Original Research Article

Profile of CD4, Tumor necrosis factor alpha, Hematological parameters and prevalence of hematological cytopenia in HIV seropositive patients on Anti-retroviral therapy in university of port Harcourt teaching hospital.

ABSTRACT:

Aims: To profile CD4 count, TNFα levels and cytopenia in HIV seropositive patients on AR and also evaluate prevalence of hematological cytopenia.

Study design: This study is a cross sectional study. **Place and Duration of Study**: Sample: department of immunology, hematology and blood transfusion, department of pharmacology university of port Harcourt and university of port-Harcourt teaching hospital, between May 2016 and July 2016.

One hundred patients (45 males and 55 females) were recruited for this study, patients included in this study were HIV positive and on ART for the past six months, they were not on any mind altering medications and where mentally sound and above 18 years.

Results: Hematological examination, CD4 count and serum TNF α levels was done. Prevalence of anemia was high (43.7%), neutropenia and leucopenia showed prevalence of 26.00% and 21.9% respectively. Prevalence of lymphopenia was 2.1% whereas thrombocytopenia was 11.5%. A profile of immunological makers was also accessed and CD4 count was 395.81±273.046, an increase in serum TNF α was observed values was 65.33.20±58.52pg/ml. WBC, lymphocyte and neutrophil were 4.82±1.38, 45.09±10.17 and 42.83±11.05 respectively, lymphocyte and neutrophil levels were below normal ranges. Platelet count of participants in this study was 243.62±66.13 while RBC, PCV and hemoglobin was 3.82±0.75, 36.39± 4.10 and 12.00±1.806g/l respectively.

Conclusion: CD4 count of patients in this study was very low hence the need to boost the immune system, high serum TNF α levels was observed, prevalence of cytopenias was high. Some hematological parameters were within normal ranges while some others where low. Further longitudinal study should be carried out to obtain valid and reliable ranges of immunological and hematological profile of HIV patients on ART in Port Harcourt.

The devastating impact of HIV/AIDS to young and promising adults is well felt in developing countries. Hence the need for developed countries to encourage researches on HIV in developing nations and also provide free drugs.

Human immunodeficiency virus can be contracted via sexual contact, exposure to blood and body fluids.

Acquired immune deficiency syndrome (AIDS) is caused by human immunodeficiency virus (HIV), the virus causes progressive damage to the immune system, as a consequence immunological complications, opportunistic infections and hematological complication abound [2].

The distinguishing complication in cellular CD4 T-helper is its cell depletion by various mechanisms of which: cytokine deregulation, HIV induced cytolysis and HIV induced autoimmunity have been proposed.[3].

CD4 cell are the most vital cells in adaptive immunity. They instruct and orchestrate other adaptive and innate immune cells; hence the devastating impact of its depletion is not surprising.

CD4 count has become a useful measure for monitoring immune function in infected patients, hence its extreme value in management of HIV infection, specifically in monitoring response of anti-retroviral therapy (ART) and HIV progression [4, 5] CD4 count is also a criterion in CDC/WHO classification of HIV infection this criteria is widely used to categorize patents for clinical management of the disease [6].

A range of hematological manifestations are seen during the course of HIV in patents, the manifestation usually present a great challenge in the management of HIV [7]. The most significant is cytopenia of which anemia and neutropenia are most prevalent and are generally caused by inadequate

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production and abnormal expression of cytokines [8].

The prevalence of leucopenia varies widely in patients with HIV, reported cases are between 10-15% [9].

The present study is aimed at evaluating prevalence of anemia, leucopenia, thrombocytopenia the levels of serum tumor necrosis factor alpha (TNF α) and CD4 count of patients ON ART.

The findings from this study will inform policy and practice as regards sate provision of ART to patents.

It will also present preliminary data regarding hematological manifestation in this part of the Nigeria.

The relationship between various hematological manifestations CD4 TNF α will be investigated.

2. MATERIALS AND METHODS

2.1 Study area

This prospective observational study was carried out in the Department of immunology Faculty of Basic Medical Sciences in collaboration with the University of Port Harcourt teaching Hospital Rivers State. University of Port Harcourt teaching hospital is owned and operated by the federal, government of Nigeria. Permission and Ethical Clearance was obtained from the University of Port Harcourt teaching hospital ethics committee. Informed consent was obtained from patients by either signature or thumb print.

2.2 Study Population and Procedure

A total of 100 HIV Patients were recruited into the study a structured and are evaluated questionnaire was used to obtain information on demographic characteristics. The study population consisted of HIV patient who had been on HAART for a period greater than 3 months. Patients were recruited based on the center for disease

control (CDC 1993) revised classification for HIV infection G.3

2.3   Blood Sample Analysis

About 4ml of venous blood was collected by an experienced laboratory technologist from each subject for immunological and hematological investigation. Hematological parameters were determined using hematology analyzer, CD4 count was carried out using Partech cyflow machine (Cytech development Inc, Partech, Germany).

2.4   Statistical Analysis

Software program (SPSS version SPSS Chicago) was used to analyze data. Results were presented using means and standard deviation for descriptive statistics, t-test was used for inferential statistics. Results were also presented as charts.

2.5   Consideration

Ethical clearance was obtained from the Ethical committee of the University of Port Harcourt teaching hospital.

Participants were informed of the objective of the study and were assured of confidentiality. A written informed consent was signed for all the participants and documented.

3. RESULTS AND DISCUSSION.

Table 1. Demographics

Variables	Frequency	Percentage
F	55	71.0
M	45	29.0
Educational status		
No formal education	11	2.8
Post graduate	11	17.6
Primary	23	13.4
Secondary	33	55.9
Tertiary	5	.8
Undergraduate	13	9.6
Occupation of participants		
Business man	11	13.1
Civil servant	12	17.1
Engineer	7	1.8
Farmer	6	4.0
Mechanic	1	.3
Seamstress	1	.3
Self Employed	23	14.1

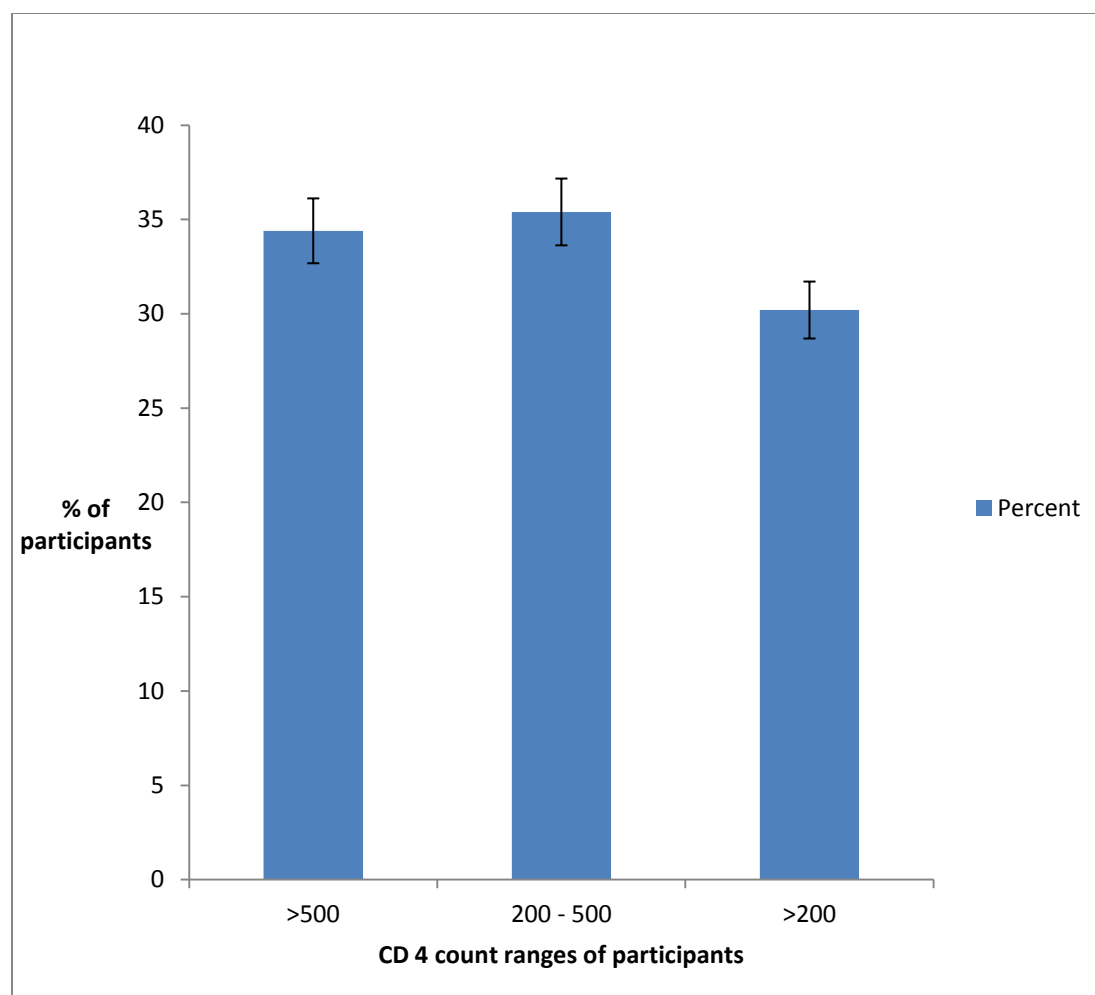|		
Student	21	7.8
Tailor	1	.3
Teacher	1	.3
Trader	11	41.1
Income in Naira		
>50,000	28	17.1
10-30,000	18	31.2
10-30,001	14	2.5
30-50,000	17	34.0
5-10,000	19	15.1

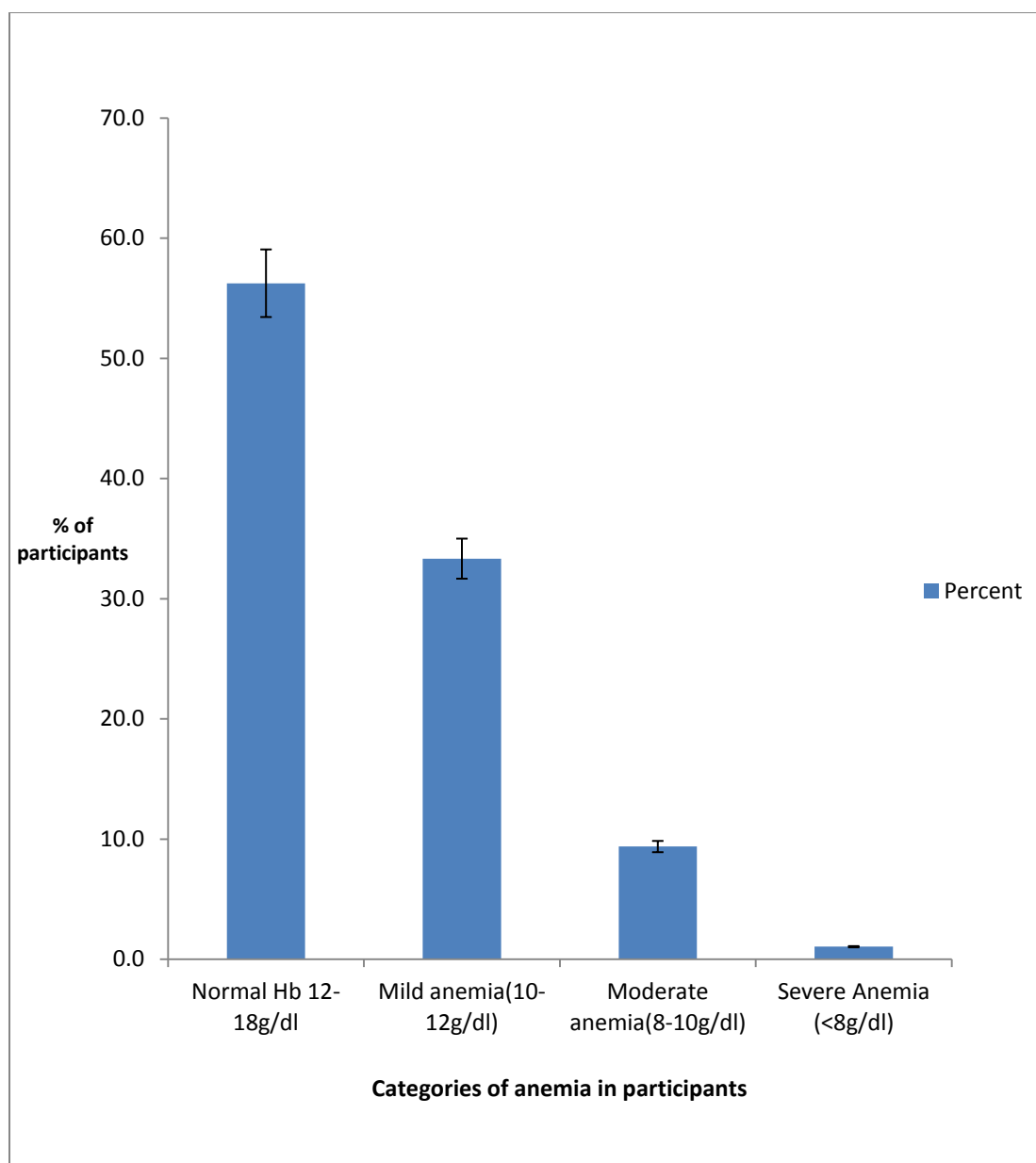**Figure 1 percentage of patients in various CD4 categories**

Figure 2 severity of anemia in participants
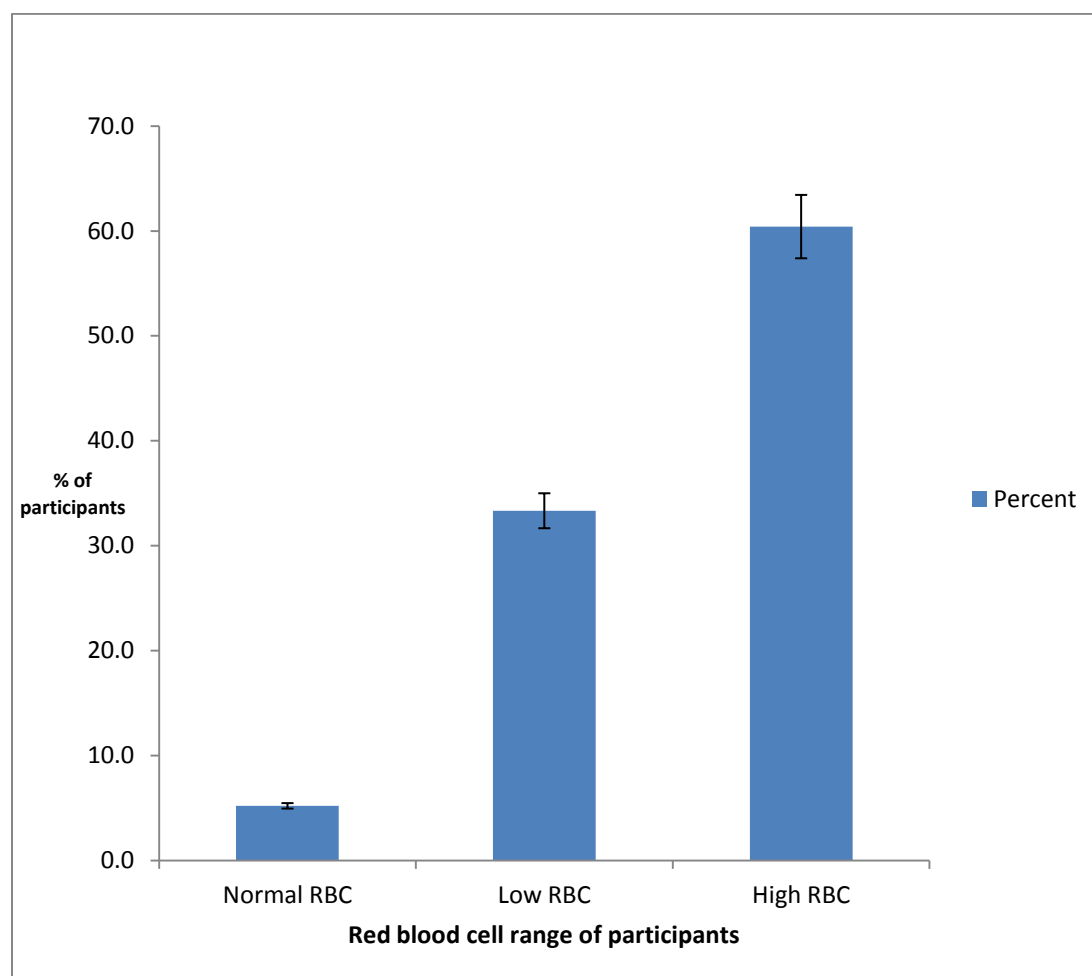
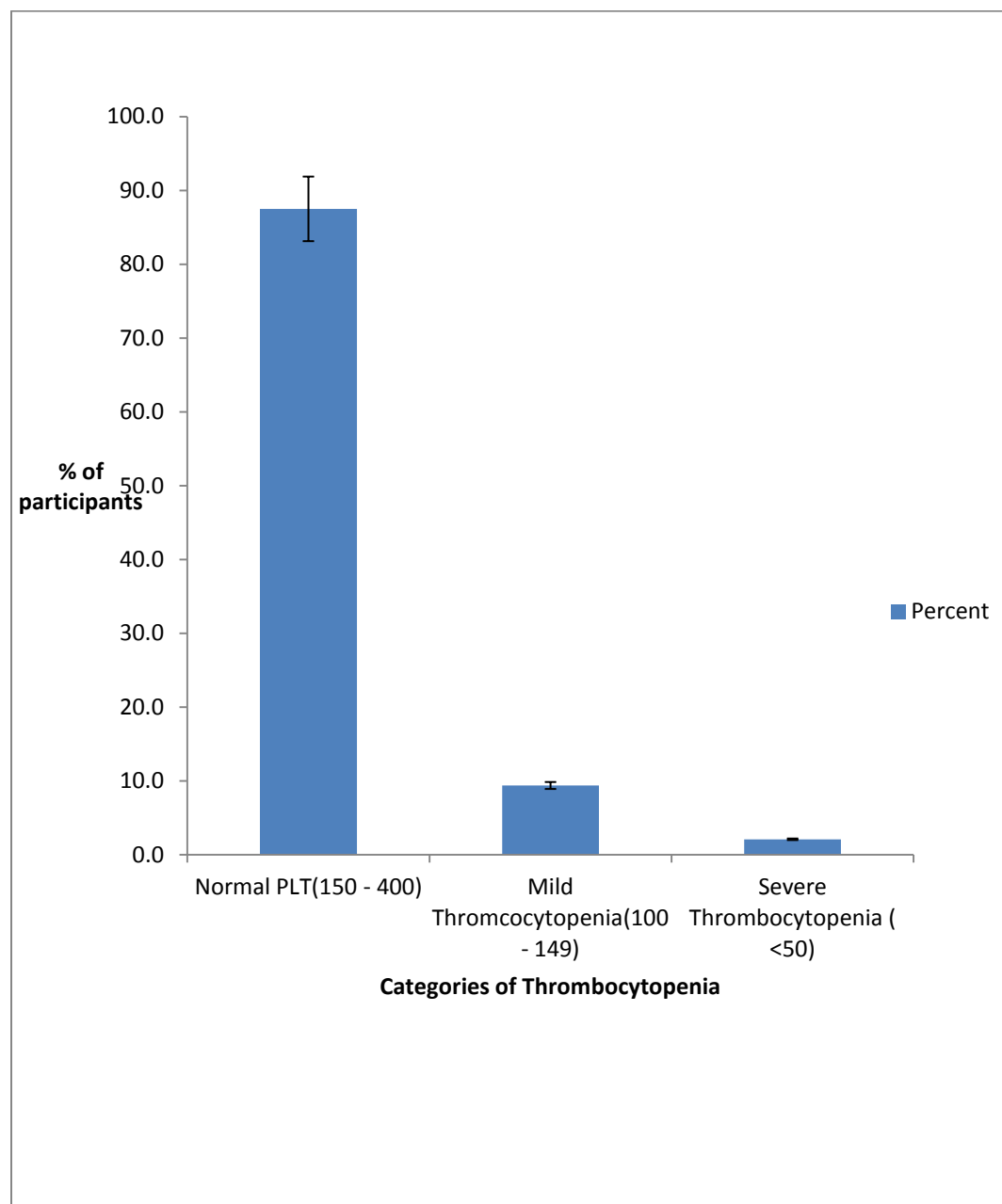**Figure 3 Red blood cell distribution of participants**

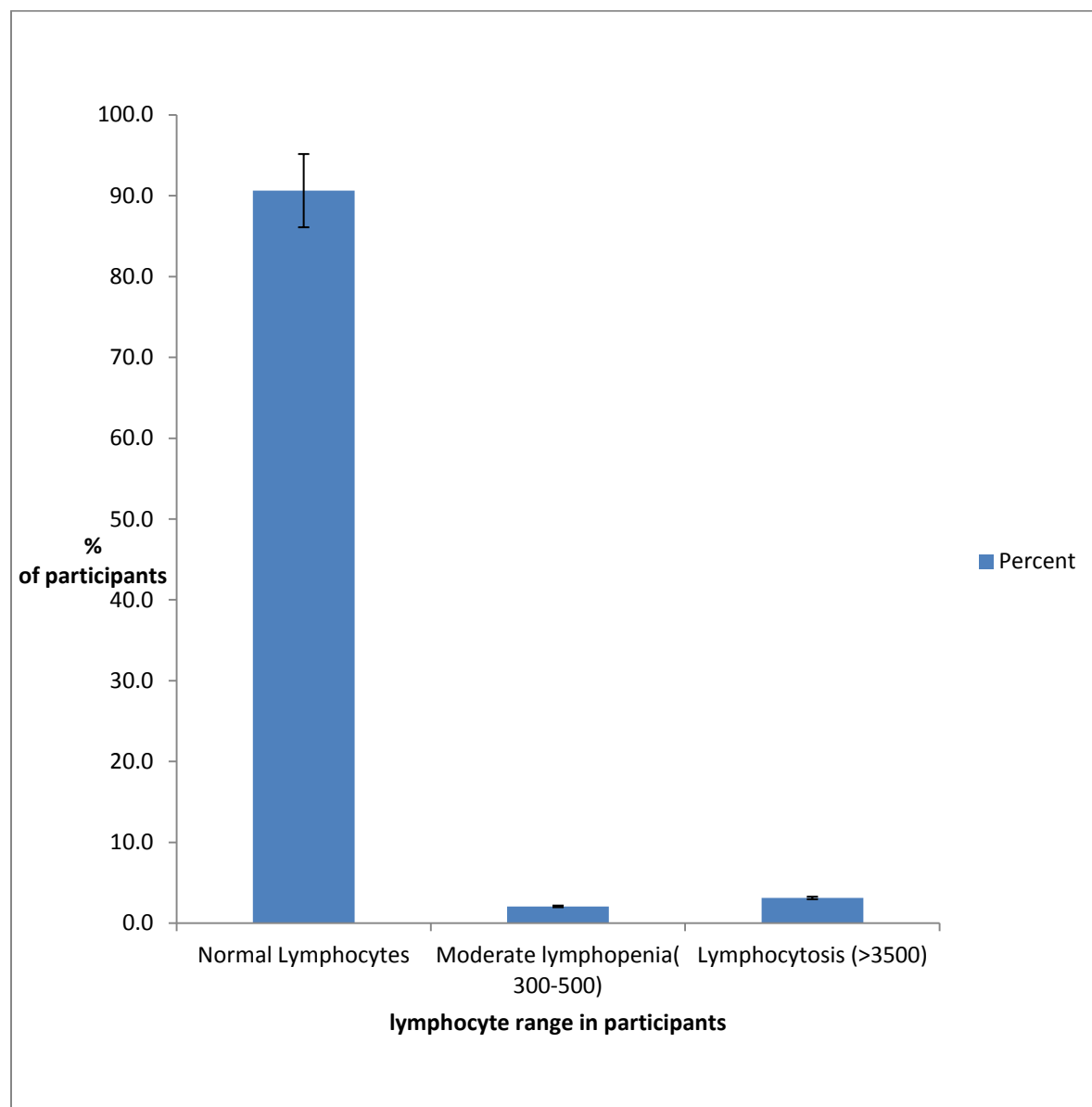**Figure 4   Prevalence of thrombocytopenia**

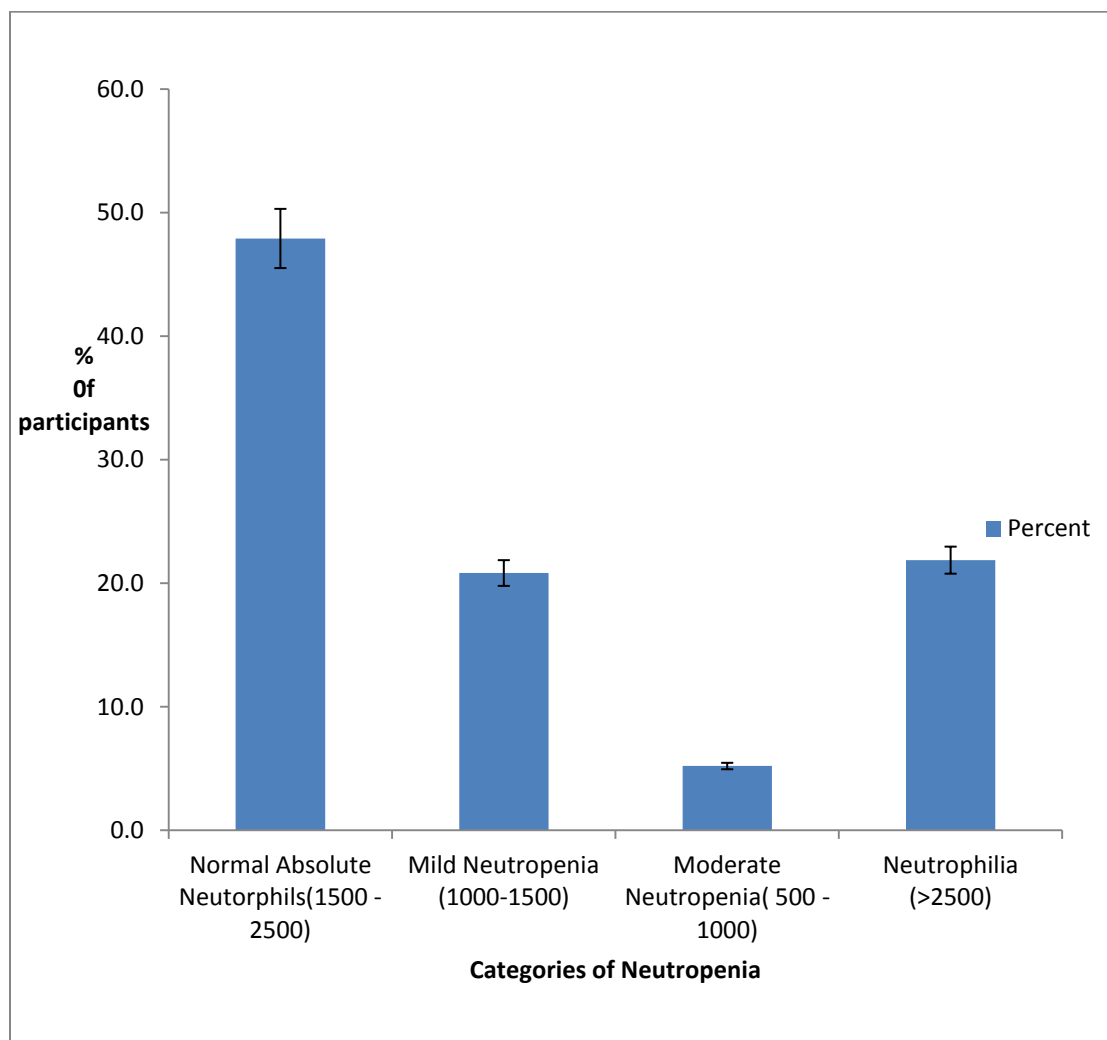**Figure 5   Prevalence of lymphopenia in participants**

Figure 6   Prevalence of Neutropenia in participants
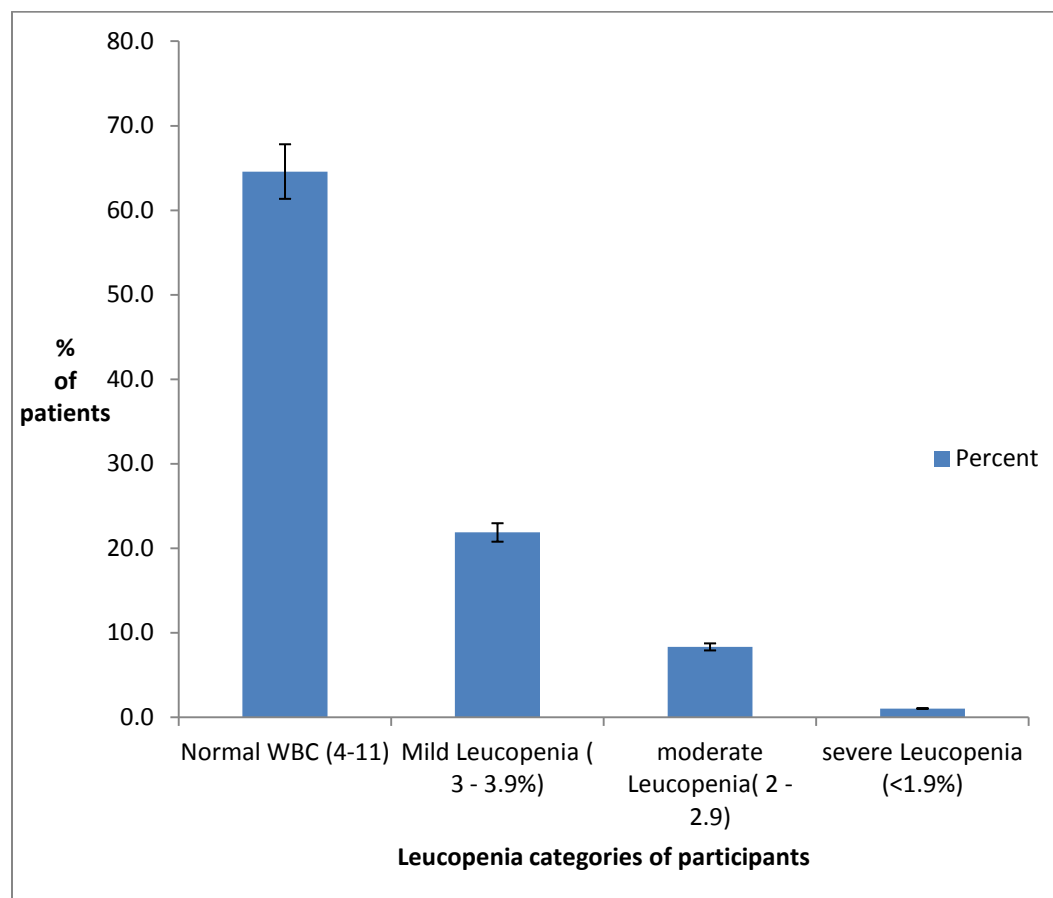
Figure 7   Prevalence of leucopenia in participants

Table 2 summary of immunological and hematological parameters

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Age	96	40.86	11.2	1.15
CD4(cells/μ/L) Baseline	96	395.81	273.046	27.868
RBC(million/μL/cu mm) Baseline	95	3.82	.758	.078
HB (g/dl) Baseline	96	12.00	1.806	.184
PCV (%) Baseline	96	36.39	4.102	.419
PLT(x 103/mL) Baseline	95	243.62	66.130	6.785
Absolute Lymphocyte count Baseline	96	2078.720	889.864	90.821
LYMP (%) Baseline	96	45.09	10.177	1.039
Absolute Neutrophil Count (Baseline)	96	1897.26	823.92	84.09
NUTR(%) Baseline	96	42.83	11.049	1.128

WBC(103/mm3)	92	4.82	1.382	.144
Baseline				
TNFα(pg/ml)	94	65.33	58.526	6.036

DISCUSSION

The demographics of participants are on table 1. Table 2 shows the distribution of CD4 count in participants of the study, 34.4% of the patients had CD4 count greater than 500, 35.4% were within 200-500 while 36.2% had CD4 count less than 200.

Fig 2 shows the severity of anemia in the population. About 56.3% of the population had normal concentration of hemoglobin, only 1% of the participants had severe anemia, mild and moderate anemic subjects were 33.3% and 9.4% respectively.

Fig 3 shows the prevalence of thrombocytopenia, prevalence of thrombocytopenia was 11.5%, in this population mild thrombocytopenia was present in 9.4% of the participants while severe thrombocytopenia was present in 2.1% of participants.

Prevalence of neutropenia was also estimated, prevalence was 26% amongst which 2.8% of participants were in the mild neutropenia group, 5.2% of the participants were in the moderate Neutropenia group, whereas, 21.9% presented with neutropenia.

Lymphopenia was also investigated. About 2.1% of the participants presented with lymphopenia whereas 3.1% had lymphocytosis

Leucopenia was accessed in participants using WBC, 21.9%of participants presented

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with mild leucopenia, 8.3% of participants had moderate leucopenia while 1% had severe leucopenia.

CD4 count and TNF α were immunological makers used to access the immunological system. The CD4 count of the participants was observed and results showed that mean CD4 count was 395.81 ± 273.6, mean tumor necrosis factor alpha (TNF α) was 65.33 ± 58.53.

The Mean hemoglobin (Hb) concentration of participants was also accessed and was pegged as Hb, 12 ± 1.81g/dl. Packed cell volume (PCV) was 36.39 ± 4.1 %, while platelet (PLT) count was 245.00 ± 66.00 X 10^9/L.

Lymphocyte count was 45 ± 10% while the Absolute lymphocyte count was 1897.20 ± 10 823.92.

Neutrophil was 42.823± 11.05 X 10^9/L. Absolute neutrophil has 1897.21± 823.9. White blood cell count (WBC) was 4.82± 1. 382 X 10^9/L.

3.2 Prevalence of Cytopenia in participants

In this study Anemia, leucopenia, neutropenia and thrombocytopenia were common findings. These same findings have been documented by [10, 11, and 12]. In this study prevalence of Anemia was 43.7% which was higher thrower than the 65.5% prevalence found in India in 2008 [13]. Another study in Brazil recorded 37.5% [14]. Furthermore these values were lower than that done in Ogun state of Nigeria, where prevalence was 74%. [15].

The report in this study is also consistent with those reported by [16, 17], where they stated that prevalence of severe anemia declined while mild to moderate anemia remained common. The anemia may be as a result of serum erythropoietin levels, [18] auto-antibodies to erythropoietin, or marrow suppression by opportunistic infections, and medications [19].

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A leucopenia prevalence of 30.3% was observed in this study which was higher than the 26.6% recorded by [20], prevalence of neutropenia and lymphopenia in this study was 26% and 2.1% respectively and these findings were consistent with those of [20].

Findings in this study also show that the results were lower than prevalence found by [21].

It was also observed that the CD4 count of patients in this study was 395.81 ± 273.05; this reduced CD4 count may explain the high prevalence of leucopenia and neutropenia.

This may be as a result of increased suppression of bone marrow and direct T helper cell infection.

The prevalence of thrombocytopenia was 11.5% in this study and this was lower when compared to studies in Lagos [22] were prevalence was 1%. Thrombocytopenia may be due to destruction of platelets by immune cells [23].

The present study also observed lymphocytosis prevalence to be 3.1% this is consistent with studies by [24, 25], they reported that physiologic lymphocytosis was peculiar to West Africans.

3.3 Immunological makers in patients.

The mean CD4 count of participants in this study was 395.81± 273. 05, this value was higher than that reported by [26] findings were higher than those reported by [27] in UK, values were 270 cells.

Tumor necrosis factor plays a major role in HIV, TNF α levels have been found to be consistently high in HIV patients of African origin [28]. The present study observed TNF α levels to be 65.33±58.2pg/ml, this results were greater than those obtained by [28].

Since persistent TNF α activation may have an important pathogenic role, it will be

useful to observe TNF α levels in HIV patients.

4.0   CONCLUSION

The most common hematological abnormalities in the study were anemia, leucopenia and neutropenia, prevalence of anemia was high, and prevalence of leucopenia and thrombocytopenia were also high. High levels of tumor necrosis factor alpha (TNF α levels) were also observed. Mean CD4 count was observed to be between 200-500 cell/ml. finding from this study have led to the recommendation that patents should check CD4 count, TNF α levels, hematological indices and hematological dysfunctions regularly.

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