



## Hypodontia and Hyperdontia of Permanent Teeth in Korean Schoolchildren

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### ABSTRACT

#### Hypodontia and Hyperdontia of Permanent Teeth in Korean Schoolchildren

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This study was performed to determine the prevalence of hypodontia and hyperdontia of permanent teeth among Korean schoolchildren, and to compare differences in the prevalence between Korea, other country, and other ethnic groups. The sample consisted of 346 girls aged 6.9~0.3 yr and 375 boys aged 6.8~0.4 yr on whom a panoramic radiograph was taken at Yeonchun-Gun community in Korea. The prevalence of congenitally missing teeth (third molars excluded) was 6.7% in boys and somewhat higher, 9.5% in girls, and 8.0% for both sexes combined. On the average, number of missing teeth per affected child was 1.9 teeth. The most commonly congenitally missing teeth were the mandibular second premolar (32.7%), followed by the mandibular incisor (28.7%), the maxillary second premolar (16.7%), and the maxillary lateral incisors (10.2%). The prevalence of supernumerary teeth was 2.1% in boys, 1.4% in girls, and 1.8% for both sexes combined. The most common supernumerary teeth were the mesiodens (76.9%), followed by the supernumerary premolar (23.1%). The affected male-female ratio was 1.6: 1.0. The prevalence of congenital missing teeth in this study

was similar to in studies of Japanese, Danish, American and German. The frequency of hyperdontia was lower in this study than in studies of Chinese children, Japanese and American.

Key words: prevalence of hypodontia, prevalence of hyperdontia, Korean schoolchildren, oral examination, panoramic radiographs

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Hypodontia, congenitally missing teeth, has been observed as one of the most

common human dental developmental anomalies. It may be defined as agenesis of one or more teeth. In contrast, hyperdontia is defined as any teeth or tooth substance in excess of the usual configuration of twenty deciduous or thirty-two permanent teeth <sup>(1)</sup>.

Studies concerning the prevalence of hypodontia and hyperdontia in various racial groups as (Table1) well as investigations of hypodontia in connection with other anomalies have been carried out <sup>(17-20)</sup>. Other studies also have dealt with genetic patterns of hypodontia <sup>(21)</sup> and hyperdontia <sup>(22)</sup>, with the relation between hypodontia and decreased size of crowns of the remaining teeth <sup>(23-27)</sup> and with hypodontia/hypodontia and environmental factor <sup>(28-29)</sup>.

Investigations on the prevalence of hypodontia and hyperdontia have shown discrepancies in results which can usually be attributed to differences in sampling techniques, diagnostic criteria and the racial derivation of the populations examined. Apart from the age of study subject, several authors have found that panoramic radiographs are suitable for this purpose <sup>(17, 30-31)</sup>.

Hypodontia is an important condition in that both esthetics and function can be detrimentally affected. Hyperdontia also may cause diastemata, crowding due to an increased number of erupted teeth, eruption failure of adjacent teeth, displacement and ectopic eruption of supernumerary or adjacent teeth, root resorption of adjacent teeth, malformation of adjacent teeth such as dilaceration, and loss of vitality of adjacent teeth <sup>(22, 32-34)</sup>. It is often difficult to solve clinical problems connected with hypodontia and hyperdontia, even though many treatment procedures have been proposed <sup>(34-43)</sup>. As knowledge of the

incidence of hypodontia and hyperdontia is important in the planning of dental care services, prevalence studies are needed.

Because there has been no controlled radiographic study of a Korean population relating to hypodontia and hyperdontia, the present study was performed to:

(a) determine the prevalence and distribution of hypodontia and hyperdontia in the permanent dentition of Korean schoolchildren.

compare differences in the prevalence of these dental anomalies between Korea, other countries, and other ethnic populations.

## Material and methods

All first grade children of 18 primary schools in Yeonchun-Gun community were invited to participate in the oral health survey. One hundred percent of the parents agreed to have their child participate, but participation rate was 96%. 721 children were examined (375 boys and 346 girls). The mean age of boys was 6.9 yrs, (range = 6.6 yrs -7.2 yrs); and the mean age of girls was 6.8 yrs, (range = 6.4 yrs - 7.2 yrs).

Each child was examined clinically by one of the authors. Hypodontia was not recorded until a radiographic examination of the region of a permanent tooth not visible in the mouth had been confirmed as congenitally absent. In cases in which it was difficult to distinguish between an extracted or congenitally missing tooth, the child was asked whether a tooth had been extracted. In the case of an extracted tooth, if there was the slightest doubt as to whether it had been a permanent or primary, the tooth was deemed an extracted permanent tooth.

All children had a panoramic radiograph taken, and standardization of the method and diagnosis was

Table 1. Hypodontia and hyperdontia of the permanent dentition in various populations (excluding the third molars)

Author	Country	Year	No. of subject	Subject age	% hypodontia	Most frequently missing teeth	% supernumerary teeth
Davis (2)	China	1987	1093	12	6.9	mandibular incisors	2.7
Nik-Hussein (3)	Malaysia	1989	NR	5, 15	2.8	12, 22	NR
Renkova et al. (4)	Czechoslovakia	1989	4405	7, 12	4.0	NR	NR
Lo Muzio et al. (5)	Italy	1989	1529	7, 14	5.2	second premolar	NR
Ignelzi et al. (6)	U.S.A.	1989	849	3, 9	7.8	NR	2.4
Yangida & Morris (7) (8)	Japan	1990	4009	2, 29	7.8	second premolar	3.0
Dechkunakorn et al. (9)	Thailand	1990	1160	6, 15	8.6	12, 22	NR
Legovic et al. (10)	Yugoslavia-Istria	1990	2401	6, 18	6.3	NR	1.4
Legovic et al. (10)	Yugoslavia-Slavonia	1990	2048	6, 18	2.3	NR	0.6
Locht (11)	Denmark	1980	704	9, 10	7.7	NR	1.7
O' Dowling & McNamara (12)	Ireland	1990	3056	NR	11.3	NR	NR
al-Emran (13)	Saudi Arabia	1990	500	13.5, 14.5	4.0	35, 45	NR
Lynham (14)	Australia	1990	662	16, 26	6.3	15, 25	NR
Aasheim & Ogaard (15)	Norway	1993	1953	9	6.5	35, 45	NR
Sterzik et al. (16)	Germany	1994	3238	NR	8.1	NR	NR

**Table 2. Children with congenitally missing teeth by sex and number of congenitally missing teeth in mandible and maxilla**

	Number of children examined	Number of children affected	Percentage of children affected
Both sexes	721	58	8.0
Males	375	25	6.7
Females	346	33	9.5
	Number of missing teeth		Percentage of missing teeth
Total	110		100.0
Mandible	72		65.5
Maxilla	38		34.5

Number of missing teeth per affected child = 1.9

ensured as the same operator took the radiographs and subsequently viewed them with no magnification on a light box. Third molars were not included in this study. Ten percent of the radiographs were re-examined 2 months after the original analysis and a reproducibility of 100% was found in the identification of congenitally missing permanent teeth and supernumerary teeth.

## Results

### Hypodontia

Excluding third molars, hypodontia (Table 2) was found in 6.7% of the boys and 9.5% of girls, resulting in 8.0% for both sexes. Nearly 65% of congenitally missing teeth were found in the mandible, while 35% were found in the Maxilla. The absence of these teeth could not be attributed to previous extractions. On average, each affected child was missing 1.9 teeth.

As it was not always possible to distinguish between central and lateral incisors, these teeth were non-specifically grouped as mandibular incisors. The distribution of the missing teeth is

outlined in Table 3. The most commonly missing teeth were mandibular second premolars and mandibular incisors 32.7% and 28.7%, respectively. The third most commonly missing teeth were maxillary second premolars (16.7%), followed by maxillary lateral incisors (10.2%). Absence of other teeth was less common.

The prevalence of congenitally missing of mandibular second premolars, mandibular incisors, maxillary second premolars, and maxillary lateral incisors was 3.5%, 2.8%, 1.9% and 1.0%, respectively.

### Hyperdontia

Hyperdontia (Table 4), supernumerary teeth, was found in 2.1% of the boys and 1.4% of girls, giving 1.8% for both sexes combined. The affected male-female ratio was 1.6: 1.0.

The most common supernumerary teeth were the mesiodens (76.9%), followed by the supernumerary premolar (23.1%). The prevalence of mesiodens was 1.4% and of supernumerary premolar was 0.4%. On average, each affected child had 1.0 supernumerary tooth.

**Table 3. Distribution and location of congenitally missing teeth**

Tooth involved	Number of missing teeth	Number of affected children	Percentage of missing teeth	Percentage of affected children	Prevalence of missing (%) sample(721)
35, 45	36	25	32.7	43.1	3.5
31, 32, 41, 42	31	20	28.7	34.5	2.8
15, 25	18	14	16.7	24.1	1.9
12, 22	11	7	10.2	12.1	1.0
17, 27	5	3	4.6	5.2	0.4
13, 23	4	3	3.7	5.2	0.4
37, 47	4	2	3.7	3.4	0.3
34, 44	1	1	0.9	1.7	0.1
Total	110	75* (58)	100.0	129.3* (100.0)	10.4* (8.0)

\* : Multiple missing teeth result 75 instead of 58, 129.3% instead of 100%, and 10.4% instead of 8.0%.

The tooth numbers are indicated by the FDI two-digit system.

**Table 4. Children with supernumerary teeth by sex and location of supernumerary teeth**

	Number of children examined	Number of children affected	Percentage of children affected
Both sexes	721	13	1.8
Males	375	8	2.1
Females	346	5	1.4
Mesiodens		10	1.4
Supernumerary premolar		3	0.4

Ratio (male : female) = 1.6 : 1

### Discussion

Hypodontia (excluding the third molar) is a relatively common finding in different population. Its prevalence varies from 2.3 to 11.3% (Table 1). The prevalence of congenitally missing teeth in Korea (8.0%) was within this range. The population of Korea is fairly homogeneous from a genetic perspective. Therefore, the frequency of hypodontia in this study may be considered to apply to the country as a whole.

The prevalence of hypodontia in Korea proved to be approximately the same as found by Yanagida and Mori among Japanese children (7.8%), Lochter among Danish children (7.7%), Ignellzi, Fields and Vann among asymptomatic pediatric patients (7.8%), Sterzik, Steinbicker and Karl among German orthodontic patients (8.1%), and Dechkunakorn, Chaiwat and Sawaengkit among Thailand population (8.6%).

Among other studies of hypodontia in children, those of O' Dowling and McNamara (11.3% for Irish

orthodontic patients) have shown a higher prevalence. However, those of Davis (6.9% for Chinese children in Hong Kong), Aasheim and Ogaard (6.5% for Norwegian orthodontic patients), Lynham (6.3% for Australian Defence Force recruits), Legovic, Ceranic and Cehich (6.3% for orthodontic patients of Istria and 2.3% for orthodontic patients of Slavonia in Yugoslavia), Lo Muzio, Mignogna, Bucci and Sorrentino (5.2% for Italian children), al-Emran (4% for Saudi Arabian male children), Renkerova, Badura, Manicova and Jambor (4% for Czechoslovakian orthodontic patients), Nik-Hussein (2.8% for Malaysian children), have shown a lower prevalence.

The teeth most frequently missing in Korean children were mandibular second premolars. The mandibular second premolars or maxillary second premolars were the most frequently missing teeth in Japanese, Italian, Australian, Saudi Arabian and Norwegian children. The Korean children differs from Chinese, Malaysian and Thailander population with mandibular second premolars being the most frequently missing teeth (Table 1).

Some studies reported no gender difference in hypodontia prevalence (2,7,9,15). There also was no significant difference in the prevalence of hypodontia between Korean males and females (chi-square = 1.877,  $P > .05$ ).

The prevalence of hyperdontia varies from 0.1 to 3.6% (2,6,8,10,11,44). The survey results suggest that prevalence of hyperdontia (1.8%) be within this range. The prevalence of hyperdontia in Korea proved to be approximately the same as that found by Legovic et al. among orthodontic patients of Istria (1.4%) in Yugoslavia and Locht among Danish children (1.7%). Among other studies of hyperdontia in children, those of Davis (2.7% for Chinese children in Hong Kong), Yangida and Moris (3.0% for

Japanese children), and Ignelzi et al (2.4% for American pediatric patients) have shown a higher prevalence. However, those of Legovic, Ceranic and Cehich (0.6% for orthodontic patients of Slavonia in Yugoslavia) have shown a lower prevalence.

A slight difference in the relative frequency of different supernumerary teeth is reported. Upper lateral incisors were the most common supernumerary teeth in Luten's study (45); where as upper central incisors were the most common in the report of Shapira and Kufinec (29). The most frequent supernumerary teeth in Korean children were mesiodens. The frequency of mesiodens was higher than supernumerary premolars.

Sexual dimorphism of hyperdontia is reported by most authors (2,8,22,32,45,46) with males being more commonly affected. The male to female ratio of hyperdontia (1.6:1) proved to be approximately the same as that found by Mitchell (2:1), Hogstrum and Anderson (2:1), and Luten (1.3:1). However, among other studies of hyperdontia in Asian, those of Davis (6.5:1 for Chinese in Hong Kong), Tay (5.5:1 for Chinese in Hong Kong), and Saito (5.5:1 for Japanese) have shown a higher male to female ratio than the ratio found among Korean children. Nevertheless, there was no significant difference in the prevalence of supernumerary teeth between male and female in Korean children (chisquare = 0.483,  $P > .05$ ).

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