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STUDY OF SERUM IRON PROFILE IN PEOPLE LIVING WITH HUMAN IMMUNE-DEFICIENCY VIRUS (HIV) WITH ANEMIA: A DESCRIPTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: Anemia is considered as one of the commonest hematological manifestation in HIV infection. It is important because it indices disease severity, progression of disease and quality of life. Among various etiologies iron deficiency, anemia of chronic disease and drug induced anemia arecommon etiologies. This study will help to identify the patterns of iron profile in patients with HIV infection with anemia. **Methods:** One hundred and ten participants were enrolled in this descriptive cross sectional study who were diagnosed as a case of confirmed Human-Immune deficiency Virus infection with anemia, from June 2018 to July 2020. All the detail data of serum iron profile (serum iron, Total Iron Binding Capacity, serum ferritin), complete blood count, peripheral smear, CD4(cluster of differentiation 4) count, viral load, duration and treatment regime of antiretroviral treatment and staging were recorded after taking ethical clearance from the institute. Statistical analysis was done using Statistical Package for the Social Sciences. **Results:** We observed 53.6% female with median age of 41.2 years with mean duration of anti-retroviral therapy for 5.3 years. 71% of study participants had mild anemia. Among all participants, 69% had normal range serum iron level, 54% had normal range TIBC and 61% had normal range serum ferritin level as the commonest iron profile manifestation. 90% of the participants had undetectable viral load and 81% had CD4 count more than 500 copies/ml. **Conclusion:** Despite undetectable viral load and higher CD4 count in majority of participants with antiretroviral therapy, young age people living with HIV infection had predominantly mild anemia but with normal serum iron level, TIBC and serum ferritin as the commonest finding of iron profile.

KEYWORDS: Anemia; iron profile; Human Immune-deficiency Virus.

INTRODCUTION

Among various hematological abnormalities in Human Immune-Deficiency Virus(HIV) infectedpeople, anemia is one of the commonest abnormalities which is associated with progression of disease and low quality of life.[1,2] There are many etiologies of anemia in HIV infection.

Nutritional deficiencies, opportunistic infections, drug induced anemia and HIV infection itselfare the common etiologies.[3] Among these etiologies Iron deficiency anemia and anemia of chronic disease are considered more common.[4]

Iron metabolism is affected by inflammation, mal-absorption, dietary intake and many other factors which directly alter the hematopoiesis in body.[5] Serum iron, Total iron binding capacity (TIBC) and Serum ferritin reflects the iron status in body. Elevated iron status may increase risk of progression of disease and also the risk of opportunistic infections whereas low iron level may contribute iron deficiency anemia which decreases the quality of life.[6] In fact, anemia in HIV infection is considered poor prognosis and associated with increase mortality. As HIV is a chronic infection, it can alter the metabolism of iron and can cause anemia, but with treatment of Anti-retroviral Therapy, suppression of viral load, therapeutic iron supplement and management of co-infections and comorbidities, the iron status of patients may have subnormal findings.

The main objective of this study is to find the patterns of iron profile in patients with HIV infection, so that early identification of abnormal iron profile and timely intervention with medication will help to improve iron status of the patient.

METHODS

This is a hospital based cross-sectional study which was conducted in B.P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal after ethical clearance from the institute. An informed verbal and written consent were taken with assurance that consenting or refusing to participate in the study will have no effect on the treatment they receive. All consecutive patients more than 18 years of age diagnosed as cases of HIV infection with anemia (Hemoglobin levels <12.0 g/dL in women and <13.0 g/dL in men) and not under any parental or oral iron therapy were included for the study. The convenient sampling technique was used. A detailed socio- demographic data of age, gender, duration of diagnosis of HIV, duration of initiation of ART (Anti-retroviral Therapy) and relevant investigations of complete blood count, Serum iron , Total Iron Binding Capacity , Serum Ferritin , CD4 (cluster of differentiation 4) count and HIV RNA level were recorded. Analysis was done using Statistical Package for the Social Sciences.

RESULTS

In our study, we took 110 patients visiting to our hospital. The mean age in our study was 41.2 years. Among them 53.6% were female.

Table 1: Demographic and clinical profile of the study participants (N=110).

Description of variables	Frequency (n)	Percentage (%)
Age (yrs) (Mean ± SD)	41.2 ± 9.4	
≤ 20 yrs	3	2.7
21 – 35 yrs	33	30.0
36 – 45 yrs	42	38.2
≥ 46 yrs	32	29.1
Gender		
Male	51	46.4
Female	59	53.6
Duration of HIV diagnosis (yrs) (Mean ± SD)	5.5 ± 4.2	
Duration of ART therapy (yrs) (Mean ± SD)	5.3 ± 4.8	

We looked for hemoglobin profile in our study where we found 71% of study participants had mild anemia (hemoglobin 11.0 to 12.9g/dL in male and 11.0 to 11.9g/dL in female). Only 5% of study participants had severe anemia (Hb<8 g/dL). Serum iron profile showed normal serum iron level (60 to 160mcg/dL in adult female and 80 to 180 mcg/dL in adult male) in 69% of patients, normal TIBC(255 to 450 mcg/dL) in 54% of patients and normal level of serum ferritin (10 to 150ng/mL in adult female and 12 to 300 ng/mL in adult male) in 61% of patients as the commonest findings.

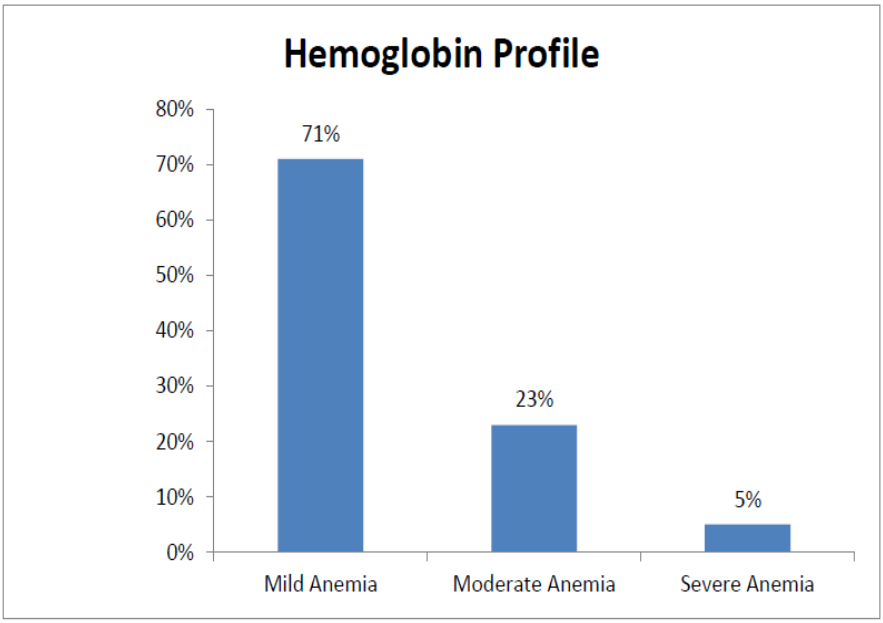

Fig. 1: Hemoglobin profile of study participants (n=110).

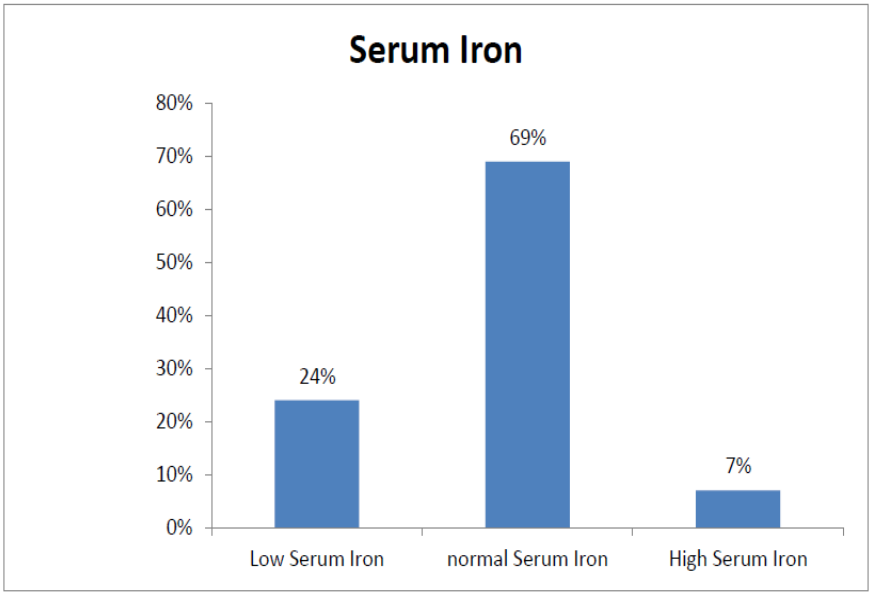

Fig. 2: Serum Iron level of study participants (n- 110).

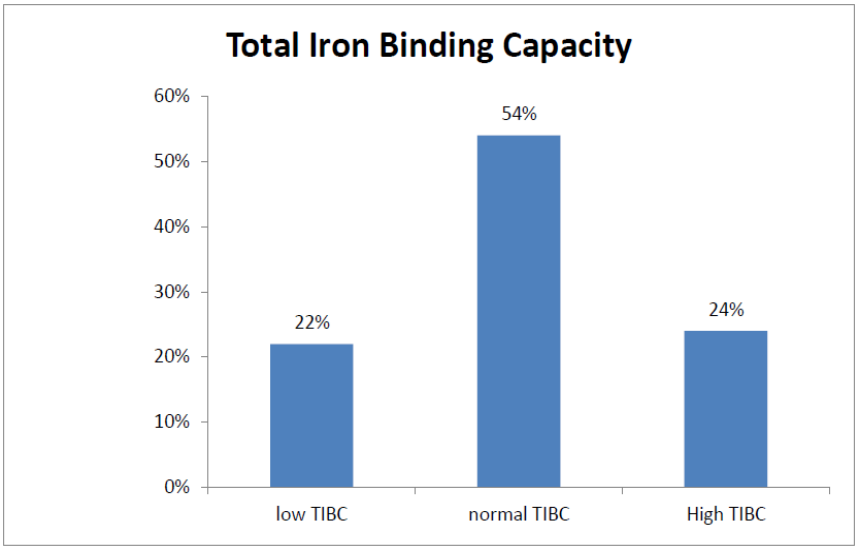

Fig. 3: Total Iron binding capacity in study participants (n=110).

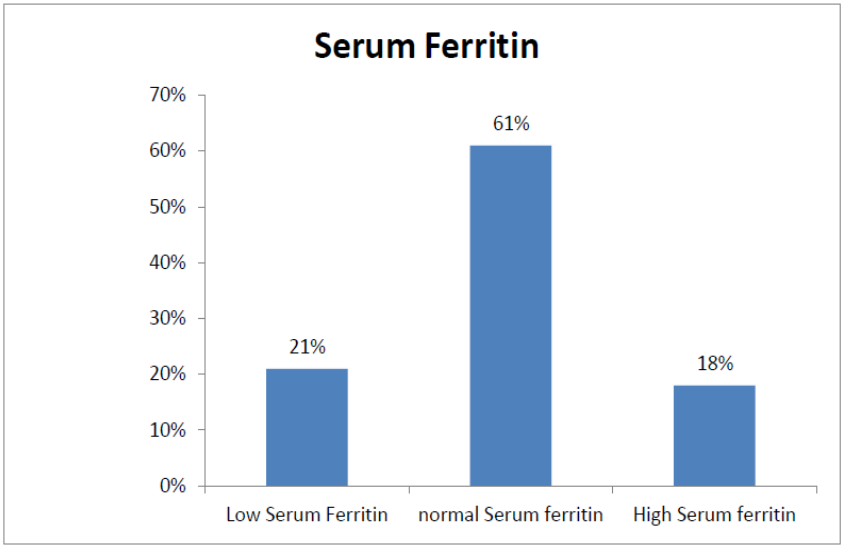

Fig. 4: Serum Ferritin level in study participants (n= 110).

In our study, most of the study participants (90%) had undetectable viral load, however 8% of study participants had detectable viral load and 2% of study participants had viral load more than 10,000 copies/ml. Our study also found that most of our study participants (81%) had CD4 countmore than 500 cells/mm^{3}.

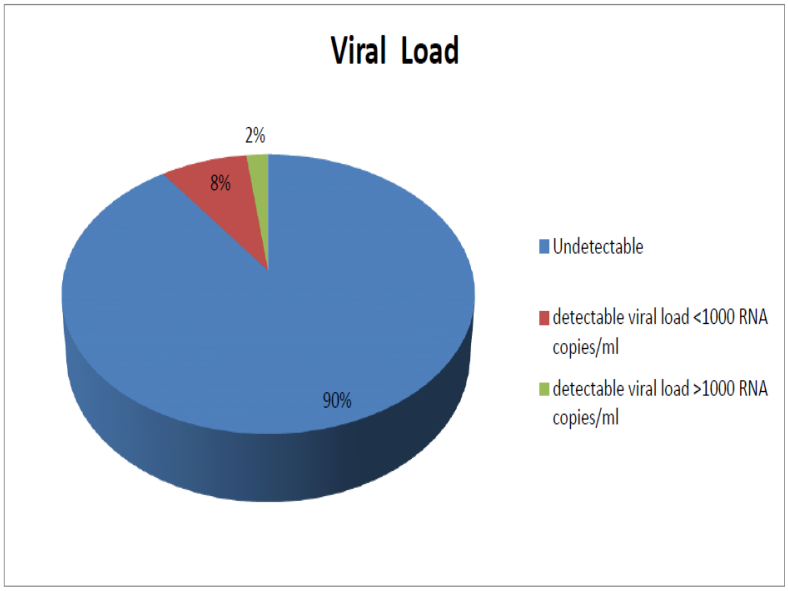

Fig. 5: Viral load (RNA copies/ml) in study participants (n=110).

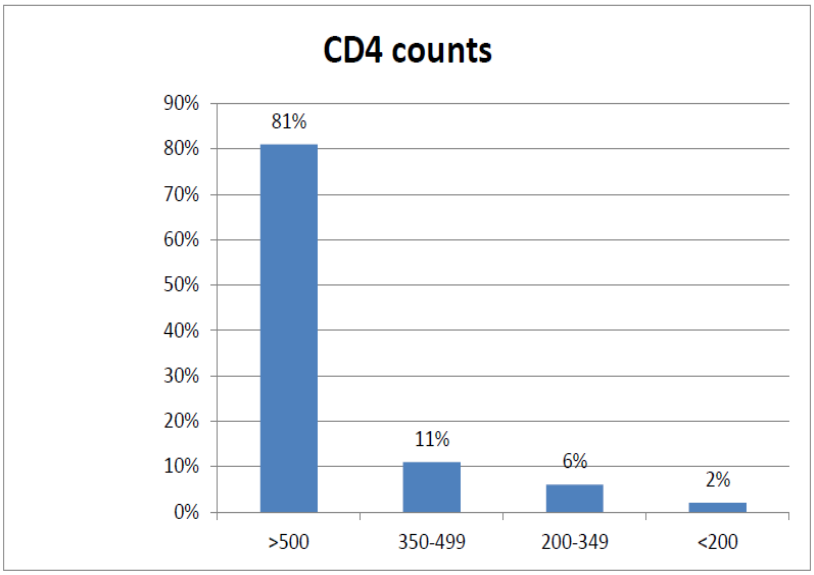

Fig. 6: CD4 count (copies/ml) among study participants (n=110.

DISCUSSION

Anemia is the commonest hematological manifestation in HIV infection which is associated with diseases progression and decrease quality of life.[7] HIV infection is considered as chronic disease. Therefore, like any other chronic diseases, HIV infection itself can cause anemia of chronic disease. However the prevalence of iron deficiency anemia is also high in general population. Also other comorbidities like renal diseases, medications for HIV and various co- infections can contribute low hemoglobin level.[8]

Our study showed 71% of participants had mild anemia. Only 5% of study participants had hemoglobin less than 8g/dL which is less compared to previous study done by Dikshit et al.[9] This is probably due to effective ART with viral load suppression in most of our patients. Our study also showed normal serum iron level in 69% of study participants. Low and high serum iron was found in 24% and 7% of study participants. However, in a study conducted by Kharb et al, 90% had normal range serum iron level in HIV seropositive females.[10] Though most of thepatient had normal serum iron level, patients with low and high serum iron were also not uncommon. Normal total iron binding capacity was more common (54% of study participants) than low or high TIBC in our study. Similarly normal range serum ferritin was the most common finding (61% of study participants) than

low serum ferritin (21% of study participants) and high serum ferritin (18% of study participants). In our study, the prevalence of high serum ferritin was higher(18% of study participants) compared to the study conducted by Lopez-Calderon et al in which only 11% of study participants had high serum ferritin.[11] Since serum ferritin is also an acute phase reactant, it can be elevated in other inflammatory conditions also.

Most of the patient (90% of study participants) had undetectable viral load and 81% of study participants had high CD4 count (>500 copies/ml) with anti-retroviral therapy. There could be various etiologies of anemia other than HIV infection itself. Our study showed normal range serum iron, TIBC and serum ferritin as the most common pattern of iron profile in HIV patients with anemia, however low and high level of serum iron, TIBC and serum ferritin are also not uncommon, which might be due to anemia of chronic diseases and iron deficiency anemia.

CONCLUSION

Anemia is relatively common in general population and also in HIV infection. Iron deficiency is the most common etiology in general population but in HIV infection Anemia of chronic diseases might be the commonest etiology. There are still many other factors that can contribute anemia in HIV infection. Despite adequate viral load suppression and high CD4 counts, many of the patients with HIV were having normal serum iron, TIBC and ferritin level. Since HIV itself is considered chronic infection, despite treatment with ART, it may continue to have major role to develop anemia. However we cannot deny other possibilities of renal diseases, drug induced anemia, nutritional deficiencies as the contributing factors.

Since this was a hospital based cross sectional study, the results obtained may not be generalized to whole population of people living with HIV. The main limitation of our study is that it didn't follow up for evaluation of etiologies of anemia, as this was an observational cross sectional study only. Also this study lacks investigation of bone marrow examination for evaluation as it is not commonly practiced in outpatient setting. But this study will definitely help for future studies for etiological evaluation of anemia in HIV infection.

Conflict of interest: None

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