

PREVALENCE OF HYPODONTIA IN ORTHODONTIC PATIENTS IN A PAKISTANI SAMPLE — A STUDY

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ABSTRACT

The purpose of this study was to determine the prevalence of hypodontia (multiple dental agenesis) in orthodontic patients, visiting the orthodontic department, faculty of dentistry, The University of Lahore.

Dental records (history sheets, dental casts and panoramic radiographs) of 230 patients (36.5% males, 63.5% females; mean age: 16.4 years) were randomly selected from orthodontic patient's record. Patients with cleft lip and palate, ectodermal dysplasia or having any syndrome were excluded from the study.

The prevalence of hypodontia (excluding third molars) was 6.08% for both sexes combined. Female to male ratio was 3.5:1. Most patients with hypodontia were missing just one (57.1%) or two (28.5%) but the rest (14.2%) were missing more than two teeth.

The most commonly missing tooth was mandibular 2nd premolar, followed by maxillary lateral incisor and then maxillary 2nd premolar and mandibular first premolar. The number of missing teeth was greater in mandible than in maxilla. Hypodontia was most common on left side.

Key words: Hypodontia, Prevalence, Orthodontic patients.

INTRODUCTION

By missing teeth is meant those teeth where germ did not develop sufficiently to allow the differentiation of the dental tissues. Complete absence of all teeth called anodontia, is seen only rarely. Hypodontia is the term used when some of the teeth are missing. Aligodontia is the absence of multiple teeth, usually associated with systemic problem.

Moyer¹ defined hypodontia as the developmental absence of one or more permanent teeth excluding the 3rd molars. Hypodontia was also defined as "absolute" and "relative." Absolute hypodontia was the number of missing permanent teeth, and relative hypodontia was the number of missing permanent teeth minus the number of retained deciduous teeth.² Advanced hypodontia is defined as 5 or more congenitally missing permanent teeth excluding third molars.³

Dyanrajani⁴ classified hypodontia according to the severity of the condition. The term mild to moderate hypodontia is used to denote agenesis of two to five teeth while absence of six or more teeth excluding 3rd

molars indicate severe hypodontia. According to Moyers¹ there are five principal known causes of congenital absence of teeth.

Heredity, ectodermal dysplasia, conditions such as rickets, syphilis and expression of evolutionary changes in the dentition. Some authorities believe that, in future, man will have neither third molars nor maxillary lateral incisors just as we seen already to have lost fourth molars.

One should not forget the relationship between congenital absence of teeth and generalized tooth size diminution. When one tooth is not developing, it is important to measure all of the other teeth to ascertain any genetic field effects on general tooth size.

The most distal tooth within each group displays the greatest variability in size is the most apt to be congenitally missing and is most frequently abnormal in shape. Maxillary lateral incisor vary in form more than any other tooth in the mouth except the third molars.⁵

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Several genetic and syndromic conditions⁶⁻⁷ are known to the risk of hypodontia but congenitally missing teeth commonly are encountered in healthy apparently normal people.⁸⁻⁹

Some genes such as MSX1 and PAX9 the risk of hypodontia but with variable expressivity.⁹⁻¹⁰

Studies of white subjects report frequencies of hypodontia of 4% to 7% (excluding 3rd molars), after with higher frequencies in females (about 3:2 female to male ratio)¹¹.

METHODOLOGY

Subjects were drawn from the department of orthodontics faculty of dentistry The University of Lahore Pakistan. Pretreatment panoramic radiographs, history sheets and dental casts of 230 orthodontic patients between the chronological ages of 10 and 32 years (mean age 16.6 years) were examined. Sample included 84 males (mean age: 15.9 years) and 146 females (mean age : 16.9 years). Fig 1.

Panoramic radiographs were used to confirm the presence of each permanent tooth. 10 years of age was chosen as the lower limit because the late forming 3rd molars starts crown mineralization at about 9 years of age. Dental history sheets were reliable for documenting extractions and avulsions and to rule out the presence of any systemic or metabolic disease.

The prevalence of congenital absence was calculated by tooth type and sex. Most statistical studies were performed with software SPSS.

RESULTS

Most patients with hypodontia were missing just one (57.1 %) or 2 (28.5 %) teeth but the rest (14.2 %) were missing more than 2 teeth. Fig 2.

The prevalence of hypodontia was 6.08% excluding 3rd molars; 4.7% were females & 1.3% were males. Fig 3.

The total number of missing teeth was 25. The most commonly missing tooth was mandibular 2nd premolar followed by maxillary lateral incisor and then maxillary 2nd premolar and mandibular 1st premolar. Fig 4.

The number of missing teeth was greater in mandible than in maxilla (14 in mandible and 11 in maxilla). Hypodontia was most common on left side than right side. 14 teeth were missing on left side and 11 teeth on right side. The majority of patients had one or two teeth missing. Only one patient was noted with 5 teeth missing and one patient with missing mandibular central incisor only.

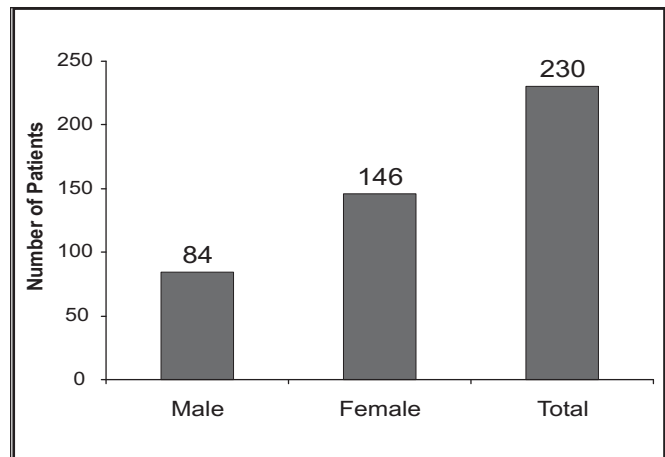


Fig 1: Gender distribution

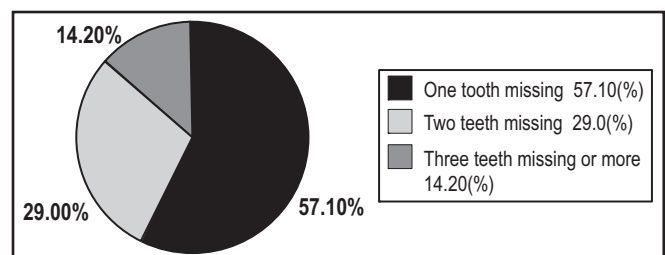


Fig 2: Percentage distribution of patients by number of missing teeth

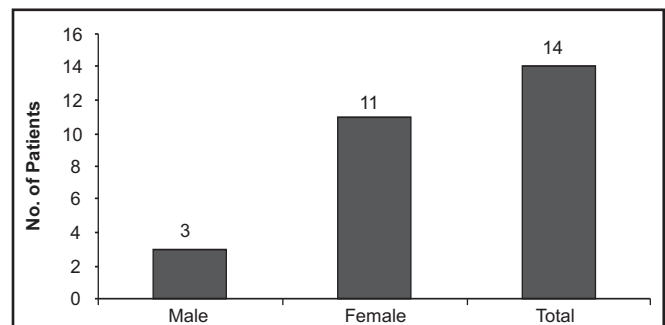


Fig 3: Distribution of Hypodontia by Gender

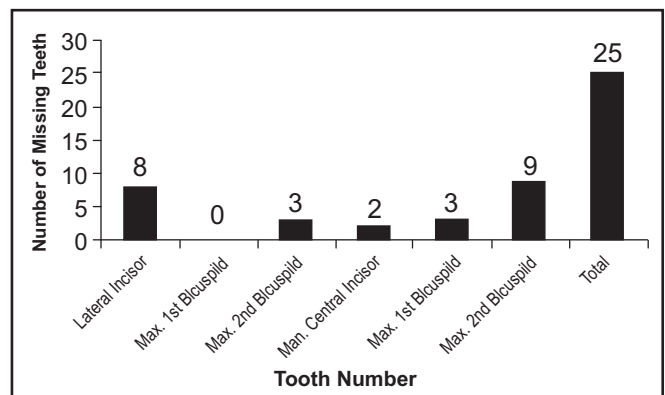


Fig 4: Distribution of missing teeth in order of Frequency

DISCUSSION

Hypodontia of permanent teeth is fairly common in contemporary populations. Various authors¹²⁻¹⁴ have commented that hypodontia is the most common human malformation, and usually occurs without any other sign or symptoms of maldevelopment. There are various causes for the congenital absence of a tooth, notably the absence of an epithelial signal to the ectomesenchyme,¹⁵ the failure of a tooth bud to reach a critical size^{16,17} or more proximately to receive the signaling to continue development.¹⁸ Each of these key steps is under genetic control.¹⁹⁻²¹ Attention currently focuses on transcription factors, notably *MSX1* that tends to affect premolars and *PAX9* that causes primarily molar agenesis.²²⁻²⁴

The prevalence of hypodontia (excluding the third molars) was 1.3% for males, 4.7% for females and 6.08% for both sexes combined, in orthodontic patients of this Pakistani sample. Toshiya Endo and Rieko Ozoe²⁵ found the prevalence in Japanese orthodontic patients as 7.5% for boys, 9.3% for girls and 8.5% for both sexes combined. These higher prevalence rates might also represent the characteristics of the Japanese population as reported by Niswander & Sujaku²⁶, that the hypodontia prevalence rates of 5.8% for boys, 9.2% for girls and 7.4% for both sexes combined were relatively higher in the Japanese population than in the other populations. The reported prevalence of hypodontia excluding the third molars, in both sexes combined varies from 0.3% in the Israeli population²⁷ to 3.7% in an American population²⁸ and 10.1% in the Norwegian population.²⁹ The prevalence of hypodontia (excluding 3rd molar) reported by Fuad Hamed³⁰ was 7.1% in Southern Jordan, 2.10% were males and 5.01% were females.

The present study showed that the congenital absence of teeth was found more frequently in females than males (about 3.5:1 female to male ratio) but the difference was not statistically significant. American whites showed female to male ratio about 3:2.¹¹ These findings are in consistent with some other researchers.^{25,30-34}

Congenital absence of one or more teeth is a common anomaly, but severe hypodontia is rare, and might be linked with some syndrome as ectodermal dysplasia.³⁵ In our study, most patients with hypodontia were missing just one (57.1%) or 2 (28.5%) teeth, but the rest 14.2% were missing more than 2 teeth. Almost same results were obtained in Southern Jordan in 2009, most patients (58.5%) had one missing tooth,

31.7% had 2 and 9.8% had more than 3 missing teeth.³⁰ Edward F. Harris in his study of American Whites & Black reported that most patients with hypodontia were missing just 1 (40.6%) or 2 (36.0%), but the rest (23.4%) were missing more than 2 and upto 6 teeth in both subjects.¹¹

The present study showed that mandibular 2nd premolar was the most commonly missing tooth after 3rd molars in orthodontic patients of Pakistani sample. 2nd mandibular premolar was also found most commonly missing tooth in Caucasians²⁸, South Jordan³⁰, Europeans³⁶, Sri Lanka.³⁷ Same is true for both American whites and blacks, although the prevalence is more in white (2.3%) than black (1.3%).¹¹ In contrary, mandibular lateral incisor is more commonly missing in Japanese and Chinese than in any other ethnic groups.^{25,26} Some other studies have shown that ethnicity strongly influences the prevalence of hypodontia.^{38,39}

The sequence of missing teeth from most common to least common is mandibular 2nd premolar followed by maxillary lateral incisor, maxillary 2nd premolar, then mandibular first premolar in our study. Bennett⁴⁰ also showed same order of congenitally missing teeth. The majority of previous studies dealing with Caucasian population have revealed that the most commonly congenitally missing teeth is the mandibular second premolar, followed by either the maxillary lateral incisor^{28,41,42} or the maxillary second premolar^{29,34,38,43}.

The number of missing teeth was greater in mandible (56%) than maxilla (44%) in our sample. This result is in consistent with some other reports^{44,45} but differ from the results of other authors who found that hypodontia tends to be common in the maxilla.^{30,32,33}

Hypodontia was most common on left side (54%) than right side (44%) in the present study. In some Scandinavian studies, predominant hypodontia was noted on left side.^{46,47} Similar distribution of congenitally missing permanent teeth between the right (50.3%) and the left side of the arches was noted in Southern Jordan³⁰ and this finding was also noted in some previous reports.^{3,25,27,33,38,43}

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