



Prevalence and predictors of thrombocytopenia among HAART naive HIV positive patients at Ambo University Referral Hospital

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ABSTRACT

Background: Deranged hematological parameters, including thrombocytopenia, are features of human immunodeficiency virus (HIV) infection. Thrombocytopenia is the second most frequent complication of HIV infection. Thus, this study aimed to determine the prevalence and correlates of thrombocytopenia among HAART naive people living with HIV at Ambo University referral hospital.

Methods: Hospital-based retrospective cross-sectional study was conducted at Ambo university referral hospital from June 2021 to September 2021. The data were gathered retrospectively from the patients' medical cards. The collected data was processed and analyzed using SPSS version 24 and presented as a table and figure, then interpreted based on the findings. Logistic regression was drawn with a p-value of less than 0.05 accepted as statistically significant.

Results: Most of the study participants were females 68(60.7%). The mean \pm SD age of the patients was 36.46 ± 9.6 years, ranging from 19 to 67 years. The overall prevalence of thrombocytopenia was 13(11.6%). In terms of CD4 count, study participants with a CD4 count less than 350 were nearly 14 times more likely to have thrombocytopenia than those with a CD4 count greater than 500 (AOR = 13.76, 95% CI (1.368–138.49)). Participants in the study who were treated with AZT containing HAART were 9 times more likely to develop thrombocytopenia than their counterparts (AOR = 9.49, 95% CI (1.732–5202)).

Conclusion: A decreased CD4 number and the presence of other medical co-morbidity showed to have increased risks towards the presence of thrombocytopenia. Therefore, to decrease thrombocytopenic-related mortality and morbidity, there should be continuous screening for HIV-infected patients.

1. Introduction

Human immunodeficiency virus (HIV) is a retrovirus that infects immune system cells and destroys or impairs their function, resulting in opportunistic infections and tumors.^{1–3} Thrombocytopenia affects approximately 40% of HIV-infected people, and it may be the first sign of AIDS in an estimated 10% of patients.³ This hematological disorder may be the first sign of HIV infection, and it may worsen over time, resulting in severe bleeding.⁴

Its pathogenesis is unknown; however, potential explanations that were reported include increased platelet destruction caused by non-specific deposition of circulating immune complex on platelets or by the presence of specific antiplatelet antibodies. Furthermore, direct infection of megakaryocytes by HIV results in ineffective platelet production.⁵

Numerous studies revealed that the prevalence of thrombocytopenia was higher in ART-naive patients when compared to patients who were on ART.⁶ In a previous study conducted in Uganda displayed that the prevalence of thrombocytopenia was 13.0% in patients on ART and 17.8% in ART-naive patients.⁶ A similar study conducted in Ethiopia revealed that the prevalence of thrombocytopenia was 25% in ART naive patients.⁷ The highest prevalence of thrombocytopenia was linked with advanced stages of HIV/AIDS, patients on zidovudine (AZT) based therapy,^{6,7} and low CD4 counts.^{6,8} However, the prevalence of thrombocytopenia did not vary by ethnicity, sex, and age.⁸

Thrombocytopenia is linked to an increased risk of morbidity and mortality, as well as a fast decline in CD4 counts and a faster development of AIDS.⁵ Because there's no such information for HIV-infected people in Ethiopia about the implications of thrombocytopenia in HIV patients, which could help to inform respective bodies for HIV-infected

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people's treatment in this regard. Finally, and most importantly, because there is limited data on this topic in the area, it could be used as an initial point or reference for those who are interested in conducting similar studies on this topic. The findings of the study could also be used to uncover hospital practices and improve service. As a result, the study sought to determine the prevalence of thrombocytopenia in HIV-infected HAART naive patients as well as the predictors of thrombocytopenia in these patients.

2. Methods

2.1. Study design, period, and setting

Hospital-based retrospective cross-sectional study was conducted at Ambo University Referral Hospital (AURH) in Ambo, Oromia regional state, from June 2021 to September 2021. Ambo is a town with a population of 76,774 people located 114 km from Addis Ababa, the capital city of Ethiopia. AURH has several wards and departments, including a medical ward, a surgical ward, obstetrics and gynecology ward, a pediatric ward, a medical emergency room, and an outpatient department that includes an ART clinic.

2.2. Source and study population

The primary source population for this study was all patients who had a regular follow-up at AURH's adult ART clinic. On the other hand, during the study period, all HIV-positive patients who met the inclusion criteria were considered the study population.

2.3. Eligibility criteria and sample size determination

This study included all adult patients with a confirmed HIV/AIDS diagnosis who received HAART for at least one year and had a regular follow-up at AURH. Patients receiving other medications or having a comorbid disease that could contribute to the occurrence of thrombocytopenia, patients undergoing blood transfusion within 3 months before data collection, as well as patients with incomplete medical records, were excluded from the study. This study included all patients who met the eligibility criteria. During the study period, 152 patients' medical cards were identified, of which 112 fulfilled the inclusion criteria and were included in the study.

2.4. Study variables

Dependent variables: Thrombocytopenia after HARRT initiation.

Independent variables: Age, sex, CD4 count, Opportunistic infection, Co-morbid condition.

2.5. Data collection instrument and procedures

The data were gathered retrospectively from the patients' medical cards. The data collection instrument was developed after a thorough review of other similar articles.^{9–11} The data collection tool includes the study participants' socio-demographic and clinical characteristics, pertinent laboratory findings, medication profiles, and comorbid disease. One BSc nurse and one B. Pharm pharmacist collected the data, and they were given a two-day training to ensure consistency in their understanding and interpretation of the study instrument, uniform implementation of the screening processes of patient's medical records, and other ethical aspects. A pre-test on 5% of the sample was carried out to assess the functionality of the data extraction format.

2.6. Data analysis

Once all necessary data are obtained, the data were checked for completeness, sorted, and categorized accordingly. The data was

entered into SPSS version 24 for analysis. The descriptive statistics were summarized by using mean, percentage, SD, tables, and ranges. Binary logistic regression was undertaken to predict determinants of the presence of thrombocytopenia among native HIV-positive patients who were on HAART, a p-value of ≤ 0.05 was considered to have a statically significant association.

3. Results

3.1. Socio-demographic characteristics

The medical records of 112 HIV-positive patients on HAART were examined. The majority of the participants in the study, 68 (60.7%), were females. The mean \pm SD age of the patients was 36.46 ± 9.6 ranging from 19 to 67 years. The vast majority of study participants (79.5%) were rural residents (Table 1).

3.2. The prevalence of thrombocytopenia

The overall prevalence of thrombocytopenia among the study participant was 13(11.6%). Platelet levels of the study participants were between 52×10^3 cells/ μ l and 413×10^3 cells/ μ l with the mean of $264 \times 103 \pm 88.561$ cells/ μ l. Regarding the CD 4 count of the study participants, the mean \pm SD CD4 count was 334 ± 162.2 cells/ μ l (Fig. 1).

3.3. Predictive factors of thrombocytopenia

On multivariable logistic regression, CD4 count and HAART type (whether it contains Zidovudine (AZT) or not) were showed significant association with the dependent variable. However, age and gender failed to show significant association on multivariable analysis. In terms of CD4 count, study participants with a CD4 count less than 350 were nearly 14 times more likely to have thrombocytopenia than those with a CD4 count greater than 500 (AOR = 13.76, 95% CI (1.368–138.49)). Participants in the study who were treated with AZT containing HAART were 9 times more likely to develop thrombocytopenia than their counterparts (AOR = 9.49, 95% CI (1.732–5202) (Table 2).

4. Discussion

Hematological disorders are common among HIV/AIDS-infected patients.¹² Thrombocytopenia is a common hematological manifestation of HIV-infected patients,^{10,13} which is not affected by gender or age difference.⁸ Thrombocytopenia is the 2nd most common complication next to anemia and is found in 3–40% of patients with HIV/AIDS infection.¹⁴ The possible mechanism may include impaired

Table 1

Socio-demographic characteristics of HAART naive HIV positive patient at Ambo University referral Hospital, 2021.

Variable	Frequency	Percentage
Gender		
Male	44	39.3
Female	68	60.7
Age category		
>35	73	65.2
≤ 35	39	34.8
Marital status		
Single	25	22.4
Married	61	54.5
Divorced/widowed	26	23.1
Residency		
Urban	23	20.5
Rural	89	79.5
Religion		
Christian	99	88.4
Muslim	4	3.6
Wakefata	9	8.0

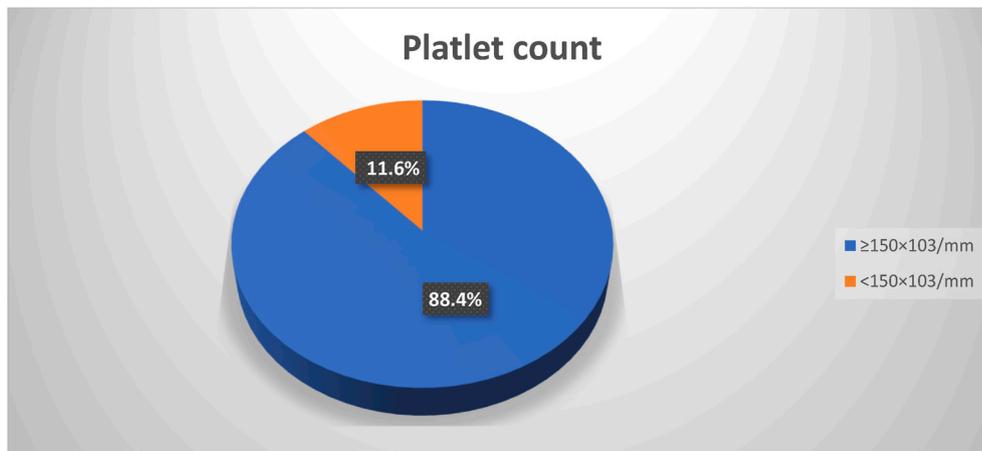


Fig. 1. The prevalence of thrombocytopenia of HAART naive HIV positive patient at Ambo University referral Hospital, 2021.

Table 2

Association of Thrombocytopenia with related factors among HAART naive HIV positive at Ambo University Referral Hospital, West Ethiopia, 2021.

Variables	Thrombocytopenia		OR (95% CI)		P-value
	No	Yes	COR	AOR	
Age					
>35	64(57.1%)	7(6.3%)	0.065(0.006–0.675)	0.23(0.13–4.124)	0.319
≤35	36(32.1%)	5(4.5%)	1	1	
Gender					
Male	38(86.4%)	6(13.6%)	0.727(0.227–2.326)	0.96(0.220–4.218)	0.960
Female	61(89.7%)	7(10.3%)	1	1	
CD 4					
<350	21(67.7%)	10(32.3%)	20.474(2.456–17.729)	13.76(1.368–138.49)	0.026*
350–500	35(94.8%)	2(5.4%)	2.457(0.214–28.24)	2.02(0.156–26.11)	0.591
>500	43(94.6%)	1(2.3%)	1	1	
Co-morbidity					
Yes	33(75%)	11(25%)	0.092(0.019–0.441)	4.251(0.519–9.261)	0.061
No	65(97%)	2(3%)	1	1	
Types of HAART					
AZT containing	17 (15.2)	5 (4.5)	6.15(3.678–7.207)	9.49(1.732–12.02)	0.010*
Not AZT containing	82 (73.2)	8 (7.1)	1	1	

*Variable showed statistically significant association towards thrombocytopenia.

megakaryocytes, hypersplenism, immune-mediated platelet destruction, malignancy, myelosuppression effect of medication, and opportunistic infections.^{15,16}

This study showed that thrombocytopenia was an important issue to consider in clinical practice. Increasing the intricacy of HIV infection, varied hematological manifestations can be seen, in which HIV-related thrombocytopenia is one of them.¹⁷ In the current study, the overall prevalence of thrombocytopenia among HIV-infected patients was 11.6%. This finding is lower than a study conducted in Rwanda 13.5%,⁴ Uganda 17.8%,⁶ and Nigeria 16.1%.¹⁸ However, higher than a study conducted in Uganda 8.3%,¹⁹ Ethiopia 5.9%,⁹ and in other similar studies conducted previously.^{20–23} This problem is truly a medical challenge in susceptible people, particularly by the absence of intervention protocol and the limited therapeutic options for HIV patients.²⁴

In this study, the majority of HAART-naïve HIV-positive patients were females. In the current study, the female prevalence confirms the WHO reports that HIV infection affects females most severely in sub-Saharan Africa, and a study conducted in Gondar university hospital also revealed that the majority of them were females.^{8,9} However, thrombocytopenia had not displayed a significant association with age and gender. This was in agreement with a previous similar study done by Majluf-Cruz,¹⁷ but a study conducted in Turkey revealed that the prevalence was higher in males than females.²⁵

In this study, as the immunity of a patient decreased, thrombocytopenia was more prevalent rather than HIV/AIDS positive individuals who have a comparatively high CD4 count. The odds of thrombocytopenia were 13.8 times more likely to occur in patients who had a CD4 lymphocyte count of ≤350 cells/μL than among patients with who had a

CD4 count >500 cells/μL. The increase in the prevalence of thrombocytopenia with decreased CD4 cell count was statistically significant ($P < 0.05$). This finding is consistent with previous similar studies done by Ananworanich J et al.,²⁶ and F Talargia and L Getacher.¹⁰ However, a study conducted in Gondar university hospital,⁹ and in Rwanda,⁴ showed that the increase in the prevalence of thrombocytopenia with decreased CD4 cell count was not statistically significant ($P > 0.05$).

Thrombocytopenia is a common comorbidity in HIV patients and HAART was significantly associated with reduced thrombocytopenia. Therefore, a prompt start of HAART might help to decrease the prevalence of thrombocytopenia and its subsequent complications.²⁷ The current study showed HIV Patient with co-morbidity has 9.5 more times likely to have thrombocytopenia. Similar to this study the study conducted in Turkey, the frequency of thrombocytopenia was significantly higher in HCV co-infected patients.²⁸

In the current study, patients who were treated with AZT containing HAART were 9 times more likely to develop thrombocytopenia than their counterparts. This finding is in agreement with a study done by F Talargia and L Getacher.⁹ The high prevalence of thrombocytopenia detected in zidovudine-based therapy may be because of the destruction of both mega karyotypes and platelets through an immune-mediated reaction which can occur in zidovudine-containing ART-regimen.²⁹

To the best of our knowledge, there is a lack of studies in Ethiopia to determine the prevalence of thrombocytopenia in HAART-naïve HIV/AIDS infected patients. However, this study had limitations such as its retrospective nature which introduces possible biases related to documentation, ascertainment, and chart review. However, this study aids as a reference for extra recommendations to improve the care of HIV/AIDS

infected persons. Moreover, the observed findings could be a good reflection of true circumstances and a step for further studies on the pathophysiology of HIV/AIDS-related thrombocytopenia.

5. Conclusion

A decreased CD4 number and AZT containing HAART showed to have increased risks towards the presence of thrombocytopenia. Therefore, to decrease thrombocytopenic-related mortality and morbidity, there should be continuous screening for HIV-infected patients. According to the current findings, it is suggested that health care professionals should give care for HIV-infected patients through routine investigation and management of thrombocytopenia.

Ethical consideration

The study was approved by the institutional review ethics committee of the college of health sciences, Ambo University. Only numerical identifiers were used as a reference, and the subject's privacy and confidentiality were protected by not recording the particulars of the identification, such as the patients' names and addresses.

Availability of data and materials

Most of the data is included in the manuscript. Additional can be found from the corresponding author based on reasonable request.

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Declaration of competing interest

The authors declare that they have no competing interests.

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
AURH	Ambo University Referral Hospital
HIV	Human Immunodeficiency Virus
TPN	Thrombocytopenia
HAART	Highly Active Antiretroviral Treatment

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