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Clinical and demographic characteristics of clients attending a care and treatment clinic in sub-Saharan Africa

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Abstract

Introduction: HIV/AIDS continues to be a major public health threat in sub-Saharan Africa, where it disproportionately affects adults in their productive years. While antiretroviral therapy (ART) has greatly improved the lives of people living with HIV (PLWH), long-term ART use and disease progression can lead to various clinical manifestations and a significant symptom burden. Understanding symptom burden and key laboratory parameters is crucial for effective patient management and improved quality of life. This study aimed to evaluate the clinical and selected laboratory features of HIV-positive patients attending a routine outpatient HIV clinic in Dar es Salaam, Tanzania.

Methods: A retrospective hospital-based cross-sectional study was conducted using electronic medical records of 7,343 HIV-positive individuals aged 18 years and above who attended the Care and Treatment Clinic (CTC) at a Regional Referral Hospital in Tanzania. Data on presenting symptoms, opportunistic infections, and laboratory investigations (HIV viral load, CD4+ T-cell count, hemoglobin levels, liver function enzymes) were retrieved. Data analysis was performed using SPSS version 23.

Results: Nausea was the most common presenting symptom, followed by cough and skin rashes. Among laboratory parameters, majority (71%) had anemia and most (85%) had normal liver enzymes. Majority (72.5%) had suppressed HIV viral load but only 20 percent had a normal CD4 count (500-1500 cells/mL). Gender-based differences were observed, with females exhibiting statistically higher CD4 counts ($p < 0.0001$) and men having significantly higher alanine aminotransferase (ALT) levels ($p=0.0004$). Differences in symptoms such as cough, weight loss, and nausea between genders were not statistically significant.

Conclusion: This study reveals crucial insights into the health of people living with HIV in Tanzania. Women were found to be disproportionately affected by HIV. Many PLWH experience nausea, and although a high percentage has achieved viral suppression, low CD4 counts and anemia remain highly prevalent. These findings suggest complex underlying factors that warrant further investigation and underscore the need for gender-sensitive care and improved strategies to manage comorbidities and support immune recovery in PLWH.

Keywords: Clinical characteristics; Demographic characteristics; Laboratory Investigations; HIV

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1. Introduction

HIV/AIDS remains a significant public health challenge in sub-Saharan Africa, a region that continues to bear a disproportionately high burden of the global HIV prevalence [1]. In many developing countries, HIV—either directly or indirectly through opportunistic infections—remains a leading cause of morbidity and mortality. However, the widespread availability of antiretroviral therapy (ART) has markedly improved both the quality of life and life expectancy of individuals living with HIV (PLWH) [2].

Despite the success of ART in prolonging life, this improved life expectancy has led to the emergence of various clinical manifestations. These may stem from the long-term side effects of antiretroviral medications or from the underlying progression of HIV itself [3]. Symptom burden among PLWH significantly affects their quality of life, regardless of ART status. In recent years, the symptom cluster approach has been proposed as a valuable tool for understanding and tracking the clinical progression of HIV [4].

Symptom clusters—groups of related symptoms occurring together—can help clinicians assess disease progression and guide treatment strategies. Commonly identified clusters include respiratory, gastrointestinal (GI), and systemic symptoms. Some clusters relate to opportunistic infections, others to ART-related side effects, and some to the natural course of the disease. Nausea is one of the most frequently reported symptoms among PLWH. It can be caused by several antiretroviral medications, such as nucleoside reverse transcriptase inhibitors (e.g., zidovudine) and protease inhibitors (e.g., atazanavir), as well as prophylactic drugs like cotrimoxazole. Additionally, gastrointestinal opportunistic infections such as isosporiasis may contribute to nausea [5]. Cough is another commonly encountered symptom in HIV care settings, often caused by infectious agents, with Mycobacterium tuberculosis being a major opportunistic pathogen. Tuberculosis remains the leading cause of death among HIV-infected individuals [2].

Laboratory parameters also play a critical role in monitoring the progression of HIV disease. CD4+ T-cell counts and viral load are primary indicators, but other routinely collected markers—such as hemoglobin levels and liver function enzymes—may provide additional insights into disease status and complications [6]. Addressing symptom clusters in HIV care has been shown to improve patient outcomes and enhance quality of life [7].

Therefore, identifying the most prevalent symptom clusters in this setting could contribute to better management strategies and more personalized care for PLWH.

This study aimed to evaluate the clinical and selected laboratory features of HIV-positive patients attending a routine outpatient HIV clinic in a tertiary hospital in Dar es Salaam, Tanzania.

2. Methods

2.1. Study Design

A hospital-based retrospective cross-sectional study was conducted to assess the clinical presentations and selected laboratory investigations among HIV-positive individuals aged 18 years and above who attended the Care and Treatment Clinic (CTC) at a Regional Referral Hospital in Tanzania.

2.2. Study Setting

The study took place at the HIV Care and Treatment Clinic of Temeke Regional Referral Hospital, a public healthcare facility located in Dar es Salaam, Tanzania. The clinic provides routine follow-up care and HIV treatment services.

2.3. Study Protocol

A list of HIV-positive clients who attended Temeke CTC during the study period was retrieved from the clinic's electronic medical database. These electronic records were reviewed to assess the range of presenting symptoms, the presence of opportunistic infections, and laboratory investigations performed, including HIV viral load and CD4+ T-cell count.

2.4. Data Analysis

Data analysis was carried out using SPSS version 23. Categorical variables were summarized using frequencies and proportions. Continuous variables were expressed as means with standard deviations (SD) or medians. Artificial intelligence techniques were also employed to complement traditional statistical methods. This allowed for the

identification of potential correlations that might not be immediately apparent through conventional analysis alone, thereby enhancing the depth and robustness of our findings.

2.5. Ethical Considerations

Ethical clearance for the study was obtained from the Temeke Municipal Council and the administrative authority of Temeke Regional Referral Hospital. Patient data was anonymized to ensure confidentiality.

3. Results

The study cohort comprised 7,343 patient records. The mean age of the patients was 40.7 years (standard deviation [SD]: 10.4), with ages ranging from 18 to 86 years. The majority of the patients were female, constituting 70.3% of the cohort, while males represented 29.7%.

Table 1 Demographic breakdown by Age group and gender among study participants

Age Group	Female	Male	Total
18-29	723	200	923
30-39	2043	620	2663
40-49	1655	800	2455
50-59	533	395	928
60-69	168	127	295
+70	43	36	79
Total	5165	2178	7343

Nausea (89.3%) emerged as the most common presenting symptom, followed by cough (4.1%) and skin rashes (1.8%). Other symptoms, though less frequent, included fever, diarrhea, fatigue, and headaches.

Among the reported laboratory parameters, 85% of patients showed normal liver enzymes. A significant portion (72.5%) had an HIV viral load less than 50 copies per milliliter, surprisingly only 20 percent achieved a normal CD4 count (500-1500 cells per milliliter). Additionally, more than two-thirds of patients (71%) suffered from anemia.

Symptomatology differences were also observed between genders: men appeared to experience more cough and weight loss, while nausea was more common among females. However, this difference was not statistically significant. Upon further analysis, men showed significantly higher alanine aminotransferase (ALT) levels than females (P-value: 0.0004). Females, conversely, had statistically higher CD4 counts (P-value < 0.0001), although the difference in HIV viral loads between males and females was not statistically significant.

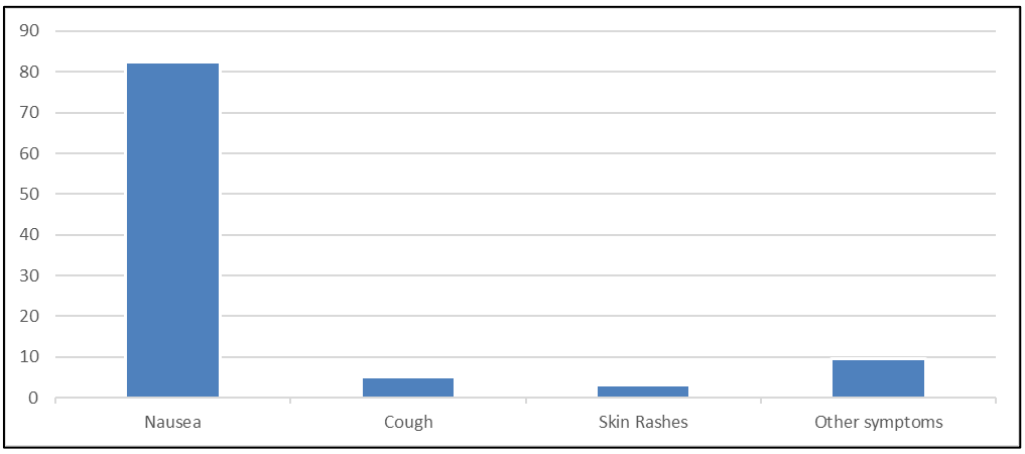

Figure 1 Bar chart showing frequency of different symptoms among participants

Table 2 Frequency of different symptoms among study participants

Symptoms	Frequency (%)
Nausea	6047
cough	381
Skin rashes	222
Fever	177
Weight loss	138
Fatigue	48
Diarrhea	52
Abdominal pains	47
Headache	63
Others	168
Total	7343

4. Discussion

This study revealed an average age of 40 years among clients attending the CTC, predominantly middle-aged individuals. This demographic profile aligns with findings from other HIV clinics in Sub-Saharan Africa, where HIV disproportionately affects adults in their productive years [8]. A significant female predominance was observed, a trend consistent with the socio-demographic profile of most HIV clinics in the region [9]. This gender disparity can be attributed to several factors, including differences in health-seeking behaviors, increased opportunities for women to attend health facilities due to reproductive health services, and general population demographics [10, 11]. Furthermore, a range of biological, socio-cultural, and economic factors—including gender power imbalances and harmful cultural practices—have been identified as key contributors to the higher prevalence of HIV among women [12, 13]. Future research should focus on addressing these disparities to reduce the gender gap in HIV infection rates.

Nausea was the most prevalent symptom reported in our study (89.3%), a remarkably high proportion compared to other published literature. This symptom can indicate gastrointestinal opportunistic infections or side effects of antiretroviral medications (ART) [14]. Other studies have reported nausea prevalence ranging from 10% to 25%, depending on the ART regimens utilized [15, 16]. The exceptionally high prevalence of nausea in our cohort may partly be explained by high prevalence of depression and anxiety disorders which is common among PLWH and have been reported to exacerbate nausea [17, 18]. On the other hand, potential recall bias from our study methodology may also have influenced high magnitude of nausea. Nevertheless, this symptom calls for further studies to investigate the underlying causes which would significantly aid in management.

Addressing nausea is crucial, as its presence, despite being commonly perceived as non-serious, can significantly affect adherence to HIV medications, consequently impacting patient progression in HIV care [19, 20]. Interestingly, some studies across sub-Saharan Africa (SSA) have reported similar trends, where analysis of symptom clusters showed nausea to be a predictor of adherence to medications [21]. Furthermore, weight loss—especially in the form of HIV wasting syndrome, a well-known complication of advanced HIV infection—may also be associated with persistent nausea [22]. Therefore, effectively managing nausea could have a positive impact on both treatment adherence and the prevention of HIV-related complications.

Our study noted a trend where men experienced more cough and weight loss and women reported more nausea; these specific gender-based symptomatic differences were not statistically significant within our cohort. Nevertheless, the existing literature provides substantial evidence for sex-specific variations in HIV symptom clusters, attributing these differences to complex biological and socio-behavioral reasons [23, 24]. Biological factors like hormonal influences, genetic predispositions, and differences in immune activation are known to affect the progression and differences in symptom presentation across sexes [23, 25]. Furthermore, socio-cultural factors, including health-seeking behaviors and access to care, can also play an indirect role in the reported prevalence of certain symptoms [26, 27].

Another notable finding was that the majority of patients had low CD4 counts (80%) despite having suppressed HIV viral loads (72.5%). This disparity can be attributed to several factors including the presence of other causes of immunodeficiency in addition to HIV, such as poor nutrition, low baseline CD4 count, and thymus dysfunction [28, 29]. Furthermore, HIV viral load generally responds earlier than CD4 counts during patient follow-up, meaning viral suppression can be achieved while immune reconstitution, as indicated by CD4 count, takes longer [30]. The high prevalence of anemia (71%) also points to a significant comorbidity burden that could contribute to overall patient health and immune status.

Consistent with our findings that females had statistically higher CD4 counts than males, higher CD4 responses to HIV treatment among females have been widely reported in several studies, as women generally exhibit a more robust immune response to HIV infection and antiretroviral therapy (ART) [31, 32]. This phenomenon is attributed to a complex interplay of biological factors, including inherent genetic differences in CD4 counts between sexes that persist even in HIV-uninfected individuals, as well as the immunomodulatory effects of sex hormones like estrogens [33, 34, 35]. Studies from various settings, including sub-Saharan Africa, have consistently shown that females achieve better long-term immune reconstitution and higher mean CD4 counts post-ART initiation compared to males [31, 36].

Elevated liver transaminases levels (particularly ALT) were observed in a subset of our study participants, with men having significantly higher ALT levels than females. This finding is consistent with other large cohort studies such as the Women's Interagency HIV Study (WIHS), Multicenter AIDS Cohort Study (MACS), and Data Collection on Adverse Events of Anti-HIV Drugs (DAD) study, which reported rates of 15-30% [37, 38]. These elevations are likely contributed by presence of fatty liver disease, co-infections with hepatitis B, the use of certain older ART drugs (e.g., nevirapine) [39, 40]. Our findings align with these previously reported trends.

5. Conclusion

This study provides valuable insights into the clinical and demographic characteristics of clients attending a Care and Treatment facility in sub-Saharan Africa. The observed female predominance and the exceptionally high prevalence of nausea underscore the need for gender-sensitive health interventions and comprehensive symptom management strategies. The disparity between suppressed viral loads and low CD4 counts highlights the complexity of immune recovery and the need for holistic care for PLWH. The high prevalence of anemia and elevated transaminases further points to significant comorbidity burdens. Further research is warranted to address the identified gender disparity, rigorously investigate the etiology of nausea in this context, and explore the multifaceted factors contributing to immune reconstitution, anemia, and liver enzyme elevations in this population.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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