Cutaneous manifestations associated with CD4 levels in HIV patients: a single-center observational study.

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Abstract

Introduction: Human immunodeficiency virus (HIV) infection remains a global public health challenge despite advances in antiretroviral treatment. Among the medical complications faced by HIV patients, cutaneous manifestations are particularly noteworthy. The relationships between these manifestations and CD4 lymphocyte levels, which are essential to the immune system, have been the subject of numerous studies. This study aimed to determine the relationship between cutaneous manifestations and CD4 levels in HIV patients at the Infectious Diseases Hospital during 2023.

Methods: This methodology is quantitative, non-experimental, cross-sectional, and retrospective, and uses observations, descriptions, and analyses.

Results: This study revealed a variety of dermatological conditions in 109 patients. Histoplasmosis and cryptococcosis were the most common, accounting for 21.39% of cases, especially in patients with CD4+ T-cell counts less than 200 cells/mm^3. Sweet's syndrome was rare, observed in only 3.7% of patients.

Conclusion: This study identified histoplasmosis and cryptococcosis as the most common dermatological diseases in HIV-positive patients, with a marked predominance of cutaneous manifestations associated with fungal infections. Furthermore, a correlation was demonstrated between CD4 lymphocyte levels and the occurrence and severity of cutaneous manifestations in HIV-positive patients, particularly in those with counts below 200 cells/mm^3.

Keywords:

HIV, Cutaneous Manifestations, CD4.

Abbreviations

ART: antiretroviral therapy.
HIV: human immunodeficiency virus.

Supplementary information

No supplementary materials are declared.

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Authors' contributions

Jhosue Farid Sanz Reyes, conceptualization, research, original draft writing, resources, software, supervision.

Cesar David Govea Silvestre, Methodology, Data Curation, Formal Analysis, Fundraising, Project Management, Validation, Visualization, Writing – Review and Editing.

Astrid Karolina Maldonado Apolo, conceptualization, research, original draft writing, resources, software, supervision.

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Availability of data and materials

The datasets used and analyzed during this study are available to the corresponding author upon reasonable request.

Introduction

Human immunodeficiency virus (HIV) infection remains one of the significant global public health challenges, despite advances in antiretroviral treatment [1]. HIV infection is characterized by the gradual but steady destruction of the immune system through various processes whose main objective is to eliminate CD4+ cells [2].

From 2010--2021, a 4.7% increase in new HIV infections was projected in Latin America, with an estimated 110,000 new infections in that period [3].

In 2017, the Ministry of Public Health (MSP) of Ecuador reported that 49,541 cumulative cases of HIV/AIDS were registered in the country between 1984 and 2016, of which 37,748 corresponded to HIV and 11,793 to AIDS. This cause of death has been linked to 17,574 deaths [3].

Among the organs most affected in patients with HIV is the skin, where the first manifestations of the disease or its progression can be observed [4]. These diseases can range from mild dermatological lesions to more serious diseases, and their appearance is related to the progression of the infection and the patient's immune status [5].

The relationships between skin manifestations and CD4 lymphocyte levels, which are essential cells of the immune system, have been the subject of numerous studies [6]. Fluctuations in CD4 levels influence a patient's susceptibility to and the severity of certain skin conditions.

There are several possible cutaneous symptoms, ranging from a nonpruritic erythematous rash that appears with the initial clinical signs of the disease to one of many cutaneous presentations, as well as a neoplastic, infectious, or noninfectious dermatological problem [7]. These manifestations can serve as initial indicators of immunosuppression and virus-associated diseases, guiding diagnosis [8]. The present study focused on investigating cutaneous manifestations associated with CD4 levels in HIV-positive patients at the Dr. José Daniel Rodríguez Maridueña Infectious Diseases Hospital in Guayaquil, Ecuador, during 2023. The objective is to contribute to scientific knowledge in dermatology and HIV infection, providing relevant information to improve the clinical care and management of HIV-positive patients in Ecuador and beyond.

Materials and methods

Studio design

This study is observational. The source is retrospective.

Scenery

The study was conducted in the statistics department of the José Daniel Rodríguez Maridueña Infectious Diseases Hospital in Guayaquil. The study period was from January 1, 2023, to December 31, 2023.

Participants

Records of patients diagnosed with HIV were included, from whom data on dermatological lesions, viral load, and CD4 levels were collected. No records were excluded.

Variables

The variables included age, sex, CD4 lymphocyte count, and the presence of dermatological diseases.

Data sources/measurements

The source was indirect. The data were collected through the institutional computer system following privacy protocols and patient consent.

Biases

Observational and selection bias were avoided by applying participant selection criteria. A medical representative from each coordinating center was assigned to collect the data, which were recorded on a single online form. The principal investigator consistently maintained the data in accordance with the research protocol's guidelines and records to avoid potential interviewer, information, and recall biases. In cases of doubt regarding the standard deviation of the data, corrections were made through onsite reviews of outliers. Two researchers independently analyzed each record in duplicate, and variables were entered into the database after verifying their consistency.

Study size

The sample was probabilistic. The study population consisted of 470 HIV-positive patients at the institution. Using the formula Z2 * (p) * (1-p)/c2, where "Z" represents the confidence level (95%), "p" represents the probability of success (0.5), and "e" represents the margin of error (0.04 = ± 4), a sample of 109 patients was obtained.

Quantitative variables

The results are presented as frequencies and percentages. Variables collected on a scale were not converted to categorical variables.

Statistical analysis

Qualitative variables were analyzed using frequencies and percentages. Proportions were compared via the chi-square test, and means were compared via Student's t test. The statistical package used was IBM Corp. (published in 2018). IBM SPSS Statistics for Windows, version 26.0. Armonk, NY: IBM Corp.

Results

Participants

A total of 109 patients were analyzed, representing 100% of the sample size.

Characteristics of the study groups

There were 29 women (26.6%) and 80 men (73.4%). In terms of age distribution, 43 young adults aged 18--29 years (39.4%), 64 (58.7%) adults aged 30--59 years (middle-aged adults), and 2 elderly patients (1.8%) were included.

CD4 lymphocytes

A total of 45 patients (41.3%) had < 200 cells/mm³, and 64 (58.7%) patients had 200--500 cells/mm³.

Associated infections

Table 1 presents the main associated opportunistic infections.

Table 1. Associated infections in patients with HIV.

	CD4 <200 cells/mm³ N=45	CD4 200 to 500 cells/mm³ N=64
Histoplasmosis	9 (20.0%)	14 (21.9%)
Cryptococcosis (B45)	9 (20.0%)	13 (20.3%)
Candidiasis (B37)	7 (15.6%)	9 (14.1%)
Herpes Zoster	5 (11.1%)	4 (6.3%)
Coccidioidomycosis	4 (8.9%)	1 (1.6%)
Genital Herpes	4 (8.9%)	4 (6.3%)
Herpes Simple	2 (4.4%)	10 (15.6%)
Molluscum Contagiosum	2 (4.4%)	5 (7.8%)
Sweet's Syndrome	2 (4.4%)	1 (1.6%)
Kaposi's Sarcoma (B21.0)	1 (2.2%)	3 (4.7%)

Table 1 presents a wide range of dermatological conditions, with a total of 109 patients analyzed. Among these manifestations, the most common are histoplasmosis and cryptococcosis, which together account for 21.39% of the frequency. Importantly, these two conditions are more prevalent in patients with a CD4 cell count less than 200 cells/mm³, representing 20.0% of all patients. Cryptococcosis is also among the most common conditions, with a frequency of 20.23%. In contrast, Sweet's syndrome is the least common syndrome, occurring in only 3.7% of the sample.

Discussion

The presence of the HIV virus causes a gradual reduction in CD4+ T lymphocytes, increasing the susceptibility of the skin to opportunistic infections. The frequency of dermatological findings in our study was 23.19% (n = 109) in this group, which presented with cutaneous manifestations. A study published in Ecuador (2019) reported a prevalence of 35.5%, with dermatological diseases classified as infectious, inflammatory, neoplastic, etc. The 2013 Ecuadorian Comprehensive Care Guide for Adults and Adolescents with HIV/AIDS (24), which mentions an age range of 20--49 years, does not align with the data presented in our study, in which a total of 109 patients were identified, ranging in age from 15--95 years in the collected sample.

The patients were predominantly male, with 80 men (73.4%) and 29 women (26.6%). In terms of the relationship between dermatological manifestations and the CD4 count, there was a greater distribution in the 200--499 cell/µL group in the research carried out by Alcívar (2017), similar to our study, which revealed that 45 patients (41.3%) had a frequency of less than 200 cells/mm³, whereas 64 patients (58.7%) had a frequency between 200 and 500 cells/mm³.

The most frequent manifestations were viral inflammatory dermatoses, herpes simplex, herpes zoster, and genital herpes, with a frequency of 21.1%, followed by infectious etiologies, such as deep fungal infections and histoplasmosis, which were similar to the former. Cryptococcosis was also present in 20.2% of the patients. In contrast, Kaposi's sarcoma was the least common, representing only 3.7% of the sample. We found a similar relationship in the Gizaw publication, where herpes zoster infection was more common, possibly because most patients presented with a low CD4 cell count, which is significantly associated with cutaneous manifestations. This occurred in 0.4% of living patients and 1.4% of deceased patients ($P < 0.002$).

During the course of this investigation, histoplasmosis was identified as the most common dermatological disease in HIV-positive patients, characterized by its cutaneous manifestations, followed closely by cryptococcosis. Both diseases were identified at significantly higher rates in the study population. This finding led us to conclude that there is a marked

predominance of cutaneous manifestations associated with infectious fungal pathologies in this specific context.

This study revealed a relationship between CD4 counts and the frequency and severity of cutaneous symptoms in individuals with HIV, particularly in patients with fungal infections such as histoplasmosis and cryptococcosis. Currently, the landscape of dermatological manifestations in HIV patients has undergone a profound transformation owing to highly effective antiretroviral therapy (ART). Although classic opportunistic infections and Kaposi's sarcoma have drastically decreased in prevalence, the skin remains a critical indicator of immune health. Today, the clinical focus has shifted toward the management of chronic inflammatory conditions, such as severe psoriasis, persistent seborrheic dermatitis, and prurigo nodularis, which tend to present more aggressively in these patients. Furthermore, with the aging of the HIV-positive population, a notable increase in nonmelanoma skin cancer and adverse cutaneous reactions to modern medications has been observed. The contemporary challenge for dermatologists is not only to identify signs of advanced immunodeficiency but also to manage chronic systemic inflammation and premature aging of skin tissue in patients whose viral load is usually controlled.

Conclusions

This study identified histoplasmosis and cryptococcosis as the most common dermatological diseases in HIV patients, with a marked predominance of cutaneous manifestations associated with fungal infections. In addition, a correlation was demonstrated between CD4 lymphocyte levels and the appearance and severity of cutaneous manifestations in HIV patients, especially in those with counts below 200 cells/mm³.

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Abstract

Introduction: Human immunodeficiency virus (HIV) infection continues to be a global public health challenge, despite advances in antiretroviral treatment. Among the medical complications faced by patients with HIV, cutaneous manifestations stand out. The relationship between these manifestations and the levels of CD4 lymphocytes, an essential component of the immune system, has been the subject of numerous studies. This study aimed to determine the relationship between skin manifestations and CD4 levels in patients with HIV at the Infectious Diseases Hospital in 2023.

Methods: This methodology is quantitative, nonexperimental, cross-sectional, and retrospective and uses observations, descriptions, and analyses.

Results: This study revealed a variety of dermatologic conditions in 109 patients. Histoplasmosis and cryptococcosis were the most common, accounting for 21.39% of the cases together, especially in patients with CD4 cell counts <200 cells/mm3. Sweet's syndrome was less common and was observed in only 3.7% of the patients.

Conclusion: In this study, histoplasmosis and cryptococcosis were identified as the most common dermatological diseases in patients with HIV, with a marked predominance of cutaneous manifestations associated with fungal infections. In addition, a correlation between CD4 lymphocyte levels and the appearance and severity of skin manifestations was demonstrated in patients with HIV, especially in those with counts below 200 cells/mm³.

Keywords: HIV, Cutaneous Manifestations, CD4.

Statements

Approval of the ethics committee and consent to participate

The Bioethics Committee of the Faculty of Medical Sciences, University of Guayaquil, approved the study. This study was carried out in accordance with the Declaration of Helsinki.

Publication consent

This information was not needed, as the present study did not publish patient-specific images, X-rays, or studies.

Conflicts of interest

The authors report that they have no conflicts of interest.

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