

Prevalence Of Hypodontia among Orthodontic Patients - A Retrospective Study

Research Article

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Abstract

Hypodontia is an anomaly that could affect and influence the orthodontic diagnosis and treatment planning. The purpose of this retrospective study was to assess the prevalence and distribution of hypodontia in the permanent dentition, excluding the third molars, in a sample of South Indian orthodontic patients. Orthopantomograms of 500 South Indian orthodontic patients (209 boys and 291 girls) between the ages of 10 and 18 years were examined for evidence of hypodontia. The casts were used as an additional means of confirming the diagnosis. The prevalence of hypodontia was 7.4% (3.4% for boys, 4% for girls) with no statistically significant difference between the sexes. The average number of missing teeth per child was 1.6 (1.4 for boys, 1.8 for girls). The most commonly missing teeth were the maxillary lateral incisors, followed by the mandibular second premolars mandibular and lateral incisors, and the maxillary second premolars; minor differences in the order of prevalence existed among groups of children classified by the number of missing teeth. The distinct characteristic of hypodontia in the South Indian population compared with other populations was a higher prevalence of both advanced hypodontia and mandibular lateral incisor agenesis in children with minor hypodontia.

Keywords: Bolton; Hypodontia; Microdontia.

Introduction

Tooth agenesis, which is defined as the congenital absence of one or more primary or permanent teeth, is one of the most frequent human dental anomalies. Tooth agenesis can be classified as hypodontia, oligodontia, or anodontia. The term hypodontia is used to describe agenesis of one to six teeth.

Hypodontia, or the congenital absence of at least one permanent tooth or tooth germ, is a common dental anomaly [1-9]. Hypodontia is a challenge for orthodontists and pedodontists. The number of missing teeth and the location in the dentition represent different diagnostic problems and treatment decisions. The most suitable age for correct diagnosis of hypodontia is of great clinical importance.

There is considerable literature about the prevalence and distribution of hypodontia, excluding third molars [10-13]. The reported prevalence of hypodontia, excluding the third [14-16] molars, in

both sexes combined varies from 0.3% in the Israeli population [17, 18] to 10.1% in the Norwegian population [17, 19]. The wide range of prevalence rates of hypodontia can be attributed to differences in the methods of sampling and examination, and the distribution of age, sex, and racial origin of the subjects. [17-22]. Although there are a few exceptions [34, 23], most studies report that girls have a higher prevalence of hypodontia than boys. Most previous studies show that the most frequent missing teeth are either the mandibular second premolars or the maxillary lateral incisors, although Niswander and Sujaku [24] and Davis [20, 24] reported that the mandibular incisor was the most frequently absent tooth in Japanese and Chinese populations, respectively. The aim of this study was to assess the prevalence of Hypodontia among orthodontic patients.

Materials and Methodology

The subjects were selected from the case files of South Indian orthodontic patients, between the ages of 10 and 18 years, who

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had visited the orthodontic Department in Saveetha Dental College and Hospital (Chennai,India). The orthodontic files, which included orthopantomogram, full-mouth sets (10 films) of peri-apical radiographs, study models were the only sources of information used to diagnose hypodontia. If an accurate diagnosis of hypodontia could not be made, the files were excluded from the study. Patients with developmental anomalies such as ectodermal dysplasia, cleft lip or palate, or Down's syndrome, or who had undergone orthodontic treatment previously were also excluded from the study.

A total of 500 case records of children (209 boys, 291 girls) were selected randomly from the database of patients who reported to saveetha dental college seeking ortho trt . The diagnosis of hypodontia from orthopantomogram has been verified to be reliable in previous studies [25, 26, 22]. Longitudinal ortho pantomogram of most children receiving orthodontic treatment after routine orthodontic examinations were available. A tooth was diagnosed as congenitally missing when no mineralization of its crown could be identified on orthopantomogram or a full-mouth set of peri-apical radiographs, and no evidence of its having been extracted was found. Third molars were not included in this study.

Ten percent of orthopantomogram of children with and without hypodontia were reexamined by another investigator 1 month after the initial survey, and a complete reproducibility was obtained in the identification of hypodontia.

The chi-square or the Welch t test was performed to determine the significance of differences in prevalence. The level of significance was set at 5%.

Results and Discussion

A total of 500 children were selected for the study of which 58.2% were girls and 41.8% were boys [Figure.1]. Among these, a total 37 children (7.4%) [Figure 2] were found to have hypodontia

in the permanent dentition, excluding the third molars. In total, 4% girls and 3.4% boys presented with hypodontia while 54.2% girls and 38.4% boys didn't present with hypodontia [Figure.3].

It was observed that 55.1% of the teeth were missing in the maxilla nad 44.9% were missing in the mandible [Figure.4]. Chi-square test was performed to associate between the gender and missing teeth in subjects with hypodontia. This was found to be statistically significant with females having more number of missing teeth in the mandibular arch (37.18%) with Pearson's chi-square value of 4.807 and p value of 0.028 (p<0.05) [Figure 5].

A total of 78 permanent teeth, excluding the third molars, were missing, with an average of 1.6 teeth per child. The boys had 33 missing teeth, with an average of 1.4 teeth per child; the girls had 45 missing teeth, with an average of 1.8 teeth. The difference in the number of missing teeth per child between the sexes was not statistically significant. It was also observed that the most commonly missing teeth in hypodontia are maxillary lateral incisors (28.2%) followed by mandibular second premolars (24.35%) [Figure.6].

Our results varied with respect to the 3 most commonly missing teeth in each group classified by the number of missing teeth. (figure 5). Nonetheless, the maxillary lateral incisors were the most commonly missing teeth. Although minor differences existed among each sex and both sexes in the order of prevalence, the mandibular second premolars and mandibular lateral incisors followed the maxillary lateral incisors in children with 1 or 2 teeth absent.

The prevalence of missing teeth was higher in the maxilla than in the mandible in children with 1 or 2 teeth absent, and in all children with hypodontia. There were no statistically significant associations between sex and number of missing teeth in the maxilla and mandible, on the right and left sides.

Figure 1. Pie chart depicts the percentage distribution of the study population. Of the overall population, 58.2% of the study population were girls and 41.8% were boys.

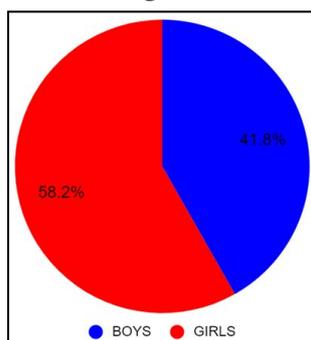


Figure 2. Pie chart depicts the percentage distribution of hypodontia. Of the overall population considered in the study, 92.6% of the study population were without hypodontia and 7.4% with hypodontia.

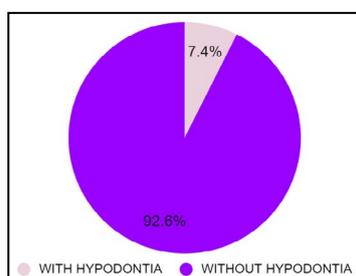


Figure 3. Bar chart representing the association between gender and hypodontia. The X-axis represents subjects with and without hypodontia . The Y-axis represents the total number of children in the age group of 10-18years. Overall girls (red) presented with more hypodontia compared to boys (blue) however the gender distribution in subjects with hypodontia showed no statistical significance.(Chi-square test p value -0.459 (>0.05), which is not statistically significant).

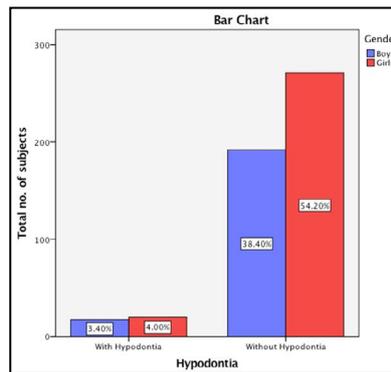


Figure 4. Pie Chart showing percentage distribution of number of missing teeth (hypodontia) in Maxilla and Mandible. 55.1% of hypodontia was found in the maxilla and 44.9% in the mandible.

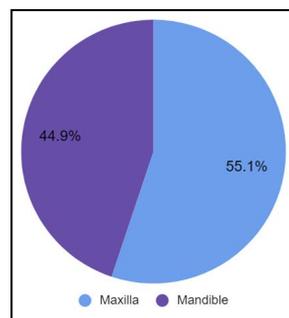


Figure 5. Bar chart representing the association between the gender and the involved arch among subjects with hypodontia. The X-axis represents the gender and the Y-axis represents the number of missing teeth (hypodontia). Chi-square association test was performed and was found to be significant . Pearson’s chi square value-4.807, p value- 0.028 (p<0.05), statistically significant. Hence females had more number of missing teeth in the mandibular arch.

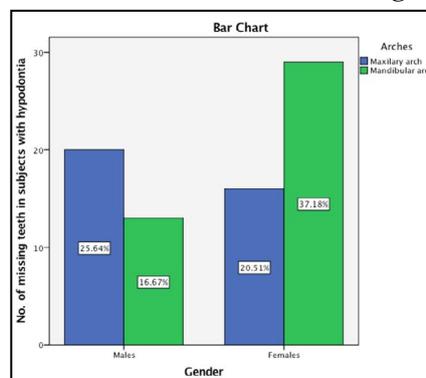
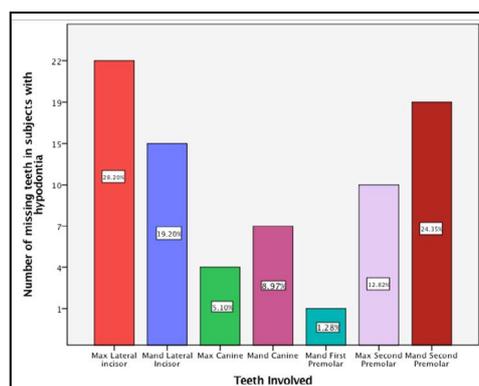


Figure 6. Bar graph showing the frequency distribution of missing teeth. X-axis showing the teeth involved and Y axis showing the number of missing teeth in subjects with hypodontia. It is inferred from the bar chart that the most commonly missing teeth in hypodontia are maxillary lateral incisors (28.2%) followed by mandibular second premolars (24.35%).



The prevalence of hypodontia (excluding the third molars) was 3.4% for boys, 4% for girls, and 3.7% for both sexes combined. These figures are within the ranges of 0.2% to 8.6%, 0.4% [17] to 11.8%, [17, 19] and 0.3% to 10.1%, respectively, in the studies published previously. These percentages are much higher than those found in other studies except those by Volk, Haavikko [27], Hunstadbraten, Maklin et al, and Rolling [27, 28]. The number of missing teeth per child in both sexes combined-2.1 -is within the previously reported range of 1.541 to 4.843 and is also higher than reported in other studies except in those by Werther and Rothenberg [27-29], Brekhus et al, [10], Glenn, Horowitz [16], and Lai and Seow [23]. These higher prevalence rates of hypodontia and the larger numbers of missing teeth per child support the findings by Horowitz, Ringqvist and Thilander, and Silverman and Ackerman, who stated that teeth were more likely to be missing in orthodontic patients than in the general population. These higher prevalence rates might also represent the characteristics of the Japanese population as reported by Niswander and Sujaku [23, 24], 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 other populations. This study showed that the prevalence of hypodontia was higher in girls than in boys with no statistically significant difference between the sexes. Furthermore, some investigators found statistically significant sex differences [17][30][31]. The number of missing teeth per child in our study was slightly higher in boys than in girls, although there is no consistent finding as to which sex is predominant in this regard.

The prevalence rate of 76.3% in children with either 1 or 2 missing teeth is within the previously reported range of 75.0% to 97.4%, 20 except for the extremely low rate of 49.0% demonstrated by Lai and Seow. [23, 31]. The 76.3% prevalence is lower than those reported in other studies, except the study by Hunstadbraten (75.0%). [19, 20]. On the other hand, the 9.8% prevalence of advanced hypodontia in children is within the previously reported range of 0.0% [1, 41] to 11.3%, apart from the extremely high rate of 32.0% by Lai and Seow. This rate (9.8%) in our study is higher than those reported in other studies except the study by Grahnén (11.3%). These findings might suggest that children with minor hypodontia are involved less often, but children with advanced hypodontia are involved more often in the South Indian population.

Our findings that maxillary lateral incisor agenesis has a higher prevalence rate in children with 1 or 2 missing teeth and in all children with hypodontia disagrees with those by Niswander and Sujaku, 24. Eidelman et al, [18, 24], Davis, Nik-Hussein [18, 24, 26], and Backman and Wahlin [22]. In particular, Niswander and Sujaku and Davis [20-22] showed that the mandibular incisors were the most commonly missing teeth in Japanese and Chinese populations, respectively.

Some investigators believe that the maxillary lateral incisors are followed by the mandibular second premolars [29, 10, 17, 32, 33]. which is similar to our study. An interesting finding is that the maxillary first premolars, canines, and first molars, which are likely to be more stable, have a relatively higher prevalence of hypodontia in children with 5 or more teeth missing. This means that no consistent pattern of tooth agenesis is found in children with advanced hypodontia. This agrees with observations by Aasheim and Ogaard [21, 33], Ogaard and Krogstad [34], and Endo et al.

[34, 35]. This study indicated that the prevalence of maxillary lateral incisor agenesis was lower in children with advanced hypodontia; this is consistent with the result of Endo et al, [35] and supports the finding of Muller et al, [36] who stated that maxillary lateral incisor agenesis decreases with increasing hypodontia severity.

Many studies have demonstrated that there is no consistent finding as to which jaw has more missing teeth [21, 36, 22]. This supports the finding that more teeth were missing from the maxilla than from the mandible in children with 1 or 2 missing teeth, but the reverse is true of children with 4 or more missing teeth. There was a remarkable similarity in the distribution of missing teeth between the right and left sides in our subjects; this agrees with the results of most previous studies.

Our findings provide good information for clinicians on where to concentrate in orthodontic examinations of patients when hypodontia is suspected. However, the association between hypodontia and craniofacial morphology in Japanese orthodontic patients has been a controversial topic. To establish a better treatment procedure for hypodontia patients with malocclusions, the clarification of this relationship will be our central theme in future studies [37-51].

Conclusions

Within the limitation of the study it can be concluded that the prevalence of hypodontia is 7.4% in the included study population. The association between gender and the involved arch in patients with Hypodontia was significant. Hypodontia was more common in females and in the mandibular arch.

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