ISSN: 2754-6691

Journal of Internal Medicine Research & Reports

SCIENTIFIC Research and Community

Review Article

Open Access

Anaemia and Its Correlates in Haart Naïve Patients in Port Harcourt, Nigeria

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ABSTRACT

Introduction: Anemia is one of the complications of HIV infection, a multifactorial marker of bone marrow dysfunction, and an indicator of poor prognosis.

Methods: A retrospective assessment of electronic data and case notes of HAART naïve patients in our hospital between January 2016 and December 2018 was done. Data on age, sex, packed cell volume (PCV) and CD4 at diagnosis was collected. Continuous variables were compared with the students' t-test while categorical parameters were compared with the chi-square. Spearman's correlation was used to assess the association between anaemia and the CD 4 count. Risk factors for the outcome variable were determined with logistic regression and a p-value of ≤0.05 was considered statistically significant.

Results: The records of three hundred and twenty-one (321) new registrants in the Antiretroviral Therapy (ART) Clinic in Rivers State University Teaching Hospital (RSUTH) were evaluated. Their mean age was 40.43 ±10.51 years (range 19 – 76 years). Anemia was prevalent in 280(87.2%) patients. The CD4 count was normal in 102 (32.6%) patients. Female gender (p=0.001) and WHO clinical stage (p<0.001) were found to be the strongest predictors of anemia in this study.

Conclusion: The findings from this study shows that a significant proportion of people infected with HIV present with severe immunosuppression and low hemoglobin. There is a need to strengthen the pathways for early diagnosis, prompt treatment by trained physicians and supportive care by hematologists to reduce the severity and impact of anemia in this group of patients.

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Received: August 08, 2022; **Accepted:** August 12, 2022; **Published:** August 18, 2022

Keywords: Anemia, HIV, Treatment-naïve, HAART, CD4

Introduction

Anemia is the reduction of hemoglobin level below the lower limit of normal for age, sex and altitude of an individual. It is a clinical condition in which the oxygen-carrying capacity of the red blood cell is reduced, impairing its function. Anemia is a marker of the quality of life in many disease states, however; in HIV infection, anemia is a marker of progressive disease, renal dysfunction, poor survival, and a notable side effect of some of the first-line medications used in HIV treatment regimens in developing countries. Anemia if left untreated in HIV infection can lead to multisystem dysfunction, HIV-associated dementia and fatigue [1].

The anemia in HIV is of diverse causes, emerging evidence points to increased elaboration of pro-inflammatory cytokines such as those that drive the ageing process [2]. Many targets such as the pluripotent steem cells, cluster differentiation, cytokine dysregulation and stromal cell impairment cooperate in the occurrence of these hematopoietic defects [3]. The correction of anemia in HIV-infected patients is associated with improvement in the quality of life and physical function [4].

This retrospective study aimed to determine the prevalence of anemia and severity of immunosuppression in patients newly diagnosed with HIV infection who are Highly Active Antiretroviral Therapy (HAART) treatment naïve.

Methodology

Study Site: This was a retrospective study on HAART-naïve HIV seropositive patients presenting at the Retroviral Clinics of Rivers State University Teaching Hospital. The hospital is located in Port Harcourt, Rivers State, which is one of the high prevalence states for HIV infection going by the recent National HIV/AIDS Indicator and Impact Survey [NAIIS], with a prevalence of 3.8%, above the prevalence in the South-Sout region and the National average as well [5].

The records of all patients presenting to the Retroviral clinic of the hospital for the first time, during the study period (between January 2016 and December 2018) who were HAART-naïve were assessed.

Participants: Inclusion criteria were newly diagnosed HIV positive adults (18 years old and above) who were HAART naive, attending the medical outpatients' clinics. Those excluded from the study were: HAART experienced HIV patients, patients less than 18 years, pregnant women, HIV patients who had previously been treated in other facilities and those too ill to be seen as out-patients. The age, sex, date of diagnosis, initial packed cell volume and initial CD4 count was retrieved from their medical records and documented on the datasheet.

Laboratory Assessment: The hematological (packed cell volume) and immunological data (CD4 cell count) of participants were extracted from the ART electronic data and a logbook. The Packed cell volume of the participants was determined using automated blood analyzer Cell-Din 1800 (Abbott Laboratories Diagnostics Division while the counts of CD4 lymphocytes were assayed using the BD FACSCOUNT system (Becton Dickenson and Company, California, USA).

Anemia in this study was defined as a Packed cell volume of less than 39% in HAART naive HIV positive men and less than 36% in women according to the WHO. Severe anemia was defined as a PCV of less than 24% for both males and females [6].

The WHO Clinical Stages of HIV (2010) of the participants was documented [7].
The WHO immunological staging was documented as follows [8]:
No significant immunosuppression: CD4 count >500cells/mm^3
Mild immunosuppression: CD4 count between 350 −499cells/mm^3
Advanced immunosuppression: CD4 count between 200−349cells/mm^3
Severe immunosuppression: CD4 count <200cells/mm^3
The CD4 cell count was classified as High (>350cell/mm^3), low (200-350cells/mm^3) and very low (<200cells/mm^3) [8].

Ethical Considerations: Approval for the study was obtained from the Ethics and Research Committee, Rivers State University Teaching Hospitall. Data collection tools were coded to maintain the confidentiality of patients' identities. Information was password protected and accessible to the researchers only.

Statistical Analysis: The data retrieved was analysed using Statistical Package for Social Sciences (SPSS) version 23 analytical software. Data were expressed as mean ± standard deviation and percentages. Continuous variables were compared with the students' t-test while categorical parameters were compared with the chi-square. Spearman's correlation was used to assess the association between anemia and the CD 4 count. Risk factors for the outcome variable were determined with logistic regression and a p-value of ≤0.05 was considered statistically significant.

Results

The records of three hundred and twenty-one new registrants in the Retroviral Clinic of RSUTH were evaluated between January 2016 and December 2018. Their mean age was 40.43 ±10.51 years (range 19 – 76 years). Most of the subjects 225 (70%) fell between the ages of 28-47years. The females made up more than two-thirds 208 (64.8%) of the study participants. Most of the males, 50(44.2%) were in the 38-47 age group, while most of the females, 85 (40.9%) were in the 28-37 age group. (Figure 1)

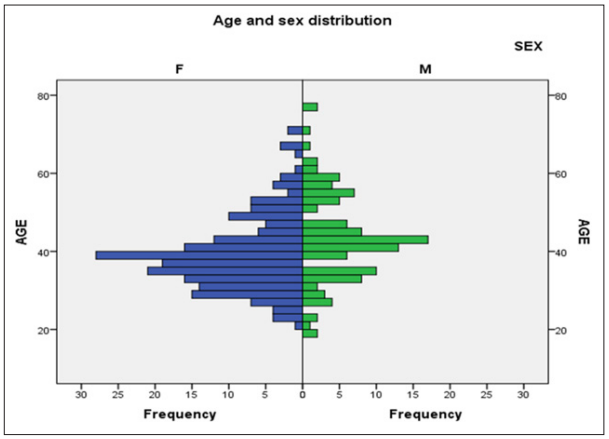

Figure 1: Age and Sex Distribution of The Study Population

Key: F=female, M=male
From the study, almost half of the participants presented in WHO clinical stage two of HIV infection, 151 (48.09%), while 123(39.17%) were in stage 3 at presentation, using the WHO staging. (Figure 2)

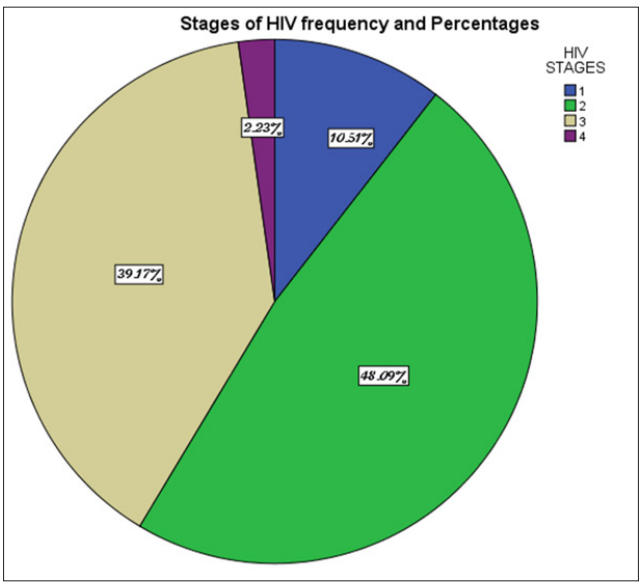

Figure 2: WHO HIV Clinical Staging of The Study Population

The median CD4 cell count was 245 cells/mm^3 (range 2 -1000 cells/mm^3), more than 67% of the participants had low or very low CD4 counts (28.4% and 39.0% respectively) which signifies mild to severe immunosuppression, while participants with high CD4 cell counts were 102 (32.6%) with no significant immunosuppression. (Table 1)

Table 1: CD 4 Cell Count Categories of The Study Population

CD4 Cell count	Frequency (n)	Percentage (%)
Very low (<200 cells/mm^3)	122	39.0
Low (200-350 cells/mm^3)	89	28.4
High (>350 cells/mm^3)	102	32.6
Total	313	100.0

Anaemia was prevalent in 280 (87.2%) of the patients, of this number, 23 (7.2%) had severe anaemia. More females, 197 (70.36%) had anaemia, compared to males 83(29.64%). There is an association between the presence of anaemia and sex (χ^2=28.706; p<0.001). The proportion of participants with anaemia increased with increasing WHO Clinical stage from 81.8% in stage 1 to 100% in stage 4 (χ^2=4.719, p=0.194). (Table 2). The spearman's correlate depicts a moderately positive association, 0.256 (p=0.023).

There is a gradual decrease in the proportion of participants with anaemia from 94.3% in the Very low CD4 category to 83.3% in participants in the high CD4 category (χ^2=8.285, p=0.016). (Table 3). The spearman's correlate depicts a weak positive association, 0.17 (p=0.002).

Table 2: Anaemia and WHO Clinical Staging of The Study Population

WHO Clinical Stage	Anemia n (%)	No anemia n (%)	Total
1	27(81.8)	6(18.2)	33
2	127(84.1)	24(15.9)	151
3	112(91.1)	11(8.9)	123
4	7(100)	0(0)	7

Table 3: Anaemia and CD4 Count Categories of The Study Population

CD 4 count category	Anemia n (%)	No anemia n (%)	Total
Very low <200 cells/mm^3	115(94.3)	7(5.7)	122
Low <350 cells/mm^3	74(83.1)	15(16.9)	89
High >350 cells/mm^3	85(83.3)	17(16.7)	102

WHO Clinical stage of participants was found to be the strongest determinant of the occurrence of anaemia among the study participants. The regression analysis (both crude and adjusted) showed that for every increase in the WHO stage of study participants, there was a 2.4 times likelihood of having anaemia; this likelihood was statistically significant (p<0.001). The sex of a study participant was also found to be a predictor of anaemia such that females were more (0.3 times) likely to have anaemia than males, and this likelihood was found to be significant (p=0.001). However, CD4 had almost no change (OR=0.999) in the likelihood of the participant being anaemic which is also significant (p=0.001) (Table 4)

Table 4: Logistic Regression Analysis for Predictors of Anaemia Among Study Participants

Variable	Crude O.R (95% C.I)	p-value	Adjusted O.R (95% C.I)	p-value
Age	0.980 (0.95-1.004)	0.100	0.987 (0.962– 1.013)	0.319
Gender	0.366 (0.207 – 0.646)	0.001	0.351 (0.191 – 0.642)	0.001
CD4 cell count	0.999(0.997 – 1.001)	0.001	0.999(0.998 – 1.001)	0.641
WHO Clinical Stage	2.398(1.612- 3.569)	<0.001	2.402(1.543 – 3.739)	<0.001

Discussion

This study aimed to determine the prevalence of anemia and the severity of immunosuppression as assessed by the Packed Cell Volume (PCV) and CD4 count respectively in HIV positive patients before initiation of HAART in our facility. Anemia was prevalent in 82.7% of the subjects in this study. Anemia is one of the commonest hematologic complications that can occur in HIV infection. The cause is multifactorial, and it can affect the outcome of care, it is an independent predictor of morbidity and mortality [9].

The prevalence of anemia in our study is higher than findings of 41.9 - 69.17% in HAART-naïve patients in other Nigerian cities, who have done studies with similar methodology; 41.9%, 46%, 51.9%, 42.9% and 58.4%. It was however lower than 84% documented by [10-19].

From our study, a significantly higher proportion of women than men were anemic at presentation, this is in congruence with another multicentre study [20]. It is presumed that the increased prevalence of anemia in females with HIV infection, compared to males is reflective of the generally higher prevalence of anemia in females, which may be associated with menstrual blood loss and the unmet increased demand for iron that occur with pregnancy, delivery and lactation [21].

Our observation that more than 80% of the patients in this study presented with Anemia at initiation of HAART, may be linked to the severity of immunosuppression at the time of presentation. More than 70% of our patients at presentation had low CD4 count - 137(43.5%) or very low CD4 count - 122 (38.7%). Their median CD4 was 245 cells/ul (range 2 -1000 cells/ul). These indices were lower than findings by and his colleagues [22]. It thus appears that our cohort presented with greater immunosuppression, hence more significant anemia. There is evidence that CD4 count of <200 cells/mm^3 is strongly associated with the occurrence of anemia and other coupaenvies [23,24]. also demonstrated that patients presenting with a CD4 cell count of >500 cells/mm^3 had a lower prevalence of anemia (5.26%) than those with CD4 counts of 200 cells/mm^3 and below (50-71.42% [22].

Anemia in HIV is associated with worsening disease and has been corroborated by our study as anemia was more prevalent in patients with low CD4 counts, females and those with advanced WHO stages. Even when HAART is used, anemia is strongly and consistently associated with disease progression [25]. Other conditions linked with anemia in HIV include the presence of renal disease, marrow infiltration by malignancies that are common in HIV, the use of older regimen containing Zidovudine as first-line therapy although these were not evaluated in our study [26]. When

anemia in HIV-infected patients is treated with no improvement, it may be due to the elaboration of pro-inflammatory cytokines that are also linked with anemia [26]. Anemia should promptly be prevented or treated in clients diagnosed with HIV-infection to prevent rapid progression of the disease [1].

Conclusion

The findings from this study shows that 82.7% of the HAART Naïve patients presenting to our center are anemic with only 32.6% not significantly immunosuppressed. More females had anemia and the overall proportion of patients with anemia increased with advancing WHO clinical stages. There is need to strengthen the pathways for early evaluation and diagnosis, prompt prevention and intervention to reduce the severity and impact of anemia in this group of patients.

Disclosure of Conflict of Interest

The authors declare no conflict of interest

Acknowledgements

None

Statement of Ethical Approval

Ethical approval was given by the Hospital's Health Research Ethics Committee. (RSUTH/REC/2022202)

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