

Prevalence of developmental dental hard-tissue anomalies among adolescents in southeastern Nigerian rural communities

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Abstract

Background and objectives: Dental anomalies are significant deviation in the normal size, structure, number, root formation or shape of a tooth. It can affect primary and permanent dentition. The aim of the present study was to determine the prevalence of developmental dental hard tissue anomalies in the permanent dentition of adolescents in two southeastern Nigerian rural communities.

Materials and methods: This cross-sectional descriptive study was conducted among school children aged 12-13 years attending two public secondary schools. The schools were located in Nkanu-West and Udi Local Government areas in Enugu state. Oral examination for the presence or absence of developmental dental hard tissue anomalies was performed by a single examiner. Statistical analysis was done using SPSS Version 25.

Results: A total of 61 (44.9%) males and 75 (55.1%) females participated in the study. The age range of the children was 12 to 13 years with mean age of 12.49 ± 0.50 years. The prevalence of developmental dental hard tissue anomalies was 2.2%. Developmental dental hard tissue anomalies were seen only in females, higher among 13-year-old school children and school children from middle socioeconomic status. Enamel hypoplasia was seen more than peg shaped lateral incisor. There was no statistically significant association with sex ($p = 0.25$), age ($p = 0.61$), socioeconomic status ($p = 0.25$) and developmental dental hard tissue anomalies.

Conclusion: The prevalence of developmental dental hard tissue anomalies was low in this study. Developmental dental hard tissue anomalies can affect aesthetics and quality of life. A visit to dental clinic for clinical assessment, preventive interventions and management is recommended.

Introduction

Dental anomalies are differences or deviation in the normal size, structure, number, root formation or shape of a tooth [1-5]. It can affect a single tooth in isolated case or multiple teeth in syndromic case. Dental anomalies can present as hyperdontia,

hypodontia, talon cusp, hypoplasia, peg-shaped lateral incisor, dentinogenesis imperfecta, taurodontism, microdontia, macrodontia, dens evaginatus, odontoma, germination, amelogenesis imperfecta, dens invaginatus and fusion [1-8]. Dental anomalies in children or adolescents had

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been assessed clinically by inspection and radiographically by use of x-rays in several epidemiological studies [1-8]. The prevalence of dental anomalies in a hospital-based study, among 8 to 12 years old children in Kuwait was 20.1% [5], 4.2 % among 12 to 15 year old Nigerian school children [3] and 3.2% among Nigerian preschool children [2]. The aim of this study was to determine the prevalence of developmental dental hard tissue anomalies in the permanent dentition of adolescents in two southeastern Nigerian rural communities.

Materials and methods

A cross-sectional descriptive study was conducted among school children aged 12-13 years attending rural public secondary schools in Nkanu-West and Udi Local Government areas in Enugu state. The school children were randomly selected from each school. The inclusion criteria were children aged 12-13 years old attending public secondary school in selected rural communities. Informed consent was obtained from the parents of the school children and assent was obtained from the school children. The students were examined while seated in their classroom chair using natural daylight while the teeth were clean.

Sample size for this study was calculated using the formula for cross-sectional study:

$N = z^2 P(1-P)/d^2$ [9], where N is the sample size, Z is the statistic corresponding to level of confidence, P is expected prevalence, and d is precision (corresponding to effect size). The total sample

size for the two local government areas was 136 (68x2) considering prevalence of developmental dental hard tissue anomalies as 4.2 % from a previous study in Nigeria [3].

Socio-demographic data (age, sex, socio-economic status) was obtained using semi-structured questionnaire. Socio-economic status was determined by criteria used in a previous study [10] and socio-economic status designation combines father's occupation with the mother's level of education [10]. Oral examination for the presence or absence of developmental dental hard tissue anomalies was done by a single examiner (A Dentist). Prior to oral examination, the examiner was trained using clinical pictures of various presentations of developmental dental hard tissue anomalies.

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) Version 25. Descriptive analysis was conducted to determine the prevalence of developmental dental hard tissue anomalies and association between dependent and the independent variables was determined using Fisher's exact test.

Results

Total 136 adolescents were enrolled in the study. Out of 136, 61(44.9%) were males and 75(55%) were females. The age range of the children was 12 to 13 years with mean age of 12.49 ± 0.5 years (Table-1). The prevalence of developmental dental hard tissue anomalies was 2.2%. Table-1 shows that developmental dental hard tissue anomalies were

Table-1: Profile of the study participants

Variables	Total	DDA present n (%)	DDA absent n (%)	p value
Total participants	136	3 (2.2)	133 (97.8)	
Age				
12	70	1 (1.4)	69 (98.6)	P= 0.61
13	66	2 (3)	64 (97)	
Gender				
Male	61	0	61 (100)	P=0.25
Female	75	3 (4)	72 (96)	
Socioeconomic status				
Low	91	1 (1.1)	90 (98.9)	P=0.25
Middle	45	2 (4.4)	43 (95.6)	

Note: DDA - developmental dental anomaly

seen only in females, higher among 13-year-old school children and school children from middle socioeconomic status. Table-2 shows that enamel hypoplasia was seen more than peg shaped lateral incisor. Among the developmental dental hard tissue anomalies seen among the school children, 66.7% were enamel hypoplasia and 33.3% were peg shaped lateral incisor/microdontia. Peg shaped lateral incisor was seen on the left side of the maxillary arch. There was no statistically significant association between sex ($p = 0.25$), age ($p = 0.61$), socioeconomic status ($p = 0.25$) and developmental dental hard tissue anomalies.

Table-2: Prevalence of types of dental anomalies in the permanent dentition ($n=136$)

Dental anomalies	Number (%)
Enamel hypoplasia	2(1.5)
Peg shaped lateral incisor	1(0.7)
No anomaly	133(97.8)

Discussion

Dental anomalies can occur in primary teeth and permanent teeth. The development of the teeth is regulated by molecular and cellular interactions and any disruptions or disturbances during the phases of initiation, morphogenesis and histodifferentiation can lead to the development of dental anomalies [11-14]. Previous studies reported that mutations in some gene families such as *Msh Homeobox 1 (MSX1)* and *paired box 9 (PAX9)* may play a role in the development of different developmental dental anomalies [15,16].

The prevalence of developmental dental hard tissue anomalies in this study was lower than 17.5% among children seen in a hospital-based study in southwest Nigeria [1] and 26.6% among children seen during a household survey in southwest Nigeria [6]. A hospital-based study in Kuwait also reported the prevalence of developmental dental hard tissue anomalies as 20.1% among 8-12 year old children [5]. This finding could be as a result of the method of detection of dental anomalies, difference in geographic location and the influence of genetic, epigenetic and environmental factors in the development of dental anomalies. However, our finding was close to 4.2% seen among 12- to

15-year-old school children in southwest Nigeria [3] and 1.8% among children seen in a hospital-based study in Turkey [8]. In our study, dental anomalies were seen only in females, this observation was in agreement with previous studies of more occurrence of dental anomalies among females [1,3-5,8]. Dental anomalies were also higher among children of middle socioeconomic status, this finding agreed with previous study of more occurrence of dental anomalies among children of middle socioeconomic status [3], but different from previous study of more occurrence of dental anomalies among children of low and high socioeconomic status [6,2]. The most common dental anomaly in this study was enamel hypoplasia. The finding was consistent with findings of previous studies [1,3,6]. However, other studies have reported less enamel hypoplasia [2,5,8]. Radiographs were not taken to identify other anomalies in this study. This study was a public-school based study within the selected local government areas, the findings of this study might not represent adolescents attending private schools in the rural community and adolescents in communities within the selected local government areas that were not visited. The findings might also not represent adolescents absent at school during the days of data collection, and out of school children (adolescents not attending any school) in the rural community. There could be marked or slight variation in the prevalence of developmental dental hard tissue anomalies among adolescents in the selected rural communities when participants are selected from both public and private schools or seen during a household survey in the rural communities.

The prevalence of developmental dental hard tissue anomalies was low. Enamel hypoplasia was the most common dental hard tissue anomaly seen. Developmental dental hard tissue anomalies can affect aesthetics and quality of life. A visit to dental clinic for clinical assessment, preventive interventions and management is recommended.

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Conflicts of interest

Authors have no conflicts of interest to declare

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