

Periodontal status and treatment need among adolescents in Ibadan, Southwestern Nigeria

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Abstract

A previous Nigerian study had reported high incidence of periodontal disease in young Nigerians though global studies show the contrary. **Aim:** To determine the periodontal status and treatment needs of adolescents attending private and public secondary schools in Ibadan, south-western Nigeria. **Methods:** One thousand, five hundred and twenty two secondary school children in Ibadan were assessed. Sociodemographic data was obtained using a data extraction form. Intraoral examination was performed on all participants. Oral cleanliness was assessed using the plaque index of Silness and Loe, while periodontal health status and treatment needs were assessed using the Community Periodontal Index of Treatment Needs (CPITN). Data were analyzed with the Statistical Package for Social Sciences (SPSS) version 22. Statistical significance was set at $p < 0.05$. **Results:** Only eight participants (0.5%) had healthy component of periodontal status. The mean plaque index was 1.12 ± 0.41 . The CPITN scores varied significantly with the gender of participants ($p < 0.001$). Number of sextants affected by periodontal diseases varied significantly with the socioeconomic status ($p = 0.02$). **Conclusions:** Gingival ill-health is prevalent among adolescent Nigerians with a great need for oral hygiene instructions and professional cleaning. There is need for oral health education among this sub-population of Nigerian children and provision of mobile dental clinics to help meet their treatment needs.

Keywords: periodontium; adolescent health; treatment outcome; student.

Introduction

Periodontal disease is a spectrum of health anomalies affecting the surrounding structures of the teeth including the gums, periodontal ligament and alveolar bone. These anomalies may be restricted to the gingiva (gingivitis) or may extend to the periodontal ligament space and alveolar bone (periodontitis). Periodontitis may lead to tooth mobility, pathologic migration and eventual loss of teeth. The clinical signs of periodontal disease may appear at any age¹ and epidemiological studies indicate that gingivitis, which varies in severity, is almost a universal finding in children and adolescents, while destructive periodontitis is of lower prevalence in younger individuals when compared with adults². A Nigerian study has reported a relatively high occurrence of deep pockets in young Nigerians³. However, whether these pockets are true (pockets greater than 6 mm deep) or false pockets (less than or equal to 6 mm) was not specified.

The first step in proper planning for oral health among young children is to establish the prevalent oral health problem, which in this case is the periodontal health condition. This will help to promote evidence-based intervention programs⁴. The Community Periodontal Index for Treatment Needs is thus a valuable tool in assessment for health policy making and strategic planning for oral health implementation programs⁵ and this is true even among children.

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Epidemiological trends have shown waxing and waning in both oral cleanliness and occurrence of gingivitis in children and adolescents. Deterioration appears to be more evident when the age range of subjects studied is wide⁶. An earlier Nigerian study in Ile-Ife reported a prevalence of periodontal diseases of 84.2% among 3-20-year olds³, while a more recent study in Benin City revealed a prevalence rate of 99.2% among 5-19-year old⁷. Both studies reported a high occurrence of gingivitis and heavy deposits of calculus but little evidence of damage to the periodontal tissues. However, these studies used the gingival index of Loe and Silness, plaque index of Silness and Loe and the oral hygiene index of Greene and Vermilion in their assessment. In a study among institutionalized mentally handicapped Nigerian children using the CPITN⁸, a high level of gingivitis and periodontal diseases was reported, with 92.9% of assessed sextants involved in periodontal tissue changes. A similar finding was reported in a similar population of Iranian children⁹. A study comparing public and private school children found that presence of calculus and gingivitis was less in private school children¹⁰. This suggests that oral hygiene was better when socio-economic status was high, as it has been previously reported¹¹.

Another study has reported that only 17.8% of 11-14 years old Nigerian children had good oral hygiene, while about 50.4% had fair oral hygiene¹². This study corroborated the gender difference in oral cleanliness reported by previous studies^{7,10}, with female children exhibiting better hygiene status than males. It has also been reported that severity of gingivitis lessens as age increases¹³.

This study aimed to describe the pattern of periodontal health status of secondary school adolescents in private and public institutions in Ibadan as well as their treatment needs.

Material and methods

In this study, children aged 11 to 16 years old from secondary schools in Ibadan, Nigeria were examined for periodontal diseases.

Sample size was determined using the formula for determining the sample for cross-sectional studies assessing qualitative variables as shown below:

$$N = Z_{\alpha}^2 p(1-p)/d^2$$

Where:

N = minimum sample size

Z_{α} = standard normal variety at $p < 0.05 = 1.96$

p = prevalence of periodontal diseases among children in this environment from a previous study = 71% = 0.71

1-p = 29% = 0.29

d = minimum acceptable error = 5%.

$$1.96^2 \times 0.71 \times 0.29 / 0.05^2$$

N = 316.

The participants for the study were selected from public and private secondary schools in five local government areas in Ibadan metropolis. The list of all public and private

secondary schools in these local government areas was obtained from Oyo State Ministry of Education and 20 schools were selected using proportionate sampling method. Ethical clearance for this study was obtained from Oyo State Ministry of Health and permission to visit the schools was obtained from the principals of the various schools. These schools have on average 3 branches per class with approximately 30 students in each class. At each school, total population samples of students who gave assent and whose parents consented to their participation in the study were collated. Random selection from the classes by simple random technique using ballot process was used to obtain the study participants.

Demographic data for each participant were obtained and socioeconomic status assessed according to the criteria of Oyediji¹⁴ (1985). Oral examinations were conducted by the field team that included two dentists (PBO & IJU). Intra oral examinations were done under natural light outdoors with sterile mouth mirrors and WHO CPITN probe. Examination for periodontal disease was carried out using the Community Periodontal Index for Treatment Needs as instituted by Ainamo et al.¹⁵ (1982). The index teeth in each sextant were examined by running the CPITN probe around the entire sulcus of each tooth and the highest score recorded. The participants were categorized as:

Score 0 = healthy periodontium

Score 1 = Gingival bleeding after gentle probing

Score 2 = supra or sub-gingival calculus

Score 3 = pathologic pockets 4-5.99 mm deep

Score 4 = pathologic pocket 6 mm and above.

Treatment needs were classified according to the highest score recorded in all assessed sextants.

TN 0 = No need for treatment

TN 1 = Need for oral hygiene instructions

TN 2 = Need for oral hygiene instructions and professional cleaning

TN 3 = Need for complex treatment.

Oral cleanliness was assessed using the plaque index of Silness and Loe¹⁶.

Calibration of the two examiners was done by repeat examination of 20 children on two occasions. The results were subjected to Cohen's Kappa statistics and intra class correlation coefficient for inter and intra-examiner reliability; values were 0.8 and 0.8 respectively. Data obtained were analyzed using the Statistical Package for Social Sciences (SPSS) Version 22. Descriptive statistics was used to summarize the variables in the data set. Qualitative variables were assessed using the Chi Square test, while the independent sample Student t-test and ANOVA were employed to test association involving descriptive data in two or more groups. Level of significance was set at $p < 0.05$.

Results

A total of 1522 secondary school children were seen. Mean age was 13.5 ± 1.1 years. Other socio-demographic variables are as shown in Table 1.

Table 1: Socio-demography of study participants

VARIABLES	n (%)
Gender	
Male	629(41.3)
Female	893(58.7)
Total	1522(100.0)
Socioeconomic status	
High	213(14.0)
Middle	878(57.8)
Low	430(28.2)
Total	1522 (100.0)
School	
Private	605(36.8)
Public	917(60.2)
Total	1522(100.0)

None of the children had a missing or edentulous sextant. Of the 9132 sextants assessed, 8219 (90.0%) were involved in periodontal tissue changes. Only eight children (0.5%) had no sign of periodontal disease as assessed with the CPITN. Periodontal health status and treatment needs as well as the mean number of sextants affected by periodontal diseases in the children assessed are as shown in Table 2.

The mean plaque index was 1.12 ± 0.41 . The males had higher plaque scores than females ($p < 0.001$). The CPITN scores varied significantly with oral cleanliness as assessed by the plaque index ($p < 0.001$). Though younger adolescents (age 11 to 13) had worse plaque scores than older adolescents (14 to 17 years old), there was no significant difference in the plaque scores on the basis of age ($p = 0.06$). The CPITN scores did not vary significantly with the age group ($p = 0.12$), socioeconomic status ($p = 0.12$), nor with the type of school attended by the children ($p = 0.37$). In contrast, CPITN scores varied significantly with the gender $p < 0.001$. While more

males had CPITN scores 0 and 1, more females had scores 2 and 3 (Table 3).

The number of sextants affected by periodontal diseases increased as the socioeconomic status of the children worsened ($p = 0.02$). Though females had more sextants affected by periodontal diseases than males, this relationship was not statistically significant ($p = 0.05$).

Discussion

This study has observed a high prevalence of adverse periodontal tissue changes among Nigerian adolescents with about 90% of the sextants assessed involved in various stages of periodontal ill health. This figure slightly improves on but is similar to that reported by Denloye⁸ among mentally handicapped children. The present finding is an improvement because our participants have better musculoskeletal capability than the handicapped children. According to the WHO stipulated goal for periodontal health among children aged 15 years as at the year 2010, 100% of 15-year-olds should have at least five healthy sextants⁵. However, findings from this study demonstrated that less than one third of the studied population had less than two healthy sextants. This finding falls severely short of the global goal for periodontal health and implies that there is still a great periodontal health need among these children. The study also found that the plaque score was higher among children with CPITN scores 1, 2 and 3. This is similar to the observation in an Iranian study among 15-19-year olds⁵, and further asserts the relationship between plaque and gingival health¹⁷.

Contrary to a previous study¹⁸, this study observed that there was no significant association between periodontal tissues status and the type of school attended or to the socioeconomic status of the children. However, we did find

Table 2: CPITN scores, treatment needs and sextant affectation of the study participants

VARIABLES	n (%)
CPITN scores and status	
0. No sign of disease	8 (0.5)
1. Gingival bleeding after gentle probing	158 (10.4)
2. Supra or sub-gingival calculus	1313 (86.3)
3. Pathologic pockets 4-5 mm deep	43 (2.8)
4. Pathologic pockets ≥ 6 mm	0 (0.0)
CPITN Treatment needs	
0. No needs for Treatment	8 (0.5)
1. Need for oral hygiene instructions	158 (10.4)
2. Need for professional cleaning and oral hygiene instructions	1356 (89.1)
3. Need for complex periodontal treatment	0 (0.0)
Mean number of sextant affected per CPITN score per child	
0. Healthy	1.83
1. Bleeding	3.09
2. Calculus	3.89
4. Shallow pockets	1.23
Proportion of children exhibiting the CPITN Score.	
0. Healthy	499 (32.8)
1. Bleeding	824 (54.3)
2. Calculus	1443 (94.8)
4. Shallow pockets	53 (3.5)

Table 3: Relationship between CPITN scores and socio-demographic factors

VARIABLES	CPITN SCORE				Total	p-value
	0	1	2	3		
Socioeconomic status						
High	1(0.5)	12(5.6)	194(91.1)	6(2.8)	213(100.0)	p=0.10
Middle	5(0.6)	90(10.3)	762(86.8)	21(2.4)	878(100.0)	Chi sq. 10.52
Low	2(0.5)	56(13.0)	357(82.8)	16(3.7)	429(100.0)	
Total	8(0.5)	158(10.4)	1313(86.3)	43(2.8)	1522(100.0)	
Gender						
Male	5(0.8)	101(16.1)	506(80.4)	17(2.7)	629(100.0)	p<0.001
Female	3(0.3)	57(6.4)	807(90.4)	26(2.9)	893(100.0)	Chi sq.
Total	8(0.5)	158(10.4)	1313(86.3)	43(2.8)	1522(100.0)	39. 02
School						
Private	4(0.7)	53(8.8)	531(87.8)	17(2.8)	605(100.0)	p=0.37
Public	4(0.4)	105(11.4)	782(85.3)	26(2.8)	917(100.0)	Chi sq.
Total	8(0.5)	158(10.4)	1313(86.3)	43(2.8)	1(100.0)	3.16

that children of lower socioeconomic class had more diseased sextants than those from higher social class. This suggests a need for a firmer surveillance system that will enable proper measurement of both the extent of spread and control of oral health conditions as well as impact of oral health promotion strategies¹⁹.

The prevalence of periodontal disease in the studied group is high and is accounted for largely by gingival bleeding, presence of calculus and shallow pockets. This is similar to previous findings in this environment based on other assessment criteria^{3,7,12} and has been attributed to the combined effect of dental cleaning ability as reflected by the association between gingival health scores and plaque scores⁵. Change in bacterial composition of the dental plaque, inflammatory cell response and the hormones of puberty are other factors which may be responsible for this poor gingival health²⁰.

This study also found no difference between periodontal health and socio-economic status of all the children assessed. This is contrary to a previous report that has documented worsened periodontal status in children of lower socio-economic strata^{10,21}.

However, since the present study also found that children in the lower socioeconomic class had more sextants affected by periodontal pathologic changes, the absence of an association between the previous variables may not be the true status of association. This occurred because the methods of classifying socioeconomic strata in the previous studies were not specified. On the other hand, the observed lack of association may be a pointer to the emergence of an alarming trend where high social class parents are beginning to ignore their children's oral health care.

In congruence with previous studies^{12,21}, the females had better oral cleanliness than males. We also found a significant relationship between gender and gingival health in the present study as in previous documentations^{7,12,10,21}. However in this study, more boys had healthy gingival status and

CPITN score 1 than the girls, who had more calculus accumulations and shallow pockets. Considering that the girls cleaned better than their male counterparts, the effect of the puberty hormones especially oestrogen and progesterone which are responsible for most of the modulator actions seen in hormone based gingivitis²²⁻²³ may be responsible for this finding. Especially since these hormones are found in higher concentration in females.

In conclusion, gingival ill-health is prevalent among adolescent Nigerians resident in Ibadan Oyo state with a great need for oral hygiene instructions and professional cleaning. There is need for oral health education among this sub-population of children and provision of mobile dental clinics to help meet their treatment needs.

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