UPDCJ EST. 2015 OPEN ACCESS

Prevalence and Factors associated with Dental Caries among Adolescents aged 12-15 years in Rural communities in Enugu, Southeast Nigeria

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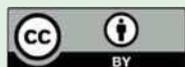   Department of Public Health , National Open University of Nigeria, Edo State, Nigeria.

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ABSTRACT

Background: Dental caries can affect all socioeconomic classes and it continues to be of dental public health interest. **Objective:** To determine the prevalence and factors associated with dental caries among adolescents aged 12-15 years in four rural communities in Enugu, Southeast Nigeria.
Materials and Methods: A cross-sectional descriptive study among 12-15 years old was conducted in Nkanu–West and Udi Local Government area of Enugu state. Data collection was done in the year 2024. Socio-demographic data was obtained using questionnaire. Oral examination for the presence of dental caries was done by two examiners using the DMFT index. Tests of association between dependent variable (dental caries) and independent variables (age, sex, socio-economic status, oral hygiene status, tooth-brushing frequency and use of fluoride containing toothpaste) were conducted using Chi square/Fisher's exact test. Statistical analysis was done using SPSS version 25. P value <0.05 was accepted as being statistically significant. **Results:** A total of 297 adolescents participated in the study and 140 (47.1%) were males. The prevalence of dental caries was 8.4% with mean DMFT of 0.11± 0.42. Dental caries was higher among females of 15 years old and adolescents from low socioeconomic status. There was no statistically significant association between sex (p= 0.143), age (p= 0.115), socio-economic status (p= 0.761), tooth-brushing frequency (p= 0.139), use of fluoride containing toothpaste (p= 0.358), oral hygiene status (p= 0.175) and dental caries. Conclusion: The prevalence of dental caries in the study population was low. Interventions for untreated carious teeth are recommended.

Keywords: Adolescents, caries, community, rural, school.

INTRODUCTION

Dental caries is a significant public health problem in both of resource limited and resource rich countries.[1] Dental caries can affect all age groups, all socioeconomic classes, both sexes and it continues to be of dental public health interest.[2,3] The prevalence of dental caries among 12-15 years old adolescents in China was 53.7%.[4] In Nigeria, The prevalence of dental caries in a previous study conducted over 13 years ago, was 35.5%[5] among 11-16 years in Awgu Local government area in Enugu state , South East, Nigeria, 34.0%[6] among 12 years in Ilorin, Kwara state, North Central, Nigeria, 22.9%[7] among 10-12 years old in Kano, North West, Nigeria, 15.4%[8] among 12-15 years in Port Harcourt, Rivers state, South Nigeria and 10.6%[9] among 10-19 years in Ibadan, Oyo state, South West, Nigeria.

Epidemiological studies on dental caries among adolescents in rural areas will provide information on the pattern, distribution and any changes in oral trends among adolescents in rural areas and it will also add to the existing literature. This study will provide information on any changes in oral health trends, like the proportion of children with high dental caries experience and high level of untreated dental caries. The aim of this study is to determine the prevalence and factors associated with dental caries among 12-15 years old school children attending public schools in four rural communities in Nkanu–West and Udi local Government Area of Enugu State, South-east Nigeria.

MATERIALS AND METHODS

A cross-sectional descriptive study was conducted in Nkanu west and Udi Local Government areas in Enugu state. Ethical clearance for this study was sought and obtained from Health Research and Ethics Committee, University of Nigeria Teaching Hospital. Informed consent was obtained from the parents of the school children and assent was obtained from the school children. School children aged 12-15 years attending public schools in Nkanu West and Udi Local Government Areas participated in this study. The school children were randomly selected in each school using labelled ballot papers.

The sample size for this study was calculated using the formula for descriptive cross-sectional study:

$$n = \frac{z^2 pq}{d^2}$$

n = sample size

p = prevalence

q= 1-p

The sample size was calculated using the following values:

Prevalence of dental caries was 22.7. % from a previous study in Enugu, Nigeria[11]

z = 1.96

p = 22.7% (0.227)[11]

q = 1- 0.227 = 0.773

d = 0.05

$$n = \frac{(1.96)^2 (0.227)\,(0.773)}{(0.05)^2} = 269.6 \text{ approximately } 270$$

10% of non-responders = 27

270 + 27 = 297; Two hundred and ninety seven children were selected.

Data collection was done in the year 2024. Socio-demographic data (age, sex, socio-economic status, frequency of tooth brushing, use of fluoride containing toothpaste) were obtained using questionnaire. Socio-economic status was determined by a criterion used in a previous study[12], using father's occupation and the mother's level of education. Oral examination for the presence of dental caries was carried out by two examiners using the DMFT index.11,13 Oral hygiene status was assessed using simplified oral hygiene index.11 The inclusion criteria were children aged 12-15 years old, attending public schools in selected rural communities and whose parents had given consent to participate in the study, while the exclusion criteria were those who were absent from the school at the time of study.

The students were examined while seated in their classroom chair using natural daylight . Data were entered unto SPSS and statistical analysis was done using Statistical Package for Social Sciences (SPSS) Version 25. Descriptive analysis was conducted to determine the prevalence of dental caries among public-school children in the selected rural communities. Tests of association between dependent variables (presence of dental caries) and the independent variables (socio-economic status, age, sex, frequency of toothbrushing, oral hygiene status, use of fluoride containing toothpaste) were conducted using chi square/fisher exact test. P values < 0.05 was considered statistically significant. Frequency distribution, percentage, mean and standard deviation were calculated

RESULTS

A total of 297 adolescents participated in the study and 140 (47.1%) were males. Table 1 shows the prevalence of dental caries was 8.4% with mean DMFT of 0.11± 0.42. Dental caries was seen more among 15 years old, females, and adolescents from low socioeconomic class. Table 2 shows that dental caries was higher in mandibular teeth and lower left first permanent molars. There was no statistically significant association found in sex (p =0.143), age (p =0.115), socio-economic status (p =0.761), tooth-brushing frequency (p =0.139), use of fluoride containing toothpaste (p= 0.358), oral hygiene status (p =0.175) and dental caries (table 3).

(Table 1:) Prevalence of dental caries and association between socio-demographic profile and dental caries among the study participants. n=297.

Variable Age(year)	Caries present n (%)	Caries absent n (%)	Total n (%)	DMFT ±SD	p-value
12	2(2.9)	66(97.1)	68(100.)	0.03±0.17	
13	5(6.8)	68(93.2)	73(100.)	0.10±0.41	
14	7(9.2)	69(90.8)	76(100.)	0.13±0.47	0.115
15	11(13.8)	69(86.2)	80(100.)	0.19±0.50	
Gender					
Male	8(5.7)	132(94.)	140(100)	0.09±0.38	0.143
Female	17(10.8)	140(89.)	157(100)	0.14±0.44	
Socio-economic status					
Low	21(8.2)	235(91.)	256(100)	0.11±0.42	
Middle	4(9.8)	37(90.2)	41(100.)	0.12±0.40	0.761
Total	25(8.4)	272(91.)	297(100)	0.11±0.42	

Table 2: Distribution of tooth specific prevalence of dental caries in permanent teeth   according to arch and quadrant. n=34

Tooth type	Mandibular teeth n=30(88.2%)		Maxillary teeth n=4(11.8%)	
Quadrant	Right n (%)	Left n (%)	Right n (%)	Left n (%)
Second premolar	0(0.0)	1(2.9)	1(2.9)	2(5.8)
First molar	9(26.4)	15(44.1)	1(2.9)	0(0.0)
Second molar	2(5.9)	3(8.8)	0(0.0)	0(0.0)
Total	11(32.3)	19(55.8)	2(5.8)	2(5.8)

Table 3: Association between age, sex, frequency of tooth-brushing, socio-economic status oral hygiene status, use of fluoride containing toothpaste and dental caries among the study participants. n=297

Variable	x^2 ; df	p - value
Age (years)	5.89; 3	0.115
Gender	2.51;1	0.143
Frequency of tooth brushing	*	0.139
Socio - economic status	*	0.761
Use of fluoride containing toothpaste	*	0.358
Oral hygiene status	3.11; 2	0.175

df: degree of freedom, * Fisher's exact test, x^2 Chi-square test.

DISCUSSION

Dental caries is a biofilm-mediated, multifactorial, dynamic oral disease[2] that occurs over a period of time resulting in the phasic demineralisation and remineralisation of dental hard tissues. This study provides information on the prevalence and factors associated with dental caries in a representative sample of 12 to 15 years old in selected rural communities in Nkanu–West and Udi local Government Area of Enugu state, SouthEast, Nigeria. In this study, the finding of 8.4% was less than a previous Nigerian study of 35.5%[5] among adolescents in rural communities in Awgu local Government Area in Enugu state and 54.4%[3] among adolescents in selected urban communities in Enugu state, Nigeria. The finding in this study was also less than 10.6% [9] among adolescents in Ibadan, 15.4%[8] among adolescents in Port Harcourt, 22.9%[7] among adolescents in Kano and 34.0%[6] among adolescents in Ilorin, Nigeria. This variation in study findings could be as a result of reduced intake of cariogenic diet among the study participants, fluoride content of their water intake, and variations in biological factors like saliva flow and viscosity of saliva. The prevalence of dental caries was also less than 66.0%[14] among adolescents in Uganda and 53.7%[4] among adolescents in China. This finding could be as a result of differences in dietary practices, oral hygiene practices, geographical location, socio-cultural practices and oral health seeking behaviours.

In this study, dental caries was seen more in females, similar to previous studies,[4-5,8,14] and it could be because females consume more cariogenic diet like ice cream, sugar containing drinks etc more than males in this age group. Dental caries occurred more in mandibular teeth and it was in agreement with findings of previous studies[3,8] and the finding could be as a result of gravity. Dental caries was seen more in first permanent molars, this observation was in agreement with the findings of previous studies[3-4,7-8] and the finding could be as a result of the early exposure of the first permanent molars to cariogenic diet and cariogenic acids as the first permanent molars are the first permanent teeth to erupt. Dental caries also occurred more in the lower left first permanent molar of the dental arch and was similar to previous Nigerian studies[7,11]. The association between age, sex, oral hygiene status, frequency of toothbrushing, socio-economic status , use of fluoride containing toothpaste and dental caries experience was not statistically significant in this study, this could be because the frequency of intake of cariogenic diet, the type of cariogenic diet taken and biological factors like saliva flow could be associated with dental caries experience among the study population.

Limitations of this study

Radiographs (bitewing radiographs) were not used to detect interproximal caries, and the associated factors of dental caries among the school children could be evaluated in a longitudinal study. This study was a public school-based study, the findings of this study might not represent the adolescents attending private schools and out of school children (adolescents not attending any school). There could be marked or slight variation in the prevalence of dental caries among adolescents in the selected rural communities when participants are selected from both public and private schools or selected during a household survey in the rural communities.

CONCLUSION

The prevalence of children with dental caries in the study population was 8.4% and all the carious teeth were untreated. Interventions for untreated carious teeth are recommended.

CONFLICT OF INTEREST
The authors expressed no conflicts of interest.

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