

Prevalence of hypodontia and hyperdontia in paedodontic and orthodontic patients in Budapest

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Various publications have reported the prevalence of accessory teeth to be between 1 and 3%. In contrast, hypodontia has a much higher prevalence. In the current work, the authors studied OP radiographs on 2,219 patients aged 6 to 18 years who presented at the Department of Paedodontics and Orthodontics at Semmelweis University in Budapest (patients with systemic disease were excluded). The examined radiographs revealed a prevalence of accessory teeth of 1.53%. The sequence of prevalence was as follows: mesiodens > second incisor > first incisor. 77.5% of the accessory teeth were located in the upper jaw, with 97.5% of those being present in the incisor region. Hypodontia was detected in 326 patients (14.69%); missing wisdom germs were not considered. The sequence of prevalence of missing germ was as follows: upper second incisor > lower second premolar > upper second premolar > lower first incisor. Hypodontia in the molar region was observed in 15 cases (0.68%). The prevalence of oligodontia was 1.04%.

Key words: Accessory tooth, hyperdontia, hypodontia, oligodontia, paedodontic and orthodontic patients, partial anodontia, supernumerary tooth, supplementary tooth, total anodontia

Introduction

Accessory teeth are teeth which are additional to the normal complement. They are divided into supplemental teeth which resemble normal teeth and supernumerary which do not. Hyperdontia is the presence of accessory teeth and hypodontia is the failure of one or more but not all teeth to develop. The latter is also called oligodontia [congenital absence of six or more permanent teeth (Norgarden *et al.*, 2002)] or partial anodontia. The complete failure of all the teeth to develop in an individual is called total anodontia.

A majority of dental anomalies of the developing dentition are numerical anomalies (Rizzuti and Scotti, 1999). The latest research indicates that hyperdontia and hypodontia are important from a clinical management point of view (Garvey *et al.*, 1999). The prevalence of hyperdontia in the permanent dentition is reported to lie between 1 and 3% (Milano, 1999). The prevalence in the primary dentition is lower: Yonezu *et al.*, (1997) studied a group of 2,733 3-year-old Japanese children and found a prevalence of only 0.07%.

The publications on hyperdontia are mainly case reports (Babu *et al.*, 1998; Williams, 1998). The etiology and prevalence of hyperdontia have been studied and accounts have been presented of the surgical (Prabhu and Munshi, 1997) and orthodontic (Brand *et al.*, 2000; McNamara *et al.*, 1997; Rizzuti and Scotti, 1997) treatment of these cases. The data on the prevalence of hypodontia reveal great variations in both the primary and the permanent dentition. Yonezu *et al.*, (1997) observed hypodontia in 2.38% of 2,733 3-year-old Japanese

children, while Daugaard-Jensen *et al.*, (1997a,b) did so in 54.9% of Danish children. For the permanent dentition, Johannsdottir *et al.*, (1997) reported a prevalence of 5% in 6-year-old children from Iceland. In Hungary, data relating to the prevalence of hypodontia and hyperdontia in 6- to 18-year-old orthodontic patients are not available. The aims of the present study were to fill this gap by determining the prevalence of hyperdontia and hypodontia in this age group, and to make a comparison with the international data.

Materials and Methods

The OP radiographs of 2,219 6- to 18-year-old children (1,293 girls and 926 boys) who presented for orthodontic assessment and treatment in the Department of Paedodontics and Orthodontics at Semmelweis University in Budapest were examined. Patients with systemic diseases were excluded (medical history, paediatric consultation).

The radiographs were examined for evidence of hyperdontia and hypodontia. For each radiograph showing the presence of accessory teeth, the affected teeth were identified as supplemental or supernumerary and charted accordingly. For each case of hypodontia, the patient was examined and a thorough history was taken to exclude the possibility that the missing teeth had been extracted or traumatically avulsed.

The absence of developing third molars was also noted, but in view of the age range of the population and in accordance with current research practice these data are not included in this paper.

Results

Hyperdontia

The 2,219 OP radiographs revealed a total of 40 permanent supernumerary teeth: 28 patients with one each, and six patients with two each. The prevalence of hyperdontia was 1.53%.

The distribution of accessory teeth in the upper jaw was as follows: mesiodens: 13, supplemental second incisor: 9, supplemental first incisor: 6, supernumerary tooth in the anterior area: 2, supplemental premolar: 1.

The distribution of accessory teeth in the lower jaw was as follows: supernumerary teeth in the anterior area: 6, supplemental incisor: 3.

77.50% of the accessory teeth were situated in the upper jaw and 97.50% of the accessory teeth were situated in the anterior region.

Results regarding hypodontia

Table 1 provides details on the patients with one or more congenitally missing permanent teeth.

Excluding missing third molars, in 326 patients one or more permanent tooth germs were found to be missing (14.69%). There was no significant difference between the male and female patients; the prevalence for girls was 14.77%, while that for boys was 14.58%.

The sequence of hypodontia for the different tooth types was as follows: upper second incisor (232) > lower second premolar (208) > upper second premolar (157) > lower first incisor (69).

Twenty three patients had six or more congenitally missing teeth. These represented 7.05% of the population with hypodontia, and 1.04% of the total population.

The numbers of patients with rare combination of missing germs: Upper first incisor: 9, all four upper incisors: 2, upper second incisor and first premolar: 2, all four lower incisors: 1, all four second incisors: 1.

Missing molar germs was found in 15 cases (0.68%); four were symmetrical and isolated.

Discussion

Several theories have been put forward in connection with the etiology of accessory teeth (Stellzig *et al.*, 1997). The most important are atavism, dichotomy and hyperactiv-

ity of the dental lamina. The theory of atavism is that teeth which disappeared during the course of evolution occasionally reappear in some descendent individuals. This might be the explanation for the high prevalence of accessory teeth in the incisor and premolar regions. In the present study, 97.50% of the permanent accessory teeth were found in the incisor region. The research data point to a very low incidence of accessory teeth in the molar region.

The prevalence of accessory teeth observed in the present study (1.53%) is in accordance with the international data (1 to 3%). The 34 patients with accessory teeth comprised 17 males and 17 females, i.e. a prevalence of 1.31% among the girls and 1.84% among the boys (the total numbers of girls and boys were 1293 and 926, respectively). Thus, the prevalence of accessory teeth is higher in males than in females, as found by Rajab and Hamdan (2002).

Some authors consider the etiology of supernumerary teeth to be partly hereditary (Babu *et al.*, 1998; Gallas and Garcia, 2000). Stellzig *et al.*, (1997) analyzed 45 mesiodens in 30 patients, and observed a hereditary tendency in 31%. Both they and Baccetti (1998) presume that a number of dental and craniofacial anomalies (hyperdontia, hypodontia, and cleft lip and palate) have a common genetic background.

Mesiodens constituted 32.50% of the accessory teeth identified, and overall there was a high prevalence of accessory teeth in the incisor region 97.50%. These findings are in accordance with the findings of Rajab and Hamdan (2002).

Some accessory teeth display delayed eruption. This is why the OP radiograph is of important for the detection of accessory teeth (Baccetti, 1998; Garvey *et al.*, 1999), and for the monitoring of patients presenting with accessory teeth.

It is also important to consider the potential complications of accessory teeth in clinical practice. Taner and Uzamis (1999) state that, besides esthetic problems, further complications may arise in connection with accessory teeth: impaction or ectopy of the permanent tooth, crowding, eruption or positioning problems of the adjacent teeth, resorption problems, follicular (dentigenous) cysts and fistulas. Various authors agree that the early diagnosis and extraction of accessory teeth and the treatment of

Table 1. Prevalence hypodontia according to tooth type

Congenitally missing germ	Number of patients	%
Upper lateral incisor	73	3.29
Second premolar	95	4.28
Lower second premolar	45	
Upper second premolar	12	
All four second premolars	24	
Upper and lower second premolars	14	
Upper lateral incisor and upper second premolar	28	1.26
Upper lateral incisor and upper and lower second premolars	30	1.35
More than 4 missing germs	31	1.39
Lower first incisor	23	1.04
Upper lateral incisor and lower first incisor	9	0.41
Lower first incisor and both lower premolars	5	0.22
Rare combinations	32	1.44
Total individuals with missing teeth	326	14.69

consequent orthodontic anomalies are necessary (Brand *et al.*, 2000; Prabhu and Munshi, 1997).

The present findings concerning hypodontia are in accordance with the known situation that hypodontia is more frequent than hyperdontia in the healthy population. The present results, based on an analysis of 2,219 OP radiographs, revealed that congenital absence of teeth occurred 9 times more frequently than accessory teeth.

In Hungary, one in seven of these 6- to 18-year-old paedodontic and orthodontic patients were found to have some form of hypodontia (missing wisdom germs were not included). This is a higher prevalence than was found by Johannsdottir *et al.*, (1997) and Nordgarden *et al.*, (2002), but lower than that reported by Plunkett *et al.*, (1998), who observed a joint prevalence of hyperdontia and hypodontia of 33%.

A number of authors have reported similar data for the absence of different teeth (Chai and Ngeow, 1999; Rasmussen, 1999;). The sequence of prevalence demonstrated by their findings is: second premolar > upper second incisor > lower first incisor. Nordgarden *et al.*, (2002) concluded that the region most frequently affected in the permanent dentition is the premolar, while in the primary dentition it is the incisor (Daugaard-Jensen *et al.*, 1997b). The present study produced the same results for the permanent dentition.

The congenital absence of molars, and particularly of lower first molars, is very rare (Goldenberg *et al.*, 2000). Its occurrence in 15 patients in the present study, four of which were symmetrical and isolated, is quite noteworthy.

The 23 patients with congenital absence of six or more teeth comprised 17 girls and six boys, i.e. a prevalence of 1.31% among the females, and 0.65% among the male patients. The female/male ratio was very close to 2:1. Rolling and Poulsen (2001) also found that the more extreme forms of hypodontia are more common in girls than in boys.

It is important to emphasise that the combination of history, clinical examination and radiographic analysis are necessary for an accurate diagnosis of hypodontia (Alexander-Abt, 1999; Kumasaka *et al.*, 1997).

The case reports in the recent literature support that conclusion that while there are increasing numbers of implants and tooth germ transplants, hypodontia is mainly treated by orthodontics and restorative dentistry.

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