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Self-Reported Periodontal status and clinical parameters. Is there an agreement?

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Abstract
Background: *Periodontal diseases are a group of highly prevalent infectious, inflammatory conditions of the supporting structures of the teeth. It affects more than 50% of the world's adult population. This necessitated the need for an alternative procedure to clinical assessment for collection of data to monitor periodontal diseases in populations. The aim of this study is to evaluate the accuracy of the self-report tool vis-avis clinical periodontal status in a population in Lagos, Nigeria.*
Materials and Methods: *A cross-sectional comparative study was carried out among 356 consecutive adult patients using the CDC-AAP Self‐report surveillance questionnaire and the Community Periodontal Index (CPI). Student's t-test was used for association between categorical variables. Specificity, sensitivity, positive and negative predictive values as well as diagnostic accuracy were determined for the self-report questionnaire. A value of the sum of sensitivity and specificity less than 120 indicated poor validity. P-value < 0.05 considered to be statistically significant.*
Results: *According to CPI scores, almost three-quarters (264, 74.2%) of the participants had gingivitis, while an equal proportion of 12.9% (46) had healthy periodontium and periodontitis. Clinically diagnosed periodontal condition demonstrated strong significant relationship with age(p=0.000), OH status(p=0.000) and gingival inflammation as depicted by BI and GI(p=0.000) The prevalence of clinically diagnosed periodontal disease of 87.1% was much higher than that of self-report-questions which ranged from 2.2% (Q5) to 59.3% (Q2). Sensitivity and specificity ranged between 2.58% (Q5) – 57.42% (Q2) and 28.26% (Q2)-100%(Q5) respectively. The question for bleeding gum and Q2 recorded equal accuracy (53.66%) which was the highest while Q5 showed the lowest (15.15%). The diagnostic power decreased as the cut‐off was increased. Area under curve (AUC) was calculated to be 0.400.*
Conclusion: *The self-report questionnaire performed poorly in identifying periodontal disease in our study group. The clinically diagnosed periodontal disease prevalence differ widely from that of self-report.*
Key words: *Gingivitis, Periodontitis, Periodontal disease, Self-reported; Questionnaire.*

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I. Introduction

Periodontal diseases are a group of highly prevalent infectious, inflammatory conditions of the supporting structures of the teeth. Over 50% of the world's adult population and 87% to 94.4% of Nigerian adult are affected by this condition.[1,2] The early stage of periodontal disease, gingivitis is completely reversible, but may if left untreated progress to a severe form, periodontitis which often results in tooth loss. The resultant disabilities of masticatory and speech dysfunction, poor nutritional status and reduced quality of life; in addition to the report that periodontal disease influence the risk for some life threatening systemic conditions (diabetes, cardiovascular diseases, adverse pregnancy outcomes) makes it a major global public health concern.[3,4,5] For adequate planning, implementation, and evaluation of preventive and control programs, population-based surveillance of periodontal diseases is crucial.[6]

The gold standard for detection of early signs of periodontal disease is clinical periodontal examination.[7] Periodontal clinical examination is expensive, time consuming and requires specially trained personnel[8,9]. The discomfort imposed on patients during probing results in higher rate of refusal to be examined. There is need therefore for an alternative procedure for collection of data to monitor periodontal diseases in populations. An alternative is the use of self-reported periodontal measures for periodontal disease. Self-report method is widely employed and accepted in assessing and monitoring the prevalence of various medical conditions in populations.

Self-report method is cheap, easy to administer, time saving and requires less resources with no demand for specialized examiners.[3,8-11] Self-report eliminates the discomfort posed on patients by probing in clinical examination with result that more individuals are willing to undergo self-assessment than clinical examination.[12] Consequently, an 8-item periodontal disease surveillance self-report questionnaire was developed by a joint Central Disease Control (CDC) and American Association of Periodontology (AAP)[3]. The CDC-AAP self-report tool consists of eight questions; two addressed personal perception of periodontal health, four, signs of periodontal disease while the remaining two concerns oral hygiene practice in addition to tooth brushing. This self-report tool has been validated and accepted in many countries.[7,13-16] This method will no doubt be highly beneficial in a developing country like ours where the prevalence of periodontal disease remains high and resources are scarce. However, it is established that validity of a tool is affected by culture and language of the population.[17] Hence the need for the tool to be tested widely in the population before it can be applied on a large scale.

In Nigeria, to the best of our knowledge the only study that has undertaken to validate this self-report tool was carried out in Ibadan.[2]. The aim of this study was to evaluate the accuracy of the self-report tool vis-avis clinical periodontal status in a population in the metropolitan city of Lagos.

II. Materials And Methods

A cross-sectional comparative study was carried out among adult patients who visited the Family Medicine clinic of Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos between January 2020 and March 2020. Approval for the study was obtained from the Health Research and Ethics Committee of the LASUTH.

Three-hundred and fifty-six (356) consecutive adult patients who met the inclusion criteria and freely consented to participate were recruited for the study.

Study design: A cross-sectional comparative study.

Study location: Family Medicine clinic of Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos-Nigeria.

Study duration: January 2020 and March 2020

Sample size: 356 comprising of males and females

Sample size calculation: The sample size was determined using the formula $n = \frac{Z^2 P(1-P)}{d^2}$

Where n = sample size, Z (statistic for 95% level of confidence) = 1.96, P(average of prevalence from previous studies (50% - 94.4%) = 72% and d = 5% level of precision. Giving 10% allowance for none response, a figure of 341 was obtained for minimum sample size required. To account for lost or incomplete data, 15 was added to give a final figure of 356.

Subjects and selection method: Consecutive adult patients who met the inclusion criteria and freely consented to participate were recruited for the study.

Inclusion criteria:

1. Age 18years and above
2. Presence of at least twenty (20) permanent teeth.

Exclusion criteria:

1. Pregnant women
2. Mentally disabled individuals
3. Individuals undergoing Periodontal treatment
4. Individuals on antibiotic therapy

Procedure

Verbal and written consent was obtained from all the participants after the aim and objectives of the study had been explained to them in a language they understood. Each individual was made to complete a questionnaire which recorded sociodemographic data, oral hygiene practice, as well as dental visits. The 8-items on the CDC-AAP Self- report surveillance questionnaire was also completed for each participant to assess self-report periodontal disease status[3]. An additional question "Do your gum bleed when you brush" which had been used previously was however included in the questionnaire to assess self-report bleeding which indicate presence of gingival inflammation.[12,18] The items were explained to the participants and translated to Yoruba or pidgin English, the commonly expressive language in the society where the subject had challenge with English language

Thereafter, the participants underwent clinical examination which was performed by a single callibrated examiner who is different from the person who administered the self-report questionnaire tool in a well-lit room. The Community Periodontal Index (CPI) was the instrument of choice for measuring the clinical periodontal status. CPI is universally accepted as a standard index for periodontal disease which is simple,

highly reproducible and reflects the full spectrum of periodontal disease [19] CPI employs a partial recording system using index teeth; 11, 16, 17, 26, 27, 31, 36, 37, 46 and 47. A mouth mirror and WHO-CPI probe specially designed for the CPI was used to examine each participants and the highest score was recorded for each participant in accordance with the following criteria: healthy periodontium (code 0), bleeding gingiva (code 1), calculus (code 2), shallow pockets (code 3), deep pockets (code 4) and excluded sextant (code X). For case definition; subjects with CPI score of 1, 2, 3 and 4 were regarded as having periodontal disease, while a CPI score of 0 indicated absence of periodontal disease. CPI scores of 1 and 2 represented those with gingivitis, while those with CPI scores of 3 and 4 represented those with periodontitis.

Simplified Oral Hygiene Index (OHI-S) of Green and Vermillion[20] was also recorded for each participant. OHI-S is made up of two components; debris and calculus, each of which is scored on a scale of 0 to 3. The sum of debris and calculus score gives the OHI-S. Based on OHI-S score, oral hygiene status was judged as good (0.1–1.2), fair (1.3–3.0), and poor (3.1–6.0).[20]

Statistical analysis

The collected data was recorded and analyzed using the statistical Package for Software Solutions (SPSS) version 20. The response to the self-report questionnaire were grouped into two, positive and negative response. For the question "Overall, how would you rate the health of your gums?" The response "Excellent", "Very good" and "Good" were regarded as positive while "Fair", "Poor" and "I don't know" were regarded as negative. For the remaining questions; "Yes'' was regarded as positive response while "No" and "I don't know" were negative. Positive response was given a score of 1, while a negative response attracted a score of 0. A periodontal disease scale was developed using the scores from all the questions except those regarding the use of dental floss and mouthwash because these are sparingly used by the people as reported earlier[2] Also, these questions concerning use of mouthwash or dental floss do not reflect any of the signs or symptoms of periodontal disease. Hence we arrived at a 7-point periodontal disease scale with the possible scores ranging from 0 - 7

Mean and standard deviation was calculated for quantitative variables. Student's t-test was used for association between categorical variables. P-value < 0.05 was considered to be statistically significant. Specificity, sensitivity, positive and negative predictive values and diagnostic accuracy were determined for each self-report question and the entire self-report tool. A receiver operating characteristic (ROC) curve was plotted and the area under curve (AUC) calculated. A value of the sum of sensitivity and specificity less than 120 indicated poor validity.

III. Results

A total of 356 subjects participated in this study. 165(45.8%) were males and 193(54.2%) were females. The age ranged from 18yrs – 75yrs with a mean of 35.6yrs±14.7. More than half (195, 54.8%) of the study group had completed tertiary education and only a negligible number (5, 1.4%) did not have any formal education. Majority of the participants (272, 76.4%) brush once a day, (234, 65.7%) had never visited a dentist and are non-smokers (336, 94.4%) **(Table 1)**

Table 1: Characteristics of participants.

Variable	**n (%)**	**n (%)**	**n (%)**	
Gender				
Male	163 (45.8)			
Female	193 (54.2)			
Age		**Male**	**Female**	
Range	18 – 75yrs	18 - 69yrs	18 – 75yrs	
Mean	35.6±14.7	38.7±14.5	33.9±14.5	
Up to 20yrs	84 (23.6)	26 (31.0)	58 (69.0)	
21-30yrs	71 (19.9)	32 (45.0)	39 (55.0)	
31-40yrs	63 (17.7)	24 (38.1)	39 (61.9)	
41-50yrs	68 (19.1)	43 (63.2)	25 (36.8)	
51-60yrs	55 (15.4)	30 (54.5)	25(45.5)	
>60yrs	15 (4.2)	8 (53.3)	7 (46.7)	**p=0.002***
Educational Level				
None	5 (1.4)			
Primary	29 (8.1)			
Secondary	127 (35.7)			
Tertiary	195 (54.8)			
Socioeconomic class				
Upper	63 (17.7)			
Middle	151 (42.4)			
Lower	142 (39.9)			
Frequency of tooth brushing				

Once a day	272 (76.4)
Twice a day	80 (22.5)
Others	4 (1.1)
Frequency of Dental visit	
Every 6months	7 (2.0)
Once a year	7 (2.0)
when I have pain	108 (30.3)
Never visited	234 (65.7)
Last Dental Visit	
<6months	12 (3.4)
6-12months ago	29 (8.1)
1-5yrs ago	29 (8.1)
>5yrs ago	52 (14.6)
Never visited	234 (65.7)
Are you a smoker?	
No	336 (94.4)
Former(>1yr)	6 (1.7)
Light smoker(10sticks/day)	8 (2.2)
Heavy smoker(>10sticks/day)	6 (1.7)

*Statically sisnificant

Table 2 shows the frequency of responses to the self-report questions. The question "Overall, how would you rate your gum health?" recorded the highest positive response (211, 59.3%) followed by "Do your gums bleed when you brush your teeth?" (203, 57%). Only 8(2.2%) reported having been told by a dentist that they had gum disease with bone loss.

Table 2: Responses to Self-report questions

CDC-AAP Self-Reported Questions	Response n(%)	
	No	Yes
SRQ1 Do you think you have gum disease?	305 (85.7)	51 (14.3)
SRQ2 Overall, how would you rate your gum health?	145 (40.7)	211 (59.3)
SRQ3 Have you ever had gum treatment, such as scaling & root planing?	174 (48.9)	182 (51.1)
SRQ4 Have you had any tooth become loose or fall off on their own without injury?	307 (86.2)	49 (13.8)
SRQ5 Have you ever been told by your dentist or hygienist that you have gum disease with bone loss?	348 (97.8)	8 (2.2)
SRQ6 Do you notice your teeth getting longer or presence of receding gum?	327 (91.9)	29 (8.1)
SRQ7 How many times do you use dental floss in the last 1week?	276 (77.5)	80 (22.5)
SRQ8 How many times do you use mouthwash in the last 1week?	280 (78.7)	76 (21.3)

The results of clinical periodontal examination according to age group and gender is displayed on **table 3**. The mean OHI-S score, mean GI score and mean BI score were 1.91±1.27, 0.93±0.73 and 38.2±41.3 respectively. OHI-S score (P=0.013), GI score (P=0.000), CPI-score (*P*=0.001) and oral hygiene status (*P*=0.000) demonstrated a statistically significant relationship with age. A higher percentage of females (14%) had healthy periodontium as compared to male (11.7%), though the association was not significant.

Table 3: Clinical parameters of participants in relation to age group and gender

	Mean			CPI score					OH status		
	OHI-S score	GI score	BI score								
	1.91 ±1.27	0.93 ±0.73	38.2 ±41.3	0	1	2	3	4	Good	Fair	Poor
Age Group											
≤20yrs	1.29 ± 1.13	0.61 ± 0.69	30.4 ± 39.5	26 31%	7 8.3 %	44 52.4%	5 5.9 %	2 2.4 %	48 43.2%	28 15.1%	8 13.6%
21-30yrs	1.66 ± 1.23	0.84 ± 0.75	37.1 ± 41.8	10 14.1%	9 12.7%	42 59.1%	8 11.3%	2 2.8 %	31 27.9%	29 15.6%	11 18.6%
31-40yrs	1.93 ± 1.22	1.04 ± 0.68	47.6 ± 40.1	5 7.9 %	6 9.5 %	44 69.9%	6 9.5 %	2 3.2 %	15 13.5%	41 22.0%	7 11.9%
41-50yrs	2.24 ± 1.16	0.99 ± 0.68	34.8 ± 40.3	4 5.9 %	3 4.4 %	51 75 %	7 10.3%	3 4.4 %	9 8.1%	47 25.3%	12 20.3%
51-60yrs	2.39± 1.12	1.18 ± 0.67	41.4 ± 43.2	1 1.8%	6 10.9%	39 70.9%	8 14.6%	1 1.8%	5 4.5%	38 20.4%	12 20.3%
>60yrs	3.12 ± 1.56	1.48 ± 0.80	51.7 ± 45.1	0 0%	1 6.7 %	12 80%	1 6.7 %	1 6.7%	3 2.8%	3 1.6%	9 15.3%

P-value	*0.013	*0.000	0.095			*0.001				*0.000	
Gender											
Male	2.09 ± 1.31	1.02 ± 0.71	41.9 ± 42.9	19 11.%	12 7.4%	108 66.3%	20 12.3%	4 2.5%	42 25.8%	89 54.6%	32 19.6%
Female	1.75 ± 1.23	0.85 ± 0.74	35.1 ± 39.7	27 14%	20 10.4%	124 64.2%	15 7.8%	7 3.6%	69 35.8%	97 50.3%	27 14%
Total				46	32	232	35	11	111	186	59
P-value	0.470	0.454	0.247			0.474				0.089	

*Statistically significant

According to CPI scores, almost three-quarters (264, 74.2%) of the participants had gingivitis, while an equal proportion of 12.9% (46) had healthy periodontium and periodontitis. Clinically diagnosed periodontal condition demonstrated strong significant relationship with age(p=0.000), OH status(p=0.000) and gingival inflammation as depicted by BI and GI(p=0.000) **(Table 4)**

Table 4: Clinically Diagnosed Periodontal disease distribution in relation to age group, gender, OH status and gingival condition.

	Healthy	Periodontal Disease		*P*-value
	CPI score 0	Gingivitis CPI score 1 & 2	Periodontitis CPI score 3 & 4	
Age group				
Up to 20yrs	26 (31%)	51 (60.7%)	7(8.3%)	0.000*
21-30yrs	10 (14.1%)	51 (71.8%)	10 (14.1%)	
31-40yrs	5 (7.9%)	50 (79.4%)	8 (12.7%)	
41-50yrs	4 (5.9%)	54 (79.4%)	10 (14.7%)	
51-60yrs	1 (1.8%)	45 (81.8%)	9 (16.4%)	
>60yrs	0 (0%)	13 (86.7%)	2 (13.3%)	
Gender				
Male	19(11.7%)	120(73.6%)	24(6.7%)	0.566
Female	27(14%)	144(74.6%)	22(11.4%)	
Oral hygiene status				
	43	61	7	0.000*
Good OH: score 0.0-1.2	3	166	17	
Fair OH: score 1.3-3.0	0	37	22	
Poor OH: score 3.0-6.0				
BI score				
0-10%--Non-gingivitis	45	101	17	0.000*
BIscore>10% Gingivitis	1	163	29	
GI score				
Healthy gingiva GI score 0.0	39	36	10	0.000*
Mild gingivitis GI score 0.1-1	7	124	9	
Moderate gingivitis 1.1-2.0	0	96	22	
Severe gingivitis 2.1-3.0	0	8	5	
TOTAL	46 (12.9%)	264 (74.2%)	46 (12.9%)	356

*Statistically significant

The response of participants to self-report questions in relation to clinically diagnosed periodontal disease is displayed on **table 5.** Only question 3 showed a significant relationship with clinically diagnosed periodontal disease (*P* = 0.007).

Table 5: Response to Self-report questions in relation to clinically diagnosed periodontal disease

Questions	Response	Healthy	Periodontal Disease	*P*-value
		CPI score 0	Gingivitis & Periodontitis CPI score 1-4	
SRQ1 Do you think you have gum disease?	No	38	267	
	Yes	8	43	0.525
SRQ2 Overall, How would you rate your gum health	No	13	132	
	Yes	33	178	0.065

SRQ3 Have you ever had gum treatment, such as scaling & root planing?	No	14	160	
	Yes	32	150	0.007*
SRQ4 Have you had any tooth become loose or fall off on their own without injury?	No	40	267	
	Yes	6	43	0.879
SRQ5 Have you ever been told by your dentist or hygienist that you have gum disease with bone loss?	No	46	302	
	Yes	0	8	0.270
SRQ6 Do you notice your teeth getting longer or presence of receding gum?	No	44	283	
	Yes	2	27	0.313
BL Do your gum bleed when you brush your teeth?	No	17	136	0.377
	Yes	29	174	

*Statistically significant

Prevalence of self-reported periodontal disease varied between 2.2% (Q5) and 59.3% (Q2). Sensitivity and specificity ranged from 2.58% (Q5) – 57.42% (Q2) and from 28.26 (Q2)-100%(Q5) respectively. The question for bleeding gum and Q2 recorded equal accuracy (53.66%) which was the highest while Q5 showed the lowest (15.15%). **(Table 6)**

Table 6: Validation parameters of individual self-report questions.

Item	SRQ1	SRQ2	SRQ3	SRQ4	SRQ5	SRQ6	BL
True positive	43	178	150	43	8	27	174
False positive	8	33	32	6	0	2	29
True negative	38	13	14	40	46	44	17
False negative	267	132	160	267	302	283	136
Sensitivity (SN) (%)	13.87	57.42	48.39	13.87	2.58	8.71	56.13
Specificity (SP) (%)	82.61	28.26	30.43	86.96	100	95.65	36.96
Positive likelihood ratio	0.80	0.80	0.70	1.06	-	2.00	0.89
Negative likelihood ratio	1.04	1.51	1.70	0.99	0.97	0.95	1.19
Self-reported Periodontal Disease Prevalence (%)	14.3	59.3	51.1	13.8	2.3	8.1	57.0
Positive Predictive Value (%)	84.34	84.39	82.45	87.78	100	93.12	85.74
Negative Predictive Value (%)	12.44	8.95	8.03	13.01	13.20	13.43	11.09
Accuracy (%)	22.74	53.66	46.07	23.30	15.15	19.93	53.66

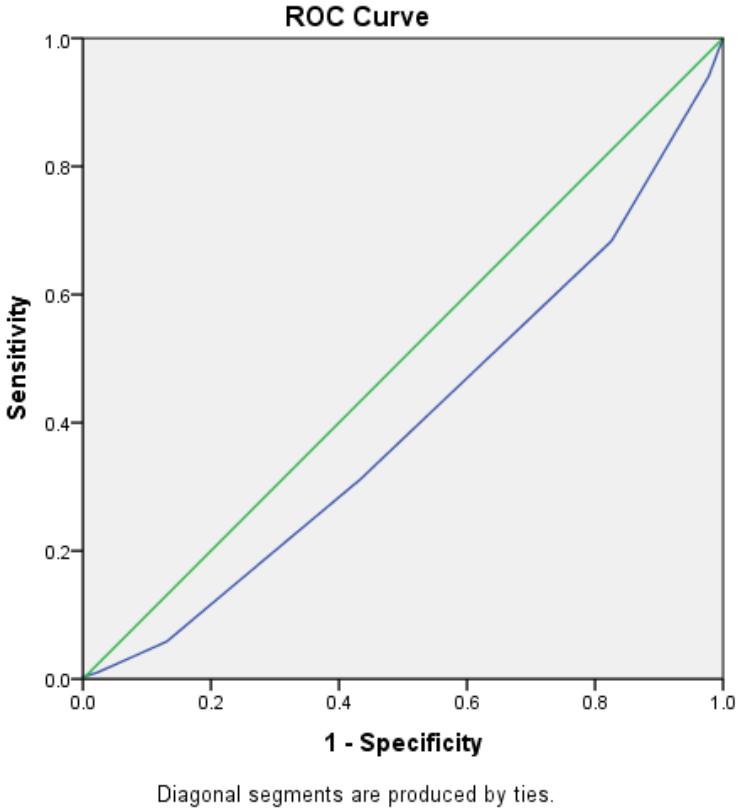
Key: SRQ1: Do you think you have gum disease? **SRQ2**: Overall, how would you rate your gum health. **SRQ3**: Have you ever had gum treatment, such as scaling & root planing? **SRQ4**: Have you had any tooth become loose or fall off on their own without injury? **SRQ5**:Have you ever been told by your dentist or hygienist that you have gum disease with bone loss? **SRQ6**: Do you notice your teeth getting longer or presence of receding gum? **BL**: Do your gums bleed when you brush your teeth?

Figure 1 presents the ROC curve and **table 7** displayed the sensitivity, specificity and diagnostic accuracy of self-reported periodontal disease questionnaire at different cut-off levels. The highest diagnostic accuracy for the self-reported periodontal disease scale to detect clinically defined periodontal disease was recorded when the cut off was ≥0. The sensitivity ranged between 0.3% and 100% and the specificity was between 0% and 100%. The sensitivity decreased as the cut‐ off level increased while the specificity increased with an increase in the cut‐ off level. Also, the diagnostic power decreased as the cut‐ off level was increased. Area under curve (AUC) was calculated to be 0.400.

Table 7: Diagnostic accuracy of the periodontal disease self-report questionnaire at different cut off levels.

Parameters	Cut off levels: Periodontal Disease is Positive if Periodontal Disease scale score is						
	≥ 0	≥ 1	≥ 2	≥ 3	≥ 4	≥ 5	≥ 6
Sensitivity (%)	100.0	94.2	68.4	31.3	5.8	1.0	0.3
Specificity (%)	0	2.2	17.4	56.5	87.0	97.8	100.0
Diagnostic Accuracy (%)	87.1	82.3	61.8	34.6	16.3	13.5	13.2

Figure 1: Receiver Operating Characteristics (ROC) curve



IV. Discussion

Periodontal disease is highly prevalent worldwide affecting more than 50% of the world's adult population. In Nigeria, a large percentage between 87% and 94.4% of the adult population is affected.[1,2] This makes a population-based surveillance of periodontal diseases crucial for adequate planning, implementation, and evaluation of preventive and control programs.[6] Comprehensive periodontal clinical examinations is the gold standard designed to detect early signs of periodontal disease, allowing us to prevent progression to the destructive forms. However, its application for population survey is expensive and time consuming. Therefore, an inexpensive, safe, and easy-to-perform alternative tool is necessary to simplify the periodontal data-collection which make feasible the surveillance of the periodontal diseases especially in an environment like ours with inadequate resources. Self-reported measures of periodontal disease present the required alternative being a more cost effective and comfortable option and requires no specially trained personnel.[7-9] Also, increasing evidence of the link between periodontal diseases and systemic diseases may necessitate the need for non-dental health professionals who are not experienced in performing periodontal clinical examination to assess periodontal status. However, in order for the self-report questionnaires to be useful, the validity and reliability in the population in which it will be used is crucial. Self-reporting and clinical examination using a "gold standard" should thus be in agreement. Therefore, we set out to evaluate the degree of agreement between self-report periodontal disease surveillance questionnaire and clinically diagnosed disease in the population of patients attending the family medicine clinic of LASUTH.

Majority (98.6%) of the participant in our study had some form of formal education and over 60% belong to upper and middle socioeconomic class. This made the understanding and administration of the questionnaire smooth and easy. The mean age was 35.6yrs ±14.7. This falls within the standard age group recommended by WHO for surveillance of oral health conditions in adults. It is believed that data from this age group is capable of giving reliable insight into the level of severe periodontal destruction in a population.[21]

Almost two-third(65.7%) of the participants in this study had never visited a dentist. The figure falls within the range of 52% - 80% that was reported by studies on different Nigerian populations irrespective of their level of education.[22-25] It is a reflection of the low level of oral health awareness among Nigerians, level of education notwithstanding.[24]

The question "Overall, how would you rate your gum health?" recorded the highest positive response (211, 59.3%) followed by "Do your gums bleed when you brush your teeth?" (203, 57%). There seems to be a contradiction in this self-report of the participants as over half reported satisfactory gum health, and over half also reported bleeding gums, a sign of disease. This discrepancy may be due to inadequate knowledge and lack

of awareness of periodontal disease and oral health. Only 8(2.2%) reported having been told by a dentist that they have gum disease with bone loss. This is expected because dental care utilization is low among the participants; almost two-third (67.5%) of the participants have never had a dental consultation.

Significant association was observed between OHI-S score (p=0.013), GI score (p=0.000), CPI-score (p=0.001) and clinically diagnosed periodontal disease. This is in agreement with the report of Micu et al.[12] Although, periodontal disease is multifactorial in pathogenesis, its initiation is determined by the presence and accumulation of plaque biofilm on the tooth surface. Also, the degree of gingival inflammation is a function of the activity of plaque microorganisms; the poorer the oral hygiene status, the more severe the level of inflammation.

In this study, only response to Q3 self-reported periodontal question showed significant association with clinically diagnosed periodontal disease. This is contrary to the study of Eke et al[7] which reported significant association of responses to all self-report questions and clinically diagnosed periodontal disease.

The prevalence of clinically diagnosed periodontal disease of 87.1% was much higher than that of self-report-questions which ranged from 2.2% (Q5) to 59.3% (Q2). This is comparable to the report from the study of Taiwo et al[2] which had 87% clinically diagnosed periodontal disease and 21.7% according to self-report Q1. It is an evidence that the self-report questions are less able to detect periodontal disease.[24] The reason for this among the respondents may be related to the poor awareness and knowledge about periodontal health such that it was difficult to discern health from disease. Also, poor attitude to oral health evidenced by poor utilization of dental facility as seen in this and other studies carried out among Nigerians may also be a factor.[22-26.]

According to the validity classification on sensitivity and specificity by Taylor and Borgnakke[13], all the self-report questions demonstrated low sensitivity (<60%) which ranged from 2.58% (Q5) to 57.42% (Q2). A number of the self-report questions had high specificity (≥80%) values (Q1, Q4, Q5 & Q6) so they are able to identify individuals without disease.[27] The accuracy was also generally low depicting that no single self-report question had good validity in predicting periodontal disease as reported by many studies.[2,12] On the contrary, some authors reported good validity with some of the self-report questions.[15,28]

Analyzing the ROC curve, the optimum cut off (highest diagnostic accuracy) was obtained when the periodontal disease scale score was ≥ 0. The diagnostic accuracy reduces as the cut off was increased. The area under curve (AUC) obtained for the ROC curve in our study was 0.400 which falls below the useful values of 0.7-0.89 as described by Swets.[29] Values ≥0.9 is said to depict excellent accuracy. Taiwo et al[2] recorded a higher value (0.6) of AUC but still below average. The difference in the figures may be due to differences in the computerization of the periodontal disease scale. In our study, only questions related to signs and symptoms of periodontal disease, diagnosis and treatment by a professional, and personal perception about periodontal health were used in computing the self-reported periodontal disease scale. The questions that relate to oral hygiene practice, use of dental floss and mouthwash were excluded in the computation of self-reported periodontal disease scale in our study contrary to that of Taiwo et al[2]. These questions do not reflect presence of periodontal disease, and more so, not a regular practice among Nigerians as noted by Taiwo et al.[2]

The validity of a tool is mediated by population factors, such as literacy, awareness, dental care habits and knowledge. The low validity recorded in this study likely resulted from poor periodontal awareness and knowledge of the participants. Nigerians have very poor knowledge of periodontal disease hence, are unable recognize periodontal disease state. The question "Has any dentist/hygienist told you that you have deep pockets?" has been judged to be best measure for self-reported periodontal disease. Unfortunately, a large percentage of Nigerians have never visited a dental office, therefore, an underestimate of the disease prevalence may have occurred.[7,12]

V. Conclusion

The self-report questionnaire performed poorly in identifying periodontal disease in our study group. The clinically diagnosed periodontal disease prevalence differ widely from that of self-report.

There is need to put up programs that will raise the periodontal knowledge and awareness, as well as dental service utilization in the population as this may have a positive impact on the validity of self-report tool.

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