HAEMATOLOGICAL PROFILE OF HIV SEROPOSITIVE PATIENTS IN RELATION TO CD4 LYMPHOCYTE COUNT
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ABSTRACT: BACKGROUND: Haematological abnormalities are a common complication of HIV infection. These abnormalities increase as the disease advances. AIM: To correlate haematological parameters with CD4 lymphocyte count. SETTING & DESIGN: Study population constituted randomly selected HIV patients attending ICTC & ARTC centre DR. B.R.A.M. Hospital, Raipur, Chhattisgarh. It is prospective, cross sectional observational study undertaken over a period of one year starting from January 2013 to December 2013. METHOD AND MATERIALS: Three hundred HIV infected individual were screened for haematological abnormalities. Patients on medication for anaemia or anti-retroviral therapy were excluded from the study. Patients were first screened by rapid ELISA test for HIV then absolute CD4 cell count analysis was carried out on the seropositive sample by flow cytometry. STATISTICS ANALYSIS METHOD: The association between CD4 cell counts and different haematological parameters was compared by using the Chi square test. RESULTS: M: F ratio was 1.2:1. The most common haematological abnormality was anaemia, seen in 74.6% (224/300) patients & 11.66% (35/300) patients were having haemoglobin <8g/dl (Severe anaemia). Normocytic normochromic anaemia was the commonest type of anaemia presented in 25.6% (77/300). Leucopenia was present in 18% (54/300) & thrombocytopenia in 7.7% (23/300) case. CD4 count was <200 in 29.3% (89/300) case. Anaemia, leucopenia & thrombocytopenia showed an inverse correlation with CD4 count (p<.001) which is statically significant. CONCLUSION: The frequency and severity of these haematological manifestations increased with decline in CD4 count. This decline was significantly associated with clinical outcomes and quality of life.
KEYWORDS: HIV, Haematological profile, CD4 cell count.

INTRODUCTION: Haematological abnormalities are among the most common complications of HIV. These involve all lineages of blood cells.¹ HIV associated haematological abnormalities seem to be dependent on the level of virus replication, as these abnormalities are severe in late-stage AIDS patients with high viremia. The mechanism underlying these abnormalities is still obscure. A specific diagnosis of the cause and mechanism must be sought because specific treatment may be needed for its correction.¹ These manifestations also reflect the underlying immune status if interpreted cautiously, especially if the patient is in regular follow-up. They may cause symptoms that are life-threatening and impair the quality of life of this patients.² the most important of them are cytopenias. Anaemia and neutropenia are generally caused by inadequate production (because of suppression of the bone marrow by the HIV infection through abnormal cytokine expression and alteration of bone marrow microenvironment).³
Thrombocytopenia is caused by immune-mediated destruction of the platelets, in addition to inadequate platelet production. Optimal management of the underlying HIV infection is essential, and mild cytopenia in asymptomatic patients may need no specific management.\textsuperscript{3,4,5}

We tried to evaluate the relationship between various haematological manifestations and CD4 cell counts in a hospital-based cohort of HIV-infected adults attending to hospital from Chhattisgarh region. As this type of study was not performed earlier in this region.

**MATERIAL AND METHODS:** It is prospective, cross sectional observational study undertaken over a period of one year starting from January 2013 to December 2013. Study population constituted randomly selected HIV patients attending ICTC & ARTC centre DR. B.R.A.M. Hospital, Raipur (C.G.).

**Inclusion Criteria:** Asymptomatic HIV patients, HIV patient with AIDS related complex or with AIDS. We have only studied the patient who had not been previously treated with anti-retroviral therapy to avoid confounding factor in form of changes caused by therapy itself.

**Exclusion Criteria:** Patients having conditions that could possibly affect blood cell count were excluded from the study. As:-

- Patients on medication for anaemia
- Pregnant or lactational patient
- Patient age <18 years of age
- Patients suffering from known malignancy or haematological disorders (e.g. Thalassemia, Haemophilia),
- Medical condition known to cause anaemia (chronic renal disease, hypothyroidism), congenital haematological disorder.

After obtaining informed verbal consent from patients, detailed case history taken from individual patients, general & systematic examination was performed with emphasis on signs suggesting haematological system involvement.

HIV status was confirmed by antibody testing using ELISA (third generation) with two different antigens.\textsuperscript{6} If a patient seropositive for HIV, 4ml blood was collected for haematological investigation & CD4 cell count. CBC were performed on fully automated five part differential cell counter & CD4 lymphocyte count was carried out by FACS counter (Fluorescent Antibody Cell Sorter, Becton Dickinson; USA).

**STATISTICS:** The association between CD4 counts and different haematological presentations was compared between different grades of anaemia, leucopenia and thrombocytopenia using the Chi square test on actual CD4 levels. Leukocyte values, hemoglobin levels and platelet counts were taken as continuous variables and correlated with CD4 levels. A p value <0.05 was considered as statistically significant.

**RESULTS:** 300 patients with HIV infection were included in the study after strict compliance to exclusion criteria. Out of 300 patients 166(55.33\%) were male & 134(44.66\%) were female. M:F ratio was 1.2:1. Predominant age group was 31-40.
The most common haematological abnormality was anaemia, seen in 74.6% (224/300) patients & 11.66% (35/300) patients were having haemoglobin <8 g/dl (severe anemia). Mean Hb was 11.01±2.4. Normocytic normochromic anaemia was commonest type of anaemia present in 77(25.6%) cases, followed by microcytic hypochromic anaemia 68(22.66%), normocytic hypochromic anaemia 58(19.33%), pancytopenia 17(5.67%) and dimorphic anaemia in 73(24.33%) cases.

We found CD4 cell count <200/cumm in 89(29.6%) cases, 201-500/cumm in 147(49%) cases & >500/cumm in 65(21.7%). Table 1 & figure 1 shows correlation of haemoglobin to CD4 lymphocyte count. Of the 89 cases with CD4 count <200/cumm, 22(24.7%) cases had Hb <8gm%. According to this Chi square was 41.807 & p=0.001, this was statically significant (p=0.001).

![Fig. 1: HB% In relation to Cd4 Lymphocyte Count](image)

| Hb gm % | CD4 count | Total |
|---------|-----------|-------|
|         | <200      | 201-500 | >500 |
| <8      | 22        | 8       | 5    | 35   |
| >8-10   | 29        | 28      | 7    | 64   |
| >10-12  | 21        | 52      | 20   | 93   |
| >12     | 17        | 58      | 33   | 108  |
| Total   | 89        | 146     | 65   | 300  |

Leukopenia was seen in 18% (54/300) of cases. Out of which Neutropenia (ANC<1500cell/ µl) was seen in 6(8%) cases & lymphopenia (ALC<800cells/ µl) was seen in 48(16%) cases. Figure 2 & table 2 shows correlation of TLC count with CD4 lymphocyte count.
Out of 89 cases with CD4 count <200/cumm, 31(35.2%) cases had TLC<4000/µl. According to this Chi square = 23.4 & p<0.001 this was statistically significant.

| TLC Cells/ µl | CD4 count | Total |
|---------------|-----------|-------|
|               | <200      | 201-500 | >500 |
| <4000         | 31        | 15      | 8    | 54   |
| 4000-11000    | 55        | 129     | 53   | 237  |
| >11000        | 2         | 3       | 4    | 9    |
| **Total**     | **89**    | **146** | **65** | **300** |

Table 2: Correlation of patient TLC with CD4 count

Fig. 2: TLC in Relation to CD4

Fig. 3: Platelet count in relation to CD4
Thrombocytopenia (<1 lakh/ µl) present in 23(7.7%), normal range of platelet count present in 259(86.3%) cases. Figure 3 shows relation of platelet count to CD4 lymphocyte count. Of the 89 cases with CD4 count <200/cumm, 19(21%) had platelet count <1lakh/ µl. So Chi square= 31.38, p<0.001, this was statically significant (p<0.001).

**DISCUSSION:** HIV infection is a multisystem disease, haematological manifestations are the second commonest cause of morbidity and one of the common causes of mortality in HIV patients.\(^3\),\(^4\),\(^5\),\(^6\) Cytopenias are most frequent during the advanced stage of disease.\(^2\) Though many studies have been conducted in India, in most of them, various aspects were addressed and the focus on the haematological manifestations was limited.\(^7\),\(^8\),\(^9\),\(^10\) In the present study, various hematologic manifestations were evaluated on 300 HIV infected patients. We detected anaemia in 74.6% of cases. Anaemia has been found to be the most common haematological manifestation in HIV/AIDS patients in many studies with an estimated prevalence ranging from 10% in asymptomatic HIV infected patients to 92% in patients with AIDS.\(^11\) Amballi et al studied 162 HIV seropositive patients and found anaemia in 74% cases and Attili et al studied 470 cases of AIDS and found anaemia in 74.6% cases. This high prevalence may be due to decreased or ineffective production or increased destruction of red blood cells. The mean Hb value was 11.01±2.4g/dl which is comparable with the studies of Dikshit B et al & Christian et al which were 10.3±2.7 & 10.03±0.31 respectively. Mocroft et al showed that haemoglobin levels provided prognostic information independent of that provided by CD4 count.

We found leucopenia in 18% of cases, which is similar to the findings of Amballi et al (16%) & Parinitha et al (20.8%). Neutropenia in 8 %of cases was comparable with the study of Choi S Y et al (10%) & lymphopenia in 16% of cases is comparable with the study of Parton LL et al (20.7%).

We detected thrombocytopenia in 7.6% of cases which is comparable with the studies of Dixit B et al (7%), Jose J et al (9%) & Denue et al (9.6%). Possible etiologies of thrombocytopenia in HIV infection include immune mediated distruction, inadequate production of platelets, thrombotic thrombocytopenic purpura, impaired haematopoiesis & toxic effects of medication.

Present study showed inverse correlation between anaemia & CD4 count with p value of 0.001 which is statically significant. Dixit et al, Atilli et al & Christian O et al also showed statically significant inverse correlation between anaemia & CD4 count. The CD4 T cells are the main targets of HIV and progressive distraction of these cells is characteristic of all stages of HIV disease. During HIV asymptomatic phase there is gradual fall in number of CD4 lymphocytes and initial surge in CD8 lymphocytes. As the infection progress, there is pancytopenia comprising of lymphopenia, normocytic normochromic anaemia and thrombocytopenia.\(^12\)

**CONCLUSION:** Peripheral blood abnormalities are common in HIV infected individual. These abnormalities are seen not only in patients with advanced disease, but also during primary infection and during the clinical latency phase also. There is a strong negative association between CD4 counts and the severity of anaemia. The relation between anaemia and disease progression is straightforward and quite useful for the treating physician.
Cytopenia often causes symptoms and contribute to complication suffered by patients with AIDS like infections, anaemia and bleeding. These cytopenia are often treatable and even correctable. Therefore it is strongly recommended that in all cases of unexplained blood dyscrasias, the possibility of ‘Silent’ HIV infection must be seriously entertained. This will lead to effective management of cases and reduce the morbidity and mortality of this dreaded disease.

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ORIGINAL ARTICLE

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