PATTERN OF DENTAL HARD-TISSUE DEVELOPMENTAL ANOMALIES AMONG CHILDREN (1-14 YEARS) VISITING A DENTAL HOSPITAL IN KATHMANDU, NEPAL

Khanal S[1], Acharya J[2]

[1]Department of Pedodontics and Preventive Dentistry, [2]Department of Community and Public Health Dentistry, Nepal Medical College and Teaching Hospital (NMCTH) Kathmandu, Nepal.

ABSTRACT

Dental anomalies have been widely examined, but no such studies have been conducted in Nepalese population. The objective of this study was to examine the prevalence of dental anomalies and investigate their possible association with dentition and ethnicity in the Nepalese children. A cross sectional study was carried out among 5216 children upto 14 years visiting the Pedodontics department. Out of the total patients examined, 222 patients presented with dental anomalies, 37.8% showed structural anomaly of teeth which was followed by 36.5% of number, 14.5% of shape anomaly, 11.3% of eruption and 4.5% of size. Enamel hypoplasia was found to be more common in this study group 36.5% which was followed by supernumerary tooth 24.8% and 11.3% presented with supernumerary root. Mongolian children had more anomaly of shape, number, size and structure. Children of Aryan race showed more prevalence in respect to the eruption of the teeth. Prevalence of anomalies of structure and eruption ($p<0.05$) and size, number was more in permanent dentition and primary teeth showed more anomalies regarding the shape($p<0.05$).

KEYWORDS

Dental anomalies,
permanent dentition,
primary dentition

CORRESPONDING AUTHOR

Dr. Sanskriti Khanal (BDS, MDS),
Department of Pedodontics and Preventive Dentistry,
Nepal Medical College, Attarkhel,
Gokarneshwor-8, Kathmandu, Nepal.
E-mail: sans212@gmail.com

INTRODUCTION

Developmental dental anomalies are an important category of dental morphologic variation. These anomaly are classified according to the number, shape, size etc.1 These abnormalities in tooth size, shape and structure results from disturbances during the morho-differentiation stage of development, while ectopic eruption, rotation and impaction of teeth result from developmental disturbances in the eruption pattern of the permanent dentition.[1,2]

Even though the prevalence of these dental anomalies is less compared to the other oral diseases like dental caries and periodontal diseases but if neglected can pose serious complications in child's growth and treatment planning.[3] These anomalies can cause delayed or non-eruption of the normal series of teeth; attrition; breast feeding problems; compromised esthetics; occlusal interference, accidental cusp fracture, interference with tongue space causing difficulty in speech and mastication, temporomandibular joint pain and dysfunction; malocclusion; periodontal problems because of excessive occlusal force; post-eruptive tooth breakdown; and increased susceptibility to caries.[4]

The disturbances in primary teeth like hypodontia, hyperdontia, gemination, or fusion of teeth increase the likelihood of anomalies among succeeding permanent teeth.[5] In a radiographic study by Nik-Hussein E that over 60% of the cases with anomalies in the primary dentition are associated with anomalies of the succadeneous permanent dentition.[6]

Because of the close relationship between the dentitions, early identification of anomalies in primary teeth and mixed dentition allows the dentist formulate customized treatment plans appropriately.[5] Therefore, the objective of this study was to assess the prevalence of dental anomalies among children and to compare the frequency of occurence of these anomalies in primary and permanent dentition.

MATERIALS AND METHODS

This was a cross sectional study carried out among 5216 children upto 14 years (3047 male, 2170 female) visiting Department of Pedodontics and Preventive Dentistry from August 2015 to August 2016. All new patients reporting to the Department of Pedodontics and Preventive Dentistry in CODSH-Nepal Medical College within a one year time duration were enrolled in the study. Parents accompanying the child gave consent for the examination.

Children presenting the history of chronic systemic diseases, physical/mental disorders or with known syndrome and those who were not willing to participate in the clinical examination were excluded from the study. All patients were examined clinically in the dental OPD by a single trained clinician. Appropriate radiographs were taken to confirm the diagnosis of the dental anomalies.

Ethical consideration

Ethical approval was obtained from Institutional Review Committee of Nepal Medical College (NMC_IRC).

Written informed consent was obtained from a parent or legal guardian of each study participant prior to enrollment in the study.

Data were analyzed using the statistical package for social science 11.5 (SPSS 11.5). Descriptive statistics were obtained and frequency distribution were calculated. Pearson's Chi square test was used to test for association (α=0.05).

RESULTS

This study was conducted among 5216 children of age till 14 years of age. Out of the total examined children, 222 patients presented with dental anomalies of different variations. Out of the children who presented with the anomaly 54.1% were male patients and 45.9% were females (120 male, 102 female).

Table 1: Distribution of variables

Age	**N= 222**	**%**
1-6 yrs	44	19.8%
7-14yrs	178	80.2%
Gender		
Male	120	54.1%
Female	102	45.9%
Ethnicity		
Aryan	73	32.9%
Mongoloids	149	67.1%

Out of the patients presenting with anomalies (222 patients), 37.8% showed structural anomaly of teeth which was followed by 36.5% of individuals having anomaly in number, 14.5% having shape anomaly , 11.3% presented with anomalies in eruption and the least was 4.5% in size (microdontia). (Table 2)

Table 2: Distribution of anomaly

Variable	**n**	**%**
Shape	33	14.9
Size	10	4.5
Number	81	36.5
Structural	84	37.8
Eruption	25	11.3

The children of Mongolian race showed higher prevalence of anomaly of 66.5% than children of Aryan race (32.9%).

Mongolian children had more anomaly of shape, number, size and structure. Children of Aryan race showed more prevalence in respect to the eruption of the teeth. (Table 3)

Table 3: Ethnicity Vs Anomaly

Variable	Ethnicity (%)		p-value*
Anomaly	**Aryan**	**Mongolian**	
Shape	27.2%	72.7%	0.83
Size	40%	70%	0.42
Structure	30.96%	69.04%	0.68
Number	32.09%	67.9%	0.58
Eruption	60%	40%	0.05

Prevalence of anomalies of structure, size, number and eruption was more in permanent dentition and primary teeth showed more anomalies regarding the shape. (Table 4)

Table 4: Dentition Vs Anomaly

Variable	Dentition (%)			p-value*
Anomaly	**Primary**	**Permanent**	**Both**	
Shape	63.6%	30%	15.1%	<0.05 0.00
Size	0	100%	0	>0.05 0.402
Structure	7.14%	90.4%	2.3%	<0.05 0.00
Number	27.1%	72.8%	0	>0.05 0.06
Eruption	36%	52%	12%	<0.05 0.002

Enamel hypoplasia was found to be more common in this study group (36.5 %) which was followed by supernumerary tooth comprising 24.8% and 11.3% presented with supernumerary root.

Enamel hypoplasia was present in the maxillary 10.3%and the mandibular teeth 13.06 % and 12.16% presented in both the arches. In respect to the dentition the permanent teeth (45.1%) presented with more number of enamel hypoplasia than primary dentition (10.9 %)and this difference was statistically significant (p= 0.00)

Fusion and gemination was found to be more prevalent in the primary dentition 16.4% and 21.8% respectively than permanent teeth(1.9% and 1.2% respectively) and this was statistically significant (p value <0.05) with more occurance in mandibular arch 11.7% and 2.7%in maxillary arch.

Higher proportion of children having mixed dentition (27.8%) presented with supernumerary tooth than children with primary dentition(18.2%) whereas primary teeth (21.8%) had more supernumerary root compared to the permanent teeth (8.0%) with no statistical difference. Regarding the anomaly of the number except for one supplemental tooth in mandible all supernumerary teeth were present in maxilla (mesiodens).

When gender was analysed with presence of supernumerary tooth and root it was seen that higher proportion of males (33.3%) presented with this anomaly than females (14.7%) and this was statistically significant (p value <0.05).

Regarding the anomaly of eruption; missing teeth 8.1% was to be more prevalent than early eruption (2.7%) and delayed eruption (0.5%) of teeth.

DISCUSSION

Complications associated with dental hard- tissue anomalies include increased predisposition to caries and periodontal diseases, aesthetic impairment, pulpitis-induced pain, and crowding all of which can negatively affect the oral health-related quality of life of affected children.[4] The etiology of dental anomalies of number, size, position, as well as timing of development, have been suggested to be genetic and hereditary, as derived from studies in families, monozygotic twins, and from the frequent observation of associations of certain dental anomalies.[7]

Out of the total examined children in this study, the prevalence of the dental anomaly was present in 222 children. Out of the children who presented with dental anomalies the difference between the boys and girls was not statistically different. But significantly mongoloid children presented with more anomaly than the Aryan children. Some studies have reported racial difference, ranging from 0.2% to 1.8% for Caucasians, compared with 7.8% for Mongoloids.[4]

Deolia *et al* have reported statistical difference in the prevalence of the dental anomalies in the different religious groups in India.[3] This racial and cultural difference could be accredited to the culture and concept of child rearing, food patterns,nutritional status, consanguineous marriages, importance of oral hygiene, the environmental factors, and the interaction of genetic and environmental factors. Enamel hypoplasia or deficiency of enamel formation8 was the most common anomaly present in this study group (36.5%). This structural anomaly of the tooth was present almost equally in both maxillary and mandibular teeth. In a study by P Nayak in India, enamel hypoplasia was found to be most prevalent than other anomalies like talon's cusp, microdontia and mesiodens.[9]

Anomalies of the oral and dental structures can be isolated (like in our study as the exclusion criteria in our study was children without systemic condition) , or sometimes they may also be a symptom of a major defect or manifestation of a general disorder or syndrome.10 Malahias *et al* have reported that the children diagnosed with celiac diseases presented with dental enamel defects in 87%[11] and Geopferd *et al* have reported enamel hypoplasia in a patient with congenital hypoparathyroidism.[12] In our study the hypoplasia of the enamel was found to be more in the permanent dentition (45.1%) presented with more number of enamel hypoplasia than primary (10.9 %).

In our study the prevalence of supernumerary teeth was 36.5%. The supernumerary tooth was the mesiodens and was present in the maxillary arch in the premaxillary region. Backman and Wahlin[13] found 14 cases with one supernumerary tooth in a study in the Caucasian population. They also noted that the majority of the supernumerary teeth were mesiodens, similar to the present study. Another study of 2,393 Saudi Arabian children found the prevalence of supernumerary tooth to be 0.5%.[14] The prevalence of supernumerary teeth in the western region of Saudi Arabia was reported to be 0.3%.[15] supernumerary teeth were seen among 5.3% subjects and mostly in the maxillary arch and these results are more than the study done by Gupta *et al* that showed prevalence 2.40% of participants with supernumerary teeth. Other studies also showed that 90% to 98% of supernumerary teeth occur in the maxilla arch.[16] Complications associated with supernumerary teeth include impaction, delayed eruption, ectopic eruption, dental overcrowding, teeth spatial disorders, and the formation of follicular cysts.[17] Grahnen *et al* have reported that supernumerary teeth can occur in both the permanent and the primary dentition, but the prevalence in the primary dentition is five times lower.[18]

Bahadure *et al* have reported that the prevalence of supernumerary tooth in primary dentition is rare which may be because of less frequent reporting of deciduous supernumerary teeth which also include less detection by parents, as the spacing frequently encountered in the deciduous dentition may be utilized to allow the supernumerary tooth or teeth to erupt with reasonable alignment.[19] Hyperdontia in the primary dentition is rare, however in our study there were 21.2% cases presenting with supernumerary primary tooth. Nik-Hussein and Mazid AZ in their study have reported 50% of subjects with primary supernumerary tooth.[6]

There was 10.3 % of the supernumerary roots present in the children and all these extra roots were present in the mandibular molars. There were 13(5.8%) children who presented with supernumerary root in primary dentition and 9(4.05%) children had in permanent dentition. A study of Indian population of 250 patients where SCT(Spiral computed tomography) was done to assess the supernumerary root and it was found to be 6.40% but was not statistically different.[20] This abnormality is a definite hindrance for successful endodontic treatment leading to perforations and also poses difficulty in extractions,[21] in permanent teeth along with these problems if it is present in the primary tooth it can disturb the eruption of permanent successor also.[22] Out of the total patients examined we found 13 patients with supernumerary root in primary dentition in the mandibular second molar. There are few case reports of 3 rooted mandibular molar.[22,23]

In our study, more anomalies were seen in permanent dentition than primary dentition similar to the study by Temilola *et al* in the Nigerian children. They reported significantly more cases of densevaginatus, macrodontia, peg-shaped laterals, talon cusp and notch shaped incisor in the permanent dentition than in the primary dentition but contrary to our finding they found significantly more cases of hypoplastic enamel ($p < 0.001$) in the primary than permanent.[4] In our study the permanent dentition presented with more hypoplastic enamel than primary dentition. These contradictory findings may be explained by marked differences in the sample size and in the methods used, making further investigations necessary.

Very few cases of fusion in mandibular primary dentition have been reported from the Indian population. In Caucasians it is 0.02% and in Japanese population 0.32%.[24] The fusion of primary teeth may be associated with the absence of 1 of the 2 permanent successors. Tsujino *et al* have reported absence of the successional lateral incisor in 65% of Upper Central Incisor/Lateral Incisor cases and 74% of Lower Lateral Incisor /Canine cases, whereas only 16% of Lower Central Incisor / Lateral Incisor cases,[25] and the prevalence depends on the combination of fused primary teeth,[26] and in our study we found that there were missing permanent lateral incisors in the fused mandibular deciduous Central Incisor and Lateral Incisor in 3 patients.

Hypodontia in our study was present in 8.1% and in primary dentition it was present in 6.8%. In previous studies all subjects with hypodontia of the primary dentition presented with hypodontia of the permanent dentition,6 and was found to be most prevalent in Saudi Arabian children 25.7%,[15] and in Norwegian children 6.6%.[27] In Iranian population, the anomalies of shape and number were more common in the age groups of 7-12 years and 13-15 years,[28] but in our study the anomaly of shape like talons cusp , enamel pearl, odontome was found to be rare. Similar results were reported by Nayak *et al* in their study.[9] The variation in the prevalence of the anomalies may be attributed to the study sample, the environmental factors associated, racial and the genetic differences of the population.

Data on dental anomalies are important for both the anthropological and clinical management of patients. The incidence and degree of expression of the anomalies can provide important information for phylogenic and genetic studies and help in the understanding of differences within and between populations.

The higher prevalence of enamel hypoplasia that we found in this study may reflect more frequent exposure of children in this suburban setting to the various aetiological factors for enamel hypoplasia.

REFERENCES

1. Rajendran R. Developmental disturbances of Oral and Paraoral Structures. Rajendran R, Sivapthasundaram B. Inc:Shafer's Textbook of Oral Pathology. 6th Ed, Elseviar India, 2009, 3-70.
2. Gupta S, Saxena P,Jain S, Jain D. Prevalence and distribution of selected developmental dental anomalies in an Indian population. *J Oral Sci* 2011; 53: 231-88.
3. Deolia S G, Chhabra C, Chhabra KG, Kalghatgi S, Khandelwal N. Dental anomalies of the deciduous dentition among Indian children: A survey from Jodhpur, Rajasthan, India. *J Indian Soc Pedod Prevent Dent* 2015; 33: 111-5.
4. Temilola DO, Folayan MO , Fatusi O, Chukwumah NM, OnyejakaN, Oziegbe E, Oyedele T, Kolawole KA, Agbaje H. The prevalence, pattern and clinical presentation of developmental dental hard-tissue anomalies in children with primary and mix dentition from Ile-Ife, Nigeria. *BMC Oral Health* 2014; doi: 10.1186/1472-6831-14-125.
5. Whittington BR, Durward CS. Survey of anomalies in primary teeth and their correlation with the permanent dentition. *NZ Dent J* 1996; 92: 4-8.
6. Nik-Hussein NN, Abdul Majid Z. Dental anomalies in the primary dentition: distribution and correlation with the permanent dentition. *J ClinPediatr Dent* 1996; 21: 15-9.
7. Patil S, Doni B, KaswanS, RahmanF. Prevalence of dental anomalies in Indian population. *J Clin Exp Dent* 2013; 5: 183– 6.
8. Slayton RL,Warren JJ, Kanellis MJ, Levy SM, Islam M. Prevalence of enamel hypoplasia and isolated opacities in the primary dentition. *Pediatr Dent* 2001; 23: 32-6.
9. Nayak P, Nayak S. Prevalence and distribution of dental anomalies in 500 Indian school children. *Bangladesh Journal of Medical Science* 2011; 10: 41-4.
10. Juki J, Ckrinjari I, Domagoj G, Zlatko U. The Prevalence of Oral and Dental Anomalies in Children with Developmental Disturbances. *Acta Stomat Croat* 2002; 36: 79-83.
11. Malahias T, Cheng J, Brar P, Minaya M T,. Green P H.R. The Association Between Celiac Disease, Dental Enamel Defects, and Aphthous Ulcers in a United States Cohort. *J Clin Gastroenterol* 2010; 44: 191-4.
12. Goepferd SJ, Flaitz CM. Enamel hypoplasia associated with congenital hypoparathyroidism. *Pediatric Dentistry* 1981; 3: 196-200.
13. Backman B, Wahlin YB. Variations in number and morphology of permanent teeth in 7-year-old Swedish children. *Int J Paediatr Dent* 2001; 11: 11-7.
14. Salem G. Prevalence of selected dental anomalies in Saudi Children from Gizan region. Community *Dent Oral Epidemiol* 1989; 17: 162-3.
15. Afify AR, Zawawi KH. The prevalence of dental anomalies in the Western Region of Saudi Arabia. *ISRN Dent* 2012; doi.org/10.5402/2012/837270
16. Kathariya MD, NikamAP, ChopraK, PatilNN, Raheja H, KathariyaR. Prevalence of Dental Anomalies among School Going Children in India. *J Int Oral Health* 2013; 5: 10–14.
17. Ata-Ali F, Ata-Ali J, Peñarrocha-Oltra D, Peñarrocha-Diago M. Prevalence, etiology, diagnosis, treatment and complications of supernumerary teeth. *J Clin Exp Dent* 2014; 6: 414-8.
18. Schmuckli R, Lipowsky C, Peltomaki T. Prevalence and Morphology of Supernumerary Teeth in the population of a Swiss Community. *Schweiz Monatsschr Zahnmed* 2010; 120: 987-93.
19. Bahadure RN, Thosar N, Jain ES, KharabeV, GaikwadR.Supernumerary Teeth in Primary Dentition and Early Intervention. *Case Reports in Dentistry* 2012 doi.org/10.1155/2012/614652.
20. Garg AK, Tewari RK, Agrawal N. Prevalence of Three-Rooted Mandibular First Molars among Indians Using SCT. *Int J Dentistry* 2013; doi. org/10.1155/2013/183869.
21. Guttala KS,Venkatesh GN,BhargavacP ,Bathid RJ. Frequency of Developmental Dental Anomalies in the Indian Population. *Eur J Dent* 2010; 4: 263-9.
22. Mokhtari I, Mokhtari S Seraj B Sanati I. Primary Mandibular First Molar With Three Roots: A Case Report. *Pakistan Oral Dent J* 2013; 33: 74-5.
23. Rana V, Shafi S,Gambhir N, Rehani U. Deciduous mandibular second molar with supernumerary roots and root canals associated with missing mandibular permanent premolar. *Int J Clin Pediatr Dent* 2011; 4: 167-9.
24. Rao PK, Mascarenhas R, Anita A, Devadiga D. Fusion in Deciduous Mandibular Anterior Teeth – A Rare Case. *Dentistry* 2014; doi:10.4172/2161-1122.S2-001.
25. KeiichiroT, TakuroY, Seikou S.Effects of Different Combinations of Fused Primary Teeth on Eruption of the Permanent Successors. Pediatric Dentistry, 2013; 35: 64-7.
26. Yuen SWH, Chan JCY,Wei SHY. Double primary teeth and their relationship with the permanent successors: a radiographic study of 376 cases. *Pediatric Dentistry* 1989; 1: 42-8.
27. Haugland L, Storesund T, Vandevska-Radunovic V. Prevalence of Dental Anomalies in Norwegian School Children. *Open J Stomatol* 2013:329-33.
28. Shokri A,Poorolajal J, Khajeh S, Faramarzi F, Kahnamoui HM.Prevalence of dental anomalies among 7- to 35-year-old people in Hamadan, Iran in 2012-2013 as observed using panoramic radiographs. *Imaging Sci Dent* 2014; 44: 7-13.