Original Article

Non-neoplastic cutaneous manifestations of HIV infection in patients from a community-based clinic in Puerto Rico

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Abstract: Although skin conditions are frequent in people living with HIV (PLWH), no prior studies have described them in Puerto Rico. This study assesses non-neoplastic cutaneous conditions in PLWH at a community clinic. We performed a cross-sectional analysis of 1,000 PLWH treated from January 2019 to December 2024. Sociodemographic, clinical, and dermatologic data were extracted from electronic records. Descriptive and bivariate analyses (Chi-square or Fisher's exact) were conducted with $p<0.05$ considered significant. Non-neoplastic skin conditions were identified in 19.1% of participants (241 diagnoses). The most common were herpes simplex virus (5.3%), dermatitis (2.8%), and warts (2.5%). Longer duration of HIV infection was significantly associated with skin conditions ($p=0.004$). No associations were found with sex, age, CD4 count, or viral load. Non-neoplastic dermatologic conditions remain prevalent among PLWH in Puerto Rico. These findings support incorporating routine dermatologic assessment into HIV care.

Keywords: HIV; Skin conditions; Puerto Rico

1. Introduction

Human Immunodeficiency Virus (HIV) remains a global public health burden, with approximately 39.0 million people infected as of 2023. In 2022 alone, 1.3 million people acquired HIV, and 630,000 died from HIV-related illnesses [1]. Moreover, approximately 1.2 million people in the U.S. have HIV. According to the CDC, around 31,800 people acquired HIV in the U.S. in 2022 [2]. In Puerto Rico, 367 new HIV diagnoses were reported in 2023, contributing to the population of people living with HIV (PLWH); additionally, 61 HIV diagnoses were reported through April 30, 2024, based on partial-year surveillance data [3].These figures underscore the ongoing impact of HIV in the region and the importance of continued efforts in prevention, early diagnosis, and comprehensive treatment. While the introduction of antiretroviral therapy (ART) has significantly reduced mortality, PLWH continues to experience comorbidities, including dermatologic conditions [4].

Skin conditions are among the earliest and most common clinical manifestations of HIV, affecting a significant proportion of PLWH [5]. The spectrum of HIV-associated skin conditions is broad, encompassing early eruptions, malignancies, opportunistic infections, non-infectious diseases, and drug-related eruptions associated with ART. As HIV progressively weakens the immune system, the skin becomes increasingly vulnerable to both infectious and non-infectious manifestations [6].

Among non-infectious cutaneous disorders, seborrheic dermatitis, atopic dermatitis, psoriasis, and xerosis are commonly observed in PLWH. These conditions tend to be more severe, diffuse, and recurrent than in the general population [7]. Seborrheic dermatitis is the most reported dermatosis in PLWH, occurring in 85%–95% of patients with advanced HIV infection [7,8]. In this population, it

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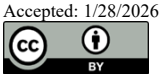

often begins early in the disease course, particularly when CD4 counts fall below 450–550 cells/μL and tends to become more severe at CD4 levels around 100 cells/μL [9]. However, the use of ART frequently leads to improvement in most cases [10].

Viral infections are also common in PLWH, with Herpes Simplex Virus (HSV) being one of the most common. HSV can involve multiple sites, including the oral, ocular, genital, and even central nervous system regions. In immunocompetent individuals, HSV infections are typically self-limited, with lesions resolving within two weeks. In contrast, PLWH may develop chronic lesions, sometimes progressing to epidermal necrosis. Herpes zoster (VZV) reactivation is also more common in this population and may present with multi-dermatomal or disseminated lesions [5]. Approximately 20%–30% of PLWH experience one or more episodes of VZV [11]. These patients are more susceptible to severe VZV manifestations, including necrotic or hemorrhagic lesions and, rarely, cutaneous dissemination [5]. Human papillomavirus (HPV) is another relevant viral pathogen in this population, with PLWH more likely to acquire HPV and present with larger or more numerous warts [12].

Fungal infections, including dermatophytes and candidiasis, are similarly prevalent. Dermatophyte infections in PLWH are typically more extensive and resistant to treatment than in the general population. *Candida* species, while commonly colonizing the skin, mouth, gastrointestinal tract, and vagina in healthy individuals, can become pathogenic at any stage of HIV infection. Clinical manifestations include oral thrush, cutaneous candidiasis, onychomycosis, paronychia, and vaginal candidiasis. On the other hand, bacterial skin infections, particularly those caused by *Staphylococcus aureus*, are also frequently reported in PLWH [13]. These infections may present as primary lesions or develop as superinfections over pre-existing conditions such as eczema, scabies, herpetic ulcers, or Kaposi sarcoma [13,14].

Despite the clinical importance of these cutaneous manifestations, research on HIV-associated skin conditions remains limited, particularly in Puerto Rico. This study aims to assess the presence of non-neoplastic cutaneous manifestations in PLWH receiving care at a community-based clinic in Puerto Rico. By focusing on this specific demographic, the study seeks to address a critical gap in the literature and provide data that may inform future healthcare interventions and management strategies for HIV-associated skin conditions in this population.

2. Methodology

An analysis was conducted using data collected from PLWH at the Puerto Rico Community Network for Clinical Services, Research and Health Advancement, Inc. (PRCONCRA), an urban community-based clinic and Ryan White HIV/AIDS Program grantee located in Puerto Rico. This study employed a cross-sectional design approved by the Institutional Review Board (IRB) of Universidad Central del Caribe, School of Medicine (UCCSoM). The study population consisted of adults aged 21 years or older who had tested positive for HIV and received care at PRCONCRA between January 2019 and December 2024. Participants were selected through convenience sampling based on the availability of electronic medical records.

Information was extracted from medical records and shared electronically via Microsoft Excel through secure messaging. No personal identifiers were included in the dataset. Variables analyzed in the study included age, sex, health insurance, federal poverty level, years with HIV, high risk behavior, CD4 cell count, viral suppression status, substance use disorder, and skin manifestations. A total of 1,000 individuals were included in the study. Skin manifestations were identified using International Classification of Diseases, 10th Revision (ICD-10) codes. Inclusion criteria included adults with a confirmed HIV diagnosis and at least one recorded clinical visit within the study window. Exclusion criteria included records with missing demographic data, missing HIV-related variables (CD4 count, viral load), duplicate records, and individuals who died before their first visit within the study period.

Univariate analyses were performed to summarize frequencies and percentages for categorical variables, and measures of central tendency and dispersion for continuous variables. Normality tests were conducted for all continuous variables. Patients were stratified based on the presence or absence

of skin manifestations to evaluate differences in sociodemographic and clinical characteristics. Bivariate analyses were conducted using Chi-square or Fisher's exact tests for categorical variables, and independent-samples t-tests or Mann–Whitney U tests for continuous variables, depending on the normality of distribution. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using R-Studio version R-4.5.1 and Intellectus Statistics 360.

3. Results

Sociodemographic characteristics

A total of 1,000 PLWH were included in this analysis. Most participants reported being assigned male at birth (78.8%) versus female (21.2%). Most participants reported being Hispanic (98.9%). The most common represented age group was 55-64 years (23.7%), followed by 35-44 years (22.7%). In terms of geographical distribution, most participants were from San Juan (66.6%), which is part of the metropolitan area of Puerto Rico. The minority of participants were from non-metropolitan regions. Healthcare insurance was predominantly through Medicaid (63.4%), and over half of the participants (55.1%) reported being below the 100% Federal Poverty Level (FPL).

Clinical profile

Most patients had been living with HIV for 1 to 10 years (35.3%), and 10 to 20 years (35.1%). Smaller proportions had been living with HIV for 20 to 30 years (21.0%), 30 years or more (6.1%), or less than 1 year (2.5%). Among reported HIV transmission categories, men who have sex with men (MSM) accounted for the largest proportion of cases (63.3%). Most participants (96.5%) had a CD4 count ≥200 cells/mm^3 , and 91.8% had a suppressed viral load of <200 copies/mL. Additionally, 92.4% were prescribed ART.

Dermatological conditions

Non-neoplastic cutaneous manifestations prevalence between 2019 and 2024 were 191 per 1,000 patients (19.1%). Table 4 presents all the non-neoplastic cutaneous manifestations identified among PLWH in the study. Because patients could present with more than one condition, the total of 241 related diagnoses represent the total number of identified diagnoses, not unique cases. For analysis, the non-neoplastic cutaneous manifestations were classified into two main categories: infectious and non-infectious. Infectious conditions included those of viral, bacterial and fungal origin. Non-infectious dermatoses encompassed chronic and inflammatory skin disorders commonly seen in PLWH.

Among the viral conditions, the most frequently diagnosed was HSV, as well as the most common condition overall (5.3%), followed by warts (2.5%). Less frequent viral conditions included secondary syphilis, VZV and molluscum contagiosum. On the other hand, bacterial skin conditions included infection of the skin (1.2%), cellulitis (1.1%), skin abscess (0.5%) and less frequently, folliculitis, furuncle and impetigo. Fungal infections were also noted, primarily dermatophyte infections (1.3%).

In the category of non-infectious inflammatory dermatoses, the most common diagnosis was dermatitis (2.8%). The latter included, atopic, seborrheic, radiodermatitis, contact dermatitis and unspecified dermatitis. Other inflammatory entries were psoriasis (0.4%), pruritus (0.3%), and xerosis (0.1%). Unspecified entries were also present. The most frequent was "dermatology skin condition, unspecified" (3.8%) and "rash unspecified" (1.0%). Additional entries included urticaria (0.2%), alopecia (0.2%), epidermal inclusion cyst (0.1%), and chronic cutaneous non-pressure ulcers (0.1%).

Associations between sociodemographic, clinical factors and cutaneous manifestations

Bivariate analyses were performed to evaluate potential associations between non-neoplastic cutaneous manifestations sociodemographic and clinical variables among 1,000 PLWH. As presented in Table 4, patients were divided into two groups based on the presence or absence of these diagnoses, and associations were evaluated using chi-square and fisher tests.

Among sociodemographic characteristics, neither sex assigned at birth (p=0.139) nor gender identity (p=0.135) showed a statistically significant association with the presence of skin conditions. However, a slightly higher representation of females (25.1%) is presenting with non-neoplastic cutaneous manifestations compared to males (19.7%) (p=0.095). Age was also not significantly associated with the presence of cutaneous manifestations (p=0.122), though notable differences were observed among age groups. The highest proportion of PLWH diagnosed with at least one skin condition was seen in those aged 55-64 years (26.7%), followed by those aged 45-54 (23.5%), 35-44 (19.3%), 65 years or more (13.6%) and 21-34 years.

An association was found between years living with HIV and the presence of cutaneous manifestations (t=2.99, p=0.003). On average, patients with non-neoplastic cutaneous manifestations had been living with HIV for a longer time (15.84 ± 8.31) compared to those without such manifestations (13.78 ± 9.15 years). This difference was statistically significant (p=0.003), as indicated by the Welch's t-test (t=2.99).

Regarding HIV transmission categories, no significant association was found (p=0.516). However, MSM represented the largest proportion of PLWH with cutaneous manifestations (60.7%). Other groups, such as individuals with heterosexual contact (32.9%), injection drug use (4.7%) or others (1.5%) had lower representation. Other variables such as insurance type, FPL, HAAR prescription, CD4 level, viral load and AIDS diagnosis did not show statistically significant differences.

Table 1. Sociodemographic characteristics of HIV patients.

Sociodemographic Characteristics	n	%
Sex at birth		
Male	788	78.8
Female	212	21.2
Age		
21-34 years old	186	18.6
35-44 years old	227	22.7
45-54 years old	198	19.8
55-64 years old	237	23.7
>65 years old	152	15.2
Health region		
Aguadilla-Mayagüez	3	0.3
Arecibo	41	4.1
Bayamón	169	16.9
Caguas	78	7.8
Fajardo	31	3.1
Ponce	12	1.2
San Juan	666	66.6
Health insurance		
Medicaid	634	63.4
Medicare	139	13.9
Private	200	20.0

Uninsured	27	2.7
Federal Poverty Level (%)		
<100	551	55.1
100-199	257	25.7
200-299	118	11.8
300-399	40	4.0
400-499	18	1.8
≥500	16	1.6

Table 1. *Values represent frequencies (n) and percentages (%) of the study population. Age groups were categorized in 10-year intervals. Federal Poverty Level (FPL) was classified according to U.S. Department of Health and Human Services guidelines. Health region categories correspond to the Puerto Rico Department of Health regional designations. Percentages may not total 100% due to rounding.*

Table 2. Clinical profile of HIV patients

Clinical Profile	n	%
Years with HIV		
<1	25	2.5
1-9	353	35.3
10-19	351	35.1
20-29	210	21.0
≥30	61	6.1
Transmission Categories		
Heterosexual	291	29.1
MSM	633	63.3
IDU	54	5.4
Others	22	2.2
CD4 value		
<200 cells/mm^3	35	3.5
<200 cells/mm^3	965	96.5
Viral load		
<200 copies/mL	918	91.8
<200 copies/mL	82	8.2
ART prescription		
Yes	924	92.4
No	76	7.6

Table 2. *Values represent frequencies (n) and percentages (%) of the study population. MSM = men who have sex with men; IDU = injection drug use. CD4 count and viral load categories reflect clinical thresholds commonly used in HIV management (<200 cells/mm³ and <200 copies/mL, respectively). ART refers to antiretroviral therapy. Percentages may not total 100% due to rounding.*

Table 3. Non-neoplastic cutaneous manifestations among HIV patients

Non-Neoplastic Cutaneous Manifestations	**n**	**%**
Non-infectious cutaneous disorders		
Dermatitis:		
Seborrheic dermatitis	4	0.4
Atopic dermatitis	8	0.8
Radiodermatitis	1	0.1
Contact dermatitis	1	0.1
Dermatitis due to other substances taken internally	2	0.2
Unspecified	12	1.2
Psoriasis	4	0.4
Xerosis	1	0.1
Photosensitivity Disorders:		
Rosacea	1	0.1
Pemphigus Vulgaris	1	0.1
Polymorphous Light Eruption	1	0.1
Pruritus	3	0.3
Infectious cutaneous disorders		
Viral:		
HSV	53	5.3
Molluscum contagiosum	2	0.2
Secondary syphilis	12	1.2
Herpes zoster	7	0.7
Warts	25	2.5
Bacterial:		
Cellulitis	11	1.1
Skin abscess	5	0.5
Folliculitis	1	0.1
Furuncle	1	0.1

Impetigo	1	0.1
Infection of Skin	12	1.2
Fungal:		
Dermatophytes (Tineas)	13	1.3
Candida (Skin, Genital)	5	0.5
Others Non-neoplastic Cutaneous Disorders (Unspecified)		
Urticaria	2	0.2
Alopecia	2	0.2
Rash unspecified	10	1.0
Dermatology skin condition, unspecified	38	3.8
Epidermal inclusion cyst	1	0.1
Chronic cutaneous non-pressure ulcer	1	0.1

Table 3. *Values represent frequencies (n) and percentages (%) of the study population. HSV = Herpes Simplex Virus. Conditions were grouped into non-infectious and infectious cutaneous disorders for descriptive purposes. Dermatologic diagnoses reflect those documented in the medical record at the time of evaluation. "Unspecified" indicates cases in which the chart did not provide a more precise diagnosis. Percentages may not total 100% due to rounding.*

Table 4. Associations between sociodemographic and clinical factors and non-neoplastic cutaneous manifestations

	Non-Neoplastic Cutaneous Manifestations			
Factors	**Yes**	**No**		
	n (%)	**n** (%)	**X^2**	**p-value**
Sex at birth				
Male	143 (74.87)	645 (79.73)	2.18	0.139
Female	48 (25.13)	164 (20.27)		
Age				

21-34 years old	26 (13.62)	160 (19.78)	7.27	0.122
35-44 years old	37 (19.37)	190 (23.49)		
45-54 years old	45 (23.56)	153 (18.91)		
55-64 years old	51 (26.70)	186 (22.99)		
>65 years old	32 (16.75)	120 (14.83)		
Health insurance				
Private	39 (20.42)	161 (19.90)	2.98	0.395
Medicare	30 (15.71)	109 (13.47)		
Medicaid	120 (62.83)	514 (63.54)		
No Insurance	2 (1.04)	25 (3.09)		
Federal Poverty Level (%)				
(mean ± SD)	1.09 ± 1.00	1.18 ± 1.36	t= -1.03	0.302
Years with HIV				
(mean ± SD)	15.84 ± 8.31	13.78 ± 9.15	t=2.99	0.003
Transmission Categories				
Heterosexual	63 (32.98)	228 (28.18)	6.21	0.516
MSM	116 (60.73)	517 (63.91)		
IDU	9 (4.72)	45 (5.56)		
Others	3 (1.57)	19 (2.35)		
CD4 value				
≥200 cells/mm^3	187 (97.90)	778 (96.17)	1.38	0.240
Viral load				
<200 copies/mL	178 (93.19)	740 (91.47)	0.61	0.435
Substance Use Disorder				
Yes	9 (4.71)	35 (4.33)	0.05	0.815
No	182 (95.29)	774 (95.67)		

Table 4. *Values represent frequencies (n), percentages (%) for categorical variables and mean ± standard deviation (SD) for continuous variables. The x^2 test was used to evaluate associations between categorical variables and the presence of non-neoplastic cutaneous manifestations. Independent samples t-tests were used to compare continuous variables (Federal Poverty Level percentage and years with HIV). MSM = men who have sex with men; IDU = injection drug use. Statistical significance was set at $p < 0.05$. Percentages may not total 100% due to rounding. Substance use disorder was defined as a documented diagnosis by a qualified healthcare provider based on ICD-10 codes F10–F19 and was analyzed as a dichotomous variable (yes/no).*

4. Discussion

This study evaluated the prevalence of non-neoplastic dermatologic diagnoses among 1,000 PLWH at a community-based clinic in Puerto Rico between 2019 and 2024. Among these PLWH, 191 of 1,000 patients (19.1%) presented with at least one non-neoplastic skin condition. Because some patients had more than one condition, a total of 241 non-neoplastic dermatologic diagnoses were identified and are summarized in Table 3. The most frequently documented were viral infections, with HSV reported at 5.3% and warts at 2.5%. These were followed by non-infectious dermatoses such as dermatitis (2.8%) and psoriasis (0.4%). Notably, seborrheic dermatitis and atopic dermatitis were frequently observed, consistent with existing literature suggesting that these conditions can be more severe and treatment-resistant in PLWH [7,10].

While conditions such as seborrheic dermatitis have been reported at higher prevalence in the era of ART (2–25%), the relatively low rate observed in our study (0.4%) may be associated to immune stability as the majority of participants were receiving ART and had CD4 counts ≥200 cells/mm³ and viral loads <200 copies/mL (Table 1) [16]. Additionally, a key limitation of our cross-sectional study design is that it may not capture resolved manifestations that occurred before the study period (2019-2024). This is particularly relevant given that many participants had been living with HIV for over ten years, meaning cutaneous manifestations that arose and resolved prior to 2019 would not have been documented in our database.

Regarding non-infectious cutaneous manifestations, the prevalence of psoriasis in our study (0.4%) was slightly lower than that reported in the general population (~2–3%) and is consistent with findings from a large HIV clinic in Trinidad, which documented a prevalence of 0.42% [17]. Atopic dermatitis has been documented in approximately 30–50% of patients with advanced immunosuppression, but only 0.8% of our study was affected [18]. Xerosis, one of the most persistent cutaneous complaints in the ART era, has been reported in 19–28% of PLWH, yet it was recorded in just 0.1% of our population [19]. Similarly, chronic pruritus is commonly reported among PLWH, with one U.S. study noting a prevalence of 45% [20]. In contrast, only 0.3% of participants in our sample reported pruritus, likely reflecting the immunological stability of this population and a lower burden of pruritogenic dermatoses.

Viral infections such as HSV (5.3%) and HPV (0.7%) were observed among PLWH, reflecting the presence of chronic viral co-infections in this population in the ART era. In a Romanian study, viral infections including vulgar warts and herpes simplex had a combined prevalence of 5.25%, comparable to our findings [21]. Other viral conditions, such as molluscum contagiosum and herpes zoster, while less frequently observed in this cross-sectional sample, are well-documented in the literature for their atypical or disseminated presentations in immunocompromised populations [22].

Bacterial infections were also observed, including cellulitis (1.1%) and abscesses (0.5%), which aligns with findings from other studies reporting low rates of bacterial skin conditions among PLWH in the ART era [21]. These findings are clinically relevant, as bacterial infections may arise as primary conditions or as complications of pre-existing dermatoses such as eczema or herpes. Notably, *Staphylococcus aureus* remains the most common cutaneous pathogen in HIV patients, and its clinical manifestations can range from localized abscesses to extensive soft tissue infections, particularly in individuals with advanced disease.

Additionally, fungal infections were also present, including dermatophyte infections (1.3%) and candidiasis (0.5%). These conditions are typically more widespread and refractory to treatment in immunocompromised individuals, including PLWH [23]. Candidiasis, especially in oral and

intertriginous forms, remains a hallmark fungal manifestation in HIV and can occur across all stages of infection. The presence of fungal infections observed in this study likely reflects the combined influence of host-related factors as well as environmental conditions, as tropical climates are known to have a higher incidence of dermatological fungal infections []23,24]. In our study, no statistically significant associations were found between cutaneous manifestations and most sociodemographic or clinical factors, including sex, age, viral suppression, and CD4 count. A significantly longer duration of HIV infection was observed among patients with non-neoplastic cutaneous manifestations compared to those without (15.84 vs. 13.78 years, p=0.003). This association may reflect cumulative immune dysregulation or chronic inflammation over time; however, increased duration of follow up and greater opportunity for clinical documentation may also contribute to this finding.

In contrast to our findings, several studies have demonstrated a significant trend between cutaneous manifestations in PLWH and immunosuppressive markers such as CD4 count. For example, a cross-sectional study in Madagascar observed that decreases in CD4 count were strongly correlated with certain skin conditions – notably oral candidiasis, syphilis, and cutaneous warts (condyloma acuminatum) occurred more frequently in patients with low CD4 levels [25]. These findings underscore that advanced HIV disease is often accompanied by more cutaneous manifestations, even though our study did not show such trends, possibly due to ART use and control of the disease and the study design.

While these findings provide important insights, several limitations must be acknowledged. First, the cross-sectional design limits the ability to infer causality between HIV status and the presence or severity of dermatologic conditions. In addition, because only bivariate analyses were performed, we were unable to adjust for potential confounding factors such as age, sex, socioeconomic status, antiretroviral therapy exposure, viral suppression, and substance use disorder; therefore, observed associations should be interpreted as descriptive and non-causal. Moreover, the study relied on data analysis using ICD-10 codes, which may have resulted in underreporting or misclassification of skin conditions, particularly in the absence of dermatologist evaluations at the clinic. In addition, a substantial proportion of diagnoses were recorded using nonspecific ICD-10 classifications (e.g., “dermatology skin condition, unspecified” and “rash, unspecified”), which likely reflects real-world documentation practices in community-based settings and may have led to underestimation and incomplete characterization of the true dermatologic burden in this population.

We were also unable to assess the number of distinct cutaneous manifestations per patient, as data were limited to whether a patient had at least one dermatologic diagnosis during the study period. Several variables of interest, such as the specific type of ART regimen, were not available. This is particularly relevant given that earlier antiretroviral medications were associated with dermatologic side effects, and it remains unclear whether long-term exposure to those agents may have lasting cutaneous consequences.

Despite these limitations, the study has several important strengths. It contributes novel epidemiologic insight into the burden of skin disease among PLWH in Puerto Rico, a population seldom examined in dermatologic HIV research. Strengths include a relatively large sample size and the inclusion of a wide range of dermatologic diagnoses within an outpatient setting, reflecting real-world clinical patterns. Notably, this is the first cross-sectional study to evaluate the prevalence of dermatologic conditions exclusively among Hispanic PLWH, providing a valuable foundation for future research and public health initiatives aimed at this underserved population.

Compared to ART-era cohorts (e.g., the recent global meta-analysis by Silva et al., 2024), which reported pooled prevalences of 42%–69% for dermatologic conditions in PLWH, our observed prevalence (19%) is substantially lower. This discrepancy likely reflects under-ascertainment due to limited dermatology access and reliance on ICD-10 coding rather than specialist-confirmed diagnoses. PRCONCRA is a community-based, non-dermatology clinic, where general practitioners may under-document cutaneous findings. Therefore, our results likely underestimate the true dermatologic burden in this population.

5. Conclusions

This study highlights the ongoing burden and clinical relevance of non-neoplastic cutaneous manifestations among PLWH in Puerto Rico. Despite high rates of viral suppression and immunologic stability in the cohort, nearly one in five patients presented with dermatologic conditions most commonly viral infections, dermatitis, and fungal disorders. The findings underscore the persistence of skin disease in the ART era and emphasize the importance of recognizing cutaneous signs as part of comprehensive HIV care. Given the diversity and frequency of these manifestations, even in outpatient settings, routine dermatologic evaluation should be integrated into HIV management strategies. Future efforts should prioritize dermatologist-led screenings and prospective studies to better characterize skin disease progression, treatment outcomes, and quality-of-life impacts in this population.

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Data Availability Statement: Data is unavailable as PRCONCRA clinic asks for their data to be secure to protect their patients' privacy.

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References

1. World Health Organization. HIV and AIDS [Internet]. Geneva: World Health Organization; 2024 Jul 22 [cited 2025 Jul 15]. Available from: https://www.who.int/news-room/fact-sheets/detail/hiv-aids

2. HIV.gov. U.S. Statistics [Internet]. Washington, DC: HIV.gov; 2025 Feb 21 [cited 2025 Jul 15]. Available from: https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics

3. Puerto Rico Department of Health. *Puerto Rico HIV/AIDS Surveillance Summary: Cumulative HIV/AIDS Cases Diagnosed as of April 30, 2024*. San Juan, Puerto Rico: Epidemiological Surveillance Section, Division of Epidemiology and Research; 2024.

4. Chandler DJ, Walker SL. HIV and skin infections. Clin Dermatol. 2024 Mar-Apr;42(2):155-168. doi: 10.1016/j.clindermatol.2023.12.005. Epub 2023 Dec 22. PMID: 38142787.

5. Tschachler E, Bergstresser PR, Stingl G. HIV-related skin diseases. Lancet. 1996 Sep 7;348(9028):659-63. doi: 10.1016/S0140-6736(96)01032-X. PMID: 8782758.

6. Cedeno-Laurent F, Gómez-Flores M, Mendez N, Ancer-Rodríguez J, Bryant JL, Gaspari AA, Trujillo JR. New insights into HIV-1-primary skin disorders. J Int AIDS Soc. 2011 Jan 24;14:5. doi: 10.1186/1758-2652-14-5. PMID: 21261982; PMCID: PMC3037296.

7. Mohseni Afshar Z, Goodarzi A, Emadi SN, Miladi R, Shakoei S, Janbakhsh A, Aryanian Z, Hatami P. A Comprehensive Review on HIV-Associated Dermatologic Manifestations: From Epidemiology to Clinical Management. Int J Microbiol. 2023 Jul 18;2023:6203193. doi: 10.1155/2023/6203193. PMID: 37496761; PMCID: PMC10368516.

8. Gupta AK, Madzia SE, Batra R. Etiology and management of Seborrheic dermatitis. Dermatology. 2004;208(2):89-93. doi: 10.1159/000076478. PMID: 15056994.

9. Garg T, Sanke S. Inflammatory dermatoses in human immunodeficiency virus. Indian J Sex Transm Dis AIDS. 2017 Jul-Dec;38(2):113-120. doi: 10.4103/ijstd.IJSTD_22_17. PMID: 30148263; PMCID: PMC6085932.

10. Cortés-Correa C, Piquero-Casals J, Chaparro-Reyes D, Garré Contreras A, Granger C, Peñaranda-Contreras E. Facial Seborrheic Dermatitis in HIV-Seropositive Patients: Evaluation of the Efficacy and Safety of a Non-Steroidal Cream Containing Piroctone Olamine, Biosaccharide Gum-2 and Stearyl Glycyrrhetinate - A Case Series. Clin Cosmet Investig Dermatol. 2022 Mar 18;15:483-488. doi: 10.2147/CCID.S344807. PMID: 35330623; PMCID: PMC8940309.

11. Clinicalinfo HIV.gov. Varicella-Zoster Virus Disease. Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV [Internet]. Updated 2022 Sep 7; reviewed 2025 Jan 8 [cited 2025 Jul 15]. Available from: https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-opportunistic-infections/varicella-zoster

12. HIVinfo.nih.gov. HIV and Human Papillomavirus. [Internet]. Bethesda (MD): U.S. Department of Health and Human Services; 2024 Nov 4 [cited 2025 Jul 15]. Available from: https://hivinfo.nih.gov/understanding-hiv/fact-sheets/hiv-and-human-papillomavirus

13. Altman K, Vanness E, Westergaard RP. Cutaneous manifestations of human immunodeficiency virus: a clinical update. Curr Infect Dis Rep. 2015 Mar;17(3):464. doi: 10.1007/s11908-015-0464-y. PMID: 25821188; PMCID: PMC4447481.

14. Diaz I, Neelagaru S, Dall L. Diagnosis of cellulitis in patients infected with the human immunodeficiency virus. Can J Infect Dis. 1994 Mar;5(2):84-5. doi: 10.1155/1994/385971. PMID: 22451771; PMCID: PMC3307408.

15. Oakley A, Brown M, Jarrett P. Skin conditions relating to HIV infection [Internet]. DermNet. 2021 Nov [cited 2025 Jul 15]. Available from: https://dermnetnz.org/topics/skin-conditions-relating-to-hiv-infection

16. Chelidze K, Thomas C, Chang AY, Freeman EE. HIV-Related Skin Disease in the Era of Antiretroviral Therapy: Recognition and Management. Am J Clin Dermatol. 2019 Jun;20(3):423-442. doi: 10.1007/s40257-019-00422-0. PMID: 30806959; PMCID: PMC6581453.

17. Edwards RJ, Lavia LO, Edwards J, Boyce G. Psoriasis in patients attending a large HIV clinic in Trinidad. *Med Sci*. 2022;10(1):9. doi:10.3390/medsci10010009

18. Chimbetete T, Buck C, Choshi P, Selim R, Pedretti S, Divito SJ, et al. HIV-associated immune dysregulation in the skin: A crucible for exaggerated inflammation and hypersensitivity. *J Invest Dermatol*. 2023;143(3):362–73. doi:10.1016/j.jid.2022.07.035

19. Lee D, Benson CA, Lewis CE, Grunfeld C, Scherzer R. Prevalence and factors associated with dry skin in HIV infection: the FRAM study. AIDS. 2007 Oct 1;21(15):2051-7. doi: 10.1097/QAD.0b013e3282eea51a. PMID: 17885295; PMCID: PMC3166536.

20. Kaushik SB, Cerci FB, Miracle J, Pokharel A, Chen SC, Chan YH, Wilkin A, Yosipovitch G. Chronic pruritus in HIV-positive patients in the southeastern United States: its prevalence and effect on quality of life. J Am Acad Dermatol. 2014 Apr;70(4):659-664. doi: 10.1016/j.jaad.2013.12.015. Epub 2014 Feb 4. PMID: 24503217.

21. Draganescu M, Baroiu L, Iancu A, Dumitru C, Radaschin D, Polea ED, et al. Perspectives on skin disorder diagnosis among people living with HIV in southeastern Romania. *Exp Ther Med*. 2021;21:97. doi:10.3892/etm.2020.9529.

22. *Ian CT Tse. 21. Dermatologic manifestations in HIV disease. In: HIV Manual 2007 [Internet]. Hong Kong: Department of Health, HKSAR Government; 2007 [cited 2025 Jul 15]. Available from: https://www.aids.gov.hk/pdf/g190htm/21.htm*

23. Patel PK, Erlandsen JE, Kirkpatrick WR, Berg DK, Westbrook SD, Louden C, Cornell JE, Thompson GR, Vallor AC, Wickes BL, Wiederhold NP, Redding SW, Patterson TF. The Changing Epidemiology of Oropharyngeal Candidiasis in Patients with HIV/AIDS in the Era of Antiretroviral Therapy. AIDS Res Treat. 2012;2012:262471. doi: 10.1155/2012/262471. Epub 2012 Aug 28. PMID: 22970352; PMCID: PMC3434376.

24. Urban K, Chu S, Scheufele C, Mehrmal S, Uppal P, Delost GR. The global, regional, and national burden of fungal skin diseases in 195 countries and territories: A cross-sectional analysis from the Global Burden of Disease Study 2017. *JAAD International.* 2021;2:22–27. doi:10.1016/j.jdin.2020.10.003

25. Sendrasoa F, Falimiarintsoa V, Ramarozatovo L, Rapelanoro Rabenja F. Mucocutaneous manifestations among HIV-infected patients in Madagascar: cross-sectional study. JMIR Dermatol. 2023;6:e47199. doi:10.2196/47199. Available from: https://derma.jmir.org/2023/1/e47199