

# Prevalence of Oral Lesions and Its Associated Risk Factors Among PLHIV Availing Anti-Retroviral Therapy from a Selected Tertiary Care Hospital, Puducherry - A Cross Sectional Analytical Study

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## Abstract

**Background and Objectives:** Oral lesions are among the earliest and most important indicators of infection with human immunodeficiency virus (HIV). The presence of oral lesions has a significant impact on the physical and mental health of the PLHIV. Hence, a novel attempt is made to assess the prevalence of various types of oral lesions among the adult people living with human immunodeficiency virus (PLHIV) undergoing antiretroviral therapy. **Methodology:** In this facility-based cross-sectional study, a total of 239 out of 300 eligible PLHIV were assessed between September and October 2018. All consecutive eligible patients encountered during the data collection period were included. Oral examination was carried out using disposable mouth mirrors, sterile piece of cotton, and bright illuminated torch. **Results:** The prevalence of oral mucosal abnormalities was found to be 25% (95% confidence interval: 20.03–30.97). The most prevalent oral lesions were acute necrotizing ulcerative gingivitis, acute necrotizing ulcerative periodontitis, and candidiasis. CD4 count <200 cells/mm<sup>3</sup>, current tobacco use, and alcohol usage were significantly associated with the prevalence of oral lesions. **Conclusion and Recommendations:** The study revealed that one-fourth of the study participants had oral lesions. Strategies for early detection and prompt treatment of oral lesions need to be planned and incorporated in the program to reduce the morbidity due to oral lesions.

**Keywords:** Acquired immunodeficiency syndrome, antiretroviral therapy, cross sectional studies, human immunodeficiency virus, oral lesions

## INTRODUCTION

Human immunodeficiency virus (HIV), the lentivirus that causes acquired immunodeficiency syndrome (AIDS), has become one of the most important health and social problem. The oral cavity is the mirror of the overall health of an individual. Among HIV-associated infections, oral mucosal manifestations have been documented as one of the most prevalent morbidities since the beginning of the epidemic. Oral lesions are the earliest clinical manifestations among people living with human immunodeficiency virus (PLHIV) predicting the progression of HIV to AIDS.<sup>[1]</sup> Seven types of oral mucosal manifestation are strongly associated with HIV infection and also most commonly found globally, i.e., oral candidiasis, hairy leukoplakia, “acute necrotizing ulcerative gingivitis” (ANUG), “acute necrotizing ulcerative periodontitis” (ANUP), Kaposi

sarcoma, linear gingival erythema, and non-Hodgkin lymphoma.<sup>[2]</sup> These oral mucosal manifestations may be present in up to 50% of the PLHIV and up to 80% of those with a diagnosis of AIDS.<sup>[3]</sup> Oral manifestations can have important diagnostic and prognostic value, especially in clinical settings where resources are not adequate.

The present study was conducted to determine the prevalence of various types of oral lesions among adult PLHIV.

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## METHODOLOGY

### Study setting, design and period

A facility-based cross-sectional study was conducted at the antiretroviral therapy (ART) clinic attached to a tertiary care teaching hospital in Puducherry. The bed strength of this hospital is more than 2500 and most of the services are provided free of cost for the poor. Data were collected over 2 months period, i.e., from September 2018 to October 2018.

### Study population

The study population included all adults aged 18 years and above undergoing ART for at least 6 months.

### Sample size and sampling technique

The sample size was calculated to be 289 using OpenEpi Version 3.03. This was calculated assuming that the prevalence of oral lesions among PLHIV was 75% as reported by Kumar *et al.* from central India,<sup>[4]</sup> absolute precision of 5% and 95% confidence level.

The present study was conducted as part of postgraduate dissertation. With the available duration of the study, we had fallen short of achieving the required sample size as 61 participants did not consent to participate in the study.

### Data-collection

Participants were made aware of the details of the study including the purpose of the study and its benefits in their local language. After obtaining informed written consent, information was collected by interviewing the PLHIV during their routine visit using pretested structured questionnaire. A pilot study was conducted among 20 PLHIV and based on the observation, the data collection sheet was modified which included questions on their sociodemographic details (residence, age, sex, religion, marital status, education, occupation, etc.), behavioral risk factors (tobacco and alcohol use) and oral hygiene practices (frequency of brushing, last dental visit, etc.). Clinical parameters like CD4 count, WHO clinical stage, HIV confirmation date, duration of ART were obtained from patient's treatment card.

Oral examination was carried out with necessary precautions for infection control and the oral conditions were categorized as recommended by WHO oral health assessment form.<sup>[5]</sup> The screening was done using disposable mouth mirrors, sterile piece of cotton, and bright illuminated torch. The oral lesions were diagnosed based on presumptive criteria given by the EEC clearinghouse on oral problems related to HIV infection and the WHO collaborating centre on oral manifestations of the HIV.<sup>[6]</sup>

Anthropometric measurements (weight, height) were measured following recommended methodology. Body mass index (BMI) was calculated as the patient's weight in kilograms divided by the square of their height in meters. We categorized BMIs <18.5 kg/m<sup>2</sup> as underweight, Normal (18.5–22.9); Overweight (23–24.9) and ≥25 kg/m<sup>2</sup> as obese. Data collection, anthropometric measurements, and oral examination were carried out by the same investigator.

### Data analysis

Data entry was done in Epi Data Entry Client version 4.0 and analysis was performed using SPSS version 20 analysis was done using IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. (Armonk, NY: IBM Corp). Prevalence of various types of oral lesions and nutrition status was summarized as percentages and 95% confidence interval (CI). Cross-tabulations were made to find the association between various known risk factors and the presence of oral lesions using the Chi-square test and a  $P < 0.05$  was considered to be statistically significant. Unadjusted prevalence ratios (PR) with 95% CI were calculated. Variables with  $P \leq 0.05$  were included in the multivariable logistic regression model to obtain adjusted prevalence ratio.

### Ethical consideration

The current study was approved by the Scientific and Ethics Committee of the institute. Before data collection informed written consent was taken in the participant's local language.

## RESULTS

Around 300 individuals satisfying the eligibility criteria had attended the ART clinic. Among these 300 PLHIV, 239 individuals could be included in the present study depending on their willingness to participate in the study. The mean age of the PLHIV was 44.9 ( $\pm 9.7$ ) years and 50% were male. Majority of the PLHIV were from neighboring states, i.e., Tamil Nadu (67%), married (69%), and Hindu (92.5%) by religion, educated up to middle or higher secondary school (53%), and belonged to lower (48%)-socioeconomic status. Table 1 shows the behavioral risk factors, oral hygiene practice, and subjective oral health status of our study participants. Currently, 22 (9.2%) were using tobacco and smoke form of tobacco was most commonly used. More currently, 28 (11.7%) were using alcohol out of which maximum participants (43%) consumed alcohol 1–3 days in a month. Maximum participants (79.5%) used to brush their teeth once in a day and toothbrush and paste (97%) was found to be the most common method of tooth cleaning. Around 12% of the PLHIV experienced pain or discomfort in their mouth during the past 6 months. Majority of the study participants 168 (70.3%) did not visit dentist anytime in the past and only 8.8% of PLHIV visited a dentist in the past 6 months.

The prevalence of oral mucosal abnormalities was found to be 25% (95%CI: 20.03–30.97) in the present study. Gender-wise distributions of various types of oral mucosal lesions are described in Table 2. The most prevalent oral lesions among PLHIV were ANUG, ANUP, and candidiasis.

Table 3 shows that there was no significant association between the presence of the oral lesion and other factors such as age category, sex, social class, BMI, brushing frequency, and frequency of dental visits.

Adjusted multiple logistic regressions in Table 3 shows that PLHIV with CD4 count less than 200 cells/mm<sup>3</sup> had 1.9 times higher probability of getting oral lesions (PR-1.94, 95% C. I: 1.37–2.75).

**Table 1: Behavioral risk factors, oral hygiene practice and subjective oral health status observed among adult people living with human immunodeficiency virus undergoing antiretroviral therapy from a tertiary care hospital of Puducherry, South India (n=239)**

Behavioral factors	Frequency (%)
Tobacco users	
Current users	22 (9.2)
Former users	25 (10.5)
Never users	192 (80.3)
Type of tobacco usage among current users (n=22)	
Smoke form	15 (68.2)
Smokeless form	7 (31.8)
Alcohol users	
Current users	28 (11.7)
Former users	37 (15.5)
Never users	174 (72.8)
Frequency of alcohol use among current users (n=28)	
Daily	2 (7.1)
3–4 days/week	7 (25.0)
1–2 days/week	6 (21.4)
1–3 days/month	12 (42.9)
Less than once a month	1 (3.6)
Brushing frequency	
One time	190 (79.5)
Two times	48 (20.1)
Three times	1 (0.4)
Method of tooth cleaning	
Toothbrush and tooth paste	231 (96.7)
Wooden tooth picks (including neem)	4 (1.7)
Tooth powder	2 (0.8)
Salt	1 (0.4)
Charcoal	1 (0.4)
Pain or discomfort in mouth during last 6 months	
Yes	28 (11.7)
No	211 (88.3)
Last dental visit (n=239)	
Within 6 months	21 (8.8)
Within 2 years	16 (6.7)
Within 5 years	16 (6.7)
>5 years	18 (7.5)
Never visited	168 (70.3)
Reason for last dental visit (n=71)	
Tooth pain	26 (36.6)
Tooth removal	25 (35.2)
Regular check up	8 (11.2)
Others reason	12 (17.0)

Among PLHIV who were currently taking tobacco and alcohol had 2.23 times (PR-2.23, 95% C. I: 1.48–3.37) and 1.15 times (PR-1.15, 95% C. I: 1.15–1.15) more probability of getting oral lesions as compared to nontobacco and nonalcohol users, respectively.

## DISCUSSION

The theme for the 2018 observance of World AIDS Day was “Know your status.” In the same year, a facility-based

**Table 2: Gender wise distribution of the adult people living with human immunodeficiency virus based on the type of oral mucosal lesion present (n=60)**

Oral mucosal condition	Gender		Total, n (%)
	Male, n (%)	Female, n (%)	
ANUG	16 (57.1)	12 (42.9)	28 (26.9)
ANUP	12 (54.5)	10 (45.5)	22 (21.1)
Oral candidiasis	12 (85.7)	2 (14.3)	14 (13.4)
Others ulceration	7 (58.5)	5 (41.7)	12 (11.5)
Angular cheilitis	7 (77.8)	2 (22.2)	9 (8.6)
Apthous ulceration	1 (0.2)	4 (0.8)	5 (4.8)
Dry mouth	1 (0.2)	4 (0.8)	5 (4.8)
Leukoplakia	4 (100)	0	4 (3.8)
Others <sup>#</sup>	3 (0.6)	2 (0.4)	5 (4.8)

<sup>#</sup>Other's include 2 OSMF, 1 smoker palate, 1 rhomboid glossitis, 1 case of herpetic stomatitis. OSMF: Oral submucous fibrosis, ANUG: Acute necrotizing ulcerative gingivitis, ANUP: Acute necrotizing ulcerative periodontitis

cross-sectional study was conducted to know the oral health and nutrition status of 239 PLHIV. The prevalence of oral lesions was found to be 25%. The most prevalent oral lesions among PLHIV were ANUG (11.7%), ANUP (9.2%), and Candidiasis (5.8%).

In our study, the prevalence of oral lesions among PLHIV was 25% which was lesser as compared to other Indian studies which ranged from 44% to 77%<sup>[7,8]</sup> The reasons for the lower prevalence of oral lesions in our study as compared to other studies may be due to the variability of exposure of different risk factors. Kumar *et al.*<sup>[4]</sup> reported higher tobacco use and alcohol consumption and poor oral hygienic practices in their study and maximum participants were from lower socioeconomic class. Higher tobacco use and poor oral hygienic practices were also found among the PLHIV of another study conducted by Muralidharan *et al.*<sup>[7]</sup> The proportion of PLHIV with CD4 count <200 cells/mm<sup>3</sup> was found to be much higher in other Indian studies (Ravi and Rao<sup>[9]</sup> and Manne *et al.*,<sup>[10]</sup>) than our study. Moreover, Kumar *et al.*<sup>[4]</sup> conducted their study among PLHIV at Home Care Institution and Ravi and Rao<sup>[9]</sup> (46%) conducted the study at district hospital as compared to our study which was at a tertiary hospital. The difference in study settings may have resulted in a low occurrence of the oral lesion in our study as opportunities for screening the patients are better in the present setup; as it is a tertiary health care center.

In the current study, the most common oral lesions were found to be ANUG, which manifested as generalized marginal gingivitis in most of the patients. This finding is consistent with other studies<sup>[10,11]</sup> conducted in South India. Candidiasis was the most common oral manifestation as reported by the studies<sup>[8,12-14]</sup> from different parts of India, while it was the third-most prevalent oral lesion in the present study. Similar to other Indian studies,<sup>[10,13,14]</sup> we also did not find any case of Kaposi's sarcoma or Non-Hodgkin's lymphoma among our participants. Bodhade *et al.*<sup>[8]</sup> reported three cases of Non-Hodgkin's lymphoma among 399 HIV-positive patients from Maharashtra, India.

**Table 3: Factor associated with oral lesion among adult people living with human immunodeficiency virus undergoing antiretroviral therapy from a tertiary care hospital of Puducherry, South India (n=239)**

Predictors	Total, n (%)	Oral lesion, present, n (%)	Unadjusted prevalence ratio with (95% CI)	P <sup>s</sup>
Age group				
18-30	17 (7.1)	2 (11.7)	Reference	
31-44	93 (38.9)	17 (18.3)	1.55 (0.39-6.12)	0.52
45-60	111 (46.4)	33 (29.7)	2.52 (0.66-9.58)	0.17
>60	18 (7.53)	8 (44.4)	3.77 (0.93-15.32)	0.063
Gender				
Male	120 (50.2)	38 (31.7)	1.71 (1.08-2.71)	0.02
Female	119 (49.8)	22 (18.5)	Reference	
Socio economic status*				
I	9 (3.7)	2 (22.2)	Reference	
II	20 (8.4)	3 (15)	0.67 (0.14-3.66)	0.63
III	35 (14.6)	8 (22.9)	1.02 (0.26-4.02)	0.96
IV	60 (25.1)	15 (25)	1.12 (0.30-4.12)	0.85
V	115 (48.1)	32 (27.8)	1.25 (0.35-4.40)	0.72
CD4 count (cells/mm <sup>3</sup> )				
CD4 <200	20 (8.4)	10 (50.0)	2.19 (1.33-3.62)	0.002
CD4 >200	219 (91.6)	50 (22.8)	Reference	
BMI <sup>#</sup>				
Underweight	32 (13.4)	12 (37.5)	1.33 (0.76-2.30)	0.31
Normal	92 (38.5)	26 (28.3)	Reference	
Overweight	34 (14.2)	7 (20.6)	0.73 (0.35-1.52)	0.39
Obese	81 (33.9)	15 (18.5)	0.65 (0.37-1.15)	0.14
Current tobacco users				
Yes	22 (9.2)	14 (63.64)	3.00 (1.99-4.50)	0.00
No	217 (90.8)	46 (21.2)	Reference	
Current alcohol users				
Yes	28 (11.7)	14 (50)	2.29 (0.15-3.6)	0.00
No	211 (88.3)	46 (21.8)	Reference	
Brushing frequency				
One time	190 (79.5)	52 (27.4)	Reference	
Two times	48 (20)	8 (16.7)	0.60 (0.31-1.2)	0.14
Visit to a dentist				
Never visited	168 (70.29)	46 (27.4)	1.92 (0.65-5.62)	0.23
>5 years	18 (7.53)	5 (27.8)	1.94 (0.54-7.03)	0.31
Within 5 years	16 (6.69)	3 (18.7)	1.31 (0.30-5.66)	0.71
Within 2 years	16 (6.69)	3 (18.7)	1.31 (0.30-5.66)	0.71
Within 6 months	21 (8.79)	3 (14.3)	Reference	

<sup>s</sup>P value was based on the Pearson Chi-Squared test, \*Classification is done based on Prasad's social classification for the year 2018, <sup>#</sup>Underweight (<18.5 kg/m<sup>2</sup>), normal (18.5-22.9), overweight (23-24.9) and obese (≥25 kg/m<sup>2</sup>). BMI: Body mass index, CI: Confidence interval

The significant factors associated with the occurrence of oral lesions in our study were lower CD4 count, tobacco use, and alcohol consumption. The CD4 count was found to be significantly associated with oral lesions in various other studies.<sup>[8,9,15-17]</sup>

Significant association of tobacco use<sup>[15,17]</sup> and alcohol consumption<sup>[17]</sup> with oral lesion was also reported from other studies across the globe. Tobacco use among the study participants was found to be lower as compared to the general population of Puducherry as per the recent Global Adult Tobacco Survey-2.<sup>[18]</sup> Alcohol consumption was also found to be lower in our participants as compared to the general population of India as per the recent National Family Health

Survey-4 (NFHS-4).<sup>[19]</sup> Although the exposure to alcohol and tobacco is less among our study participants as compared to the general population, still the prevalence of oral lesions is much higher among the PLHIV.

Moreover, the smaller sample size in the present study might have missed to pick up any significant association of prevalence of oral lesion with the brushing frequency, the mode of oral hygiene practice, and BMI. However, PLHIV should be trained about the proper way of brushing and they should also be counseled for two time brushing because oral hygiene is necessary for having a healthy mouth and also contribute to their quality of life.

The mean BMI of our study participants was 23.05 (±4.17), which was similar to another study conducted by Crum-Cianflone

*et al.*<sup>[20]</sup> The nutritional status of PLHIV in our study was similar to that of the general population in Puducherry as per the NFHS-4 survey.<sup>[21]</sup> Whereas studies<sup>[22,23]</sup> from other parts of India reported a higher prevalence of underweight PLHIV.

Diagnosis of oral lesions needs clinical experience and histopathological knowledge. So a qualified dental health professional's visit is needed to diagnose these lesions. Oral lesions also can be detected and managed at primary or secondary care hospitals, if a qualified dentist is available. Counseling for behavioral risk factors and dental hygiene training need to be incorporated in the program and there is also a need for sensitization of health care workers involved in the management of PLHIV regarding the importance of screening risk factors associated with oral lesions at regular intervals.

### Strengths

The oral conditions were categorized as recommended by WHO oral health assessment form<sup>[5]</sup> which is a valid and widely accepted tool. Screening for oral lesions was done by a qualified dentist following standard procedures. Privacy was ensured during the conduct of the interview and adequate time was spent with each participant for quality data capture. Dedicated software (Epidata manager v 4.2.0.0) was used for the data entry and it has inbuilt checks to reduce data entry errors.

### Limitations

The sample size was calculated only for estimating the prevalence of oral lesion but was not calculated to find association of oral lesion with its risk factors. We had to believe completely on the information given by the PLHIV regarding their monthly income, oral hygiene practices, and behavioral risk factors like alcohol and tobacco use, thus the presence of recall bias, reporting bias and social desirability bias cannot be excluded.

### CONCLUSION

The present study reveals that one-fourth of the PLHIV suffered from oral lesions. The most prevalent oral lesions among PLHIV were ANUG, ANUP, and candidiasis. The significant factors associated with the occurrence of oral lesions in our study were lower CD4 count, tobacco and alcohol use.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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