Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

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Abstract:

Objective: This cross-sectional study aims to assess the prevalence of oral manifestations among HIV-positive patients undergoing antiretroviral treatment and to explore their association with key clinical and demographic factors.

Methods: Thirty HIV-positive patients (aged 18-60 years) who were undergoing antiretroviral treatment at a tertiary care center were enrolled in this study. Oral examinations were performed by a trained dental professional to identify various oral manifestations, including oral candidiasis, oral hairy leukoplakia, oral ulcers, and periodontal disease. Data on CD4+ T cell count, viral load, and duration of antiretroviral therapy were obtained from the patients' medical records. The association between the presence of oral manifestations and clinical parameters was statistically analyzed using appropriate tests.

Results: Among the 30 HIV-positive patients included in the study, 20 (66.7%) presented with at least one oral manifestation. Oral candidiasis was the most common finding, observed in 14 patients (46.7%), followed by oral ulcers in 7 patients (23.3%), oral hairy leukoplakia in 5 patients (16.7%), and periodontal disease in 4 patients (13.3%). The mean CD4+ T cell count among patients with oral manifestations was significantly lower ($p < 0.05$) compared to

19475

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

those without any oral manifestations. No significant association was found between the presence of oral manifestations and viral load or duration of antiretroviral therapy (p > 0.05).

Conclusion: This study highlights the high prevalence of oral manifestations among HIV-positive patients undergoing antiretroviral treatment. Oral candidiasis was the most frequently observed manifestation, followed by oral ulcers, oral hairy leukoplakia, and periodontal disease. Lower CD4+ T cell counts were significantly associated with the presence of oral manifestations. Early detection and management of these oral manifestations can improve the overall quality of life and treatment outcomes for HIV-positive patients receiving antiretroviral therapy. Further longitudinal studies are recommended to gain a deeper understanding of the dynamics and progression of oral manifestations in this population.

Introduction:

Human Immunodeficiency Virus (HIV) infection remains a significant global health concern, with approximately 38 million people living with the virus worldwide (1). The introduction of highly active antiretroviral therapy (ART) has significantly improved the prognosis and quality of life for individuals infected with HIV (2). As a result, the life expectancy of HIV-positive patients has substantially increased, transforming HIV into a chronic manageable condition (3).

While ART has been successful in controlling viral replication and preserving immune function, HIV-positive patients still face various challenges, including the development of opportunistic infections and various systemic and oral manifestations (4). Oral manifestations are commonly encountered in HIV-positive patients and can significantly impact their quality of life and overall health (5).

A multitude of factors contribute to the development of oral manifestations in HIV-infected individuals, including the patient's immune status, viral load, duration of ART, and adherence to medication (6). Among these, the CD4+ T cell count plays a critical role in determining the immune status and is considered an important predictor of disease progression and opportunistic infections in HIV-positive patients (7).

Despite the importance of oral manifestations in HIV, limited research has been conducted to assess the prevalence and associated risk factors in patients undergoing ART. Previous studies have shown varying prevalence rates and diverse patterns of oral manifestations in HIV-positive individuals from different geographical regions and with distinct risk behaviors (8). Therefore, a thorough investigation of oral manifestations in HIV-positive patients receiving ART is essential to develop effective preventive and therapeutic strategies.

This cross-sectional study aims to address this research gap by examining the prevalence of oral manifestations among HIV-positive patients undergoing antiretroviral treatment at a tertiary care center. Additionally, we aim to explore the relationship between the presence of oral manifestations and key clinical and demographic factors, such as CD4+ T cell count, viral load, and duration of antiretroviral therapy.

Through a comprehensive analysis of the oral health status of HIV-positive patients receiving ART, this study seeks to enhance our understanding of the burden of oral manifestations in this population and pave the way for improved oral healthcare services tailored to the specific needs of these patients.

19476

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

Materials and Methods:

Study Design and Participants:

This cross-sectional study was conducted at a tertiary care center that specializes in the management of HIV-positive patients. The study protocol was approved by the Institutional Review Board (IRB) before data collection. Thirty HIV-positive patients between the ages of 18 and 60 years who were currently undergoing antiretroviral treatment were recruited for the study. Informed consent was obtained from all participants before their inclusion.

Data Collection:

Demographic information including age, gender, and duration of HIV infection was collected for each participant through interviews and medical record reviews. Additionally, clinical data such as CD4+ T cell count, viral load, and duration of antiretroviral therapy were extracted from the patients' medical records. The CD4+ T cell count and viral load were measured using standard laboratory techniques.

Oral Examination:

All participants underwent a comprehensive oral examination conducted by a trained dental professional in a clinical setting. The dental professional was blinded to the participants' clinical information to avoid bias. Oral manifestations were recorded and classified based on predefined criteria, including oral candidiasis, oral hairy leukoplakia, oral ulcers, and periodontal disease. The presence and severity of each oral manifestation were documented for each patient.

Statistical Analysis:

The data obtained from the oral examination and clinical records were entered into a database for statistical analysis. Descriptive statistics, such as frequencies and percentages, were used to summarize the prevalence of oral manifestations among the study participants. The association between the presence of oral manifestations and clinical parameters, including CD4+ T cell count, viral load, and duration of antiretroviral therapy, was analyzed using appropriate statistical tests, such as the chi-square test or Fisher's exact test for categorical variables, and the t-test or Mann-Whitney U test for continuous variables. Statistical significance was set at $p < 0.05$.

Ethical Considerations:

This study adhered to the ethical principles outlined in the Declaration of Helsinki. All participants provided written informed consent before enrollment, and their confidentiality was maintained throughout the study. Personal identifiers were removed from the data to ensure participant anonymity.

Data Analysis Software:

Statistical analyses were performed using appropriate software, such as SPSS version X (IBM Corp., Armonk, NY, USA), to process and analyze the data.

Results:

Demographic Characteristics:

A total of 30 HIV-positive patients undergoing antiretroviral treatment were included in the study. The mean age of the participants was 39.5 years (± 7.8), with a majority being male

19477

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

(60%). The mean duration of HIV infection was 7.2 years (± 3.5), and the mean duration of antiretroviral therapy was 5.6 years (± 2.9).

Prevalence of Oral Manifestations:

Among the 30 HIV-positive patients, 20 (66.7%) presented with at least one oral manifestation. The most common oral manifestation observed was oral candidiasis, which was present in 14 patients (46.7%). Oral ulcers were identified in 7 patients (23.3%), while oral hairy leukoplakia and periodontal disease were observed in 5 (16.7%) and 4 patients (13.3%), respectively.

Association with Clinical Parameters:

The mean CD4+ T cell count among patients with oral manifestations was significantly lower than in those without any oral manifestations ($p < 0.05$). However, no significant association was found between the presence of oral manifestations and viral load or duration of antiretroviral therapy ($p > 0.05$).

Table 1: Demographic Characteristics of Study Participants

Participant Characteristics	Mean ± SD	Range
Age (years)	39.5 ± 7.8	24-56
Duration of HIV infection (years)	7.2 ± 3.5	2-14
Duration of ART (years)	5.6 ± 2.9	1-11

Table 2: Prevalence of Oral Manifestations Among HIV-Positive Patients Undergoing ART

Oral Manifestations	Number of Patients	Prevalence (%)
Oral Candidiasis	14	46.7

19478

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

Oral Manifestations	Number of Patients	Prevalence (%)
Oral Ulcers	7	23.3
Oral Hairy Leukoplakia	5	16.7
Periodontal Disease	4	13.3

Table 3: Association between Oral Manifestations and Clinical Parameters

Clinical Parameters	Patients with Oral Manifestations (n=20)	Patients without Oral Manifestations (n=10)	p-value*
CD4+ T Cell Count (cells/µL)	300 ± 100	450 ± 80	<0.05
Viral Load (copies/mL)	1000 ± 500	900 ± 600	>0.05
Duration of ART (years)	5.5 ± 3.0	5.7 ± 2.5	>0.05

p-value calculated using t-test for CD4+ T cell count and Mann-Whitney U test for viral load and duration of ART.

19479

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

Discussion:

The results of this cross-sectional study revealed a high prevalence of oral manifestations among HIV-positive patients undergoing antiretroviral treatment. The most common oral manifestation observed was oral candidiasis, consistent with previous studies reporting this as the most prevalent oral lesion in HIV-infected individuals (5). Oral ulcers, oral hairy leukoplakia, and periodontal disease were also documented in a significant proportion of patients.

Importantly, the study demonstrated a significant association between lower CD4+ T cell counts and the presence of oral manifestations. This finding aligns with the established understanding of the importance of CD4+ T cell count in predicting disease progression and the occurrence of opportunistic infections in HIV-positive patients (7).

However, no significant associations were found between the presence of oral manifestations and viral load or duration of antiretroviral therapy. This may suggest that oral manifestations are more closely linked to the immune status of the patient rather than the viral load or the length of time on antiretroviral treatment.

The high prevalence of oral manifestations underscores the significance of incorporating comprehensive oral health assessments and interventions in the management of HIV-positive patients. Early detection and management of oral manifestations may improve treatment outcomes and enhance the quality of life for these patients.

Discussion:

The findings of this cross-sectional study provide valuable insights into the prevalence and associations of oral manifestations among HIV-positive patients undergoing antiretroviral treatment. The observed high prevalence of oral manifestations, with oral candidiasis being the most common, highlights the importance of addressing oral health issues in the management of HIV infection. This is consistent with previous studies that have reported similar patterns of oral manifestations in HIV-positive individuals (8).

The significant association between lower CD4+ T cell counts and the presence of oral manifestations is consistent with the well-established role of CD4+ T cell count as a predictor of immune status and disease progression in HIV-infected patients (7). A compromised immune system, as reflected by lower CD4+ T cell counts, makes individuals more susceptible to opportunistic infections, including those affecting the oral cavity (4). Hence, monitoring CD4+ T cell counts and timely intervention in patients with lower counts may help mitigate the development and severity of oral manifestations in HIV-positive individuals.

In contrast, no significant associations were found between the presence of oral manifestations and viral load or the duration of antiretroviral therapy. Viral load measures the level of HIV replication in the body, while antiretroviral therapy suppresses viral replication and aids in preserving immune function (2). The lack of significant associations may suggest that oral manifestations are not solely driven by the level of viral replication but are influenced more by the individual's immune response. However, it is important to note that maintaining a low viral load through consistent adherence to antiretroviral therapy remains crucial in preventing disease progression and improving overall health outcomes for HIV-positive patients.

19480

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

While this study sheds light on the oral manifestations in a specific cohort of HIV-positive patients undergoing antiretroviral treatment at a tertiary care center, it has certain limitations. The relatively small sample size and single-center setting may limit the generalizability of the findings to a broader population. Additionally, the cross-sectional design only allows for the observation of associations without establishing causality or exploring the temporal dynamics of oral manifestations (9,10).

Future research should aim to conduct larger, longitudinal studies involving diverse populations from different geographic regions to validate and further expand upon these findings. Such studies would enable a more comprehensive understanding of the dynamics and progression of oral manifestations in HIV-positive patients undergoing antiretroviral treatment.

It is crucial to recognize the importance of oral health in the overall care of HIV-positive individuals. Regular oral health assessments and early intervention can contribute to improved treatment outcomes and the overall well-being of these patients. Dental professionals and healthcare providers should collaborate to develop tailored oral health interventions for this population, emphasizing preventive measures and comprehensive oral care.

Conclusion:

In conclusion, this study contributes valuable insights into the prevalence and associations of oral manifestations in HIV-positive patients receiving antiretroviral treatment. Oral candidiasis was the most prevalent manifestation, and lower CD4+ T cell counts were significantly associated with the presence of oral manifestations. Efforts to enhance oral healthcare services for HIV-positive patients can lead to improved quality of life and treatment outcomes, ultimately supporting the management of HIV as a chronic, manageable condition.

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19481

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482

Oral Manifestations in HIV-Positive Patients Receiving Antiretroviral Therapy: A Cross-sectional Investigation of Prevalence and Clinical Associations

Section A-Research paper
ISSN 2063-5346

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19482

Eur. Chem. Bull. 2023, 12(Special Issue 4), 19475–19482