SHORT COMMUNICATION

Distribution of hypodontia and hyperdontia in concomitant hypo-hyperdontia patients: Critical appraisal of the published data

Yong Chen, Sreekanth Kumar Mallineni[1]

Department of Orthodontics, Xiamen Dental Hospital, Xiamen City, China, [1]Department of Pedodontics and Preventive Dentistry, Narayana Dental College and Hospital, Nellore, Andhra Pradesh, India

Address for correspondence:
Dr. Sreekanth Kumar Mallineni, Department of Pediatric and Preventive Dentistry, Narayana Dental College and Hospital, Nellore - 524 003, Andhra Pradesh, India.
E-mail: drmallineni@gmail.com

ABSTRACT

Aim: Distribution of hypodontia and hyperdontia in the reported concomitant hypo-hyperdontia (CHH) patients. **Materials and Methods:** An extensive search of the reported literature from January 1966 to December 2015 was conducted using the "EmBase," "Google Scholar," "Medline," and "PubMed" databases. The search words used were "agenesis," "concomitant," "hypodontia," "hyperdontia," "hypo-hyperdontia" "concomitant hypo-hyperdontia" and "supernumerary teeth" in different combinations. The citation lists from the included references were subsequently examined, and a hand search was performed in an attempt to find additional data. Detailed analyses of the incidence of hyperdontia and tooth type of hypodontia were evaluated to determine the occurrence of hypodontia and hyperdontia in this condition. Descriptive statistics were carried out using a Chi-square test to determine the occurrence of hypodontia and hyperdontia in CHH, the value of $P < 0.05$ was considered statistically significant. **Results:** Overall, 103 individuals were reported on CHH in published English literature. The average age of them was 11.29 years and frequently observed in males ($P < 0.05$). Overall 63% of teeth were missing in all the cases that were reported on CHH, whereas 37% of supernumerary teeth were documented ($P < 0.05$). Most of the cases involved are an anterior region of the both arches (57%). Second premolars are the most commonly missing teeth in both maxillary and mandibular arches, and maxillary mesiodens (50%) are frequent supernumeraries in CHH patients. **Conclusion:** Hypodontia is more common in CHH patients than hyperdontia. Second premolars are the commonly missing teeth while maxillary mesiodens are the frequently reported in CHH patients. Posterior CHH has not been reported.

Key words
Hyperdontia, hypodontia, hypo-hyperdontia, supernumerary teeth

INTRODUCTION

Hypo-hyperdontia is an extremely rare mixed numerical condition, which exhibits both missing teeth and extra teeth to the normal set of teeth.[1] The occurrence of this anomaly in the same individual is noted as concomitant hypo-hyperdontia (CHH). This condition may involve the maxillary and/or the mandibular arches and may be appreciated in the primary and/or the permanent dentition. The published literature devoted exclusively to the prevalence of either hypodontia (agenesis of teeth) and/or of hyperdontia (supernumerary teeth). Nevertheless, based on the existing records, the reported prevalence ranges between 0.002% and 3.1%.[2] Gibson[3] classified this condition of maxillary, mandibular, premaxillary, and bimaxillary subdivisions. Most recently, Mallineni *et al.*[1] divided this condition into bimaxillary, maxillary, and mandibular types. The authors included premaxillary hypo-hyperdontia as a subtype of maxillary CHH.

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The etiology of excessive teeth (hyperdontia) and agenesis of teeth (hypodontia) may associate with both environmental and genetic factors.[4,5] However, the exact etiological factors were not clearly stated for this mixed numerical anomaly. The occurrence of CHH in association with syndromes has been discussed comprehensively in the literature.[6] It has not been sufficient evidence to provide data on hypodontia and hyperdontia and their influence in CHH patients. Furthermore, the incidences of tooth agenesis and supernumerary teeth are not clearly documented in CHH. Therefore, the aim of this study is to determine the distribution of hypodontia and hyperdontia in CHH subjects. The null hypothesis of this study was hypodontia is more common than hyperdontia in individuals with CHH.

MATERIALS AND METHODS

A comprehensive review of the literature performed to describe the distribution of hypdontia and hyperdontia in individuals with CHH. An extensive search of the English literature from January 1966 to December 2016 was conducted using the "EmBase," "Google Scholar," "Medline," and "PubMed" databases. The search words used were "agenesis," "concomitant," "hypodontia," "hyperdontia," "hypo-hyperdontia" and "supernumerary teeth" in different combinations. The citations from the retrieved references were subsequently assessed, and a hand search was also conducted in an attempt to identify further reports. The case reports and studies on hypodontia, and hyperdontia, animal studies, studies published in other than English language were excluded

The data categorized into age, gender, and associated anomalies. Anomalies associated with CHH were evaluated using the retrieved data. Detailed analysis of tooth type of hypodontia and the occurrence of hyperdontia were evaluated to determine the common occurrence of hypodontia and hyperdontia in CHH. All primary teeth were also considered as 1 unit as with the permanent component. For analysis, the presence of one missing tooth and one supernumerary tooth were considered as 1 unit. One examiner SKM involved in search and data analysis, and after 2 weeks, similar search was performed to evaluate intra-examiner reliability. Descriptive statistics were carried out to determine the occurrence of hypodontia and hyperdontia in CHH and $P < 0.05$ was considered statistically significant. Kappa statistics used to check intra-examiner reliability.

RESULTS

Overall, 7 case studies and 40 case reports (103 individuals) were reported on CHH in published English literature. The extensive review revealed that CHH is frequently observed in males than females ($P < 0.05$) and the average age reported was 11.29 years. Hypodontia is predominantly seen in CHH than the hyperdontia [$P < 0.05$]. Overall 250 (65%) teeth were missing in all cases that were reported on CHH, whereas 137 (35%) supernumerary teeth were documented ($P < 0.05$). Distribution of hypodontia and hyperdontia in bi-maxillary CHH 67% (195) and 37% (91), maxillary CHH 30 (51%) and 28 (49%), and mandibular CHH 58% (25) 42% (18) types, respectively. The occurrence of hypodontia is more in mandibular arch have been found in CHH ($P < 0.05$) patients, whereas hyperdontia was most commonly reported in maxillary arch [$P < 0.05$, Figure 1]. The second premolar is the commonly missing tooth in CHH patients in both maxillary and mandibular arches [Figure 2]. In the case of hyperdontia, mesiodens (50%) were commonly reported in CHH in both the arches. Maxillary mesiodens (66%) are more common than the mandibular mesiodens (34%). Hypodontia was distributed almost evenly in both anterior and posterior regions ($P > 0.05$) whereas hyperdontia is most common in the anterior region than the posterior region [$P < 0.05$, Figure 3]. Kappa statistics showed excellent intra-examiner reliability.

DISCUSSION

Hypo-hyperdontia occurs in the same individual "concomitant hypo-hyperdontia,"[7] "oligopleiodontia"[8] and "hypohyperdontia"[3] terms were used. Consequently, the term concomitant has been discarded as suggested by Gibson[3] and the term "hypohyperdontia" alone has frequently been used to describe this mixed numerical dental anomaly. Brook[9] suggested that factors such as age, complete radiographic coverage, dental history, gender, racial/ethnic background, and sampling technique would be considered and reported when conducting epidemiological surveys. Henceforth, in the present study, the studies included were based on the aforesaid factors. Hypo-hyperdontia is an "extremely rare mixed numerical anomaly in which teeth may be extra and missing, relative to the normal compliment."[1,10,11] Hypodontia is commonly seen in females, whereas hyperdontia is common in males.

The reported prevalence of hypodontia in different populations varies considerably, and it is reported to be 3.5%–8%.[12] Polder *et al.*[12] in their meta-analysis found the prevalence of hypodontia of permanent teeth differed according to geographic location and gender, and the prevalence is higher in females than in males. The authors summarized the data from the Caucasian populations, reported that the mandibular second premolars were the most commonly missing teeth. It has also been stated that unilateral occurrence of hypodontia is more common than the bilateral occurrence. Similarly, this study found second premolar (34%) is the frequently missing tooth type, and second permanent molar (1.6%) is rarely missing tooth in CHH patients. After second premolars, central incisors and lateral incisors (19%)

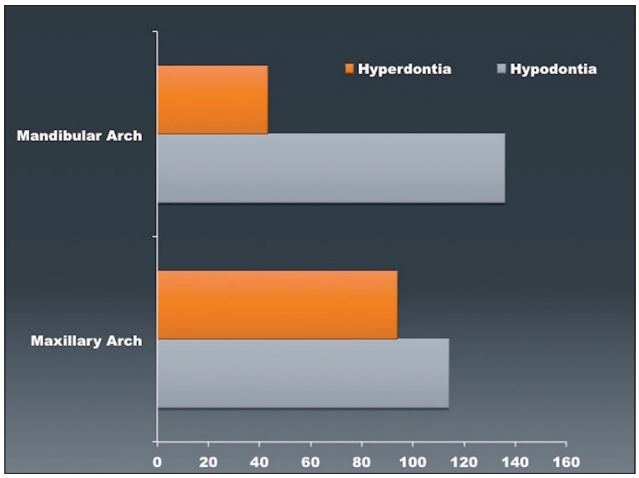

Figure 1: Distribution of hypodontia and hyperdontia in maxillary and mandibular arches in hypo-hyperdontia patients ($P < 0.05$)

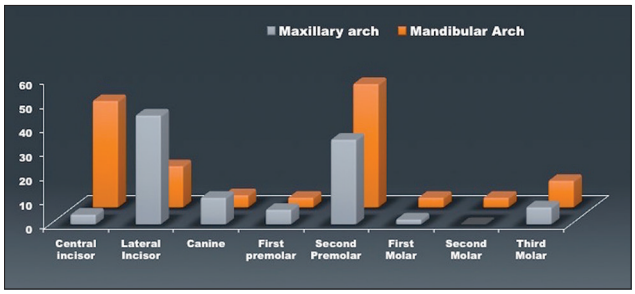

Figure 2: Distribution of hypodontia in both maxillary and mandibular arch in reported hypo-hyperdontia patients

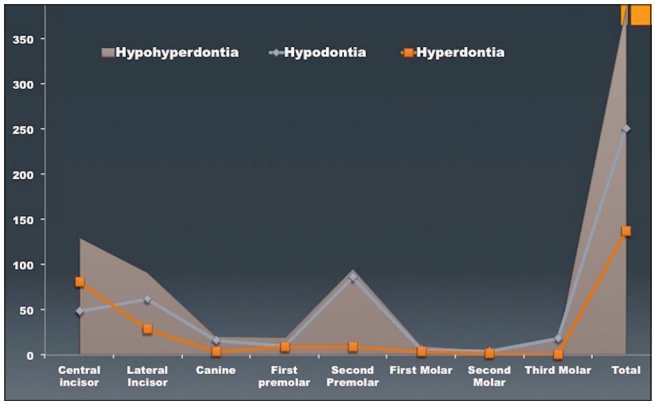

Figure 3: Distribution of hypodontia, hyperdontia, and hypohyperdontia in different tooth bearing areas ($P < 0.05$)

are frequently missing teeth. It has also been noted that mandibular lateral incisors are more commonly missing than the central incisors.[13-15] Contrarily, the present study revealed the agenesis of central and lateral incisors are almost same in CHH patients. After the third molar, mandibular second premolars are commonly missing, followed by maxillary lateral incisors.[14] Analogously, in maxillary arch, lateral incisor is the commonly missing tooth, whereas the second premolar in mandibular arch is associated in CHH patients.

Hyperdontia refers to an increase in the number of normal complement of teeth.[15] Supernumerary teeth have been reported in the entire tooth-bearing areas of the dental arches in both the dentitions.[16] It appears to be more than 90% of the supernumerary teeth affecting the premaxillary region. Similarly, the present study revealed that maxillary mesiodens is a frequent type of hyperdontia associated with CHH. The anterior region is most commonly affected by hyperdontia in subjects with CHH. Maxillary mesiodens (65%) are more commonly associated with CHH than mandibular mesiodens (35%).

Hypodontia is more common in posterior region while hyperdontia is frequent in anterior region of the dental arches.[9] The present study revealed that hypodontia is more common than hyperdontia in individuals with CHH, which was statically significant. Correspondingly, hypodontia in posterior region of the arch and hyperdontia in anterior region were noted in CHH patients. Hypodontia is more predominant than the hyperdontia in all the types of CHH. Nevertheless, hyperdontia frequently affects the anterior region, whereas, hypodontia commonly affects the posterior region in CHH patients. Only available studies are case reports and case studies nonetheless the null hypothesis is rejected.

CONCLUSION

Based on this study's results, the following conclusions about individuals with CHH can be made:

- Hypodontia is more common than the hyperdontia
- The second premolar is commonly missing tooth, and maxillary mesiodens is the frequent supernumerary teeth
- Hypodontia is more common in posterior region while hyperdontia is more often in anterior region.

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Conflicts of interest

There are no conflicts of interest.

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