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HYPODONTIA OF PERMANENT TEETH IN A KENYAN POPULATION

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ABSTRACT

Objective: To assess the occurrence of hypodontia (except 3rd molars) in a population of orthodontic patients.

Design: A retrospective case study.

Setting: Private orthodontic practice in Nairobi.

Patients: Six hundred and fifteen orthodontic patients aged eight to fifteen years.

Results: Hypodontia occurred in 39 children (6.3%). The missing teeth were observed in 24 males (7.2%) and 15 females (5.3%). Of the children with hypodontia, about 80% lacked one or two teeth, 54% had hypodontia involving anterior teeth, 18% lacked single posterior teeth and 8% had two or more teeth missing in the same quadrant. The highest recorded number of missing teeth in any one individual was seven. The most frequently missing teeth were mandibular 2nd premolars (30%), maxillary 2nd premolars (24%) and maxillary lateral incisors (22%) in that order.

Conclusions: Our data for hypodontia were within the wide range reported in the literature. The finding of patients with hypodontia involving the anterior teeth and others missing more than two teeth in the same quadrant was an indication of a great need for orthodontic treatment. The present findings reiterate the need for a thorough radiographic evaluation of patients prior to removal of permanent teeth for orthodontic reasons.

INTRODUCTION

Congenital absence of a number of teeth (hypodontia) is a subject which has been widely reported in different parts of the world. The studies have included case reports(1), missing teeth in populations of orthodontic patients(2-4) and epidemiologic studies(5-7). The data for hypodontia range from about 3.3% to 11.7% (2-11). The different findings could be explained by the differences in the samples examined in terms of age-range, ethnicity and type of radiographs used in the assessment. If two or more teeth are missing in the same quadrant, functional or periodontal problems may arise, whereas hypodontia of anterior teeth can result in compromised dental and facial aesthetics(12,13).

Literature search revealed no previous studies on hypodontia in Kenya. The purpose of this study, therefore, was to assess the occurrence of hypodontia in a sample of orthodontic patients in Nairobi, Kenya.

MATERIALS AND METHODS

The clinical records of 615 children, 331 males and 284 females aged 8 - 15 years who were seen at a private dental clinic in Nairobi between January 1993 - June 1999 were retrieved and analysed for hypodontia. All the children had good quality orthopantomographs (OPGs). The OPGs were used to compliment the clinical notes. They were therefore carefully scrutinized for

evidence of congenitally missing teeth. In all cases, the radiographic findings were consistent with the previously recorded information in the notes.

The age group was selected on the basis of available, usable records of children expected to have developing or developed permanent dentition. The clinic from which the records were obtained caters mainly for patients with orthodontic problems. Although most of the patients come from within Nairobi, a substantial proportion also comes from other parts of the country. About 30% of the patients are referred by other dentists.

Only orthopantomographs of children without serious systemic conditions or syndromes known to affect the normal development of the dentition were included in this study. In a few instances the patient had requested to seek a second opinion elsewhere and therefore had gone away with the radiographs. In the absence of the radiographs the case was excluded. The study focussed on Kenyans of African descent.

RESULTS

The age distribution of the children is shown in Table 1. The total number of children with hypodontia (except 3rd molars) was 39 (6.3%), with a male/female ratio of 2.4: 1.5. Table 2 shows the data for the occurrence of hypodontia in the present study and those previously reported from various countries. The total number of missing teeth was 79. Of the children with hypodontia, 54% had involvement of anterior teeth, 18% single

Table 1

Age distribution of 615 children (331 M and 284 F) assessed for hypodontia

Age in yrs	8	9	10	11	12	13	14	15
No. of children	78	89	105	93	99	67	49	35

Table 2

Comparison of findings of hypodontia in various populations

Author	Nationality	No. of subjects	Male (%)	Female (%)	Total hypodontia (%)
Rose J.S.(2)	U.K.	6000	3.53	5.1	4.3
Silverman N.E.(3)	U.S.A.	4032	-	-	4.3
Burden D.J. (4)	Ireland	1020	-	-	11.7
Rolling S. (5)	Denmark	3325	7.7	7.8	7.8
Davis P.J. (6)	Southern Korea	1093	6.1	7.7	6.9
Magnusson T. (7)	Iceland	1116	6.7	8.9	7.9
Davies P.L. (8)	Australia	2170	-	-	3.3
Huntsbraten (9)	Norway	1295	8.4	11.8	10.1
Al-Emran S. (10)	Saudi Arabia	500	-	-	4
O' Dowling J.B. (11)	Ireland	3056	10.43	12.54	11.3
Nganga R. N. (present study)	Kenya	615	7.2	5.3	6.3

Table 3

Distribution of 79 missing teeth in 615 males and females according to site in the jaws

	Central		Lateral		Canines		1st premolars		2nd premolars		Molars	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Maxilla	0	0	17	(21.5)	1	(1.2)	2	(2.5)	19	(24)	0	0
Mandible	7	(8.8)	7	(8.8)	0	0	2	(2.5)	24	(30)	0	0

Table 4

Distribution of hypodontia by tooth type in 24 males (M) and 15 females (F)

Tooth type	Missing teeth			
	M		F	
	No.	%	No.	%
$\bar{5}$	12	28.6	12	32.5
$\bar{5}$	9	21.4	9	24.3
$\bar{2}$	7	16.7	9	24.3
$\bar{2}$	7	16.7	0	0
$\bar{1}$	4	9.5	3	0
$\bar{4}$	2	4.7	0	0
$\bar{3}$	1	2.4	2	5.4
$\bar{4}$	0	0	2	5.4
Total	42		37	

Table 5

Frequency distribution of hypodontia in 24 males (M) and 15 females (F)

No. of missing teeth	M				F	
	No.	%	No.	%	No.	%
1	12	50	3	20		
2	9	37.5	7	46.7		
3	1	4.2	1	6.7		
4	1	4.2	4	26.7		
5	0	0	0	0		
6	1	4.2	0	0		

Table 6

Distribution of unilateral and bilateral hypodontia (79 teeth) in 39 males and females

Tooth type	N	Hypodontia right side %	Hypodontia left side %	Bilateral hypodontia %
$\bar{5}$	24	8.3	16.7	75
$\bar{5}$	18	11.1	22.2	66.7
$\bar{2}$	16	37.5	12.5	50
$\bar{1}$	7	42.8	28.6	28.6
$\bar{2}$	7	14.3	0	85.7
$\bar{3}$	3	33.3	0	66.7
$\bar{4}$	2	0	0	100
$\bar{4}$	2	100	0	0

posterior teeth, 14% two or more posterior teeth and eight per cent two or more teeth in the same quadrant. The ratio of missing teeth in males and females was 4.3:3.6. The distribution of the missing teeth according to site in the jaws and tooth type is shown in Tables 3 and 4 respectively.

Hypodontia occurred with equal frequency in the maxilla and the mandible. When analysed according to specific sites in the jaws, hypodontia was more frequent in the premolar areas followed by lateral incisor areas (Table 3). About 80% of the individuals were missing only one or two teeth (Table 5). Table 6 shows the distribution of unilateral and bilateral congenitally missing teeth in both sexes. The highest number of missing teeth in any one individual was seven.

DISCUSSION

Congenital absence of teeth is commonly classified as hypodontia, indicating the absence of only a few teeth, oligodontia, meaning congenital absence of many but not all the teeth, and anodontia, implying the total absence of teeth. Oligodontia and anodontia are very rare but hypodontia is relatively more common.

A distinct genetic influence on the development of teeth has been demonstrated, with a high proportion of individuals with hypodontia coming from families with previous hypodontia(14). The nature of the genetic influence is complex and the modes of inheritance unclear(15). Current thinking is that more than one gene is involved(14). Hypodontia, particularly of third molars, is thought to be an evolutionary reduction in tooth number(16). Environmental factors have also been implicated in the aetiology of hypodontia(15,17). The dental lamina is extremely sensitive to external stimuli and damage before formation can result in hypodontia. A number of clinical syndromes also appear to be associated with hypodontia. Among the more commonly known of these are(18,19): chondroectodermal dysplasia (Ellis-Van Creveld syndrome), Crouzon syndrome, Down's syndrome, ectodermal dysplasia, cleft lip and palate, Ehlers-Danlos syndrome, Gorlin syndrome, Sturge-Weber syndrome, Turner syndrome and incontinentia pigmenti.

Retrospective studies of this nature may have certain short-comings, among them reliability of records and amount of data available for evaluation. Although the data used in this study had been systematically recorded and stored over the years by the present authors, the number of cases was relatively small compared to similar studies elsewhere.

A better method of determining the occurrence of hypodontia would probably be to undertake prospective epidemiologic investigations in the general population aided by relevant radiographs. However, this method has logistical difficulties too, and it may not stand the test of ethics and clinical justification if it was the only reason for taking the radiographs. A combination of prospective and

retrospective studies would perhaps provide a more accurate picture of the occurrence of hypodontia.

The subjects in our study attended the clinic seeking professional advice in regard to the arrangement of their teeth. They can, therefore, be considered as a selected sample. Although one may argue that teeth are more likely to be missing in a population with occlusal problems than in the general population, this does not appear to have been clearly substantiated in the literature. Hence to what extent this may have influenced our results is not clear. Only three patients were found to have attended the clinic with the specific complaint of missing teeth. Strict comparison of most of the studies of missing teeth from different parts of the world is made difficult by the variations in the size of the samples, the radiographs used to assess hypodontia and the different age-ranges of the populations studied. Moreover, the terms hypodontia and oligodontia are not always clearly differentiated in some of the literature. These notwithstanding, however, the data do allow some worthwhile comparisons.

Hypodontia was encountered in 6.3% of the present population, which is within the wide range reported in the literature (Table 2). Silverman *et al*(3) have reported hypodontia occurring more frequently bilaterally than unilaterally for the most commonly missing teeth. Our study showed a similar trend (Table 6). The present study supports the findings from investigations in other populations in that severe hypodontia (oligodontia) is very rare(16).

As is the case in some studies(3,20) we found little difference in the number of missing teeth in the maxilla and the mandible. One study(5) has reported finding more missing teeth in the mandible than the maxilla. We found a higher occurrence of hypodontia in males than females. This was in contrast with studies of Caucasians(7,11,12), Southern Chinese(6) and Malaysians(21) where females have been reported to have a higher tendency for this anomaly.

The most commonly missing tooth in this population was the mandibular second premolar, which is in agreement with studies of Caucasians(7,5,12) and Saudi Arabians(10,20) but different from those reported for Malaysian children(21) where the maxillary lateral incisor was the most commonly missing tooth, and Southern Chinese(6) where the most frequently missing tooth was the mandibular incisor. This may probably be due to ethnic variation.

In some individuals, there may be delayed development of premolars(12), hence one cannot always be absolutely certain that these teeth are missing below the age of about nine years, especially among males. This point is important because many reports of hypodontia, the present one among them, have included subjects below nine years of age.

Classification of children with hypodontia according to need of orthodontic treatment as described in a previous study(12) showed that about 18% of the present population had hypodontia of single posterior teeth. This indicated a

moderate need of treatment. About 54% had hypodontia involving anterior teeth and 8% had hypodontia of two or more teeth in the same quadrant, both features indicating a great need of orthodontic treatment for aesthetic and functional reasons respectively.

The treatment option for hypodontia depended on the individual case and fell into one of the following categories: (i) maintenance of the primary tooth or teeth; (ii) replacement of the missing tooth, prosthetically or by transplantation; (iii) extraction of the overlying primary teeth, and then allowing the permanent teeth to drift; or (iv) extraction of the primary teeth followed by immediate orthodontic treatment. These are normally the recommended approaches(16).

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