



Relationship of oral hygiene status and practices with oral lesions in a group of HIV positive patients in Lagos, Nigeria

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Abstract

Objective: The oral health of HIV positive patients may be compromised because of their depressed immunity and may increase their risk of developing some oral lesions. This study was carried out to assess the relationship of the oral hygiene status and practices with oral lesions in HIV positive patients at a dedicated HIV clinic in Nigeria.

Method: A cross sectional study of adult HIV positive patients aged 18 years and above at the HIV outpatient clinic of the Lagos University Teaching Hospital. Data on age, gender, marital status, level of education and oral hygiene practices were collected. Their CD4 counts were recorded. Oral examination was carried out on all patients to assess their oral hygiene status using the Simplified Oral Hygiene Index. Oral lesions were recorded when present.

Result: A total of 134 HIV positive patients were seen, most (71.6%) of whom had never visited a dentist. The mean oral hygiene index (OHI-S) score of the patients was 1.85 and 55.2% had a fair oral hygiene status. The majority (77.6%) cleaned their teeth once daily. Oral candidiasis and linear gingival erythema (LGE) were the two most prevalent oral lesions being 26.1% and 11.2% respectively. The mean oral hygiene index (OHI-S) score was higher in males [2.10] compared with females [1.71] ($p < 0.05$), in patients who had never visited the dentist [1.99] compared with those who had visited the dentist previously [1.49] ($p < 0.05$) and in patients with linear gingival erythema compared with those without the lesion ($p < 0.05$). The CD4 + T-lymphocyte count was not associated with the OHI-S ($p > 0.05$).

Conclusion: Poorer oral hygiene was significantly associated with male gender, no previous dental visits and linear gingival erythema lesions in the HIV positive patients in this study. Regular oral health education programmes should be incorporated into the treatment protocol of HIV positive patients at the HIV clinic to improve their overall health status.

Key words: Oral hygiene, linear gingival erythema, HIV, Nigeria

Introduction

The human immunodeficiency virus (HIV) infection has continued to be a global health burden and source of concern, as it affects an estimated population of 33.3 million people globally and more than two thirds of these people reside in Sub-Saharan Africa⁽¹⁾. Nigeria is the most populous black nation in the world having an estimated population of 167 million people⁽²⁾. In terms of the estimated number of people living with HIV/AIDS (PLWHA), Nigeria with a prevalence of 3.6%⁽¹⁾ bears a large burden of this infection in Africa as it ranks second after South Africa in Sub-Saharan Africa⁽³⁾. This teeming population of immune compromised patients is susceptible to a variety of opportunistic infections in the oral cavity^(4,5). This may be further aggravated by poor oral health care which includes poor oral hygiene, a major concern in developing countries such as Nigeria. The effect of this infection is thus a reduction in the quality of life of these individuals⁽⁶⁾ and a significant impact on their general health⁽⁷⁾. As such, their oral hygiene must be given the optimum attention. Poor oral hygiene has been implicated as one of the predisposing factors for some of the HIV-associated oral conditions such as oral candidiasis in addition to low CD4 counts $< 200/\mu\text{L}$ and high viral loads⁽⁴⁾. These oral lesions may be the first symptoms of the HIV

infection and could signify the clinical progression of the disease^(8,9). These HIV-associated oral lesions have been reported to be present in about 50% of people with HIV infection and in 80% of those with a diagnosis of AIDS⁽¹⁰⁾. These lesions include: candidiasis, oral hairy leukoplakia, oral ulceration and HIV-associated periodontal diseases; such as linear gingival erythema (LGE), necrotizing ulcerative gingivitis and periodontitis⁽¹¹⁾. Studies have reported oral candidiasis to be the commonest among the oral lesions⁽¹²⁻¹⁵⁾. Of the HIV associated periodontal lesions, linear gingival erythema appears to be the commonest. It presents as a persistent and distinct erythema of the gingiva which may be limited to the marginal tissue or extend to the attached gingiva. These erythematous changes are usually generalized but may be confined to one or two teeth. The gingiva bleeds easily on tooth brushing or gentle probing. A study carried out in India, reported an LGE prevalence of 47%⁽¹⁶⁾, while in Nigeria, the prevalence of LGE ranged from 2.0-16.6%^(14,15,17,18). These oral lesions can then be a cause of feeding problems and as such exacerbate the person's undernutrition⁽¹⁹⁾.

Other oral problems of importance to HIV infected persons are plaque induced periodontal diseases which according to some studies appear to be more severe in HIV infected patients⁽²⁰⁻²³⁾ and are also associated with poor oral



hygiene. The morbidity of these oral lesions could compromise both the patients' ability to maintain good oral hygiene and affect chewing. All the above facts underscore the importance of good oral hygiene maintenance in HIV infected individuals.

A dearth of literature exists on the oral hygiene practices and oral hygiene status of HIV infected individuals in Nigeria. Previous studies in Nigeria^(14,15,17,24) and in Africa^(13,25) have focused on the prevalence of oral lesions. The objective of this study was to assess the level of oral hygiene practices and oral hygiene status of HIV positive patients and evaluate their relationship with oral lesions in a dedicated HIV outpatient clinic of the Lagos University Teaching Hospital in Nigeria where according to the clinic database over ten thousand Nigerians are receiving care.

Materials and method

This was a cross sectional descriptive study carried out at the HIV outpatient clinic of the Lagos University Teaching Hospital (LUTH) between October 2007 and February 2008. This clinic provides specialist care for HIV positive patients in Lagos. This study was carved out of a larger study. The inclusion criteria were HAARTS naive HIV positive adult patients, 18 years and above, diagnosed by ELISA technique, confirmed by Western Blot and had not commenced antiretroviral therapy at the time of enrollment into the study. The HIV positive patients were diagnosed within one year from the time of study and selected using a convenience sampling technique. The study was approved by the Research and Ethics Committee of the Lagos University Teaching Hospital and written informed consents were obtained from each of the participants. An interviewer administered questionnaire was used in collecting the following data: age, gender, level of education and oral hygiene practices. The CD4 lymphocyte counts of the HIV positive patients were retrieved from their medical records and categorized as < 200, 200-499 and >500 cells/mm³ according to CDC classification⁽²⁶⁾. The CD4+ cell count was assayed by semi automated method using Partec Flow cytometer. Intra-oral examination was carried out on the subjects and was performed in a consulting room with the subjects sitting in an upright position using sterile dental mirrors and probes. Oral lesions were recorded as present or absent according to the presumptive diagnosis of the European Community clearing house on oral problems related to HIV infection⁽¹¹⁾. They were examined by a single examiner to control the variability of the examiner. However, no intraexaminer calibration was done.

The oral hygiene of the subjects was assessed using the Simplified Oral Hygiene Index (OHI-S)⁽²⁷⁾. This is a composite index that scores plaque and calculus deposits on six index teeth.

Criteria for scoring plaque

- 0 - No plaque (or debris) present.
- 1 - Plaque (or debris) covering not more than 1/3rd of exposed tooth surface.
- 2 - Plaque (or debris) covering between 1/3rd and 2/3rd of exposed tooth surface.
- 3 - Plaque (or debris) covering more than 2/3rd of exposed tooth surface.

Criteria for scoring calculus

- 0 - No calculus present
- 1 - Supragingival calculus covering not more than 1/3rd of exposed tooth surface.
- 2 - Supragingival calculus covering between 1/3rd and 2/3rd of exposed tooth surface or presence of flecks of subgingival calculus around the cervical portion of the tooth.
- 3 - Supragingival calculus covering more than 2/3rd of exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth.

The OHI-S is the sum of the plaque score (PI-S) and calculus score (CI-S) per subject. The oral hygiene was classified as good when OHI-S was 0.0-1.2, fair (1.3-3.0) and poor (3.1-6.0). The data of the HIV positive patients were recorded on the questionnaires to maintain their confidentiality. Data analysis was done with EPI-info 2007 statistical software version 3.4.3. Frequency distribution was generated for categorical variables while their means and standard deviations were recorded. Microsoft Excel was used for the graphics. The Mann Whitney chi-square test was used to determine significant differences between means of various groups. P value of less than 0.05 was considered statistically significant.

Result

The age and gender distribution of the patients are shown in **Table 1**. A total of 134 HIV infected patients were seen during the period of this study. Females were 64.2% (n=86) and males 35.8% (n=48) giving a female to male ratio of 1.8:1. The age of the patients ranged from 19-72 years with an overall mean age of 35.4 years (SD=9.5 years). Majority of the patients belonged to the 25-44 year group. Sixty five (48.5%) patients had secondary school education, 36 (26.9%) had primary school education, 29 (21.6%) had post-secondary education, while 4 (3%) had no formal education (**Figure 1**).

Oral hygiene practices

Table 2 shows the oral hygiene practices of the HIV positive patients. Tooth brush and paste was the predominant cleaning aid used. Over three quarters (77.6%) of the patients brushed their teeth once a day. More than half (58.2%) of the HIV patients used the horizontal brushing technique with a large proportion (71.6%) of patients having never visited a dentist prior to the study. There were no statistically significant differences in the oral hygiene practices between male and female patients (P>0.05).

Oral hygiene status

Figure 2 shows the oral hygiene status of the HIV patients. About 55.2% of the HIV positive patients had fair oral hygiene, 29.9% had good oral hygiene and 14.9% had poor oral hygiene.

The mean oral hygiene (OHI-S) of the patients was 1.85± with male patients having significantly higher OHI-S scores than females (P= 0.023). Oral hygiene status was significantly associated with history of previous dental visits (P=0.016) but was not associated with the level of education (P=0.056), tooth cleaning aid (P= 0.056), frequency of tooth cleaning (P=0.734) and method of



Table 1. Age and Gender distribution of the patients

Age group	Female		Male		Total	
	n	(%)	n	(%)	n	(%)
≤ 24	10	(16.3)	4	(6.3)	14	(10.4)
25-34	36	(49.7)	18	(37.5)	54	(40.3)
35-44	35	(47.7)	14	(29.2)	49	(36.6)
≥ 45	5	(6.8)	12	(31.0)	17	(12.7)
Total	86	(64.2)	48	(35.8)	134	(100)

Table 2. Oral hygiene practices of the patients

Oral hygiene practices	Female n (%)	Male n (%)	Total n (%)	X ²	P value
Tooth cleaning Aid				3.01	0.391
Toothbrush and paste	66 (76.7)	36 (75.0)	102 (76.1)		
Chewing stick	3 (3.5)	0 (0.0)	3 (2.2)		
Toothbrush + chewing stick	16 (18.6)	10 (20.8)	26 (19.4)		
Others (Charcoal, bitterleaf)	1 (1.2)	2 (4.2)	3 (2.2)		
Method of tooth cleaning				0.95	0.623
Vertical (Up and down)	14 (16.3)	11 (22.9)	25 (18.7)		
Horizontal (Scrub)	51 (59.3)	27 (56.3)	78 (58.2)		
Vertical + Horizontal	21 (24.4)	10 (20.8)	31 (23.1)		
Frequency of tooth cleaning				0.94	0.332
Once daily	64 (74.4)	40 (83.3)	104 (77.6)		
Twice daily	22 (25.6)	8 (16.7)	30 (22.4)		
Dental visits				0.71	0.399
Visited	27 (31.4)	11 (22.9)	38 (28.4)		
Never visited	59 (68.6)	37 (77.1)	96 (71.6)		
Total	86(64.2)	48(35.8)	134(100)		

Table 3. Mean oral hygiene Index (OHI-S) score in relation to Socio-demographic characteristic

Characteristics	N (%)	Mean OHI-S	X ²	P value
Age (years)			2.09	0.553
< 24	14 (10.4)	1.50 ± 0.77		
25-34	54 (40.3)	1.88 ± 0.97		
35-44	49 (36.6)	1.88 ± 1.04		
≥ 45	17 (12.7)	1.93 ± 0.83	5.19	0.023 *
Gender				
Male	48 (35.8)	2.10 ± 0.95		
Female	86 (64.2)	1.71 ± 0.94		
Educational level			7.57	0.056
None	4 (3.0)	2.53 ± 0.77		
Primary	36 (26.9)	2.17 ± 1.06		
Secondary	65 (48.5)	1.67 ± 0.90		
Post-secondary	29 (21.6)	1.76 ± 0.87		
Total	134(100)			

*Statistically significant

Distribution of oral lesions and CD4 counts of patients
Sixty two HIV positive patients presented with at least one oral lesion. The prevalence of HIV related oral lesions was 46.3% with oral candidiasis and linear gingival erythema (LGE) being the two most frequent lesions. Thirty five (26.1%) patients presented with oral candidiasis while 15 (11.2%) had linear gingival erythema (LGE) (Figure 3). The CD4 count was available for 121 (90.3%) patients and this

Table 4. Mean oral hygiene Index (OHI-S) in relation to Oral hygiene practices

	N (%)	Mean OHI-S	X ²	P value
Tooth cleaning Aid			7.43	0.059
Toothbrush and paste	102 (76.1)	1.84 (±0.97)		
Chewing stick	3 (2.2)	2.90 (± 1.22)		
Toothbrush + chewing stick	26 (19.4)	1.64 (±0.80)		
Others (Charcoal, bitterleaf)	3 (2.2)	2.73 (±0.84)		
Method of tooth cleaning			0.62	
Vertical (Up and down)	25 (18.7)	1.90 (±0.96)		
Horizontal (Scrub)	78 (58.2)	1.86 (±0.97)		
Vertical + Horizontal	31 (22.4)	1.77 (±0.95)		
Frequency of tooth cleaning			0.12	0.734
Once daily	104 (77.6)	1.87 (±0.98)		
Twice daily	30 (22.4)	1.75 (±0.89)		
Dental visits			5.77	0.016 *
Visited	38 (28.4)	1.49 (±0.68)		
Never visited	96 (71.6)	1.99 (±1.02)		
Total	134(100)			

*Statistically significant

Table 5. OHI-S in relation to oral lesions and CD4 count Variables

	N(%)	Mean OHI-S (±SD)	P value
Candidiasis			0.122
Present	35(26.1)	2.07 (±0.94)	
Absent	99(73.9)	1.77(±0.96)	
Linear gingival erythema			0.038*
Present	15(11.2)	2.29(±0.89)	
Absent	119(73.9)	1.79(±0.95)	
Necrotizing periodontal diseases			0.963
Present	4(3.0)	1.88(± 1.04)	
Absent	130(97.8)	1.85(±0.96)	
Hairy leukoplakia			0.320
Present	3(2.2)	2.33(± 0.04)	
Absent	131(97.8)	1.84(± 0.96)	
Oral ulcers			0.655
Present	5(3.7)	1.54(±0.50)	
Absent	129(96.3)	1.86(±0.97)	
CD4 count (cells/mm³)			0.507
< 200	55(45.5)	1.85(±0.92)	
200-499	52(11.6)	1.98(±1.06)	
>500	14(43.0)	1.54(±0.62)	

was what was used for the analysis. Among the oral lesions, linear gingival erythema was the only lesion that had a significant association with the mean OHI-S score. The mean OHI-S score was higher in patients with LGE [2.29±] compared with patients without LGE [1.79] (P=0.038). Fifty five (45.5%) HIV positive patients had CD4 counts < 200 cells/mm³, 52 (43%) had 200-499 cells/mm³ and 14 (11.6%) had CD4 counts > 500



cells/mm³. The OHI-S score was not significantly associated with the CD4 counts ($P=0.507$). This is shown in (Table

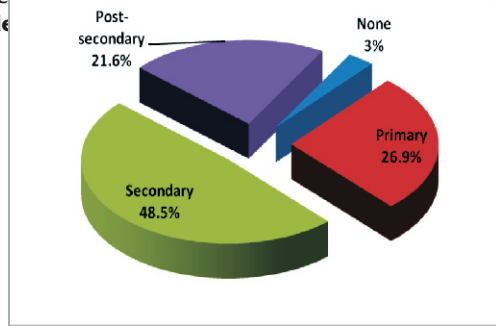


Figure 1. Educational level of patients

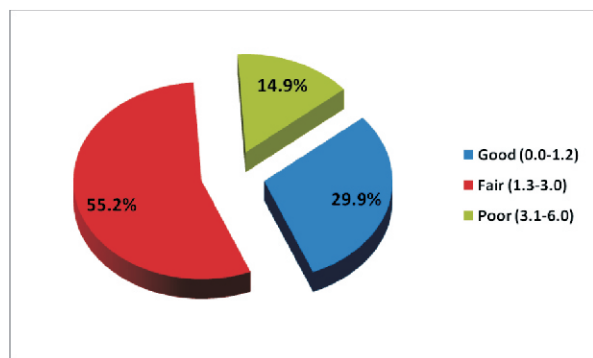


Figure 2. Oral hygiene status of the patients

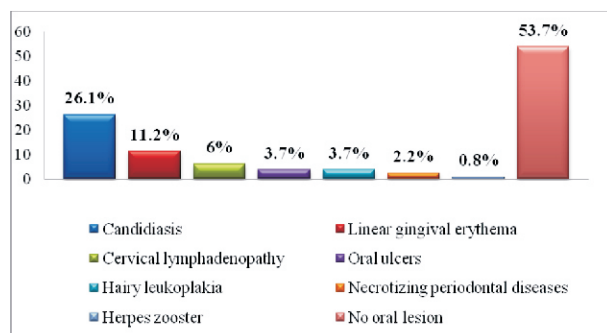


Figure 3. Prevalence of oral lesions in HIV positive patients

Discussion

To the best of our knowledge and based on available literature, this is the first study to assess the oral hygiene practices and status of HIV positive patients in Nigeria. This was the main focus of the study. Previous studies focused mainly on HIV-related oral manifestations, unmet needs in adults and treatment needs of HIV paediatric population of Nigerians^(14,17,24,28,29). There were more HIV positive females than males in this study with a female:male ratio of 1.8:1 which is comparable to other studies^(14,28). This female preponderance may be because women are

physiologically more vulnerable to HIV infection than men as they have more co-factors of infection such as STI⁽³⁰⁾. Most of the patients were also found to be in their 3rd and 4th decades of life, a pattern reported in other studies^(14,31). This has been explained by the high risk sexual behaviour and early onset of sexual activity of people in this environment. This study further revealed that most of the patients were educated as 70.1% had at least secondary school education. This is similar to an earlier study in which over 75% had at least secondary school education⁽³¹⁾. This may not be totally surprising as the HIV clinic is located in an urban setting and may thus be readily accessible to this category of patients.

We observed that the oral hygiene status of the greater proportion of the HIV positive patients in this study was fair, with a mean OHI-S score of 1.85. This is similar to the study by Choromaska in Poland⁽³²⁾ in which the HIV infected patients had a mean OHI-S score of 2.03 and was significantly higher than that of the HIV uninfected subjects in their study. Our study differs from theirs by being a descriptive study, hence we did not include a control group. However, previous studies on the general Nigerian population who were presumed to be HIV uninfected, revealed lower mean OHI-S scores of 0.66⁽³³⁾ and 1.23⁽³⁴⁾. Arguably, the subjects in their study were slightly younger than our own study.

The predominantly fair oral hygiene status in our study may be related to the better level of education among the patients. In spite of this, only 29.9% of the patients had a good oral hygiene. This may prove to be detrimental to their oral health as the tissues surrounding the teeth possess a potentially weak barrier which may be readily penetrated by bacteria and their virulence factors⁽³⁵⁾. Consequently, maintaining a low microbial load within the mouth is an essential component of preventive treatment regimen in HIV positive patients⁽³⁵⁾. The low proportion of patients with good oral hygiene may indicate unsatisfactory oral hygiene practices in the patients. This is supported in our study by the finding that most of the patients cleaned their teeth only once a day, and is further buttressed by the large number of patients who had never visited the dental clinic prior to the study. These patients were consequently found to have significantly poorer oral hygiene than those with history of previous dental visits. This may be a reflection of the low oral health awareness among the general population, particularly HIV positive patients⁽³⁶⁾.

The poorer oral hygiene in male patients may not be totally surprising and is in agreement with previous studies which were however in the general population^(33,37,38). The reason may be attributed to the greater attention women place on their appearance and impression of others compared to males. The factors associated with poorer oral hygiene in HIV positive patients in this study do appear to be similar to that of the general Nigerian population.

Oral candidiasis was the commonest oral lesion in these patients. This is in agreement with previous studies^(14,31). However, candidiasis was not associated with poorer oral hygiene in our study. Out of all the HIV-related oral lesions, only linear gingival erythema, a non-plaque induced gingival lesion, the second most frequent oral lesion was found to be associated with higher mean OHI-S scores in the HIV patients. Patients with this lesion had significantly poorer oral hygiene than those without the lesion. This is an



interesting observation since candidiasis and linear gingival erythema both have fungal origin. However, the often anterior location, erythematous and sometimes painful nature of the linear gingival erythema lesion may have alarmed the patients and possibly prevented these patients from cleaning their teeth properly out of fear of bleeding and pain and likely accounting for the significantly poorer oral hygiene observed in them. This may have serious implications since according to Brown et al⁽³⁹⁾, poor oral health and HIV associated oral lesions may be considered debilitating. The degree of immunosuppression in the HIV patients did not however, have any significant relationship on their oral hygiene status. This may be because of the relatively stable clinical conditions of the HIV patients as they were all attending an outpatient clinic having been diagnosed within a year of the study, on account of which they may have maintained a fair oral hygiene level. This is further asserted in the study by choromaska⁽³²⁾ in which HIV positive patients who had been infected for a shorter duration of time of < 5 years had better oral hygiene than those infected for a longer duration of > 5 years prior to the study.

In conclusion, most of the HIV positive patients had fair oral hygiene status. This was still below the good status expected of them. Their oral hygiene practices were also generally unsatisfactory. Poorer oral hygiene was associated with male gender and patients who had never visited a dentist. This further reiterates the importance of dental visits by HIV positive patients in achieving better standards of oral hygiene care. The ability of patients with LGE lesions to maintain good level of oral hygiene care was compromised.

We thus recommend that an oral health education programme should be incorporated into the treatment protocol of HIV positive patients at the HIV clinic to improve their oral hygiene practices with emphasis on regular dental visits. Regular oral examination should be carried out by dentists to assess the oral hygiene status of HIV patients and enable early detection and treatment of oral lesions such as linear gingival erythema. Dentists and physicians need to collaborate to improve overall health care delivery to HIV positive patients.

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