

## Anemia in People Living With HIV/AIDS: A Cross Sectional Study from India

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### Abstract:

**Introduction:** Hematological abnormalities are a common complication of HIV infection. Anemia is the most common abnormality found in the people living with HIV. It is observed that the severity of anemia increase the mortality in PLWH independent of CD4 count. There are wide variations in the prevalence of anemia from different countries all over the world. Also gender specific variation observed in different studies.

**Aims and Objectives:** Aim of our study was to collect the data from India and study the anemia and its gender specific variation in people living with HIV in India.

**Materials and Methods:** Two hundred PLWH of age group 18-60 years were included in the study. Study conducted from June 2012 to June 2014 at tertiary care hospital and medical teaching institute in south central India. Out of two hundred subjects ninety nine were males and one hundred one females, Complete blood count done on ERMA-PCE 210 blood cell counter. Hemoglobin values were further studied for diagnosis and classification of anemia.

**Results:** The results of study indicated high prevalence of anemia in PLWH i.e.77.5%. The prevalence of anemia in female (84.15%) was higher as compared to males (70.70%). No significant correlation found between anemia and sex  $p=0.260$ .

**Conclusion:** Anemia prevalence is high in PLWH and is higher in females as compare to males.

**Keywords:** Anemia, HIV/AIDS, people living with HIV/AIDS, PLWH.

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### I. Introduction

The Human Immune-deficiency Virus (HIV) is a retrovirus that infects cells of the immune system, destroying or impairing their function. As the infections progresses, the immune system becomes weaker, and the person becomes more susceptible to infections. The most advanced stage of HIV infection is Acquired Immunodeficiency Syndrome (AIDS).HIV/AIDS is the major health challenge in the modern world and causing devastation in the resource poor south-east Asian countries. It involves almost all the systems in human body. Disorders of hematopoietic system including lymphadenopathy, anemia, leucopenia and/or thrombocytopenia are common throughout the course of HIV infection. Studies have unequivocally demonstrated that anemia is associated with quality of life decrements, decreased survival and increased disease progression in adults with HIV infection [1, 2, 3].Anemia can be quite severe and may require repeated blood transfusion. It is supposed to have multifactorial etiology drug toxicities (e.g. zidovudine, dapsone, trimethoprim/sulfamethoxazole, ganciclovir, interferon  $\alpha$  etc.), systemic fungal and mycobacterial infection, nutritional anemia (malabsorption and anorexia induced by HIV/AIDS)[4].Anemia is the most common hematological abnormality in HIV seropositive patients and its incidence is strongly associated with the progression of the disease. Anemia is common in patients with HIV infection, particularly those with advanced disease. In patients not receiving effective antiretroviral therapy (ART), anemia is associated with increased mortality, independently of CD4+ T-cell count and viral load [5].Much of the data on HIV-related anemia are from industrialized countries prior to the introduction of triple drug ART. Increased incidence of anemia after initiation of zidovudine monotherapy was demonstrated in early placebo-controlled trials [6, 7].Anemia is one of the most common blood abnormalities in people with HIV disease. Up to 90% of adults can develop anemia during an HIV infection and especially, in individuals with advanced disease of lower CD4+ T-cell count. People with anemia after suffering a decreased quality of life potentially increase chance of mortality. The incidence of anemia has been found to be strongly associated with the progression of HIV to AIDS [8].

There is wide variation in the prevalence of anemia among HIV/AIDS patients in different studies all over the world. There is less data available from the developing countries like India. So we decided to study anemia and gender specific variation of anemia in people living with HIV/AIDS in India.

## **II. Materials And Methods**

### **Study area and design**

This study was conducted at tertiary care hospital and teaching institute situated in south central India. This institute is also a reputed ART center and ICTC center under NACO supervision. This institute provides all medical care and ART to the people living with HIV of surrounding eight to ten districts. This study was descriptive cross-sectional study and carried out in the time period of June 2012 to June 2014.

### **Study population**

All the subjects male and females were people living with HIV (PLWH) who were diagnosed cases of HIV infection at various ICTC center under NACO supervision including present institute.

### **Inclusion criteria**

HIV infection diagnosed Subjects both male and female of age between 18-60 years were selected. Subjects who given the written informed consent.

### **Exclusion criteria**

Subjects below 18 years and above 60 years, subjects with known hematological disorders like sickle cell anemia, thalassemia, hemophilia etc. subjects with history of resent blood transfusion, female subject with pregnancy and subjects with terminal illness were excluded. Subjects who have not given the written informed consent excluded.

### **Data collection**

The purpose of the study was explained to the participant and their questions regarding the study were solved. After obtaining written informed consent all the subjects were thoroughly examined for general and systemic examination. Appropriate advice was given as per the need of subject. Socio-demographic variable and patient history was collected through structured questionnaire after the informed consent given by the subject.

### **Sample collection**

After giving the written informed consent subjects were enrolled for the study. With the subjects sitting comfortably on chair with all aseptic precaution 5 ml venous blood collected from ante cubital vein in EDTA bulb. All the samples were collected between 9:00 a.m. to 12:00 p.m. All the samples were analyzed within two hours of sample collection.

### **Investigations**

All the hematological parameters Hemoglobin, Total Leukocyte Count(TLC), Red blood cell count(RBC), Differential Leukocyte Count (DLC), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Platelet Count, Erythrocyte Sedimentation Rate (ESR) were studied on ERMA-PCE 210 blood cell counter.

### **Data analysis**

Proportions were compared using chi-square test of significance. Student t test was done as indicator of statistical significance. Data analysis was carried out using Statistical Package for Social Science (SPSS) version 16.0. P value < 0.05 considered as significant and p value > 0.05 non-significant.

### **Ethical consideration**

Present study was part of research work "Study of some hematological parameter changes in people living with HIV/AIDS" and approved by the local ethical committee of institute via letter No/Pharm/IEC/Approv letter 598/11.

## **III. Results**

### **Socio-demographic variables**

**Sex:** Among two hundred subjects selected for study 101(51.5%) were females and 99(49.5%) were males.

**Age group:** In different age groups, 18-30years, 31-40years, 41-50years and 51-60years the number of subjects were 49(24.5%), 92(46%), 42(21%), 17(8.5%) respectively. The 141 (70.5%) subjects were in age 18-40 years which is sexually active age of the society.

**ART or non-ART:** Among two hundred subjects 167(83.5%) subjects were on ART and 33(16.5%) subjects were not on ART. Socio-demographic variables are shown in Table 1.

### **Hematological parameters**

All hematological parameters with highest, lowest and mean values are shown in Table 2.

#### **Anemia:**

Hemoglobin estimation was done to diagnose and classify the anemia.

Normal hemoglobin for male >13gm/dl and for female >12gm/dl

The anemia was defined as per WHO criteria Hemoglobin <13gm/dl in males and Hemoglobin <12gm/dl in female [9]. Mild anemia defined as Hemoglobin 11- 12.9gm/dl in male and 11-11.9gm/dl in females. Moderate anemia defined as Hemoglobin 8-10.9gm/dl in both males and females. Severe anemia defined as Hemoglobin <8gm/dl in both males and females. Among two hundred subjects 155 (75.5%) show hemoglobin lower than for respective sex as per the WHO criteria for anemia.

**Anemia:** In males 70(70.70%) and in females 85(84.15%) were anemic.

**NORMAL:** In males 29(29.30%) in females 16 (15.5%) shows normal hemoglobin. The prevalence of anemia was high in females (85.15%) as compare to males (70.70%) No significant correlation found between hemoglobin and sex ( $p = 0.260$ ). Gender specific values and p value are shown in Table 3. Gender specific variation in anemia is shown in Figure 1.

#### **Classification of anemia:**

**Mild anemia:** Total 42% subject show mild anemia. In male 41.41% and in female 42.57% shows mild anemia.

**Moderate anemia:** Total 29.5% subjects shows moderate anemia. In male 26.26% and in female 32.67% shows moderate anemia.

**Severe anemia:** Total 12.6% subjects shows severe anemia. In male 3.03% and in female 8.91% shows severe anemia.

**Normal:** Total 22.5% subjects were not anemic. In male 29.29% and in female 15.84% show normal hemoglobin. Anemia according to severity are shown in Figure 2.

## **IV. Discussion**

Present study was carried out to study anemia and gender specific variation of anemia in people living with HIV at tertiary level hospital and teaching institute in India. Two hundred peoples living with HIV in age group 18-60 years of both sexes i.e. male and female were recruited for this study. All the hematological parameters Hemoglobin, Total Leukocyte Count (TLC), Red blood cell count (RBC), Differential Leukocyte Count (DLC), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC) and Platelet Count were studied.

In our study 77.5% people living with HIV were anemic as respect to their sex .

This finding was in agreement with some other studies like Ambali et al, Pande et al and Rudresh et al [5,10,11] Prevalence of Anemia found higher than present study by Kotwal et al and Erhabor et al [12,13]. But present study was in opposite to some other studies such as Se Youn Choi et al, Akinbami et al, Sharma et al, Adediran et al, Amanda et al, and Dikshit et al [14,15,16,17,18,19]. These differences may be due to the different subject groups recruited for the study such as Akinbami et al done the study on newly diagnosed patient without ART whereas most of subjects in present study were already on ART .

In present study 84(42%) subject show mild anemia, 59 (29.5%) subjects shows moderate anemia and 12 (6%) subjects shows severe anemia. Prevalence of mild, moderate and severe anemia in male was 41(41.41%), 26 (26.26%) and 3(3.03%) respectively. Prevalence of mild, moderate and severe anemia in female was 43 (42.57%), 33 (32.67%) and 9 (8.91%) respectively. It was in agreement with Meseret Alem et al and Isaakidis et al [20, 21]. Whereas Daka et al found high prevalence of severe anemia as compare to present study. It may due to the subjects in the study were not on ART where as in present study most of the subjects were on ART. In present study we found difference in the prevalence of anemia in respect to sex. Higher prevalence of anemia in females was observed. Present study was similar with Meseret Alem et al who found higher prevalence of anemia in females. But present study was in opposite to Arora et al and Omoregie et al they found higher prevalence of anemia in males as compare to female sex [22,23]

HIV infection may lead to anemia in different ways; the important causes are defective iron metabolism, nutritional deficiencies, opportunistic infections, ART, and advanced stage of disease with its complications. Therefore while treating the people living with HIV there should be proper monitoring of anemia and appropriate measurement must be taken for treatment of anemia in people living with HIV.

V. Figures And Tables

Table 1: Socio-demographic variables of subjects

SOCIO-DEMOGRAPHIC VARIABLES	SUB-GROUPS	NO.OF SUBJECTS (%)
AGE	18-30 years	49(24.5%)
	31-40 years	92(46%)
	41-50 years	42(21%)
	51-60 years	17(8.5%)
SEX	MALE	99(49.5%)
	FEMALE	101(50.5%)
ART	YES	167(83.5%)
	NO	33(16.5%)

Table 2: Highest, Lowest and Mean values of parameters

PARAMETER	HIGHEST	LOWEST	MEAN
HB	15gm/dl	6.5 gm./dl	11.0575 gm./dl
RBC	6.1million/ mm3	2.07/ mm3	4.0655 / mm3
PCV	47%	21%	34.055%
MCV	124fl	51fl	85.09fl
MCH	39pg/cell	15pg/cell	27.9pg/cell
MCHC	39 gm./dl	20 gm./dl	32.13 gm./dl
TLC	20700 / mm3	3100/ mm3	7037.5/ mm3
ANC	17881 / mm3	1705/ mm3	4517/ mm3
ALC	4428/ mm3	252/ mm3	2179.355/ mm3
AMC	492/ mm3	0	145.755 / mm3
AEC	525/ mm3	0	194.13 / mm3
ABC	0	0	0
PLATELET	4.1lakh/ mm3	0.63lakh/ mm3	2.06935lakh/ mm3
ESR *	36mm	7mm	19.798mm

\* At the end of 1 hour

Table 3: Gender specific variation of anemia

	MALE N=99(%)	FEMALE N=101(%)	CHI-SQUARE VALUE	p VALUE
ANEMIA	70(70.70)	85(84.15)	5.188	0.260
NORMAL	29(29.30)	16(15.84)		

Figure no1: Gender specific variation of anemia

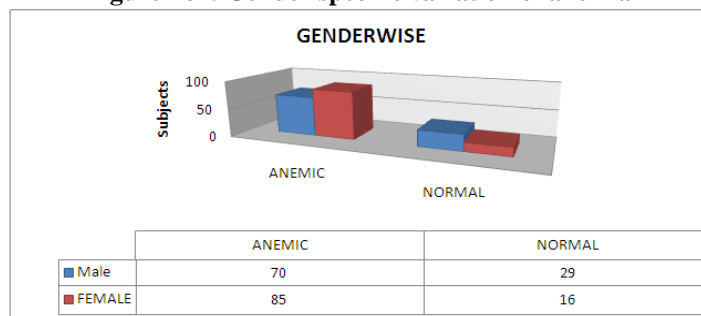
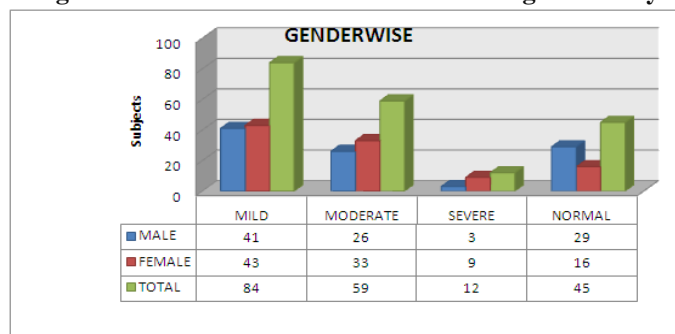


Figure 2: Classification of anemia according to severity.



## VI. Conclusion

From present study we conclude that there is high prevalence of anemia in people living with HIV. Females gender shows higher prevalence of anemia as compare to male but no significant correlation found between anemia and sex or gender (p value= 0.260). Present study was cross sectional study and no baseline data for comparison was available. Most of the subjects were on ART and many studies shows that ART can increase the anemia occurrence in people living with HIV. Further study is needed considering ART specially Zidovudine containing regimen and its effect on hematological status in HIV infection. Further study is also needed to evaluate the etiology of anemia in HIV infection for management of anemia and improve the quality of life in HIV infection

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