square test was applied to determine an association between hypodontia and Angle's malocclusion. Tooth agenesis was observed in 34(4.3%) and a statistically significant difference was found between the genders ($p=0.005$). A positive association was found between hypodontia and malocclusion groups. Higher frequency of missing teeth was seen in Class III malocclusion which indicates a great need for orthodontic treatment as it has a psychosocial impact on the quality of life.

Keywords: Hypodontia, Malocclusion, Frequency, Tooth loss.

Introduction

Dental abnormalities occurring during the developmental stage present as aberrations in the normal shape, size, colour or morphology, depending on the degree of insult to the teeth. Multiple systemic and environmental factors are responsible for disturbing the pattern of normal dental development.^{1,2} Any deviation occurring in the number of either primary or permanent dentition can result in an excess of teeth or lack of teeth in both the arches. The diagnosis of missing teeth is confirmed when a tooth is unerupted in the oral cavity and its dental crypt is not visible on a radiograph.³

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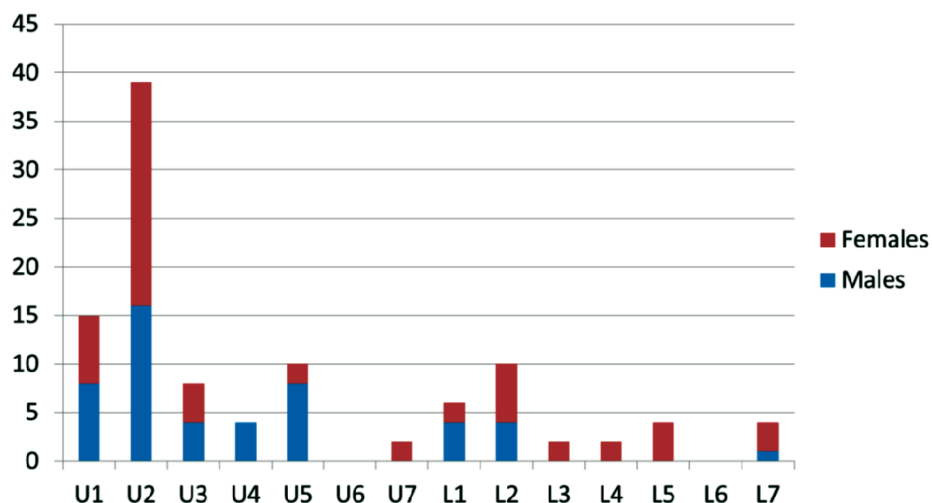
Dental agenesis is one of the most frequently reported tooth anomalies, with a higher prevalence rate in the permanent dentition as compared to the primary dentition.⁴ Population studies reveal that about 60-100% people with missing primary teeth also presented with hypodontia in the permanent successors. A higher prevalence of hypodontia was evident in females and studies demonstrate a male to female ratio of 1:1.4.⁵

It is generally observed that variability in the tooth size or number normally affects the most distal tooth of its type. Hence, 80% of people show absence of one or two teeth, predominantly the third molars, the second premolars and the lateral incisors.^{3,4}

Literature review suggests that hypodontia has been reported in association with other dental anomalies like peg-shaped lateral incisors, taurodontism, impacted canines and developmental defects of the enamel.^{6,7} However, these dental anomalies are rarely studied in reference to a particular malocclusion. Congenitally missing teeth can affect the occlusal and molar relationships of upper and lower jaws. Class III malocclusion with both dentoalveolar and skeletal maxillary deficiencies in all the three planes can be a challenging task for the orthodontists regarding treatment duration and treatment mechanics. Therefore, management of hypodontia in such cases requires a thorough knowledge and experience in order to provide a better facial aesthetics. Similarly, Class II malocclusion with mandibular deficiency and absence of teeth in the lower jaw becomes challenging to be treated. The current study was planned to determine an association between hypodontia and Angle's classes of malocclusion, and to calculate the prevalence of hypodontia in a sample of orthodontic patients.

Methods and Results

This retrospective cross-sectional study was conducted at a tertiary care hospital, Karachi, and comprised records of all the patients visiting the orthodontic clinics of the hospital from 2005 to 2015. A total of 1,000 orthodontic records were screened, out of which complete records of 790(79%) subjects, including 189(23.9%) males and 601(76.1%) females, with a mean age of 17 ± 5.06 years, were obtained. They consisted of standardised good



U1 = upper central incisors, U2 = upper lateral incisors, U3 = Upper canines, U4 = upper first premolars, U5 = upper second premolars, U6 = upper first molars, U7 = upper second molars, L1 = lower central incisors, L2 = lower lateral incisors, L3 = lower canines, L4 = lower first premolars, L5 = lower second premolars, L6 = lower first molars, L7 = lower second molars,

Figure: Distribution of missing teeth between males and females.

quality dental casts, orthopantomograms and a dental chart with complete history and dental examination. The age of 9 years was selected as the minimum age to be included in the study as the calcification of the crowns of all permanent teeth is completed by the age of 6 whereas some individuals show a late onset of mineralisation, especially of second premolars at the age of 8.[3] Finally, a sample of 34(4.3%) subjects with hypodontia was then selected. Of them, 15(44.1%) were males and 19(55.9%) were females. Inclusion criteria consisted of subjects with absence of a tooth on dental cast or lack of tooth germ or crown calcification seen on panoramic radiograph. Patients with history of tooth loss due to caries, trauma, cleft lip or palate, syndrome, periodontal disease or orthodontic extraction were excluded.

The total sample of 790 subjects was distributed into three groups on the basis of Angle's classification:³ Class I molars: the mesiobuccal cusp of the maxillary first molar lies in the buccal groove of the mandibular first molar [270(34.2%) subjects]; Class II molars: the mesiobuccal

Table: Comparison of prevalence of hypodontia between the three malocclusion groups.

Study groups	Hypodontia		P value
	Yes	No	
Class I	6 (2.2%)	264 (97.8%)	0.000**
Class II	16 (3.6%)	430 (96.4%)	
Class III	12 (16.2%)	62 (83.8%)	

* P<0.05, ** P<0.001, Chi-square test.

cusp of the maxillary first molar lies mesial to the buccal groove of the mandibular first molar [446(56.5%) subjects]; and Class III molars: the mesiobuccal cusp of the maxillary first molar lies distal to the buccal groove of the mandibular first molar [74(9.4%) subjects].

SPSS version 20 was used for data analysis. Baseline information on demographics was analysed using descriptive statistics. Chi-square test was used to compare the prevalence of hypodontia between the gender, upper and lower jaws, right and left sides and among the malocclusion groups. P ≤ 0.05 was considered statistically significant.

A total of 106 teeth were missing in the sample [49(46.2%) in males and 57(53.8%) in females] (Figure).

Of the total cases, maxillary hypodontia was found in 30(3.8%) patients, whereas mandibular hypodontia was observed in 14(1.8%). A statistically significant difference was found between the upper and lower arches, with a greater prevalence in the upper arch (p = 0.014).

The frequency of missing teeth was 12(16.2%) in Class III malocclusion group as compared to 6(2.2%) in Class I and 16(3.6%) in Class II malocclusion groups (p < 0.001) (Table).

Discussion and Conclusion

Tooth agenesis is a condition which occasionally occurs because of a defect in the developmental stage of a tooth due to genetic or environmental factors. In the present study, a prevalence rate of 4.3% was found. Our results are almost similar to other studies conducted on the orthodontic subjects of Pakistani population that reported a prevalence rate of 4.2% to 6.8%.^{8,9} Numerous studies have been carried out on different populations to calculate the prevalence of hypodontia, and variation is observed between different races, populations and countries.¹⁰ The wide range in prevalence indicates the effect of race, ethnicity and geographic parameters on the absence of teeth in a particular population.

The maxillary lateral incisor is clearly the most commonly missing tooth which is in accordance with many previous reports. On the contrary, some studies found mandibular

second premolar as the commonly missing tooth.^{6,7} The high incidence of missing lateral incisors in orthodontic patients could be due to increased aesthetic anxiety of patients or the difference in ethnicity or poor sampling methods.

Females showed a higher prevalence rate with a significant difference between the gender. The results of our study are in concordance with the results of other studies that found a significant difference between the gender with a higher frequency of hypodontia in females.^{10,11}

A multitude of studies have demonstrated a maxillary predominance of hypodontia which is in favour of the results obtained from the current study. But a few studies indicate a mandibular predominance.⁵ Hence, the frequency of missing teeth is not limited to any one jaw and it can vary from population to population.

According to the present study, a significant association was found between hypodontia and the Angle's classes of malocclusion with a higher frequency of missing teeth in the Class III malocclusion as compared to the other malocclusion groups. These results are consistent with the results of other authors who reported a greater prevalence rate in Class III subjects.⁵ This is interesting to note that a significantly higher prevalence of hypodontia in maxillary arch and Class III subjects suggests a possible aetiological factor for Class III malocclusions where

maxillary deficiency along with hypodontia is observed on orthodontic examination.

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