Prevalence of Dental Caries in a Nigerian Rural Community: A Preliminary Local Survey

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Abstract_____

Background: Dental caries is the most prevalent oral disease of childhood; however, not much attention has been given to studies on this among the rural Nigerian children.

Objectives: The aim of this study is to assess the prevalence and risk factors associated with dental caries in secondary school children residing in the rural communities of Awgu North Local Government Area, Enugu.

Methods: Stratified random sampling technique was used to select 301 students who were 11-16years of age. Trained interviewers administered semi-structured questionnaires. Two calibrated examiners examined the participants. Diagnosis of caries was based on the guidelines laid down by the World Health Organization. Oral health education component was incorporated and toothpaste tubes were given out to all participants as an incentive. Analysis of data was done using EPI-INFO version 3.3.2 and PEPI version 11.0.

Results: One hundred males (33.2%) and 201 females (66.8%) were studied, 35.5% had dental caries. Mean DMFT was 0.85 ± 1.50. Girls had significantly higher Decayed Missing and Filled Teeth (DMFT) than boys at ages 12 and 16 years ($P = 0.027$ and $P<0.0001$ respectively). Students who used fluoridated toothpaste were found to have less caries. Boys who cleaned their teeth with chewing sticks had more caries than boys who used toothbrush and paste. Decayed component accounted for 53(49.5%) of the dental caries while only (3) 2.8% of the caries were filled.

Conclusion: The prevalence of caries is low in this study, but still higher than prevalence rates reported in urban areas of Enugu States. The findings of this study could serve as a guide for planning rural community oriented oral health promotion programmes.

Keywords: Prevalence**,** Caries, Rural, Nigeria

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Introduction

Dental caries is a complex chronic oral disease. It is the most prevalent chronic disease of childhood, yet oral health is often neglected within the health care system.[1] A common perception is that dental caries rates are decreasing in developed countries but the trend in developing countries is not clear.[2] Caries prevalence varies greatly between and within

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countries, as well as within different strata of the population.[3] Statistically speaking, dental caries does not rank among the more serious diseases in

Africa. On an individual level, however, dental caries causes great suffering, pains and burden.[4]

The results of most surveys [5-8] of the prevalence of dental caries among school age children showed that children in rural communities had lower prevalence of dental caries than those in the urban. Studies [9,10] on caries experience carried out in Enugu State of Nigeria were done in the urban areas. The aim of this study is to assess the prevalence and risk factors of dental caries in 11 to 16-year-old secondary school children in the rural communities of Awgu North Local Government Area, Enugu. Oral health education, including sharing of toothpaste tubes, was incorporated in this study as an incentive to all participating schools.

Subjects and Methods

This study was conducted in April 2010, in Awgu North Local Government in Enugu State, Nigeria. A stratified random sampling technique was used to select 11-16-year-old students from the three secondary schools in the randomly selected three communities in the Local Government Area. This area is typically rural, less densely populated and consists mainly of farmers who depend on streams as a major source of drinking water. Ethical clearance was obtained from the local ethics committee. Also obtained was written and oral informed consent from the school authorities and guardians of the selected students. Trained interviewers administered semi-structured questionnaires to selected students to elicit information on socio-demographic variables, tooth cleaning method, snacking habit and previous dental visits. The questionnaire was validated using a secondary school in a neighboring community with similar socio-demographic characteristics. Students were examined using dental mirrors and blunt probes under natural light while seated comfortably on back chairs. Use of radiographs was made impracticable by the study setting. The diagnosis of caries was made based on the guidelines laid down by World Health organization.[11] Oral health education given to all students present on the days of visit, highlighted causes, consequences and prevention of common oral diseases. Free toothpastes tubes were given out to all participating students.

Data was analyzed using the EPI-INFO (version 3.3.2) and Programme for Epidemiologist (PEPI Version 11.0) software statistical package. Frequency distribution tables were generated for categorical variables, using chi-square statistics and student T-test to test for significance. Associations and differences were considered significant when *P*-values were equal to or less than 0.05.

Results

Three hundred and one school children participated in this study. There were 100 (33.2%) males and 201 (66.8%) females, between the ages of 11 and 16 years. The mean age was 13.99 ± 3.01 (Table 1).

Table 2 summarizes the findings concerning oral hygiene habits and utilization of dental services. Slightly above half of the participants use toothbrush and paste. Significantly more males (65%) used toothbrush and paste (*P* = 0.023) while more females insignificantly used chewing sticks. Most students 220 (73%) brushed their teeth once a day. In general, fluoridated toothpaste was used infrequently by those students (90.5%) who cleaned with toothbrush and paste. Nearly half (43.2%) of the participants reported that they had

never been to the dentist. More females than males had visited the dentist before this survey.

More girls 169 (84.1%) reported taking cakes, biscuits, sweets, chocolates and similar sugary snacks, though this was not statistically significant when compared to males ($P= 0.495$). there was no difference in consumption of sweet drinks between males and females (Table 3).

Of the 301 students studied, 107 (35.5%) had caries experience. Sex distribution of caries showed that 28 (9.3%) were males, while 79 (26.2%) were females (Table 4). More females had caries experience than males, though this was not statistically significant ($P = 0.054$).

The total mean DMFT of the study population was 0.85 ± 1.50. At ages 12 and 16 years, girls had significantly higher DMFT than boys. ($P = 0.027$ and $P<0.0001$ respectively) (Table 5). Males who used chewing sticks had more caries than those who used toothbrush and paste ($P = 0.004$) (Table 6). Students who used fluoridated toothpaste had less caries than those who used non fluoridated toothpaste ($P<0.0001$)(Table 6). Students who visited the dental clinic tended to have less caries than those who did not, though the onset and reasons for dental visit was not investigated in this study.

Table 1: **Age distribution of Respondents**

Age (Years)	Male (n = 100)	%	Female (n = 201)	%
11	14	14	13	6.5
12	20	20	31	15.4
13	18	18	29	14.4
14	22	22	41	20.4
15	15	15	50	24.9
16	11	11	37	18.4
Total	**100**	**100**	**201**	**100**

Mean Age = 13.99 ± 3.01

Table 2: **Percentage of respondents according to oral hygiene habits and utilization of dental services**

	Male (n = 100)	Female (n = 201)	Total	X^2	*P*
Tooth cleansing tool					
• Chewing stick	35(35.0)	98(48.8)	133(44.2)	3.12	0.877
• Toothbrush + paste	65(65.0)	103(51.2)	168(55.8)	5.12	0.023[*]
Frequency of brushing					
• Twice a day	15(15.0)	45(22.4)			
• Once a day	76(76.0)	144(71.6)			
• Occasionally	9(9.0)	12(6.0)			
Use of toothpaste					
• Fluoridated	58(89.2)	94(91.3)	152(90.5)	0.19	0.662
• Non fluoridated	7(10.8)	9(8.7)	16(9.5)	0.06	0.806
Ever visited the dentist					
• Yes	43(43.0)	128(63.7)	171(56.8)		
• No	57(57.0)	73(36.3)	130(43.2)		

Table 3: **Snacking habit of the school children in relation to dental caries and sex**

	Male (n = 100)	Female (n = 201)	DMFT (n = 107)	No DMFT (n=194)
Consume sugary snacks	79	169 (84.1)	86(80.4)	162(83.5)
Do not consume sugary snacks	21	32 (15.9)	21(19.6)	32(16.5)
Total	**100**	**201 (100)**	**107(100)**	**194(100)**
	$x^2 = 0.47,$	p = 0.495		
Consume sweet drinks	88	181 (90.0)	94(87.9)	175(90.2)
Do not consume sweet drinks	12	20 (10.0)	13(12.1)	19(9.8)
Total	**100**	**201 (100)**	**107(100)**	**194(100)**

$x^2 = 0.40$: *P* = 0.526

Table 4:   **Sex Distribution of Caries**

Dental caries	Male (n = 100)	Female (n = 201)	Total (n = 301)	x^2	*P*
Decayed	13(4.3)	40(13.3)	53(17.6)	2.19	0.139
Missing	14(4.7)	37(12.3)	51(16.9)	0.92	0.337
Filled	1(0.3)	2(0.6)	3(1.0)	-	0.704[F]
DMFT	28(9.3)	79(26.2)	107(35.5)	3.72	0.054

F = fisher exact

Table 5:   **Age of respondents in relation to caries**

Age	Male (n = 100)	Mean DMFT	Female (n = 201)	Mean DMFT	t	*P*
11	14	0.79 ± 1.47	13	0.77 ± 1.09	0.12	0.907
12	20	0.40 ± 0.88	31	0.71 ± 1.24	2.23	0.027[*]
13	18	0.83 ± 1.82	29	0.69 ± 1.47	0.73	0.464
14	22	0.73 ± 1.12	41	1.24 ± 2.69	1.84	0.066
15	15	1.27 ± 2.63	50	0.92 ± 2.28	1.18	0.239
16	11	0.25 ± 0.50	37	1.23 ± 1.77	5.42	<0.0001[*]

[*] = statistically significant

Table 6: **Respondents according to tooth cleansing tool, frequency and type of toothpaste in relation to dental caries**

	Male (n=100)	DMFT (n=28)	No DMFT (n=72)	Female (n=201)	DMFT (n=79)	No DMFT (n=122)
Tooth cleansing tool						
• Toothbrush + paste	65	12	53	103	39	64
• Chewing stick	35	16	22	98	40	58
	x^2=8.38,	P=0.004[*]		x^2=0.18,	P=0.668	
Frequency of brushing						
• Twice a day	15	5	10	45	18	27
• Once a day	76	20	56	144	59	85
• Occasionally	9	3	6	12	2	10
	x^2=0.45,	df=2,	P=0.800	x^2=2.75,	df = 2	P=0.0252
Use of toothpaste						
• Non fluoridated	22	19	3	98	66	32
• Fluoridated	78	9	69	103	13	90
	x^2=47.66	P<0.000[*]		x^2=63.05	P<0.000[*]	
Ever visited the dentist						
• Yes	43	7	36	128	22	106
• No	57	21	36	73	57	16
	x^2=55.14,	P=0.023[*]		x^2=72.26	P<0.000[*]	

[*] = statistically significant

Table 7: **Distribution and percentage of DMFT in study population**

DMFT	Male (n = 100)	Female (n = 201)	Total (n = 301)	x^2	P
0	72(72.0)	122(60.7)	194(64.4)	3.72	0.054
1 – 2	19(19.0)	51(25.4)	70(23.3)	1.52	0.218
3 – 4	6(6.0)	21(10.4)	27(9.0)	1.50	0.221
5 or more	3(3.0)	7(3.5)	10(3.3)	0.05	0.826
Total	**100(100.0)**	**201(100.0)**	**301(100.0)**		

Discussion

A caries prevalence rate of 35.5% with total mean DMFT of 0.85 ± 1.50 is lower than the global standard according to WHO references for the year 2000.[12] This prevalence rate compares favourably with the finding of 33% prevalence rate in the Egor district in southern Nigeria. [8] Previous studies [9,10] in Enugu State had reported prevalence rates between 15.5% and 24.1% in the urban school children. The difference found between the urban and the rural reports in Enugu could be explained by dietary pattern and oral hygiene habits, especially the use of fluoridated toothpastes. Most participants brushed once daily, therefore probably did not brush at night after high consumption of sugary snacks observed in this study. Caries is formed as a result of interplay between oral microflora, fermentable carbohydrates like sugary snacks, a susceptible tooth, and adequate time. In contrast to the observation of some earlier researchers.[5-7] higher DMFT for rural school children at 15 years old was reported in the Egor district.[8] Locality has been reported to be an important factor in DMFT. The finding of this study is similar to what has been reported in Iran and Brazil.[14]

Higher DMFT was observed in females than in males at ages 12 and 16 years in this study. This is similar to those observed in previous studies. [8,9,10 This could be explained by higher consumption of sugary snacks by females observed in this study. However some researchers did not find any significant difference in gender. Also in this study, at ages 11, 13, 14, 15, there was no significant difference in gender.[15,16]

The association between the use of fluoridated toothpaste and reduced DMFT (*P*=0.000)

observed in this study has earlier been reported.[19] Daily applications of fluoride result in reduced plaque acidogenicity for a long period (8 – 12 hours), which could contribute to caries prevention.[20]

Males who used chewing stick to clean the teeth had more caries than those who used toothbrush and paste. This may be because chewing sticks they used do not have the caries preventive effect of fluoridated toothpaste, or they may not be proficient in the use of chewing stick as cleansing tool.

About half of the decayed teeth remained untreated while only (3)2.8% of decayed teeth are restored. This indicates high restorative treatment needs and very low restorative index. This is common to most Nigerian studies, which also conclude that even though caries in the studied population was low, the utilization of oral health services was poor. [17,18]

Limitations of study: The emphasis of this study was on describing the prevalence of caries, oral hygiene habits and sweet consumption of index age school children in the rural communities. Data collection method may have certain limitations. The students may tend to give socially desirable responses by overestimating the frequency of dental visits or tooth brushing. They may also underestimate negative behaviour such as consumption of sugar.

Conclusion

Prevalence of caries is low in this study, but still higher than prevalence rates reported in urban areas of Enugu States. The findings of this study could serve as a guide for planning rural community oriented oral health promotion programmes. There is also need for more

comprehensive study involving the urban and rural school children of Enugu State.

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