DENTAL ANOMALIES IN THE PERMANENT DENTITION

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ABSTRACT

One thousand three hundred and sixty six, 14-year-old children from five states in the Peninsular Malaysia were examined for abnormalities of the permanent dentition. Radiographs were not used. There were 106 occurrences of anomalies detected in 97 subjects. The anomalies detected were hypodontia, supernumerary teeth, dens evaginatus, peg-shaped lateral incisors and double teeth. There were no instances of dens invaginatus or talon cusp. Hypodontia occurred in 2.8% of the children examined and the teeth most frequently missing were the mandibular lateral incisors. Most of the supernumerary teeth were located in the premaxillary region and the prevalence of the erupted supernumerary teeth is 1%. Dens evaginatus was diagnosed in 2% of the subjects and all the anomalies were detected on the premolars. Peg-shaped lateral incisors was noted in 2% of the subjects. The prevalence of double-teeth was 0.4% and these were located in the mandible.

INTRODUCTION

Variations in number and form of teeth are frequently encountered in clinical practice and these anomalies are important as they have significant implications on clinical management.

Hypodontia

One of the commonest dental anomaly is the congenital absence of one or more teeth in the dentition and this condition is known as hypodontia[1-3]. Other terms which are also used to describe the condition of congenitally missing teeth are aplasia[4-5] and oligodontia[6-7]. Winter and Brook are of the opinion that the term oligodontia should be used for those cases in which many but not all teeth are congenitally missing. The term partial anodontia has been used[9], but this term is not technically accurate as the term anodontia means absence of teeth in one or more dentitions.

Hypodontia may occur in association with generalised syndromes such as hypohidrotic ectodermal dysplasia or Ellis van Creveld syndrome[8], whereby the dental involvement may be very severe. Fortunately, these conditions are very rare and what is usually encountered in clinical practice is hypodontia without any evidence of systemic involvement. The prevalence of hypodontia has been reported to be in the range of 2.0 - 7.7 %[1-10].

Supernumerary Teeth

Supernumerary tooth (ST) is an extra tooth which is found in the dentition. This extra tooth may be morphologically similar to normal teeth or it may have an abnormal shape and size[11]. ST is not rare in the permanent dentition and the prevalence of ST has been reported to be in the range of 1.5-3.5%[11-15]. Although ST may erupt into the oral cavity, a large percentage of these teeth are unerupted ST and the proportion of unerupted ST depended on the ages of the subjects at the time of clinical examination[11]. Over 70% of the ST have been reported as unerupted in young children during the early mixed dentition stage[13-15]. However, in slightly older populations the proportion of unerupted ST was reported as 42-60%[16-18].

Dens Evaginatus

Dens evaginatus is a form of anomaly which is characterized by the presence of an enamel covered tubercle which usually projects from the occlusal surface of the premolar tooth[19]. The anomaly occurs mainly in Mongoloids and Yip[20] reported that the prevalence of dens evaginatus among Singaporean Chinese is 3.62%.

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Peg-shaped Laterals

Peg-shaped lateral incisors is the commonest form of microdont tooth. The affected lateral incisor is usually smaller than normal and has a tapering or conical form[8]. The prevalence of peg-shaped lateral incisors has been reported in the range of 1-2% and females are more frequently affected than males[11].

Double Teeth

Double teeth or joined teeth has been described under different terms and the terminologies are often confusing. There are several ways in which union of the teeth can occur and the terms commonly used to describe the condition are fusion and gemination[21-23].

Double teeth occur more commonly in the primary than the permanent dentition and has been reported as 0.1%[11].

Dens Invaginatus

Dens invaginatus is a development anomaly which occurs due to abnormal morphodifferentiation, and is thought to arise as a result of invagination in the surface of a tooth crown before calcification occurs[24], thus resulting in a portion of the enamel developing in the pulp chamber of the tooth[25].

The prevalence of dens invaginatus has been reported to be in the range of 0.25-10%[24-26] and the anomaly occurs most frequently in the lateral incisors, maxillary canines, mandibular incisors and mandibular premolars may be affected[26-29].

Talon Cusp

Talon cusp is a term which is used to describe a cusp-like structure that projects from the lingual/palatal surface of a tooth[30]. The anomaly occurs most commonly on the maxillary lateral incisors. Other teeth which may be affected are maxillary central incisors and mandibular incisors[31-32].

The purpose of this study is therefore to investigate the prevalence of these anomalies among Malaysian children and to compare the results obtained with studies from other countries and also with previous studies carried out in Malaysia whenever available.

MATERIALS AND METHODS

Subjects for this study were selected from urban areas of five states in Peninsular Malaysia. These children were selected from a total population of about seven thousand children in the school register. Selection was based on being a Form II student, being born in one of the five states chosen and a continuous resident of the state which they were born. The five areas chosen were Johor Bahru, Petaling Jaya, Kuantan, Kuala Trengganu and Penang.

One thousand three hundred and six subjects, 647 males and 659 females, average age 14.46 years were examined for caries and anomalies of the permanent dentition (result for dental caries has already been reported elsewhere)[33]. Intra-oral examination of the children was carried out in the classroom with the subject seated in a portable dental chair and with the aid of a standard portable dental light. As facilities for taking radiographs were not available, radiographic examination of the subject were not carried out. The following dental anomalies were examined:

Hypodontia : A tooth was registered as congenitally missing when it could not be detected clinically and the patient confirmed that the tooth had not been extracted. Third molars were not included in the investigation.

Supernumerary teeth: ST was diagnosed if any tooth or structure was seen in excess of the usual number for a given region of the dental arch[11].

Double teeth: Double teeth was diagnosed when two or more tooth structures are joined such that a dental floss was not able to pass through them.

Dens evaginatus: Dens Evaginatus was diagnosed when a conical projection was observed on the occlusal surface of the tooth. A tooth which has a fractured occlusal tubercle was also diagnosed as a positive occurrence.

Peg-shaped lateral incisors: Peg-shaped lateral incisor was diagnosed when the maxillary lateral incisor is smaller than normal and is tapering or conical in shape.

Dens invaginatus: Dens invaginatus was diagnosed when a definite invagination or deep cleft of the enamel was detected on the lingual /palatal surface of the anterior teeth.

Talon cusp: Talon cusp was diagnosed when an additional cusp projected prominently from the lingual/ palatal surface and extends at least half the distance of the coronal length of the erupted tooth[32].

RESULTS

Of 1306 subjects examined, 97 children (7.4%) showed the presence of 106 occurrences of dental anomalies (Table 1). There were 88 single occurrences of anomalies (6.7%) and in the other 9 subjects (0.7),

two anomalies were detected in each of these subjects. The anomalies were found almost equally in females and males.

Table 2 shows the distribution of anomalies that were detected and their respective prevalence. The commonest anomaly was hypodontia, followed by dens evaginatus and peg-shaped lateral incisors.

Hypodontia: Table 3 shows the total number and distribution of different missing teeth. There were 59 missing teeth in 36 affected subjects. Females were more commonly affected than males and the ratio of affected females to males is 1.4:1. The most commonly missing tooth was the mandibular lateral incisor followed by the maxillary lateral incisors, then the maxillary second premolars and then the mandibular second premolars.

Supernumerary teeth: Table 4 shows the distribution of ST according to sex, site and the appearance of ST. Males were affected more commonly than females and the ratio of affected males to females is 1.6:1. Almost all of the ST were located in the maxilla. Seven (53.8%) of the ST were conical in clinical appearance, three (23.1%) were supplemental teeth and had the appearance of maxillary lateral incisor.

In addition to ST, two subjects were found to have other abnormalities as well. One female patient had a ST fused to a 34, whilst a male subject had a ST and hypodontia of maxillary lateral incisor.

Dens evaginatus: The distribution and occurrence of dens evaginatus are shown in Table 5. Twenty-six subjects, 16 males and 10 females exhibited the presence of dens evaginatus, prevalence of 2.0%. The anomaly occurred most frequently among the Chinese and the prevalence of 3.55 was noted for this racial group. All the anomalies were detected in the premolar teeth and 40% of the anomaly was detected on mandibular second premolars. There were 9 single occurrences. In 16 subjects the anomaly was diagnosed bilaterally, 7 subjects had 3 premolars involved, one subject had 4 teeth involved whilst another subject had 5 premolars affected. The occlusal tubercle were still intact in all but one affected premolar and the presence of abcess formation was also noted in association with this tooth.

Peg-shaped lateral incisors: Peg-shaped lateral incisors were diagnosed in 26 subjects, prevalence of 2.0% (Table 2). It was observed more frequently in females than males, ratio of affected females to males in 1.6:1. The anomaly occurred unilaterally in 12 subjects and in 14 subjects, it was detected bilaterally.

Table 1: Distribution of Subjects and Number of Anomalies

Number of Subjects	Males	Females	Combined	No. of anomalies detected
Examined	647	659	1306	-
With one anomaly	43	45	88	88
With two anomalies	4	5	9	18
Total	47	50	97	106

Table 2: Distribution of Anomalies and Prevalences

	Number of Subjects Affected			
Anomalies	Male	Female	Combined	Prevalence %
Hypodontia	12 (3)	16 (5)	28 (8)	2.8
Erupted Supernumerary	7 (1)	4 (1)	11 (2)	1.0
Dens Evaginatus	15 (1)	9 (1)	24 (2)	2.0
Peg-shaped lateral	8 (2)	14 (2)	22 (4)	2.0
Double-teeth	1 (1)	2 (1)	3 (2)	0.4
Total	43 (8)	45 (10)	88 (18)	-

( ) *Denotes the number of subjects showing the presence of other anomalies as well as the anomaly indicated.*

Table 3: Distribution of Congenitally Missing Teeth

Tooth Missing	Number of Subjects Affected			No. of Missing Teeth	As a % of Missing Teeth
	Male	Female	Combined		
Mand Lateral	7	10	17	29	49.2
Max Lateral	5	6	11	22	37.3
Max 2nd premolar	2	3	5	5	8.5
Mand 2nd premolar	1	2	3	3	5.1
Total	15	21	36	59	100.1*

** Rounding off error*

Table 4: Description of Erupted Supernumerary Teeth

Description	No. Affected	%
Prevalence		
Male	8	1.2
Female	5	0.8
Total	13	1.0
Site of Occurrence		
Maxilla	12	92.3
Mandible	1	7.7
Appearance		
Conical	7	53.8
Supplemental	3	23.1
Others	3	23.1

Table 5: Description and Occurrence of Dens Evaginatus

Description	No of subjects		%
	Examined	Affected	
Prevalence			
Male	647	16	2.5
Female	659	10	1.5
Total	1306	26	2.0
Race			
Chinese	513	18	3.5
Malay	501	8	1.6
Indians	292	0	0
Teeth affected			
35 and/or 45	-	22	40.0
34 and/or 44	-	21	38.2
15 and/or 25	-	8	14.5
14 and/or 24	-	4	7.3
Total	-	55	100.0

Double teeth: Double teeth was diagnosed in 5 subjects, prevalence of 0.4% (Table 2). All the anomalies were detected in the mandible and in all instances, the teeth involved were lateral incisor and canine.

No instances of dens invaginatus or talon cusp were detected in any of the subjects examined.

DISCUSSION

Among the 1306 children examined for dental anomalies, 97 subjects (7.4%) presented with one or more of the following: hypodontia, supernumerary teeth (ST), dens evaginatus, peg-shaped lateral incisors or double-teeth. The prevalence of these anomalies among Malaysian schoolchildren are hypodontia 2.8%, ST 1.0%, dens evaginatus 2.0%, peg-shaped lateral incisors 2.0% and double teeth 0.4%. Except for ST, the prevalence of these anomalies are within the range reported for the Caucasian population.

With regards to ST, the low figure is expected as radiographs were not employed in the investigation, thus only the erupted ST were diagnosed. As about 60% of the ST remain unerupted in this age group, the prevalence in this study would probable be approximately 2.5% and this is in agreement with an earlier study on Malaysian children where radiographs were used and a prevalence of 2.8% was reported[13].

As mentioned above, radiographs were not used in the study, thus it was expected that the prevalence recorded for hypodontia may represent a slight overestimation as teeth which were clinically missing were diagnosed as congenitally missing when some of these teeth may infact be present but unerupted. Nevertheless, this finding is in agreement with an earlier study on hypodontia in Malaysian children where radiographs were used and which also reported a prevalence of 2.8%[10].

Dens evaginatus was detected in Chinese and Malay subjects, being more frequently among the former (3.5%). This is similar to the study by Yip[20] who reported a prevalence of 3.62% among Singaporean Chinese. None of the Indian subjects examined showed this anomaly.

The prevalence of dens invaginatus and talon cusp has been reported in the range of 0.25-10% and 0.6-7.7% respectively. The wide range of these two anomalies is probably due to the lack of rigid criteria in diagnosis rather than actual difference in population sample and it is probable that some researchers were diagnosing pits on the palatal surfaces of incisors as dens invaginatus and cingulum of the teeth as talon cusp. The lack of rigid criteria used for dens invaginatus is also reflected on the widely differing results of Shafer[24] who reported a prevalence of 1.3% and Amos[34] who reported a prevalence of 5.1%, both of whom examined patients at Indiana Dental School. In this study, no instances of dens invaginatus or talon cusp were noted in any of the subjects examined. As reported in the earlier section of this study, only definite invagination or deep cleft of the enamel would be considered as a positive occurrence of dens invaginatus and talon cusp was considered present when the projection on the palatal/lingual surfaces of the incisor was more than half of the crown length of the tooth. As there was no earlier prevalence study on dens invaginatus on Malaysian children, a comparison could not be made. The failure to diagnose the presence of dens invaginatus in this study is quite surprising. It is most likely that prophylactic treatment of the anomaly may have been carried out by the school dental nurses or dentists and this finding was observed when surface analysis of decayed and filled teeth was carried out among these children which showed that 2.57% of the palatal surfaces of maxillary lateral incisors had decayed or filled pits (1.98% filled and 0.59% decayed)[35].

An earlier study on talon cusp in Malaysia by Rusmah[36], who used similar criteria to the one employed in this study reported a prevalence of 5.2%. However, the subjects in her study were not randomly chosen as all the 536 subjects were patients who attended for treatment at the Dental Faculty, University of Malaya, and no mention was also made on whether they were consecutive patients that were seen in the Faculty or otherwise.

CONCLUSION

Anomalies of the permanent dentition was detected in 7.4% of the subjects examined and nine subjects (0.7%) showed the presence of two different types of anomalies. The anomalies detected and their respective prevalences are hypodontia 2.8%, erupted supernumerary teeth 1.0%, dens evaginatus 2.0%, peg-shaped lateral incisors 2.0% and double-teeth 0.4%. No cases of dens invaginatus or talon cusp were detected.

REFERENCES

1. Grahnen H, Hypodontia in the permanent dentition: A clinical and genetic investigation. Odont Revy 1956;7:1-100.

2. Hunstadbraaten K. Hypodontia in the permanent dentition. J. Dent Child 1973; 40:115-117.

3. Foster TD. A textbook of Orthodontics, 3rd ed. Blackwell Scientific Publications, 1990;156-167.

4. Davies PL. A genesis of teeth of the permanent dentition. A frequency study in Sydney children. Aust Dent J 1968; 13:146-150.

5. Ravn JJ, Nielsen HG. A longitudinal radiographic

study of the mineralization of 2nd premolars. Scand J Dent Res 1977; 85:232-236.

6. Silverman NE, Ackerman JL. Oligodontia : A study of its prevalence and variation in 4032 children. J Dent Child 1979; 46:38-45

7. Ruprecht A, Bantiji S, El-Neweihi E. Incidence of oligodontia (hypodontia). J Oral Med 1986; 41:43-46.

8. Winter GB, Brook AH. Tooth Abnormalities. Rowe, A.H.R., Alexander AG, Johns RB, eds. Clinical Dentistry, Blackwell Scientific Publications 1986;55-103.

9. Soames JV, Southam JC. Oral pathology, Oxford University Press, 1985.

10. Nik Hussein NN. Hypodontia in the permanent dentition: a study of its prevalence in Malaysian children. Aust Orthod J 1989; 11:93-95.

11. Brook AH. Dental anomalies of number, form and size: their prevalence in British school children. J Ass Dent Child 1974; 5:37-53.

12. Ruprecht A, Bantiji S, El-Neweihi E . Incidence of supernumerary teeth. Ann Dent 1984; 43:18-21.

13. Nik Hussein NN. A radiographic survey of supernumerary teeth in Malaysian children. Sing Dent J 1985; 10:13-15.

14. Bergstorm K. An orthopanthomographic study of hypodontia, supernumeraries and other anomalies in school children between the ages of 8-9 years. Swed Dent J 1977; 1:145-157.

15. Luten JR. The prevalence of supernumerary teeth in primary and mixed dentition. J Dent Child 1967; 34:346-353.

16. Ravn JJ. Aplasia, supernumerary teeth and fused teeth in the primary dentition - An epidemiologic study. Scand J Dent Res 1967; 79:1-6.

17. Di Biase DD. Midline supernumeraries and eruption of the midline central incisor. Dent Practit 1969; 20:35-40.

18. Grahnen H, Lindahl B. Supernumerary teeth in the permanent dentition. Odontol Revy 1961; 12:290-294.

19. Lim ST, Chen ML, Yong SL. The treatment of dens evaginatus. Sing Dent J 1980; 5:39-43.

20. Yip WK. The prevalence of dens evaginatus. Oral Surg 1974; 38:80-87.

21. Miles AEW. Malformation of the teeth. Proc R Soc Med. 1954; 47:817-826.

22. Kelly JR. Gemination, fusion or both? Oral Surg 1978; 45:655-656

23. Brook AH, Winter GB. A retrospective study of "geminated" and "fused" teeth in children. Br Dent J 1970; 129:123-130.

24. Shafer WG. Dens in dente. N Y ST Dent J 1953; 19:220-225.

25. Conklin WW. Double bilateral dens invaginatus in the maxillary incisor region. Oral Surg 1975; 39:949-952.

26. Hallett GEM The incidence and clinical significance of palatal invagination in the maxillary incisor teeth. Proc R Soc Med 1953; 46:491-499.

27. Grundy MC. Dental anomalies of tooth formation Part 1. Dental Update 1980; 7:153-158.

28. Conklin WW. Bilateral dens invaginatus in the mandibular incisor region. Oral Surg 1978; 45:905-907.

29. Banner H. Bilateral dens in dente in the mandibular premolar. Oral Surg 1978; 45:827-828.

30. Mader CL. Talon cusp. J Am Dent Assoc 1981; 103:244-246.

31. Chawla HS, Tewari A, Gopalakrishnan NS. Talon cusp - a prevalence study. J Ind Soc Pedod Prev Dent 1983; 1:28-34.

32. Davies PJ, Brook AH. The presentation of talon cusp; diagnosis, clinical features, associations and possible aetiology. Br Dent J 1986; 160:84-88.

33. Majid ZA, Nik Hussein NN, Low WY, Dental caries experience of 1306, 14-year-old Malaysian children 17 years after water fluoridation. (Submitted for consideration for publication.)

34. Amos ER. Incidence of the small dens in dente. J Am Dent Assoc 1955; 51:31-33.

35. Majid ZA, Nik Hussein NN. Surface analysis of decayed and filled teeth among urban Malaysian schoolchildren. (In preparation.)

36. Rusmah M. Talon cusp in Malaysia. Aust Dent J 1991; 36:11-14

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