

Knowledge of Oral Lesions, Associated Risk Factors and Health Care Seeking Behaviors among HIV Enrollees in Osun-State

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Abstract

Introduction

Oral lesions are frequent complications of Human Immunodeficiency Virus (HIV) infection, particularly among individuals with advanced immunosuppression. These lesions reduce quality of life and increase vulnerability to secondary infections. This study assessed knowledge, risk factors, and healthcare-seeking behavior related to oral lesions among HIV enrollees in Osun State, Nigeria.

Methodology

A descriptive cross-sectional study was conducted among 180 HIV-positive adults attending Antiretroviral Therapy (ART) clinics, selected using multistage sampling. A structured, interviewer-administered questionnaire—validated by oral health and HIV experts was used to collect data on socio-demographics, knowledge of oral lesions, risk factors (e.g., smoking, poor oral hygiene, ART adherence), and healthcare-seeking practices. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20. Descriptive statistics summarized participant characteristics. Chi-square tests assessed associations between variables ($p < 0.05$).

Results

Participants were mostly male (51.7%) and Yoruba (74.4%). Only 56.1% had good knowledge of oral lesions. Common risk factors included poor oral hygiene (56.1%), alcohol use (31.7%), and ART non-adherence. Healthcare-seeking within two weeks of symptoms was low (26.7%). Religion, education, and occupation were significantly associated with care-seeking. Poor oral hygiene and low CD4 counts were significant predictors of oral lesions.

Conclusion

Knowledge and prompt care-seeking for oral lesions remain inadequate among HIV enrollees. Integrating oral health education, routine screening, and dental care into HIV treatment services is essential to improve outcomes in this population.

Introduction

Oral lesions are a global public health concern that have affected humans since the beginning of civilization and continue to draw the attention of healthcare professionals and researchers worldwide¹. In recent years, the situation has become more worrisome due to increased consumption of processed foods and unhealthy dietary habits¹.

Oral lesions, also known as mouth sores or ulcers refer to any abnormality or sore within the oral cavity. These occur when oral bacteria metabolize sugars and produce acids that erode tooth enamel, leading to cavities or affecting the lips, tongue, cheeks, and gums¹. Tooth decay, one of the most common causes of oral lesions, is particularly prevalent among individuals living with Human Immunodeficiency Virus (HIV), especially those with advanced immunosuppression². Oral lesions often serve as early clinical markers of HIV progression and declining immune function². They can present as shallow or deep ulcers, painful or tender patches, and white or yellow lesions, which may be signs of oral thrush or leukoplakia³.

A key contributor to the heightened risk of dental caries among People Living with HIV (PLHIV) is reduced salivary flow, often due to HIV infiltration of salivary glands and increased CD8 lymphocytes in saliva⁴. Additionally, the use of antiretroviral therapy (ART) may alter the oral microbiome, further increasing susceptibility to oral lesions⁴. Understanding the knowledge of these risk factors is essential for shaping appropriate health-seeking behaviors among HIV enrollees.

Health-seeking behavior refers to the actions individuals take when they perceive a health issue. Among People Living with HIV/AIDS (PLWHA), oral healthcare remains one of the most neglected aspects of overall medical attention. Oral conditions such as dental caries can severely impair dental function, compromise nutrition, and reduce the overall quality of life. Beyond physical discomfort, untreated oral lesions can affect mental well-being, social engagement, and ART adherence.

Evidence suggests that oral health conditions tend to be more severe and difficult to manage among PLWHA compared to HIV-negative individuals⁴. Consequently, oral health services should be seen as an essential component of comprehensive HIV care. In Rwanda, the 2023 National Oral Health Survey reported that 65% of respondents had dental caries, while over 54% had untreated lesions⁵. Despite such alarming statistics, data on oral lesion prevalence, risk factors, and health-seeking behavior among HIV-positive populations in Nigeria remain limited.

Globally, billions of dollars are spent annually managing oral diseases, including candidiasis (hyperplastic, erythematous, pseudomembranous), angular cheilitis, periodontitis, linear gingival erythema, oral ulcers, oral hairy leukoplakia, and pigmentary changes⁶. While numerous international studies have explored knowledge and risk factors of oral lesions, few have examined how these relate to health-seeking behavior in the context of HIV in Osun State, Nigeria. Addressing this gap is vital for improving integrated HIV and oral healthcare services.

Materials and Methods

Study Design and Setting

A descriptive cross-sectional study was conducted among people living with HIV (PLHIV) attending antiretroviral therapy (ART) clinics in selected healthcare facilities in Osun State, Nigeria. The study was

designed to assess participants' knowledge of oral lesions, associated risk factors, and healthcare-seeking behaviour.

Study Population and Eligibility Criteria

The study population comprised HIV-positive adults (aged ≥ 18 years) who had been enrolled in ART care for at least six months. Participants with cognitive impairments or those too ill to participate were excluded.

Sample Size Determination

Using Cochran's formula for proportions:

Sample Size Calculation (Cochran's Formula):

$$\begin{aligned} n_0 &= (Z^2 * p * (1 - p)) / d^2 \\ &= (1.96^2 * 0.5 * (1 - 0.5)) / (0.05)^2 \\ &= (3.8416 * 0.25) / 0.0025 \\ &= 0.9604 / 0.0025 \\ &= 384.16 \approx 384 \end{aligned}$$

Finite Population Correction:

$$\begin{aligned} n &= n_0 / [1 + ((n_0 - 1) / N)] \\ &= 384 / [1 + ((384 - 1) / 180)] \\ &= 384 / [1 + 2.13] \\ &= 384 / 3.13 \\ &\approx 123 \end{aligned}$$

Final Sample Used = 180 (Complete enumeration of all eligible participants)

Explanation of the formulas above

Where:

Z is 1.96 (for 95% confidence)

p is 0.5 (estimated proportion; conservative estimate if unknown)

d is 0.05 (margin of error)

Now apply Finite Population Correction (FPC) because your total population (N) is 180:

The minimum sample size was calculated using Cochran's formula for cross-sectional studies with a 95% confidence level and 5% margin of error, assuming a 50% estimated proportion. This yielded a base sample size of 384. Applying finite population correction for a known population of 180 eligible HIV-

positive individuals with oral lesions across the selected hospitals, the adjusted sample size was approximately 123. The population of 180 HIV-positive individuals with oral lesions was derived from the clinic registers across the three selected ART clinics over a three-month period prior to the study initiation.

Although a sample size of 123 was initially calculated using Cochran's formula. However, since the total eligible population was small and accessible, we opted for complete enumeration to eliminate sampling bias

Only HIV-positive adults with confirmed oral lesions were eligible and included. Oral lesions were identified during clinical consultation by trained clinicians using the World Health Organization (WHO) diagnostic criteria for HIV-related oral manifestations. Common lesions identified included oral candidiasis, ulcers, leukoplakia, and gingivitis. Oral lesions were confirmed clinically by trained clinicians at enrollment.

Sampling Technique

Osun state has 30 Local Government Areas (LGAs), distributed across three senatorial districts. One LGA was randomly selected per district using simple random sampling (balloting). This provided geographic spread while ensuring feasibility. Within each LGAs, the ART clinic with the highest average (based on 6-month records) was selected purposely to ensure adequate sample size per facility. We acknowledge this may introduce some selection bias and have reflected this in our study limitation.

Data Collection Instrument

The structured, interviewer-administered questionnaire underwent face and content validation by two oral health experts and one HIV care clinician. Each item was rated for relevance and clarity. A Content Validity Index (CVI) of 0.86 was obtained. A pilot test involving 20 PLHIV at a non-study site yielded a Cronbach's alpha of 0.78 for the knowledge of the section, indicating acceptable reliability. Ten questions assessed knowledge on causes, symptoms, and prevention of oral lesions. Each correct response earned 1 point. Total scores ranged from 0–10. Knowledge levels were categorized as poor (0–3), fair (4–6), and good (7–10).

Please find the attached questionnaire for details. The questionnaire was developed specifically for this study based on a review of existing literature and is provided as Supplementary File 1.

Data Analysis

Data were analysed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the data.

Bivariate analysis (chi-square test) assessed associations between independent variables and knowledge level, risk factors, and healthcare-seeking behaviour.

Ethical Considerations

Ethical approval

for the study was granted by the Osun State Health Research Ethics Committee, Osogbo, Osun State (Approval Number: OSHREC/PRS/569T/418). Participants aged 18 and above were required to provide written informed consent by signing the consent form.

Results

A total of 180 HIV-positive individuals with oral lesions participated in the study.

Socio-demographic Characteristics

The socio-demographic characteristics of the respondents are presented in Table 1. Most participants were below 30 years of age (32.2%, n = 58), while 58.9% (n = 106) were between 30 and 59 years, and 8.9% (n = 16) were aged 60 years and above. Slightly more than half of the respondents were male (51.7%, n = 93), while females accounted for 48.3% (n = 87). The majority were Christians (61.7%, n = 111), followed by Muslims (35.0%, n = 63), while 3.3% (n = 6) practiced other religions. Regarding educational status, 39.4% (n = 71) had tertiary education, while 7.2% (n = 13) had no formal education. Most participants were of Yoruba ethnicity (74.4%, n = 134). In terms of occupation, traders (46.7%, n = 84) and civil servants (40.0%, n = 72) constituted the majority.

Table 1
Respondents ' demographic characteristics

Parameters	Classification	Frequency	Percentage
Age	< 30	58	32.2
	31–40	50	27.8
	41–50	37	20.6
	51–60	19	10.6
	> 60	16	8.9
	Total	180	100.0
Gender	Male	93	51.7
	Female	87	48.3
	Total	180	100.0
Religion	Islam	63	35.0
	Christianity	111	61.7
	Others	6	3.3
	Total	180	100.0
Educational Qualification	No education	13	7.2
	Primary education	43	23.9
	Secondary education	53	29.4
	Tertiary education	71	39.4
	Total	180	100.0
Ethnicity	Yoruba	134	74.4
	Hausa	24	13.3
	Ibo	16	8.9
	Others	6	3.3
	Total	180	100.0
Occupation	Trader	84	46.7
	Civil servant	72	40.0
	Self-employed	10	5.6
	Housewife	7	3.9

Parameters	Classification	Frequency	Percentage
	Students	7	3.9
	Total	180	100.0

Awareness and Knowledge of Oral Lesions

The level of awareness and knowledge of oral lesions among respondents is presented in Table 2. More than half of the respondents (53.9%, n = 97) reported prior awareness of oral lesions. Among those aware, healthcare workers were the most common source of information (37.1%, n = 36), followed by radio (17.5%), friends (17.5%), relatives (14.4%), and television (13.4%). Regarding symptoms, mouth wounds (35.1%) and mouth ulcers (26.8%) were the most commonly identified signs.

Table 2
Knowledge of oral lesions among respondents

Variable	Classification	Frequency	Percentage
Awareness of oral lesions	Yes	97	53.9
	No	83	46.1
	Total	180	100
If yes, your source of information	Health and care	36	37.1
	Radio	17	17.5
	Television	13	13.4
	Friends	17	17.5
	Relation	14	14.4
	Total	97	100.0
Signs and symptoms of oral lesions	Mouth Wound	34	35.1
	Mouth Ulcer	26	26.8
	Whitish particle	12	12.4
	Pain	25	25.8
	Total	97	100

Association between Socio-demographic Characteristics and Knowledge

The association between socio-demographic characteristics and knowledge of oral lesions is presented in Table 3a and Table 3b. There was a statistically significant association between knowledge and age, educational level, and ethnicity ($p < 0.05$). In addition, occupation was significantly associated with knowledge of oral lesions ($p < 0.05$).

Table 3

a: Association between respondents' socio demographic status and knowledge about oral lesion among HIV enrollee in Osun State.

Variable	Categories	Summarized knowledge score		Statistics
		Poor knowledge	Good Knowledge	
Age	< 30 years	13 (22.4%)	45 (77.6%)	Df-4, P-0.001 Chi square-19.611
	31–40 years	29 (58.0%)	21 (42.0%)	
	41–50 years	17 (45.9%)	20 (54.1%)	
	51–60 years	13 (68.4%)	6 (31.6%)	
	> 60 years	7 (43.8%)	9 (56.3%)	
Religion	Islam	32 (50.8%)	31 (49.2%)	Df-2, P- 0.346, Chi square-2.124
	Christianity	44 (39.6%)	67 (60.4%)	
	Others	3 (50.0%)	3 (50.0%)	
Gender	Male	40 (43.0%)	53 (57.0%)	Df-1, P- 0.806, Chi square-0.060
	Female	39 (44.8%)	48 (55.2%)	
Ethnicity	Yoruba	50 (37.3%)	84 (62.7%)	Df-3, P- 0.022, Chi square-9.666
	Hausa	14 (58.3%)	10 (41.7%)	
	Ibo	11 (68.8%)	5 (31.3%)	
	Others	4 (66.7%)	2 (33.3%)	
Educational Status	No education	0 (0.0%)	13 (100.0%)	Df-3, P- 0.000, Chi square-23.737
	Primary education	22 (51.2%)	21 (48.8%)	
	Secondary education	34 (64.2%)	19 (35.8%)	
	Tertiary education	23 (32.4%)	48 (67.6%)	

Table 3

b: Association between respondents' socio demographic status and knowledge about oral lesion among HIV enrollee in Osun State.

Variable	Categories	Summarized knowledge score		Statistics
		Poor knowledge	Good Knowledge	
Occupation	Trader	27 (38.6%)	43 (61.4%)	Df-14, P- 0.000, Chi square-39.009
	Civil servant	17 (37.0%)	29 (63.0%)	
	Social worker	13 (59.1%)	9 (40.9%)	
	Business man	3 (100.0%)	0 (0.0%)	
	Self employed	0 (0.0%)	4(100.0%)	
	Mechanic	3 (100.0%)	0 (0.0%)	
	Pastor	0 (0.0%)	2 (100.0%)	
	Farmer	3 (30.0%)	7 (70.0%)	
	Teacher	2 (100.0%)	0 (0.0%)	
	Retired	0 (0.0%)	2 (100.0%)	
	House wife	2 (100.0%)	0 (0.0%)	
	Gold miner	4 (100.0%)	0 (0.0%)	
	House help	2 (100.0%)	0 (0.0%)	
	Student	0 (0.0%)	5 (100.0%)	
	Manager	3 (100.0%)	0 (0.0%)	
	Hausa	14 (58.3%)	10 (41.7%)	
	Ibo	11 (68.8%)	5 (31.3%)	
	Others	4 (66.7%)	2 (33.3%)	

Health-Seeking Behavior

The association between socio-demographic characteristics and health-seeking behavior is presented in Table 4a and Table 4b. A statistically significant relationship was observed between health-seeking behavior and age, religion, and educational status ($p < 0.05$). Occupation was also significantly associated with health-seeking behavior ($p < 0.05$).

Table 4

a: Association between respondents' socio demographic status and Health seeking behavior among HIV enrollee in Osun State.

Variable	Categories	Health seeking behavior		Statistics
		Good health seeking behavior	Poor health seeking behavior	
Age	< 30 years	11 (19.0%)	47 (81.0%)	Df-4, P-0.001 Chi square-18.843
	31–40 years	1 (2.0%)	49 (98.0%)	
	41–50 years	0 (0.0%)	37 (100.0%)	
	51–60 years	4 (21.1%)	15 (78.9%)	
	> 60 years	0 (0.0%)	16 (100.0%)	
Religion	Islam	1 (1.6%)	62 (98.4%)	Df-2, P- 0.022, Chi square-7.664
	Christianity	15 (13.5%)	96 (86.5%)	
	Others	0 (0.0%)	6 (100.0%)	
Gender	Male	8 (8.6%)	85 (91.4%)	Df-1, P- 0.889, Chi square-0.020
	Female	8 (9.2%)	79 (90.8%)	
Ethnicity	Yoruba	16 (11.9%)	118 (88.1%)	Df-3, P- 0.110, Chi square-6.028
	Hausa	0 (0.0%)	24 (100.0%)	
	Ibo	0 (0.0%)	16 (100.0%)	
	Others	0 (0.0%)	6 (100.0%)	
Educational Status	No	4 (30.8%)	9 (69.2%)	Df-3, P- 0.012, Chi square-10.985
	Primary	4 (9.3%)	39 (90.7%)	
	Secondary	1 (1.9%)	52 (98.1%)	
	Tertiary	7 (9.9%)	64 (90.1%)	

Table 4

b: Association between respondents' socio demographic status and Health seeking behavior among HIV enrollee in Osun State.

Variable	Categories	Health seeking behavior		Statistics
		Good health seeking behavior	Poor health seeking behavior	
Occupation	Trader	12 (17.1%)	58 (82.9%)	Df-14, P- 0.000, Chi square-57.230
	Civil servant	0 (0.0%)	46 (100.0%)	
	Social worker	0 (0.0%)	22 (100.0%)	
	Business man	0 (0.0%)	3 (100.0%)	
	Self employed	4 (100.0%)	0 (0.0%)	
	Mechanic	0 (0.0%)	3 (100.0%)	
	Pastor	0 (0.0%)	2 (100.0%)	
	Farmer	0 (0.0%)	10 (100.0%)	
	Teacher	0 (0.0%)	2 (100.0%)	
	Retired	0 (0.0%)	2 (100.0%)	
	House wife	0 (0.0%)	2 (100.0%)	
	Gold miner	0 (0.0%)	4 (100.0%)	
	House help	0 (0.0%)	2 (100.0%)	
	Student	0 (0.0%)	5 (100.0%)	
	Manager	0 (0.0%)	3 (100.0%)	

Association between Knowledge and Health-Seeking Behavior

The association between knowledge of oral lesions and health-seeking behaviour is presented in Table 5. There was no statistically significant association between knowledge and health-seeking behavior among respondents ($p > 0.05$).

Table 5

Association between knowledge scores of oral lesion and Health seeking behavior among HIV enrollee in Osun State.

Variable	Categories	Health seeking behavior		Statistics
		Good health seeking behavior	Poor health seeking behavior	
knowledge scored	Poor knowledge	4 (5.1%)	75 (94.9%)	Df-1, P-0.111 Chi square-2.544
	Good knowledge	12 (11.9%)	89 (88.1%)	

There is no significant association between knowledge about oral lesion and health seeking behavior among HIV enrollee in Osun State.

Discussion

Knowledge of Oral Lesions

This study revealed that 53.9% of HIV enrollees in Osun State demonstrated good knowledge of oral lesions. This finding contrasts with a study conducted in Tanzania, which reported low awareness of oral manifestations among people living with HIV/AIDS (PLWHAs)⁷. Similarly, a Nigerian study found that although PLWHAs had moderate knowledge of general HIV symptoms, their understanding of HIV-related oral manifestations remained poor⁷. These differences may reflect variations in oral health education, access to information, and integration of dental care into HIV services.

Oral lesions are among the earliest and most visible indicators of HIV infection and are a major contributor to discomfort, morbidity, and tooth loss globally⁷. Enhancing awareness of these manifestations is essential for timely intervention and improved quality of life among HIV-positive individuals.

Risk Factors Associated with Oral Lesions

Several risk factors were significantly associated with the presence of oral lesions in this study, including poor oral hygiene, tobacco use, alcohol consumption, low CD4 cell counts, and poor adherence to antiretroviral therapy (ART). These findings are consistent with previous research from Kenya, which also identified behavioral and immunological determinants as predictors of oral lesions in PLWHAs⁸.

PLWHAs are known to be at increased risk of developing oral lesions due to compromised immune function. However, studies focusing specifically on the prevalence of oral lesions among ART-experienced HIV-positive individuals remain limited and inconsistent in their findings. This gap underscores the need for further investigation into how ART modifies the risk and presentation of oral conditions in this population.

Health-Seeking Behavior

Prompt health-seeking behavior was defined as seeking care within two weeks of onset of oral symptoms based on WHO and previous studies on delayed care-seeking among PLHIV⁷. Participants with higher knowledge levels were more likely to seek timely oral healthcare, defined in this study as presenting to a health facility within two weeks of noticing symptoms. Those with limited knowledge and multiple risk factors, however, were more likely to delay care. While approximately 89% of participants demonstrated some form of health-seeking behavior, many lacked awareness of where to access professional oral healthcare. Instead, they resorted to self-devised methods, including the use of herbal remedies, over-the-counter pain relievers, or rinsing with salt water, practices that may offer temporary relief but delay appropriate treatment.

These findings align with earlier research highlighting the influence of knowledge, access, and perceived severity on health-seeking behavior among PLWHAs^{7,8}.

Implications

The high burden of oral lesions and the low awareness of professional care options among HIV enrollees in Osun State emphasize the need for integrated oral health education within HIV treatment programs. Strengthening provider communication, community-based outreach, and routine oral screening in HIV clinics can improve early detection and management.

Limitations

This study has several limitations that should be acknowledged. First, the cross-sectional design limits causal inference between risk factors, knowledge, and health-seeking behavior. Second, oral lesions were identified based on clinical diagnosis without confirmatory laboratory investigations such as cytology or microbiology, which may have led to misclassification in some cases. Third, although we used a structured and validated questionnaire, responses on knowledge and behaviors were self-reported and thus subject to recall bias and social desirability bias. Fourth, the purposive selection of high-volume ART clinics, while ensuring adequate sample size, may limit generalizability to smaller or rural clinics. Lastly, while we attempted full enumeration of eligible participants in the selected sites, the study was confined to three Local Government Areas and may not reflect experiences across all regions of Osun State or other parts of Nigeria.

CONCLUSION

This study revealed that while over half of HIV enrollees in Osun State demonstrated knowledge of oral lesions, a significant proportion still exhibited poor health-seeking behavior. Several modifiable risk factors, such as poor oral hygiene, substance use, and delayed care, were strongly associated with the development of oral lesions in this population. To address these challenges, there is an urgent need for **targeted oral health interventions** tailored to HIV-positive individuals. These should include:

- **Health education programs** focused on oral lesion recognition, risk factors, and when to seek care.
- **Routine oral screening** integrated into HIV clinic visits
- **Improved access to professional oral healthcare services**, including referral systems and subsidized treatment
- **Training for healthcare workers** on oral health integration in HIV management

Furthermore, **policy-makers and stakeholders** should prioritize the inclusion of oral health services within existing HIV treatment programs across Osun State to ensure timely diagnosis and prevention of complications.

Future research should explore the **longitudinal impact of ART on oral lesion prevalence**, evaluate the effectiveness of integrated oral health interventions, and compare oral health outcomes between HIV-positive and HIV-negative populations to better understand disparities.

Abbreviations

ART

Antiretroviral Therapy

CD4

Cluster of Differentiation 4

CVI

Content Validity Index

FPC

Finite Population Correction

HIV

Human Immunodeficiency Virus

LGA

Local Government Area

PLHIV

People Living with HIV

SPSS

Statistical Package for the Social Sciences

WHO

World Health Organization

Declarations

Ethical Approval and Consent to Participate

This study was conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable

ethical standards. Ethical approval for the study was obtained from the Health Research Ethics Committee of the Osun State University Teaching Hospital, with Approval Number: OSHREC/PRS/569T/418.

Informed consent was obtained from all individual participants included in the study. Participation was voluntary, and all participants were assured of confidentiality and the right to withdraw from the study at any time without any consequences.

Availability of Data and Materials

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing Interests: The authors declare no potential conflict of interest

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Contributions: MB and AE conceptualized and designed the study. MB, AE, OS, OA, AO, and OP were involved in data collection. MB, OS, AF, and OT performed data analysis and interpretation. MB and AF drafted the manuscript. OS, AC, AG, AEy, and AA critically reviewed and revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Supplementary Files

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