ORIGINAL ARTICLE

Study of Cytopenia in HIV/AIDS at a Tertiary Care Teaching Hospital from India

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Abstract:

Background: Hematological abnormalities are most common complications found in human immunodeficiency virus (HIV) infection and these complications increase with the advanced stage of diseases. Hematological disorders which are generally observed in HIV infection are different cytopenias like anemia, leukopenia and thrombocytopenia. Various type of cytopenias in HIV has been associated with different factors like sex, age, race or ethnicity, geographical location and CD4 count. So present study was planned with the aim to study the prevalence of cytopeniaviz anemia, thrombocytopenia and leucopenia in Indian population. *Material and Methods:* This cross-sectional study was conducted at a Dr. Shankarrao Chavan Goernment Medical College Nanded in Maharashtra, India. The present study was approved by the local ethical committee of the institute. Total two hundred subjects were selected for study. To avoid the bias due to preexisting illness or previous treatment affecting hematological profile, proportions were compared using chi-square test of significance. Student t test was done as indicator of statistical significance. Data was analysed by using Statistical Package for Social Science (SPSS) software version 16.0. P value < 0.05 considered as significant and p value > 0.05 non-significant. *Results:* In present study the prevalence of different types of cytopenia in decreasing order was anemia (75.5%) thrombocytopenia (8.5%) and leucopenia (2%). *Discussion:* The result observed in the present study were similar to other studies done in India and abroad. There were also few studies with the higher or lower prevalence of these cytopenias than the present study. These differences in observations might be due to the factors like age, sex, ART status and the population from different geographical locations. The present study provide some baseline data from Indian population and can be useful for future studies in people living with HIV/AIDS.

Conclusion: Different types of cytopenias like anemia, leucopenia and thrombocytopenia are very common among people living with HIV/AIDS. The antiretroviral therapy (ART) shows reversal of these cytopenias and must be initiated as early as possible and maintained during course of disease.

Keywords: Anemia, ART, HIV/AIDS, Leucopenia, Thrombocytopenia.

Introduction:

Hematological abnormalities are most common complications found in human immunodeficiency virus infection and these complications increase with the advanced stage of diseases. No matter either individual is on antiretroviral therapy (ART) or not different types of hematological abnormalities occurs during the course of illness [1]. Hematological disorders which are generally observed in HIV infection are different cytopenias like anemia, leukopenia and thrombocytopenia either alone or in combination. The hazardous effect of HIV virus on white blood cells or leucocytes are universally known. But it also affects erythrocytes and platelets.

Altered hematopoiesis is common in HIV infection. This affects all three major cell lines i.e., red blood cells, white blood cells and platelets. This ultimately results in HIV-infected patients suffering from anemia, leucopenia, thrombocytopenia, or any combination of these three. They are common in HIV infection and may be due to direct effect of HIV virus either at stem cell level or at the mature blood cell level. Further secondary infections and neoplasms, or side effects of

ART may also results in above mentioned cytopenias [2].

When compared to HIV/AIDS patient not on ART, patients in whom ART was started earlier showed better survival rates observed in patients on ART against the HIV virus [3-5]. Use of highly active antiretroviral therapy (HAART) in western developed countries significantly decreases AIDS-related deaths. This decrease in deaths and mortality changed the earlier picture of HIV infection from one of rapidly fatal disease to a chronic still manageable infection[6]. Various type of cytopenias in HIV has been associated with different factors like sex, age, race or ethnicity, geographical location and CD4 count. A study found that anemia and neutropenia were highest in Ugandan population as compared to the US. Anemia was more prevalent among African-Americans and neutropenia was more in non-Hispanics than Hispanics. Anemia and neutropenia were higher in females. Anemia is more prevalent in older age. Low CD4 count has been associated with higher prevalence of anemia, neutropenia and thrombocytopenia [7].

Hematological parameters are not part of the criteria for starting ART. It is neither used for staging HIV disease by the World Health Organization. But peripheral blood cell counts or abnormalities are important prognostic tools for assessing the treatment outcomes and morbidity in patients of HIV infection and AIDS. In developing countries, access to the healthcare institutions is still low as compared to developed countries. Many times people visit these healthcare institutions in the most severe stage of HIV infection with cytopenias [8].

Most of the studies done in Asian countries like India are focused on individual hematological abnormalities focusing on particular type of cytopenia like anemia, thrombocytopenia or leucopenia. Less number of studies are done on cytopenia comprising of all these three cells. Therefore the present study was planned with aim to study the prevalence of cytopenia viz anemia, thrombocytopenia and leucopenia in Indian population.

Material and Methods:

This cross-sectional study was conducted at a Dr. Shankarrao Chavan Government Medical College Nanded in Maharashtra, India. The present study was approved by the local ethical committee of the institute. Total two hundred subjects both male and female with HIV infection visiting the hospital for routine check-up or ART were selected for study (Table No.1).

To avoid the bias due to preexisting illness or previous treatment affecting hematological profile, following inclusion, exclusion criteria were set and subjects were selected accordingly. Subjects both male and female were willing to give written informed consent and diagnosed with HIV infection between the age of 18-60 years were included in the study.

Subjects with known hematological disorders like sickle cell anemia, thalassemia, hemophilia etc, having history of recent blood transfusion, pregnant women, terminal illness and those who have not given the written informed consent were excluded from study.

The aim of the study was explained to the participant and their questions regarding the study were answered. After obtaining written informed consent socio-demographic variable and patient history was collected through structured questionnaire.

With the subjects sitting comfortably on the chair with all aseptic precaution 5 ml venous blood was collected from the antecubital vein in a EDTA bulb .All the samples were analyzed within two hours of sample collection.

Hematological parameters viz hemoglobin, total leucocyte count (TLC) and platelet count, were determined on ERMA-PCE 210 blood cell counter as per guidelines provided by the manufacturer. Hemoglobin estimation was done to diagnose anemia.

Anemia was defined as per WHO criteria; Hb<13gm/dl in males and Hb<12gm/dl in females [9]. Total leucocyte count Leucopenia (TLC)< 4000/ mm3 and platelet count <1.5 lakh/ mm3weretaken as leucopenia and thrombocytopenia respectively [10].

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.

Table No. 1: Demographic characteristics of population

Demographic variables		Number of subjects
Gender (n=200)	Male	99
	Female	101
Age group in years (n=200)	18-30	49
	31-40	92
	41-50	42
	51-60	17
ART status (n=200)	ART	167
	Non-ART	33

Results:

In the present study the prevalence of different types of cytopenia in decreasing order was anemia (75.5%) thrombocytopenia (8.5%) and leucopenia (2%). (Table No. 2, 3 and 4)

Female showed higher prevalence of anemia, thrombocytopenia and leucopenia as compare to male. Similarly higher prevalence of anemia and thrombocytopenia was observed in younger age group (31-40 years) and subjects on ART. (Table No.2 and 4). But it was also non-significant. In contrast prevalence of leucopenia was low in subjects on ART and it was higher in age group 51-60 years. (Table No. 2). But all these observations were non-significant in respective categories.

Table No. 2: Anemia in HIV/AIDS

Demographic variables		Normal	Anemic	Chi-square value	p-value
Gender (n=200)	Male	29	70	5.188	0.25
	Female	16	85		
Age group in years (n=200)	18-30	06	43		
	31-40	25	67	5.991	0.112
	41-50	08	34		
	51-60	06	11		
ART status (n=200)	ART	34	133	2.660	0.103
	Non-ART	11	22		

Table No. 3: Leucopenia in HIV/AIDS

Demographic variables		Normal	Leucopenia	Leucocytosis	Chi-square value	p-value
Gender (n=200)	Male	91	02	06	3.84	0.148
	Female	98	02	01	-	-
Age group in years (n=200)	18-30	47	01	01	-	-
	31-40	86	02	04	7.831	0.174
	41-50	42	00	00	-	-
	51-60	14	01	02	-	-
ART status (n=200)	ART	159	03	05	1.064	0.605
	Non-ART	30	01	02	-	-

Table No. 4: Thrombocytopenia HIV/AIDS

Demographic variables		Normal	Thrombocytopenia	Chi-square value	p-value
Gender (n=200)	Male	93	06	1.50	0.22
	Female	90	11	-	-
Age group in years (n=200)	18-30	44	05	-	-
	31-40	84	08	1.527	0.676
	41-50	39	03	-	-
	51-60	16	01	-	-
ART status (n=200)	ART	153	14	0.684	0.773
	Non-ART	30	03	-	-

Discussion:

This study was done to assess the different types of cytopenias encountered during HIV infection in people living with HIV/AIDS. We also tried to study the relation between different types of cytopenia with respect to sex, age group and ART status of subject.

Anemia is the most common cytopenia found worldwide in HIV infection. The prevalence ranges from 1.3% to 95%. Studies across the world indicated that anemia is directly related to the severity of immunosuppression and progression of HIV infection [11]. In the present study anemia was identified as the most common cytopenia with prevalence of 77.5%. Results similar to the present study were observed by some other studies from India as well as from Nigeria [12-14]. But in contrast to the present study, Nigerian study found higher prevalence of anemia [15]. Similarly one Indian and two studies from Africa found lower prevalence of anemia as compare to the present study [16-18]. Anemia is common in patients with HIV infection; the important causes are decreased iron absorption, deficiencies of various components required for hemoglobin synthesis and common opportunistic infections. Advanced stage of the disease with its complications and ART itself is among the cause of anemia in HIV infection.

The prevalence of thrombocytopenia in HIV infection ranges from 10%-40%. In present study thrombocytopenia was identified as the second most common type of cytopenia with a prevalence of 8.5%. Findings similar to present study were observed by some other studies from Uganda, Nigeria and India [7,12,14,18].The study from Uganda also observed that the prevalence of different types of cytopenia was associated with female sex, CD4 count and body mass index of individual [19].

Low prevalence of thrombocytopenia as compared to present study was reported in studies from Korea and India. Both these studies observed reversal of cytopenia after starting HAART or ART [20,21]. These observations underline the importance of HAART or ART for improving cytopenia in HIV infection. There were also studies which observed higher prevalence of thrombocytopenia as compare to present study. Two studies one from Zimbabwe other from India observed higher prevalence of thrombocytopenia as compare to present study [22, 23]. Another Indian study observed higher prevalence of thrombocytopenia in males and this was in opposite to present study where prevalence was more in females [24].

Immune-mediated destruction of thrombocyte or platelet by different antibodies and cross-reacting antibodies are responsible for thrombocytopenia in HIV infection.

Leucopenia is one of the hematological abnormalities that occurs during the course of HIV disease progression. Its prevalence is widely variable ranging from 10–50%. In the present study only 2% subjects showed leucopenia. Similar prevalence of leucopenia was observed in a study from Nigeria [15]. At the same time few other studies from India and abroad found high prevalence of cytopenia as compared to the present study [13,14]. The profound depletion of CD4 lymphocyte due to HIV infection may be the reason for the increasing occurrence of leucopenia in HIV infections.

The geographical distribution of population, ART, age, sex and stage of AIDS affects the outcome. The advanced stage of AIDS alter the hematological profile. Most of the subject in present study were relatively healthy as the patient with more advanced stage and terminal illness were not included in study but other studies compared with present study recruited patients from even advanced stage of AIDS. The ART or HAART is another factor which alter hematological parameters. Many studies have provided evidence supporting positive effect of ART on improvement in leucopenia and thrombocytopenia. Since most of our subjects were on ART it may positively affect the prevalence of these cytopenia. Few studies compared exclusively selected subjects without ART.

Conclusion:

Different types of cytopenias like anemia, leucopenia and thrombocytopenia are very common among people living with HIV/AIDS. The prevalence of these

cytopenias depends on various factors like age, sex, HAART or ART, geographical distribution of population. The present study provide some base line data from Indian population and can be useful for future studies in people living with HIV/AIDS.

Conflict of Interest - Nil

Sources of Support - Nil

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