

Original Research Article

Prevalence of Anemia among human immunodeficiency virus infected patients accessing healthcare in Federal Medical Center Keffi, Nigeria.

Abstract

Background.Anemia is an underestimated but important condition to reckon with among HIV infected people especially as it affects their morbidity and mortality. This study was therefore aimed at determining the prevalence, burden and risk factors associated with anemia in this group.

Methodology A cross sectional study was carried out among 300 consenting HIV positive adults between April – August 2014. A blood sample was obtained from each participant by venipuncture and the hemoglobin concentration was determined by an auto-analyzer. The World Health Organization definition and classification of anemia toxicity and severity were used to interpret the results.

Results An overall anemia prevalence of 64% was observed with 7.8% of them categorized as having severe anemia. The association of anemia with age, gender, CD4 counts, HAART and occupation was not statistically significant.

Conclusion The 64% prevalence of anemia reported in this study was high. There is a need for routine evaluation of HIV infected people for anemia.

Key words: HIV, anemia, adults, prevalence, severity, Nigeria

Introduction

Hematological complications occurring in the form of anemia, neutropenia, lymphopenia, and thrombocytopenia have been reported as the most common cause of morbidity in human immunodeficiency virus (HIV) infected patients [1]. Of these, anemia is the common hematologic abnormality that has been noted as a significant predictor of progression to AIDS or death [2,3,4,5,6]. Anemia simply refers to the hematological condition in which the hemoglobin of the blood is lower than normal for the person's age, gender and environment with a consequent reduction in the oxygen carrying capacity of

the blood [7]. However, this condition in HIV infected persons maybe caused by the same basic mechanisms that cause anemia in apparently healthy persons[8].

Although, the presence of advanced HIV has been reported to be associated with anemia [9,10] another study did not observe that association [6]. Similarly, anemia has been reported as independent of CD4 and viral load [11]. In HIV positive patients, the cause is multifactorial and includes the effect of opportunistic infections, nutritional deficiencies (e.g iron, folio acid and vitamin B12 deficiencies), certain medications (some antibiotics and antiviral agents) and some diseases of the bone marrow [4,12]. Anemia as a result of the side effects of antiretroviral agents like zidovudine on hematopoitic cells has been reported [4,13]. However, Kerkhoff and coworkers noted ART as strongly associated with the resolution of HIV-related anemia [14].

Apart from manifesting as a laboratory abnormality, anemia is known to affect some vital aspects of human health like energy, temperature regulation, behaviour and immune function in severe cases especially where there is loss of blood or heart failure, mortality could result [15]. Some authors have noted low hemoglobin and CD4 counts as strong predictors of mortality that could be used to determine individuals at risk of adverse outcomes associated with anemia [12]. However, among those infected with HIV it affects their quality of life especially as it can cause fatigue, and shortness of breath [16]. Interestingly, it is still not very certain whether the association between anemia and mortality in these patients is causal or the former acts as a surrogate marker of underlying disease [1,17].

Generally, there is no adequate attention given to treatment of anemia in developing countries [11] as the whole attention is on HIV infection, prevalence of opportunistic infections and complications. This is why despite the numerous studies on the prevalence of HIV infection in this study area there is no published information on the prevalence of anemia among this group. This study was therefore mooted to evaluate the prevalence and burden of anemia among HIV positive individuals accessing healthcare in a clinic in North Central Nigeria. This is with a view to improving their healthcare services.

Materials and Methods

The study participants were adult (≥ 18 years) HIV positive patients on HAART and HAART naïve. Pregnant women were excluded from the study.

The study design was cross-sectional. Three hundred consenting HIV positive patients attending a Sexually Transmitted Disease Clinic in Keffi were recruited for the study. Five milliliters of blood was collected from each patient by vein puncture and dispensed into a labeled ethylene di-amine tetra-acetic acid (EDTA) container. An automated blood auto-analyzer (Sysmex KX – 21 Sysmex Corporation, Kobe Japan) was used to determine the hemoglobin concentration.

For this study, anemia was defined according to the World Health organization (WHO) criteria [5]. For males, anemia was defined as hemoglobin (Hb) concentration less than 13g/dl while for female it is less than 12g/dl. Mild anemia was defined as a hemoglobin level of 8-13 g/dl and 8-12g/dl for men and women respectively. But severe anemia was defined as a Hb of less than 8 g/dl for both sexes.

The anemia patients were further categorised according to WHO/ACTG anemia toxicity grades [3].

Grade 1----- Hb of 9.5 – 10.5 g/dl

Grade 2----- Hb of 8 – 9.4 g/dl

Grade 3 ----- Hb of 7.9 – 6.5 g/dl

Grade 4 ----- Hb of < 6.5 g/dl

Ethical Approval

This was obtained from the Ethical Research Committee, Federal Medical Centre, Keffi.

Statistical analysis

Proportions and percentages were calculated for categorical variables. The Pearson Chi-square test was used for statistical comparison of groups and p-value ≤ 0.05 was considered as statistically significant.

Results

Of the three hundred participants 77(25.7%) were males and 223 (74.3%) were females. Most of them (65.0%) were married. Majority of the patients (64.0%) had CD4 counts $\geq$ 250 cells/ml (Table 1). The prevalence of anemia in this study was 64% (192/300) and it was found to be higher among females (67.1%) than males (53.2%). It was 72.8% among married patients and 52.4% among divorcees. The study reported a decrease in the prevalence of anemia with an increase in CD4 counts with the highest occurrence

(95.1%) among those with CD4 count <100 cells/ml ($p > 0.05$). With respect to occupation, anemia was most prevalent among students (75.2%) and least among civil servants (39%). The type of education the participants had did not affect the prevalence of anemia. It was 62.3% among those with non-formal education and 65.2% among those with a formal education (Table 1).

Based on WHO anemia grading, many of the participants with anemia (58.3%) did not fall into any category as they had Hb > 10.5g/dl. However, 23.9% had grade 1 anemia, 9.9% had grade 2, 5.7% had grade 3 and 2.1% had grade 4 (Table 2). Anemia was prevalent in 67% of the patients on HAART and 55.5% among those that were HAART naïve (Table 3).

Parameter	No. Tested	No. Anemic	Percentage	P-value
Sex:				
Male	77	41	53.2	>0.05
Female	223	151	67.1	
Marital Status:				
Single	84	39	46.5	>0.05
Married	195	142	72.8	
Divorced	21	11	52.4	
Age (years):				
≤ 19	27	8	29.6	>0.05
20-30	96	71	74	
31-40	83	44	53	
41-50	33	21	63.6	
≥ 51	61	48	78.7	
CD4 count (cells/μl):				
<100	41	39	95.1	>0.05
100-249	67	43	64.2	
≥250	192	110	57.3	
Occupation:				
Students	101	76	75.2	>0.05
Civil Servants	59	23	39	
Farmers	80	51	63.7	
Business	60	42	70	

Education:

Non-formal	122	76	62.3	>0.05
Formal	178	116	65.2	

Table 1: Prevalence of anemia based on demographic and laboratory data of HIV positive patients accessing healthcare in Federal Medical Centre, Keffi.

Table 2: Grades of anemia among HIV patients with respect to their ART status

WHO anemia grade	On HAART	HAART naïve	Total (%)
Grade 1: Hb 9.5 – 10.5g/dl	32(61.5%)	14(50.0%)	46(23.9)
Grade 2: Hb 8 – 9.5g/dl	11(21.2%)	8(28.6%)	19(9.9)
Grade 3: Hb 6.5 – 7.9g/dl	6(11.5%)	5(17.9%)	11(5.7)
Grade 4: Hb < 6.5g/dl	3(5.5%)	1(3.6%)	4(2.1)

Note: 112 patients do not belong to any of the grades because they had Hb > 10.5g/dl.

Table 3: Prevalence of Anemia among HAART and HAART naïve HIV positive patients accessing healthcare in Federal Medical Centre, Keffi.

		Males			Females			Total	
ART Status	No. tested	No.	with anemia (%)	No. tested	No.	with anemia (%)	No. tested	No.	with anemia (%)
On HAART	46	23	(50%)	164	119	(72.6)	210	142	(67.6)
HAART naïve	31	18	(58.1)	59	32	(54.2)	90	50	(55.5)
Total	77	41	(53.2)	223	151	(67)	300	192	(64)

P > 0.05

DISCUSSION

In the present study the prevalence of anemia among the study subjects was 64.0%. This is higher than reports of 60.0% in a similar study in Benin city [3] and 57.5% in patients on HAART in Northeastern Nigeria [18]. There is dearth of published reports of similar studies among adults in the study area as most published reports are on a different

population. The prevalence reported in the present study was higher compared to the 57.3% prevalence among HIV positive pregnant women in Ibadan [19], 42.5% in Southwestern Nigeria [20] and 62.6% in Rivers State [21]. Prevalence rates higher than what was reported in this study have also been observed among HIV positive children where researchers reported 77.9%, 74% and 70% in Lagos [10], Ile Ife [22] and Abuja [23] respectively. Similarly, lower rates of 59.5% in Makurdi [6] and 3% in Enugu [9] have been reported among HIV positive children.

Researchers outside Nigeria have reported anemia among 30% of HIV positive adults in Ghana [1], 23.1% in Southwest Ethiopia [24], 55.6% in Nepal [16], 70% in India [25], 51.9% among HAART naïve in India [26] and 22% in a pediatric group in Ethiopia [7].

The prevalence of anemia in HIV-positive patients is widely variable. Despite the dearth of published Nigerian studies the few that have been published shared variability. It was also different from rates in other countries. These differences might be due to the differences in the definition of anemia and even the type of blood used for the study. Capillary blood has been reported to give higher hemoglobin (Hb) values than venous blood [1]. The method for determining anemia is also an important reason for the differences because while some researchers used packed cell volume, others used hemoglobin concentration [27]. Similarly, some authors might not have taken the issue of the effect of altitude into consideration. Although this study and many others cited in this report did not consider the stage of infection, it is important to note that generally subjects with advanced disease are expected to be more at risk of anemia. This is because the suppression of erythropoiesis by cytokines produced by HIV infected lymphocytes, macrophages and monocytes increases with an increase in the number of the infected cells at an advanced stage of the infection [9].

Although female gender has been reported as a risk factor for anemia among HIV patients, the present study did not find any statistically significant difference in the prevalence of anemia between female and male patients. However, it was arithmetically higher among female than their male counterparts (67.1% vs 53.2%). This is similar to the study by Omoregie and his co-researchers in Benin City[3]. Volberding and coworkers also had a similar observation in their study [28]. This higher frequency in females may be attributed to the loss of blood in adult females during the monthly

menstrual cycle and the drain on iron reserves during pregnancy and delivery. Some earlier researches had posited that generally women will have higher deficiency prevalence than men for all iron related tests. And suggested that it maybe because of the 50% higher iron required by women than men due to the monthly blood loss and a lower iron and energy intake from food [29].

Gender has also been reported as an important parameter in reporting results of such studies that could result in discrepancies, because the cut off values for males is different from that for female adults. Whereas, some researches do not distinguish one from the other. The 67.1% vs 53.2% reported for females and males respectively in the present study was on the basis of WHO cut off points for the different sexes.

In this study the WHO anemia toxicity grades was also used for categorizing anemia into grades[3]. About 58.3% of the participants had Hb levels greater than 10.5g/dl so they could not be placed in any toxicity grade. However, 23.9% of the participants were on Grade 1 level toxicity and only 2.1% were on Grade 4 level. Those on Grade 1 level toxicity will usually require very urgent intervention although this has to be interpreted alongside other clinical diagnosis.

With respect to HAART status, anemia was more prevalent among those on HAART than HAART naïve (67.6% vs 55.5%). Although this difference was not statistically significant. This is in contrast to reports of a similar study in Nigeria [3], 37.6% vs 15.2% from Ghana [1] and 29.9% vs 16.2% from Southwest Ethiopia [24]. Some authors have noted that HAART is effective in decreasing the prevalence of anemia by improving both hematocrit and hemoglobin values in HIV patients [1,14]. However, HAART containing Zidovudine was a risk factor for anemia in some studies [3,20,23] and not in another study where patients on ART demonstrated improvement on Hb levels [30]. Some researchers have reported that it causes anemia by hemoglobin synthesis inhibition and toxicity to erythroid lines [31]. Other researchers have reported the presence of anemia as a predictor of poor response to ART [26]. But because HIV anemia is complex and could also be multifactorial, some patients may likely do well with multiple interventions [14].

There have also been conflicting reports concerning the prevalence of anemia and CD4 counts. The present study did not report any significant association between prevalence anemia and CD4 counts although it was arithmetically associated with a decrease in CD4 counts with the highest rate among those with less than 100 cells/ μ l. Similarly a study among pregnant HIV positive women in Jos reported no significant association between Hb and CD4 counts [30].

Conclusion

This study highlights the huge burden of anemia (64%) in HIV positive patients as well as a relatively large number of those on Grade 1 level toxicity. This underscores the importance of routine pre-art evaluation of anemia. As a baseline study this could serve as a reference to improve patients' healthcare. The routine measurement of blood hemoglobin in such people could help to identify patients at risk for closer monitoring or therapeutic interventions. Therefore, longitudinal studies with long term follow up are required.

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