Periodontal status and treatment needs of primary school teachers in the absence of formal school oral health programme

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Abstract

Objective: Information is sparse about the periodontal health of teachers who play important roles in prevention of oral diseases in schools, especially in developing countries where the promotion of oral health in school programmes is still sub-optimal. The objective of the study was to evaluate the periodontal health status and periodontal treatment needs of primary school teachers in a country lacking formal school-based oral health programmes.
Method: This was a descriptive survey in which intraoral examination was conducted on 407 primary school teachers. Recordings on the oral hygiene status using OHI-S, bleeding on probing, periodontal pocketing and treatment needs with CPITN and tooth mobility were obtained by a trained and calibrated examiner. Information on sociodemographic characteristics was also sought. Data were analysed using SPSS and the level of significance set at $p < 0.05$
Result: None of the teachers had healthy periodontium, 3 bled to probing, 284 had calculus accumulation and 109 had shallow pockets while 11 had deep periodontal pocketing. Majority (80.6%) of the teachers had poor oral hygiene and 43 (10.6%) had one or more mobile teeth. A higher proportion of rural based teachers had periodontal pockets compared to those in urban areas (38.5% vs. 26.7%, $p = 0.026$). Older teachers were more likely to have mobile teeth ($p = 0.002$). There were significant positive correlations between OHI-S, CPITN score and number of mobile teeth.
Conclusion: Periodontal disease is highly prevalent among primary school teachers in the country with calculus accumulation being the predominant feature. The periodontal treatment need of most of the teachers is in the form of oral prophylaxis and non-surgical periodontal treatment.

Key words: Periodontal status; treatment need; primary school teachers; developing country; oral health

Introduction

The occurrence of periodontal disease, although a global phenomenon, varies with prevalence ranging from 5% to over 98% with developing countries at the worst end of the spectrum and it is still a public health problem[1-6]. Periodontal disease has been documented as one of the commonest causes of tooth loss[7] and its association with systemic diseases and accompaniment by varying degrees of morbidity and mortality has been reported[8-10].
Different prevention strategies have so far been proposed, but for those to be meaningfully instituted in any subpopulation, knowledge about the current status of the disease is mandatory. Information about periodontal disease status will enable health planners to know what needs have to be met, which will therefore ensure appropriate allocation of resources in a country with limited resources for health. Many studies on the prevalence of periodontal disease in Nigeria and other African countries, using the Community Periodontal Index of Treatment Needs (CPITN) have been carried out on children and the elderly[6,11]. Information about the periodontal health of adults especially in primary school teachers who play important roles in prevention of oral diseases in school based prevention programmes is sparse. This is particularly important since the promotion of oral health in school based programmes is still suboptimal in many parts of the world especially in developing nations[12]. The success of preventive oral health programmes is predicated on the involvement of major stakeholders, such as teachers, who themselves have to be aware of the importance of oral hygiene and meeting relevant dental treatment needs[12-14]. This study therefore, aimed to evaluate the periodontal health status and periodontal treatment needs of primary school teachers in a country where there is no formal school-based oral health preventive programme.

Materials and method

This study was cross sectional in design and was conducted in Ibadan, the capital city of Oyo State, Nigeria between April and July 2011. The city is divided into eleven local government areas (LGAs) covering both the urban and the rural settlements of the city. The population under study were school teachers selected from public primary schools in the city through a multi staged random sampling technique as participants in a study on the oral health related quality of life of primary school teachers and how it affects the oral hygiene of their pupils.

Data collection procedure
Following ethical approval from the Institution's Ethical Review Committee (UI/EC/10/0140), approval was obtained from each LGA schools' board before proceeding to the schools. Data were obtained from 407 teachers about their sociodemographic characteristics such as age, sex, marital status, highest level of education attained, present salary scale and geographical location of the school.

Oral examination
This was done in an office or classroom in the schools with the teachers sitting upright on a chair and natural lighting serving as source of illumination. Only a teacher was allowed into the room at a time to ensure privacy. Sterile Community Periodontal Index of Treatment Needs (CPITN)[15] probes, dental mirrors and gloves were used to examine the teachers. Data were collected on Community Periodontal Index and Periodontal Treatment Need, oral hygiene status and teeth mobility. Ten index teeth (17, 16, 11, 26, 27, 37, 36, 31, 46 and 47) were used in the assessment of CPITN.
The highest score found in the sextant was recorded. In the presence of less than two teeth, or if the remaining teeth were less than two in a sextant, (x) was charted. The CPITN score was used to evaluate the periodontal treatment need [15,16].

Oral hygiene status
This was assessed using the Simplified Oral Hygiene Index (OHI-S) of Greene and Vermillion[17]. The index comprises of the debris index and the calculus index and the selected index teeth were (16, 11, 26, 36, 31, and 46). The debris index and calculus index were scored using standard guidelines[17]. For each individual, the debris and calculus index scores were summed up and divided by the number of teeth surfaces scored. The Simplified Oral Hygiene Index score was calculated by adding the debris and calculus scores together.

Tooth mobility
This was assessed using the Millers mobility index[18]. A grade of **0** was charted when no mobility was detected; grade **1,** mobility greater than the physiologic point; grade **2,** when mobility up to 1mm was detected in the buccolingual direction; and grade **3,** when mobility greater than 1mm was detected in all directions or if the tooth was depressible in the socket (buccolingual and apicocoronal).

Data management and analysis
Data collected were subjected to statistical analysis using SPSS version 21 software (IBM Corp; Armonk, NY). For the purpose of cross tabulation; the age of the teachers was dichotomized according to the mean; marital status categorized as married and not being married, which included those who were single, separated or widowed; salary scale was also collapsed into a binary variable according to the median salary grade level (of 13) and the geographical location of the teacher's school, which was classified as either rural or urban. The CPITN score was converted into a binary variable by grouping those without periodontal pockets into one category (CPITN score of 1 or 2) and those with periodontal pocketing (CPITN score of 3 or 4) into the other. Tooth mobility was categorized into two groups as those with mobile teeth or those with no mobile tooth. The OHI-S was categorized into good, fair or poor based on scores of 0.0 to 1.2, 1.3 to 3.0 and 3.1 to 6.0 respectively and this was further dichotomized by combining the classes with good or fair OHI-S into one group and poor OHI-S in the other group. Chi square statistics was used to test for associations between the sociodemographic variables and periodontal status and treatment need (CPITN scores), oral hygiene status (OHI-S) and teeth mobility. The relationships between CPITN scores, OHI-S and the total number of mobile teeth were explored using Spearman's rank correlation. The p value for statistical significance was set at <0.05.

Result

A total of 407 teachers participated in the study and their sociodemographic characteristics are as displayed in **Table 1**.

Periodontal status and treatment need
None of the teachers had a healthy periodontium: 3 (0.7%) bled on probing (CPITN score of 1), 284 (69.8%) had calculus accumulation (CPITN score of 2), 109 (26.8%) had shallow periodontal pockets (CPITN score of 3) while 11 (2.7%) had deep periodontal pockets (CPITN score of 4). The majority (287) required simple oral hygiene measures, 109 needed oral hygiene instructions and motivation coupled with prophylactic cleaning procedures, while 11 participants required complex periodontal treatments. The periodontal pathologic pocketing was most associated with the upper right second molars **(Table 2)**.

Table 1. Sociodemographic characteristics of the study participants

Variable	Categories	Number (%)
Age	≤ 48years	175 (43.0)
	> 48 years	232 (57.0)
Gender	Male	31 (7.6)
	Female	376 (92.4)
Marital status	Single	3 (0.7)
	Married	389 (95.6)
	Widowed	15 (3.7)
Highest level of education	NCE*	314 (77.1)
	University	93 (22.9)
Salary grade level	6 - 8	41 (10.1)
	9 - 11	69 (17.0)
	12 - 14	297 (72.9)
Location of school	Rural	311 (76.4)
	Urban	96 (23.6)

*-NCE: National Certificate of Education received after attending teacher training

Table 2. The index teeth and CPITN recording of the participants

CPITN Scoring/ Index teeth	17	16	11	26	27	31	36	37	46	47
0 - Healthy	4	5	1	3	2	1	2	2	1	2
1 - Bleeding	5	4	7	5	5	5	4	5	7	5
2 Calculus	315	362	393	366	340	395	391	381	389	385
3 Pocket 3mm to 5.5mm	77	31	5	31	56	3	6	17	5	10
4 Periodontal pocket > 5.5mm	4	4	1	2	3	2	2	1	4	3

Oral hygiene status

Only 3 (0.7%) teachers had a debris index score of 0, 72 (17.7%) had a score of 1, 273 (67.1%) had a score of 2 and 59 (14.5%) had a score of 3. The majority (274, 67.3%) had a calculus index score of 2, the others had scores of: 0 (4, 1.0%), 1 (66, 16.2%) and 3 (63, 15.5%). The OHI-S ranged from 0.0 to 6.6: good (0.0 to 1.2) in 1, fair (1.3 to 3.0) in 78 (19.2%) and poor (3.1 to 6.0) in 328 (80.6%) teachers. The mean OHI-S score was 4.03 (± 1.08).

Teeth mobility

A total of 43 teachers had one or more mobile teeth, with the sum total of all mobile teeth being 162: 66 (40.7%) teeth had grade 1 mobility, 61 (37.7%) had grade 2 mobility and 35 (21.6%) had grade 3 mobility. The lower left central, lower right central, upper right central and the upper left central (in descending order) were the most frequently mobile teeth.

Sociodemographic characteristics and oral examination variables

A higher proportion of teachers residing in rural locations had periodontal pockets compared to those in urban areas (38.5% vs. 26.7%, p = 0.026). There was no association between CPITN score and other sociodemographic variables analysed **(Table 3)** and neither in the relationship between the OHI-S and age, gender, marital status, salary grade level or location **(Table 4)**. The proportion of teachers who were older than 48 years and had mobile teeth (14.7%) was higher than the proportion of teachers who were younger and had mobile teeth (5.1%), p = 0.002. There was no significant association between tooth mobility and gender, marital status, salary grade or location **(Table 5)**.

Table 3. Association between presence of periodontal pockets and sociodemographic characteristics

Variable	CPITN Category				
	No pocket	Periodontal pocket	Total	χ^2	p value
	No (%)	No (%)	No (%)		
Age group (years)					
≤ 48	130 (74.3)	45 (25.7)	175 (100.0)	2.098	0.147
> 48	157 (67.7)	75 (32.3)	232 (100.0)		
Gender					
Male	26 (83.9)	5 (16.1)	31 (100.0)	2.879	0.090
Female	261 (69.4)	115 (30.6)	376 (100.0)		
Marital status					
Married	274 (70.4)	115 (29.6)	18 (100.0)	0.026	0.871
Not married	13 (72.2)	5 (27.8)	389 (100.0)		
Salary grade					
< 13	124 (72.9)	46 (27.1)	170 (100.0)	0.826	0.363
≥ 13	163 (68.8)	74 (31.2)	237 (100.0)		
Location					
Urban	228 (73.3)	83 (26.7)	311 (100.0)	4.957	0.026*
Rural	59 (61.5)	37 (38.5)	96 (100.0)		
Total	**287 (70.5)**	**120 (29.5)**	**407 (100.0)**		

*Statistically significant

Table 4. Association between OHI-S and sociodemographic characteristics of the participants

Variable	OHI-S Fair No (%)	Poor No (%)	Total No (%)	X^2	p value
Age group (years)					
≤ 48	41 (23.4)	134 (76.6)	175 (100.0)	3.169	0.075
> 48	38 (16.4)	194 (83.6)	232 (100.0)		
Gender					
Male	8 (25.8)	23 (74.2)	31 (100.0)	0.878	0.349
Female	71 (18.9)	305 (81.1)	376 (100.0)		
Marital status					
Married	73 (18.8)	316 (81.2)	389 (100.0)	2.334	0.127
Not married	6 (33.3)	12 (66.7)	18 (100.0)		
Salary grade					
< 13	38 (22.4)	132 (77.6)	170 (100.0)	1.616	0.204
≥ 13	41 (17.3)	196 (82.7)	237 (100.0)		
Location					
Urban	56 (18.0)	255 (82.0)	311 (100.0)	1.661	0.197
Rural	23 (24.0)	73 (76.0)	96 (100.0)		
Total	**79 (19.4)**	**328 (80.6)**	**407 (100.0)**		

*Statistically significant

Table 5. Relationship between teeth mobility and sociodemographic characteristics

Variable	Teeth mobility No mobile tooth No (%)	Has mobile teeth No (%)	Total No (%)	X^2	p value
Age group (years)					
≤ 48	166 (94.9)	9 (5.1)	175 (100.0)	9.553	0.002*
> 48	198 (85.3)	34 (14.7)	232 (100.0)		
Gender					
Male	28 (90.3)	3 (9.7)	31 (100.0)	0.028	0.867
Female	336 (89.4)	40 (10.6)	376 (100.0)		
Marital status					
Married	350 (90.0)	39 (10.0)	389 (100.0)	2.708	0.100
Not married	14 (77.8)	4 (22.2)	18 (100.0)		
Salary grade					
< 13	158 (92.9)	12 (7.1)	170 (100.0)	3.798	0.051
≥ 13	206 (86.9)	31 (13.1)	237 (100.0)		
Location					
Urban	279 (89.7)	32 (10.3)	311 (100.0)	0.106	0.745
Rural	85 (88.5)	11 (11.5)	96 (100.0)		
Total	364 (89.4)	43 (10.6)	407 (100.0)		

*Statistically significant

Relationship between oral hygiene and periodontal status

There was a weak but statistically significant positive correlation between OHI-S status and CPITN score (.20); teachers with high OHI-S scores were more likely to have higher CPITN scores (poorer periodontal status), $p < 0.01$. The correlation between OHI-S status and total number of mobile teeth was also positive and weak (.17) and teachers having poorer OHI-S more likely to have more mobile teeth ($p = 0.01$). The CPITN score of the teachers correlated positively and weakly (.13) with the total number of mobile teeth they had; teachers with poorer periodontal status had higher numbers of mobile teeth ($p = 0.07$).

Discussion

This study described the periodontal status and periodontal treatment needs of primary school teachers using the Community Periodontal Index of Treatment Needs. It also assessed their oral hygiene status as well as the pattern of tooth mobility, to incorporate a broad representation of the different stages of periodontal disease. Analysis of the results showed that the prevalence of periodontal disease (gingivitis and periodontitis) in the studied population was very high. All the teachers (100%) that participated in this study had one form of periodontal disease or the other, which was similar to the findings reported in Japan[19] and Germany[20]. Lower prevalence of periodontal disease has been reported in the South Eastern part of Nigeria[21], Thailand[5], Greece[22] and in the United States[23]. The different values obtained may be suggestive of varying disease distribution across the globe and the population studied. Findings from this study further add to the existing literature that periodontal disease is commoner amongst the older age group[19,20].

Analysis of the different components of the CPITN revealed that calculus accumulation was the predominant clinical feature of periodontal disease noted in most of the teachers, which is similar to finding by other authors as the most common periodontal disease seen in the population, regardless of age[5,6,19]. The proportion of respondents with calculus accumulation is similar to values reported in Thailand[5] and Japan[19] but higher than that reported in Germany[20]. Only 0.7% of the study participants had CPITN 1 as the highest score, a similar finding amongst adult Thais[5] but lower than the value reported in Japanese[19] and German adults[20]. It was found that 26.8% of the study participants had shallow periodontal pocketing, which is consistent with findings in Thailand[5], but at variance with higher values reported by others[19,20]. Only 3% of the respondents in this study had deep pathological periodontal pocketing unlike in the elderly population where 22% to 29% had been reported to have deep pocketing[6,20]. The differences noted in the periodontal features in the various studies may probably be attributed to variations associated with periodontal disease across the studied age groups. When the mean ages of the respondents in these studies were considered, it was noted that the severity of periodontal disease increases with age, which is already well established and documented.

The trend of periodontal treatment need followed the disease distribution; only a few teachers needed complex periodontal therapy as observed by Taiwo et al[6] among the elderly population in Ibadan, Nigeria. On the other hand, most of the teachers needed oral prophylaxis, which is surprising since this treatment forms part of the basic package of oral health care made readily available in the primary oral health care centre as well as other levels of oral health care in the city and in Nigeria as a whole. To further corroborate this finding, is the poor oral hygiene exhibited by the teachers in the present study. The high proportion of the teachers with poor oral hygiene is worrisome because this may suggest either the neglect of oral hygiene measures or better still the use of inappropriate brushing techniques. Teachers being future builders involved with the health of school pupils are expected to have fair to good oral hygiene, which is however not the case here. This could be because they have inadequate knowledge of oral health[24].

The association of the index teeth with the different parameters assessed by the CPITN showed that calculus accumulation was mostly recorded in relation to the lower central incisors, upper central incisors and the lower first molars. This is not unexpected because calculus accumulation has been associated with the orifices of the salivary glands that are related to these teeth except the upper central incisors. The maxillary second molars, followed by the maxillary first molars were the most frequently charted teeth with periodontal pocketing[25]. Furthermore, the right side of the mouth was affected more often with periodontal pocketing than the left side corresponding to the findings by Arowojolu[25] and Saglie et al[26]. The difficulty associated with brushing by right handed persons may be responsible for this.

Finding a low percentage of the teachers with mobile teeth further buttressed the fact that severe periodontal disease affected a few and only a minority require complex periodontal therapy; also evidenced by a few of the teachers having periodontal pocketing since tooth mobility and periodontal pocketing are major clinical features of advanced periodontitis. Consistent with findings by Arowojolu[25], the lower incisors followed by the maxillary incisors were the most frequently recorded mobile teeth. It is, however, inconsistent with the outcome of the study by MacGregor and Sheiham[27] in which the upper molars were the most frequently affected. Although these two findings differ in terms of the teeth found frequently mobile, common factors with these findings are the association of periodontal diseases with the eruption pattern; where teeth erupting into the mouth early are most commonly affected by the disease[25].

Conclusion

Periodontal disease is highly prevalent in the studied population of primary school teachers with calculus accumulation being the predominant feature. The periodontal treatment need of most of the teachers is in the form of oral prophylaxis and non-surgical periodontal treatment.

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