

Initial clinical and laboratory findings of patients diagnosed with HIV in a hematology outpatient clinic: a retrospective analysis

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ABSTRACT

Aims: To assess the clinical and laboratory characteristics at the time of HIV diagnosis in patients first identified in a hematology outpatient clinic.

Methods: This single-center retrospective study included 23 patients diagnosed with HIV in the hematology outpatient clinic of a tertiary center between January 2023 and July 2025. Demographic characteristics, presenting symptoms, opportunistic infections, and initial laboratory parameters-including CD4 counts and HIV RNA levels-were recorded. Late presentation was defined a priori as CD4<350 cells/ μ L or an AIDS defining condition at diagnosis; advanced HIV disease as CD4<200 cells/ μ L. "High viral burden" was defined as HIV RNA>100,000 copies/ml.

Results: The median age was 51 years (range: 22-69), and 87% were male. The most common presenting findings were lymphadenopathy (56.5%;13/23) and weight loss (47.8%;11/23). Among 23 patients, 10 (43.5%) had cytopenias at diagnosis. Specifically, anemia was observed in 3 patients (13.0%), leukopenia in 6 patients (26.0%), and thrombocytopenia in 6 patients (26.0%). Pancytopenia was present in 2 patients (8.7%). Splenomegaly was observed in 8 patients (34.7%). Opportunistic infections at diagnosis included oral candidiasis (n=1), CMV pneumonia confirmed by bronchoalveolar lavage (BAL) PCR (polymerase chain reaction) (n=1), CMV encephalitis confirmed by CSF (cerebrospinal fluid) PCR (n=1), and disseminated herpes zoster (n=1). Two patients were diagnosed with syphilis (co-infection) at presentation. Two patients had concurrent hematologic malignancies (one aggressive B-cell lymphoma, diffuse large B-cell lymphoma, and one acute myeloid leukemia) at the time of HIV detection. The median CD4 count was 214 cells/ μ L (range: 35-901; IQR: 124-356), and 22/23 (95.6%) had HIV RNA>100,000 copies/ml. Mean hemoglobin was 12.36 g/dl ($\pm$ 2.91); mean WBC $6.02 \times 10^3/\mu$ L ($\pm$ 3.55); mean platelet count $183.87 \times 10^3/\mu$ L ($\pm$ 91.28). Overall, 17 patients (73.9%) were late presenters, and 11 (47.8%) had advanced HIV disease.

Conclusion: Most patients diagnosed with HIV in hematology clinics present with cytopenias and generalized lymphadenopathy, often at advanced stages. Given the small, single-center retrospective design, these descriptive findings should be interpreted cautiously; nonetheless, raising awareness among hematologists to routinely consider HIV testing in patients with unexplained cytopenias and lymphadenopathy may facilitate earlier diagnosis and improve clinical outcomes.

Keywords: HIV infection, hematology outpatient clinic, cytopenia, lymphoma, acute myeloid leukemia

INTRODUCTION

HIV infection remains a significant global health issue despite advances in diagnosis and treatment.¹ HIV primarily disrupts adaptive immunity via dysfunction and depletion of CD4+T cells, with hematologic abnormalities (e.g., neutropenia) frequently observed.² This progressive immune deterioration increases susceptibility to opportunistic infections and malignancies and may ultimately lead to the development of acquired immunodeficiency syndrome (AIDS).³

Early HIV infection may present with nonspecific systemic symptoms such as fever, malaise, anorexia, lymphadenopathy, and mucocutaneous eruptions.⁴ In practice, diagnostic

opportunities may be missed in non-infectious disease clinics (including hematology), particularly among patients with unexplained cytopenias or lymphadenopathy.⁴⁻⁶ Data specifically characterizing initial HIV presentations identified within hematology clinics, especially in our region, are limited, representing a knowledge gap that this study aims to address.

We aimed to describe the initial clinical presentations and baseline laboratory findings, including immunologic and virologic status, of patients newly diagnosed with HIV in a hematology outpatient clinic.

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METHODS

Study design, setting, and period: We conducted a retrospective, observational (chart review) study at the hematology outpatient clinic of a tertiary care center between January 1, 2023, and July 31, 2025. This study has been approved by the Clinical Researches Ethics Committee of Etlik City Hospital. (Date: 27.09.2025, Decision No: AEŞH-BADEK1-2025-425). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. Informed consent was waived due to the retrospective design and use of de-identified data.

Participants (eligibility and selection): We included all patients who were newly diagnosed with HIV infection during the evaluation for unexplained cytopenia in the hematology outpatient clinic and whose diagnosis was subsequently confirmed and registered by the Department of Infectious Diseases. HIV testing in the hematology outpatient clinic was primarily requested for patients presenting with unexplained cytopenias (isolated or multilineage), generalized lymphadenopathy, splenomegaly, or systemic symptoms such as weight loss or fever. We excluded patients with a prior HIV diagnosis or with missing essential baseline data.

Variables and definitions: We extracted demographic variables; presenting symptoms/signs (e.g., fever, weight loss, generalized lymphadenopathy, splenomegaly); opportunistic infections (OIs) at diagnosis; co-infections; and baseline laboratory data (hemoglobin, WBC, platelet count, LDH, ferritin, CRP, CD4 count, HIV RNA level).

Operational definitions (pre-specified)⁷:

- Late presenter: CD4 <350 cells/ μ L or any AIDS defining condition at diagnosis.
- Advanced HIV disease: CD4<200 cells/ μ L.
- High viral burden: HIV RNA>100,000 copies/ml.
- Cytopenia: was defined as the presence of ≥ 1 cytopenic lineage (anemia, leukopenia, and/or thrombocytopenia). Cut-off values were: hemoglobin <13 g/dl in men and <12 g/dl in women, leukocyte count <4.0 $\times 10^3$ / μ L, and platelet count <150 $\times 10^3$ / μ L.

Data Sources and Measurement

Data were extracted from the electronic medical records by one reviewer (Dr. SS) and independently cross-checked by a second reviewer (Dr. BAK). All laboratory analyses were conducted in the hospital's accredited laboratory using standardized methods. All data were independently reviewed by two investigators (Dr. SS and Dr. BAK). Any discrepancies were resolved through discussion and consensus between the reviewers. Diagnostic criteria for OIs were as follows: CMV pneumonia and CMV encephalitis were diagnosed based on compatible clinical and radiologic findings in combination with PCR confirmation in BAL and cerebrospinal fluid samples, respectively. Disseminated herpes zoster was diagnosed clinically in patients with vesicular lesions involving multiple dermatomes or diffuse distribution, supported by characteristic clinical evolution and antiviral treatment response.

HIV infection was confirmed at the national reference laboratory. CD4 T-cell counts were determined by flow cytometry, and HIV viral loads were quantified using PCR.

Bias: Given the setting, selection bias is likely (hematology clinics preferentially see patients with hematologic abnormalities), potentially over-representing advanced disease. Information bias is possible due to variability in documentation inherent to retrospective studies. We mitigated bias by including consecutive cases and excluding only those with missing essential baseline data; nonetheless, residual bias may remain.

Study size: No a priori sample size calculation was performed; all eligible cases within the timeframe were included (convenience sample, n=23).

Statistical Analysis

We used descriptive statistics. Continuous variables with skewed distributions (e.g., CD4 count) are presented as median (interquartile range [IQR]); approximately normally distributed variables (e.g., hemoglobin) are presented as mean $\pm$ SD. For transparency, we report numerators/denominators for all proportions and, where informative, 95% CIs for key proportions to convey precision in this small sample. Specifically, 95% confidence intervals (CIs) were calculated for key clinical proportions, including the frequency of cytopenias, lymphadenopathy, and splenomegaly according to CD4 category (<200 vs. ≥ 200 cells/ μ L), as shown in [Table 1](#). We did not perform hypothesis testing or adjusted analyses, as the study goal was descriptive. Analyses were conducted using IBM SPSS Statistics (version 28.0;2022).

Table 1. Comparison of clinical and hematologic features according to immune status (CD4<200 vs ≥ 200 cells/ μ L)

Clinical/hematologic feature	CD4<200 (n=11)	CD4 ≥ 200 (n=12)
Generalized lymphadenopathy, n (%)	6 (54.5%)	9 (75.0%)
Cytopenia (≥ 1 lineage), n (%)	11 (100.0%)	6 (50.0%)
Anemia	2 (18.2%)	1 (8.3%)
Leukopenia	7 (63.6%)	3 (25.0%)
Thrombocytopenia	6 (54.5%)	2 (16.7%)
Pancytopenia	2 (18.2%)	0 (0%)
Weight loss, n (%)	8 (72.7%)	9 (75.0%)
Splenomegaly, n (%)	1 (9.1%)	6 (50.0%)
Fever, n (%)	5 (45.5%)	5 (41.7%)
Night sweats, n (%)	3 (27.3%)	3 (25.0%)

Values are expressed as numbers and percentages of patients within each CD4 group. Percentages may not total 100% due to rounding.

RESULTS

Demographics and presenting features: Most patients underwent HIV testing due to unexplained cytopenias and/or generalized lymphadenopathy, often accompanied by systemic symptoms including weight loss, fever, or night sweats. Median age was 51 years (range 22-69);20/23 (87.0%) were male. The most frequent presenting findings were generalized lymphadenopathy (13/23;56.5%) and weight loss (11/23;47.8%). Splenomegaly occurred in 8/23 (34.7%). Among 23 patients, 10 (43.5%) had cytopenias at diagnosis. Specifically, anemia was observed in 3 patients (13.0%),

leukopenia in 6 patients (26.0%), and thrombocytopenia in 6 patients (26.0%). Pancytopenia was present in 2 patients (8.7%) (Table 2).

Table 2. Baseline demographic, clinical, and laboratory characteristics of patients diagnosed with HIV in a hematology outpatient clinic (n=23)

Characteristic	value
Demographics	
Age, years-median (range)	51 (22-69)
Male sex-n (%)	20 (87.0)
Female sex-n (%)	3 (13.0)
Presenting clinical features	
Generalized lymphadenopathy - n (%)	13 (56.5)
Cytopenia ($\geq$ one lineage)-n (%)	10 (43.5)
Anemia-n (%)	3 (13.0)
Leukopenia-n (%)	6 (26.0)
Thrombocytopenia-n (%)	6 (26.0)
Pancytopenia-n (%)	2 (8.7)
Weight loss	11 (47.8)
Splenomegaly-n (%)	8 (34.7)
Fever	5 (21.7)
Night sweats	4(17.4)
Opportunistic infections and co-infections	
Any opportunistic infection-n (%)	4 (17.4)
Oral candidiasis-n (%)	1 (4.3)
CMV pneumonia-n (%)	1 (4.3)
CMV encephalitis-n (%)	1 (4.3)
Disseminated herpes zoster-n (%)	1 (4.3)
Co-infection: syphilis-n (%)	2 (8.7)
Concurrent hematologic malignancies	
Any malignancy-n (%)	2 (8.7)
Diffuse large B-cell lymphoma-n (%)	1 (4.3)
Acute myeloid leukemia-n (%)	1 (4.3)
Laboratory findings	
CD4 count, median (interquartile range [IQR])	214 (35-901; IQR: 124-356)
Late presenters (CD4<350 or AIDS condition)-n (%)	17 (73.9)
Advanced HIV disease (CD4<200) -n (%)	11 (47.8)
HIV RNA>100,000-n (%)	22 (95.6)
Hemoglobin, mean $\pm$ SD	12.36 $\pm$ 2.91
WBC, mean $\pm$ SD	6.02 $\pm$ 3.55
Platelets, mean $\pm$ SD	183.87 $\pm$ 91.28
LDH, median (IQR)	232 (IQR 214–306.5)
Ferritin, median (IQR)	266 (IQR 180–446)
CRP, median (IQR)	12 (IQR 4.07-22.5)

WBC: White blood cell count, PLT: Platelet count, CRP: C-reactive protein, LDH: Lactate dehydrogenase. Units: WBC ($\times 10^3/\mu\text{L}$), PLT ($\times 10^3/\mu\text{L}$), CRP (mg/L), LDH (U/L), ferritin (ng/ml), HIV RNA (copies/ml), CD4 (cells/ μL).

OIs and co-infections: OIs at diagnosis occurred in 4/23 (17.4%): oral candidiasis (n=1), CMV pneumonia (BAL PCR confirmed, n=1), CMV encephalitis (CSF PCR confirmed, n=1), and disseminated herpes zoster (n=1). Two patients (8.7%) had syphilis co-infection at presentation.

Hematology and immunovirology: Median CD4 was 214 cells/ μL (range: 35-901; IQR: 124-356). Mean hemoglobin was 12.36 g/dl (± 2.91); mean WBC $6.02 \times 10^3/\mu\text{L}$ (± 3.55); mean platelet count $183.87 \times 10^3/\mu\text{L}$ (± 91.28). At baseline, median ferritin was 266 ng/ml (IQR 180-446), median LDH was 232 U/L (IQR 214-306.5), and median CRP was 12 mg/L (IQR 4.07-22.5). High viral burden (HIV RNA>100,000 copies/ml)

was present in 22/23 (95.6%). Inflammatory markers stratified by CD4 categories are summarized in Table 3. Patients with CD4<200 cells/ μL exhibited higher median CRP and ferritin levels compared with those with higher CD4 counts.

Table 3. Inflammatory markers stratified by cd4 categories

Parameter	CD4<200	CD4 200-349	CD4 $\geq$ 350
CRP (mg/L)	15.60 (6.72-35.85)	4.98 (2.20-8.70)	8.80 (2.65-16.98)
Ferritin (ng/ml)	321.0 (232.5-470.0)	273.0 (118.9-597.5)	252.0 (162.5-329.0)
LDH (U/L)	237.0 (220.0-299.5)	216.5 (210.0-236.8)	257.5 (221.3-312.5)

Values are presented as median (interquartile range, IQR). CRP: C-Reactive protein, LDH: Lactate dehydrogenase

As shown in Table 1, cytopenias were present in all patients with CD4<200 cells/ μL , whereas lymphadenopathy, splenomegaly, and constitutional symptoms were more frequent among those with CD4 $\geq$ 200 cells/ μL .

Disease stage at diagnosis:

Late presenters: 17/23 (73.9%).

Advanced HIV disease: 11/23 (47.8%).

Concurrent hematologic malignancies: Two patients (8.7%) had concurrent hematologic malignancies at HIV diagnosis: one diffuse large B-cell lymphoma and one acute myeloid leukemia (AML).

DISCUSSION

In this single-center series of 23 patients diagnosed with HIV in a hematology outpatient clinic, most presented with hematologic and systemic features suggestive of advanced infection, including generalized lymphadenopathy and cytopenia. Nearly three-quarters were late presenters (CD4<350 cells/ μL), and nearly half had advanced HIV disease (CD4<200 cells/ μL), underscoring diagnostic delay in this subset, in line with national data reporting high rates of late diagnosis.⁸ A high proportion exhibited very high baseline viremia (>100,000 copies/ml). OIs (CMV disease, disseminated zoster, oral candidiasis) at diagnosis further reflected severe immunosuppression.⁹ The OIs we observed are classic complications of advanced immunosuppression and portend poorer outcomes if diagnosis and ART (antiretroviral therapy) initiation are delayed. Additionally, syphilis was detected in two patients at diagnosis, reinforcing the importance of comprehensive screening for sexually transmitted and OIs in this population.

Cytopenias in HIV arise from multifactorial mechanisms (direct viral effects on hematopoiesis, immune dysregulation, OIs, and malignancies) and can occur across the disease course, often worsening with progression. Disruption of hematopoietic stem and progenitor cells further contributes to pancytopenia in advanced HIV.^{6,10} The observed spectrum in this cohort fits known pathophysiology.

The detection of aggressive B-cell lymphoma and AML at HIV diagnosis highlights the bidirectional link between HIV and hematologic malignancies and supports routine HIV testing in hematology practice when unexplained cytopenias,

lymphadenopathy, or splenomegaly are encountered. It is also important to note that in these two cases with concurrent hematologic malignancies-diffuse large B-cell lymphoma and acute myeloid leukemia-the observed lymphadenopathy and cytopenias were likely multifactorial. While HIV infection can contribute to bone marrow suppression and reactive lymphadenopathy, the malignant process itself may have been the primary driver of these hematologic abnormalities. Therefore, attributing these findings solely to HIV would be an oversimplification; both mechanisms likely played a role at the time of diagnosis.

The malignancies identified, particularly diffuse large B-cell lymphoma (DLBCL), represent the most frequent HIV-associated hematologic cancers,^{11,12} with their increased incidence attributable to profound immunosuppression and persistent viremia that drive distinct morphological variants and molecular subtypes.¹³ In our cohort, the coexistence of hematologic malignancies such as DLBCL and AML in HIV-positive individuals highlights the profound immune dysregulation associated with chronic infection. Similar cases of HIV-related lymphomas, including those with central nervous system involvement, have also been documented.¹⁴ Although uncommon, the coexistence of HIV and AML presents unique clinical challenges, driven by indirect leukemogenic mechanisms within a permissive marrow microenvironment.^{15,16} Importantly, institutional series have recommended routine HIV testing during the work up of newly diagnosed AML (HIV positivity ~0.7% at diagnosis).¹⁵

Limitations

Strengths include a clearly defined cohort, standardized baseline characterization, and focus on an under-reported diagnostic setting (hematology). Limitations include the small sample size, single-center design, and retrospective data collection. Selection bias is inherent (a hematology clinic cohort likely over represents patients with hematologic manifestations and advanced disease). Information bias may arise from variable documentation. We did not include a comparison group (e.g., HIV negative hematology patients or HIV diagnoses made in other clinics), limiting inferences about specificity or relative risk. Precision is limited due to the small sample size. These factors constrain generalizability to broader settings beyond similar tertiary hematology clinics.

Pragmatically, hematologists should maintain a low threshold for HIV testing when encountering unexplained cytopenias, generalized lymphadenopathy, or splenomegaly. Future multicenter studies should quantify the diagnostic yield of routine HIV testing in hematology populations, assess outcomes post diagnosis, and compare patients diagnosed in hematology vs. other settings to determine whether earlier testing reduces opportunistic events and malignancy at presentation.

CONCLUSION

Early recognition of HIV infection in hematology outpatient clinics remains challenging; in this cohort, most patients presented late and/or with advanced disease. Routine HIV screening should be an integral part of the diagnostic work-

up for patients with unexplained cytopenias, generalized lymphadenopathy, or splenomegaly. Implementing such systematic screening in hematology practice is expected to facilitate timely ART initiation, reduce OIs and HIV-associated hematologic malignancies, and ultimately improve patient outcomes.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study has been approved by the Clinical Researches Ethics Committee of Etlik City Hospital. (Date: 27.09.2025, Decision No: AEŞH-BADEK1-2025-425).

Informed Consent

As this was a retrospective study, formal written informed consent was not required and was therefore not obtained.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

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Author Contributions

Study conception, data collection, drafting of manuscript: S.S., B.A.K., S.K.; Statistical analysis, results interpretation, critical revisions: S.S., B.A.K., S.K., G.Y.T., G.Ç.Ş., K.A.; Literature review, drafting discussion, final approval: S.S., B.A.K., G.Ç.Ş., A.K.G., K.A., S.K., G.Y.T.; All authors read and approved the final manuscript.

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