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Hematological profile of people living with HIV/AIDS

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Abstract
Human Immunodeficiency Virus (HIV) is a retrovirus that attacks the body's immune system. Normally, the immune system produces white blood cells and antibodies that attack viruses and bacteria. The infection fighting cells are called T- cell lymphocytes. Months to years after a person is infected with HIV, the virus destroys all the T-cell lymphocytes.
It was a prospective study in which HIV patients were diagnosed by clinical profile, biochemical tests like ELISA, CD4 counts.
Evaluation of haematological profile in HIV patients was done with Hb%, RBC, TC, DC, Platelet count, ESR, Bone marrow if needed and biochemical tests. The mean total count in our study was 6297 ± 2251 cells /mm^3. The total count varied between 2000 to 11,000 cells/mm^3. 30% of them had leucopenia. In our study majority of the PLHA's (61%) were in advanced stage (III & IV) of HIV infection.

Keywords: hematological profile, HIV infection, CD4 counts

Introduction
The Acquired Immunodeficiency Syndrome (AIDS) [1] was first reported in 1982 in New York. Since then, HIV was emerged as a major pandemic. AIDS has spread like wild fire to engulf all the continents of the world to assume proportions of a pandemic. However, with more data becoming available, the gravity of the problem is being better understood and HIV infection in adults and adolescents is being recognized as a major issue [2].
The first AIDS case in India was detected in 1986 [3]; since then the spread of HIV in India has been diverse, epidemic being most extreme in the southern half of the country and in the far North-East. The highest HIV prevalence rates are found in Maharashtra in the West; Andhra Pradesh, Karnataka and Tamil Nadu in the South; and Manipur and Nagaland in the North-East [4].
Human Immunodeficiency Virus (HIV) is a retrovirus that attacks the body's immune system. Normally, the immune system produces white blood cells and antibodies that attack viruses and bacteria. The infection fighting cells are called T- cell lymphocytes. Months to years after a person is infected with HIV, the virus destroys all the T-cell lymphocytes. This disables the immune system to defend the body against diseases. Opportunistic infections take advantage of the body's weakened immune system. These infections which normally don't cause severe or fatal health problems will eventually cause the death of the HIV patient [5]. HIV infection is a multisystem disease, hematological abnormalities are among the most common clinico pathological manifestations of HIV infection. HIV infection is associated often with a wide range of hematological abnormalities, including impaired haematopoiesis, immune mediated cytopenias and coagulopathies, particularly in the later part of the disease [6]. Bone marrow findings are highly variable depending on the clinical severity of the immuno deficient state. The consequences of these hematological problems are twofold. First, they have major morbidity in themselves, adversely altering the patient quality of life. Second, they hinder the treatment of both the primary viral infection and the secondary infections and neoplastic complications.
The poor haematopoetic tolerance of the therapies often necessitates dose reductions, alterations of drug regimens, or interruption of therapies. The hematologic complications are better controlled, resulting in longer life spans.
The accurate measurement of CD cell counts is essential for assessment of immune system of HIV infected person as the pathogenesis of Acquired Immunodeficiency Syndrome is largely attributable to the decrease in CD4 lymphocyte counts.

Many reports to these effects are available; however Indian data on the subject is meager. Presently in India more than five million people are infected with HIV and with the second largest pool of HIV-positive individuals in the world.

In general hematological abnormalities progress in frequency and the severity with the progression of infection from the asymptomatic HIV carrier state to the later symptomatic stages of the disease [7, 8, 9].

According to Zon LI *et al*., the frequency of anemia in asymptomatic HIV patients was 20% while as in patients with AIDS was 70% and the frequency of leucopenia was 10% among asymptomatic HIV patients while in patients with AIDS was 65%. The frequency of thrombocytopenia was 15% in asymptomatic HIV patients while as 40% in patients with AIDS [10].

According to Groopman JE *et al*., the frequency of anemia in patients with AIDS has been estimated to be 63-95% [10].

According to Murphy MF *et al*., the incidence of lymphopenia, neutropenia and thrombocytopenia in patients with AIDS was 75%, 20% and 30% respectively and in patients with asymptomatic HIV positive patients the incidence was 15%, 0% and 0% respectively [10].

According to Spivak JL *et al*., anemia was found in 18% of HIV seropositive patients, 50% of patients with AIDS related complex, and 75% of those with AIDS [8].

According to multicenter AIDS Cohort study found that 3.2% of HIV- seropositive patients with mean CD4 T-lymphocyte counts > 700 cells/mm^3 were anemia, whereas anemia was present in 20.9% of these with mean CD4 T-lymphocyte counts < 249 cells/mm^3 and 6.7% of participants had thrombocytopenia (platelet count below 1.5 lakh/mm^3).

Granulocytopenias with or with or without lymphopenia occurs in approximately 8% of the asymptomatic HIV carriers and as many as 70% to 75% of children and adults with AIDS. While anemia and granulocytopenia tend to occur concomitantly with a severity that parallels the course of the HIV infection, thrombocytopenia can occur independently of other cytopenias and at all stages of HIV infection. Isolated thrombocytopenia may be the first manifestation of HIV infection.

Among the neoplastic complications, Kaposi's sarcoma is the most common neoplasm in patients with AIDS, occurring with a 700 fold increase in HIV infected patients compared with age matched, non-infected controls [9, 10]. Other malignancies increasingly seen in patients with AIDS are non-Hodgkin's lymphoma, seminoma and non-melanoma skin cancer.

Methodology

Design of study

Prospective study.

Inclusion criteria

- All patients with HIV infection.
- HIV infection proven by ELISA.

Exclusion criteria

- Chronic infection like tuberculosis.
- Alcoholics.
- Worm infestations.
- Chronic kidney disease.
- Drug intake (phenytoin).
- Patient on anti-retroviral therapy.

It was a prospective study in which HIV patients were diagnosed by clinical profile, biochemical tests like ELISA, CD4 counts. Evaluation of haematological profile in HIV patients was done with Hb%, RBC, TC, DC, Platelet count, ESR, Bone marrow if needed and biochemical tests.

These haematological abnormalities were correlated with various stages of HIV (WHO stages).

The results were analyzed by calculating percentage, mean, standard deviation, chi-square test and fisher exact.

Proportion were compared with chi-square test of significance and p- value of <0.05 for considered statistically significant.

Results

Table 1: Age distribution

Age (in yrs)	No. of cases	Percentage
20 – 29	18	18
30 – 39	48	48
40 – 49	26	26
50 – 56	8	8
Total	100	100

Most of patients were in age group of 30-39 years

The mean age was found to be 36.2±7.5 years, range 20-56 years.

Table 2: Sex distribution

Sex	No.of cases	Percentage
Male	57	57
Female	43	43
Total	100	100

Majority of the patients were males (57%) when compared to females (43%)

Table 3: WHO stage distribution?

WHO stage	No. of cases	Percentage
I	9	9
II	30	30
III	51	51
IV	10	10
Total	100	100

Majority of them were in stage III and least were in Stage I.

Table 4: Total count distribution

WBC count	No. of cases	Percentage
2000-3000	7	7
3001-4000	18	18
4001-5000	7	7
5001-6000	15	15
6001-7000	11	11
7001-8000	16	16
8001-9000	14	14
9001-10000	10	10
10001-11000	2	2
Total	100	100

The mean total count was found to be 6297 ± 2251 cells / mm^2 out of the 100 patients 41 of them had leucopenia.

Range 2000-11000.

In our study the differential count distribution showed

- Neutropenia in 28 patients

- Lymphocytopenia in 26 patients and Monocytopenia in 46 patients.

Table 5: Different count

White Blood Cells	Mean±SD
Neutrophils	62.1±9.6%
Lymphocytes	31.4±9.7%
Monocytes	4.3±3.1%
Eosinophils	1.7±2.1%
Basophils	0.4±0.7%

Table 6: CD-4 count distribution

CD 4 count	No.of cases	Percentage
<200	88	88
200-499	11	11
>500	1	1
Total	100	100

The mean CD-4 count was 99.5. Range 6-800. Almost all the patients (88) enrolled in our study had CD4 count <200/microlitre with only a minor fraction (11) having counts ≥ 200/microliter.

Table 7: Haemoglobin distribution

Hb gm%	Male	Female	Total
4.1 – 7.0	6	0	6
7.1 – 10	22	15	37
10.1 – 12.0	13	11	24
12.1 – 14.0	14	17	31
14.1 – 16.0	2	0	2
Total	57	43	100

The mean Hb value was 10.5 ± 2.1 g/dl.
Range 4.1 – 16 gm%.

Table 8: Anaemia

	Anaemia	Percentage
Male (n=57)	52	91.22
Female (n=43)	26	60.46
Total	78	78

Males were found to have anemia more commonly than female patients

Discussion

The mean age of the study population was 36.2± 7.5 yr. About 48% of them were in 30-39 year age group i.e., age at the diagnosis of HIV infection.

As per the data released by Karnataka State AIDS Control Society about 50% of HIV infected patients belonged to 30 - 49 years at the time of diagnosis.

In the western countries about 36% of them were in the 35-44 years age group at the time of diagnosis, which happens to be the Major age group affected.

Our data is in concordance with these data

In our study population 57% were males and 43% females. The M:F ratio was 1.3:1. The sex ratio of PLHA is at the time of diagnosis was 8:3 in India [137] and 7:3 in western countries [138].

The ratio was altered in our study probably, because more males got excluded who were alcoholics. Hence our sex ratio differed from those of the surveillance reports.

Majority of the PLHA's (about 51%) belonged to stage III at the time of diagnosis whereas only 9% were in stage I. Hence the diagnosis of HIV infection was considerably less in the asymptomatic stage and most of them were diagnosed only with features of full blown AIDS and Opportunistic infections.

This implies the fact that, most of the PLHA's at diagnosis had full blown AIDS and hence would develop most of the complications and opportunistic infections. Initiation of retroviral therapy would only add on to the morbidity.

The mean total count in our study was 6297 ± 2251 cells / mm^3. The total count varied between 2000 to 11,000 cells/mm^3. 30% of them had leucopenia.

The percentage of PLHA's with leucopenia at the time of diagnosis was found to 16% and 25% by Amballi *et al*. [11] and Amanda *et al*. [12] respectively. Erhabor *et al*., in his study on the effect of anti-retroviral therapy on the haemotological profile of people living with HIV (PLHA) found leucopenia in 62% [13].

Higher incidence of leucopenia in our study may be due to the diagnosis of HIV infection at advanced stage. This again reiterates the fact that diagnosis of HIV infection at advanced stage would increase the incidence of complication.

The awareness campaigns and counseling programs has to be intensified, so that the diagnosis of HIV infection can be done at earlier asymptomatic stage.

The mean neutrophil count was 62 ± 9.6% and in our study 28% had neutropenia. Whereas Amballi *et al*. found 42.4% of PLHA's to have neutropenia at the time of diagnosis of HIV infection.

In our study, out of the 28 persons who had neutropenia, 22 were in advanced stage of HIV disease (stage III & IV) and 4 were in stage II, 2 were early asymptomatic stage of HIV infection (Stage I). Zon and group man noted neutropenia in 13% of asymptomatic HIV infected patients and in 44% of those with frank CDC - defined AIDS [14].

In the multistate adult and adolescent spectrum of HIV disease surveillance project neutropenia was detected in 10% and 50% of asymptomatic patients and advanced stage of HIV disease patients respectively. Hence the occurrence of neutropenia was lesser in our study.

In our study more patients in advanced stage of HIV infection were having neutropenia. This poses them at the increased risk of developing opportunistic infections.

The mean lymphocyte count was 31.4 ± 9.71% and the median CD4 count was 99.5 cells/micro litre. CD4 count varied between 6 cells/ml to 800 cells/ml. Lymphocytopenia was found in 26% of the PLHA's and CD4 count <200 cells in 29% of the patients. In the study conducted by Amballi *et al*. the median CD4 count was 160 cells. They detected lymphopenia and CD4 count <200/microlitre in 24.3% and 62.8% respectively.

In our study majority of the PLHA's (61%) were in advanced stage (III & IV) of HIV infection. The findings of low CD4 count in 88% of patients and lymphocytopenia in 29% is in accordance with WHO document and clinical staging of HIV / AIDS for adults and adolescents, which ascertained both lymphocytopenia and CD4 cells depletion in HIV / AIDS.

Platelet count varied between 0.17 to 3.6 lakh/mm^3 and the mean count was 1.44 ± 0.48 lakh/mm^3. Thrombocytopenia was found in 49% of the PLHA's in our study. In his study conducted among HIV positive pregnant women Khandekar *et al*, found thrombocytopenia in 9% of them [15].

Pechere *et al*. detected thrombocytopenia in 40% of HIV infected patients during the course of the disease and as the

first symptoms or sign of HIV infection in approximately 10% [16].

Murphy *et al*. concluded that thrombocytopenia was found in 30% (6 of of patients with advanced HIV disease and 8% (5 of 59) in those with asymptomatic HIV infection. In our study it was found in 38% (26 of 67) and 42% (14 of 33) of advanced HIV disease and asymptomatic HIV infection respectively.

Conclusion

- 100 PLHA's were analyzed for the Hematological abnormalities in HIV/AIDs.
- Majority of them were in stage III (51%) and had CD4 count <200/microlitre (88%).
- Leucopenia was found in 30% of them.
- Neutropenia was detected in 28%.
- Thrombocytopenia was found in 49%

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