REVIEW ARTICLE

HAEMATOLOGICAL PROFILE OF HIV SEROPOSITIVE HAART NAIVE CLIENTS IN KOGI STATE UNIVERSITY TEACHING HOSPITAL, ANYIGBA, KOGI STATE. NIGERIA

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ABSTRACT:

Examination of haematological profile is useful for baseline assessment, treatment monitoring and prognostic evaluation in Hiv/AIDS management. The objectives of the study was to assess the haematological profile of HIV seropositive HAART naive patients who attended Kogi State University Teaching Hospital, Anyigba, Kogi State, Nigeria between January 1, 2014 and December 31, 2014. The study was prospective experimental research. Ethical clearance was obtained from ethical committee of Kogi State University Teaching Hospital, Anyigba. Written and verbal informed consent was taken from all patients. A total of 404 HIV seropositive HAART naive patients comprising 147 (36.4%) males and 257(63.6%)females were examined. The overall mean age of patients was 33.0 ±12.7 years and female-male ratio was 1.7: 1. Half of respondents 200(50.4%) accessed HIV care and treatment for the time in stage three HIV disease. Patients had overall mean CD4 cells count of 381.8 ± 240.8 cells/mm³ , white blood cells count of 5.8 ± 3.6 × 10⁹/L, lymphocyte count 2.3 ±1.3, granulocyte count 0.8 ± 0.8 and platelet count of 260.0 ± 109.1 × 10⁹/L. The mean packed cell volume was 34.1± 5.9 %, haemoglobin 11.3 ± 2.1 g/dl and mean corpuscular haemoglobin concentration was 31.5 ± 14.3 g/dl.   The packed cells volume (p=0.0001, T test= 4.0259) and haemoglobin (p=0.0001, T test= 4.1534) profiles of HIV clients were respectively statistically significance with gender, while CD4 cells count (p=0.004, F= 4.523) and platelet count (p= 0.008, F = 3.974) were significance respectively with HIV disease staging. The study recommended the need for awareness programs, nutritional education and micronutrients supplementation including multivitamins for HIV clients.

Keywords: Haematological, HIV, HAART, patients, KSUTH, Nigeria.

PROFIL HEMATOLOGIQUE VIH SEROPOSITIVE HAART CLIENTS NAIFS A L'HOPITAL UNIVERSITAIRE D'ETAT DE KOGI,ANYIGBA, ETAT DE KOGI, NIGERIA.

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RESUME
L'examen du profil hématologique pour l'évaluation de base, le contrôle du traitement et de l'évaluationpronostique dans la gestion du VIH/SIDA. Le but de l'étude était d'évaluer le profil hématologiquedes HAART séropositifs au VIH chez les patients naïfs qui fréquentaient l'hôpital universitaire d'état de Kogi, Anyigba, état de Kogi, Nigeria entre 1er janvier, 2014 et 31ᵉᵐᵉdécembre, 2014. L'étude était la recherche expérimentale prospective. L'approbation éthique a été obtenue du comité de l'hôpital universitaire d'état de Kogi, Anyigba. Le consentement informé verbal et écrit a été prise de tous les patients. Un total de 404 VIH séropositifs HAART patients naïfs comprenant 147 (36,4%) hommes et 257 (63,6%) femmes ont été examinés. L'âge moyenglobale des patients était de 33,0 ±12,7 ans et le ratio femme – homme était 1,7 : 1. La moitié des répondants 200 (50,4%) ont accédé les soins et le traitement du VIH pour le moment à la troisième phase de la maladie de VIH.Les patients avaient la numération moyenne globale des cellules CD4 de 381,8 ± 240,8 cellules/mm³, numération des globules blancs de 5,8 ± 3,6 x 10⁹/L, nombre de lymphocyte 2,3 ± 1,3, nombre de granulocyte 0,8 ± 0,8 et numération plaquettaire de 260,0 ± 109,1 x 10⁹/L. Le

volume cellulaire moyen emballé était 34,1 ± 5,9%, hémoglobine 11,3 ± 2,1 g/dl et la concentration corpusculaire moyenne en hémoglobine était 31,5 ± 14,3 g/dl. Le volume des cellules emballés (p=0,0001, T test = 4,0259) et les profilsd'hémoglobines (p=0,0001, T test = 4,1534) des clients VIH étaient respectivement statistiquement significative avec le sexe tandis que la numération des cellules CD4 (p=0,004, F= 4,523) et la numération plaquettaire (p= 0,008, F= 3,974) étaient respectivement signification avec le stade de la maladie VIH. L'étude a recommandé la nécessité pour les programmes de sensibilisation, l'éducation nutritionnelle et micronutriments supplémentation y compris des multi vitamines pour les clients du VIH.

Mots clés : Hématologique, VIH, HAART, KSUTH, Nigeria.

INTRODUCTION

The World Health Organization (WHO) and United Nations Agency for International Development (UNAID) in 2013 reported that about 35 million people worldwide and 3.4 million Nigerian were living with human immune deficiency virus (HIV). HIV has a great prediction for the CD4 glycoprotein receptor on the surface of immune cells such as the T helper cells, monocytes, macrophages and dentritic cells[4-7]. Examination of haematological profile especially packed cell volume (PCV), haemoglobin (Hb), mean corpuscular volume (MCV), mean corpsular Haemoglobin concentration (MCHC), CD$_4$ Count, white blood cell count (WBC) and platelet count are cardinal as baseline assessment, treatment monitoring and prognostic evaluation in HIV/AIDs management[8-16]. Anaemia is the most common cytopenia in HIV complication and is characterized by packed cells volume (PCV) less than 30%, haemoglobin below 10milligram/deciliter and typically of normochromic and normocytic morphology in 10–20% of patients with HIV infection at diagnosis and the prevalence can range from 66–85% during the course of the disease[8,17,18]. Common causes of normocytic anaemia in HIV patients are chronic diseases, infectious agents such as parvovirus B$_{19}$ or Mycobacterium avium complex (MAC), thrombotic thrombocytopenic purpura (TTP), drug toxicities, autoimmunity and hypersplenism[19-21]. The main mechanism of anaemia of chronic disease is due to haemopoiesis suppression of marrow progenitors by HIV infected T cells[22].

Microcytic anaemia with mean corpuscular volume (MCV) below 80 femto litres are described in HIV patients with iron deficiency anaemia as sequelae of hookworm parasitic infestation, intestinal malabsorption (Giardiasis, Crytosporidosis), lactose intolerance (chronic infection), gastrointestinal bleeding (shigellosis, amoebiasis) and nutritional deficiency[19,23,24]. Megaloblastic or macrocytic anaemia are uncommon except in HIV infected

count in a healthy, HIV negative adult is usually between 500 and 1500 cells per cubic millimeter of blood[30]. In people with untreated HIV infection, the CD$_4$ cells count decline by approximately 50–80 cells per cubic millimeter per year. The pattern of decline may be slow and steady or the CD$_4$ cells count may level off for an extended period of time and then decrease[31].

patients on zidovudine, cotrimoxazole and cytotoxic drug therapy[19]. Most patients develop macrocytosis after 2 weeks of zidovudine initiation and have mean corpscular volume (MCV) greater than 110 femoliters[19]. Macrocytosis can be used as a prognostic marker of zidovdine adherent though is dose dependent and correlate with the climax stage of the disease[19]. The mechanism of megaloblastic anaemia in HIV infected patients on cotrimoxazole therapy is attributed to folate antagonism especially in patients with nutritional deficiency[19]. Anaemia and hypochromic red cells morphological pattern were reported in HIV clients among iron deficiency and thalassemic patients, while hyperchromia were described among sickle cell disease and hereditary spherocytosis. Anisocytosis, poikilocytosis and rouleaux formation has also been noted in the peripheral blood films of some HIV patients[25-27]. Granulocytopenia including neutropenia and abnormal granulocyte functions are problems commonly encountered in patients with HIV infection[28-29]. Neutropenia (Neutrophil count below $1.5 \times 10^9/_L$ may occur in 10-30% of HIV patients typically with advanced disease. The pathogenesis of granulocytopenia in patients with HIV infections is multi-factorial. The mechanism may involves direct effect of HIV infection in the bone marrow, opportunistic infections (cytomegalovirus, mycobacterium avivum complex, tuberculosis, histoplasmosis and leishmaniasis), auto immune disease, infiltrative disorders (infection, maligancy) and drug toxicity (zidovudine, starvudine, Cotrimoxazole and antituberculous; ironiazid, rifampicin and rifabution)[28-29].

The other morphological findings observed in HIV infection include hypogranular giant meta myelocyte, toxic granulation, dohle bodies and cytoplasmic vacuolation in the peripheral blood smear. The CD$_4$ T lymphocyte count in HIV infected patients were described to relate or correlate with the degree of immune suppression and the clinical stage of the patients. A normal CD$_4$ T lymphocyte

Thrombocytopenia occurs in 15-60% of patients with AIDs and is seen in 10% of patients at early stage of HIV infection. The thrombocytes are usually of normal morphology except where there is immune destruction. The possible aetiologies of thrombocytopenia in HIV infection include immune mediated destruction, thrombocytopenic purpura, impaired haemopoicsis, drug toxicity (heparin,

quinidine), alcoholism, splenomegaly and liver disease[31-32].

The objective of the research was to study the haematological profile of HIV seropositive HAART naïve patients in Kogi State University Teaching Hospital Anyigba between January1, 2014 to December 31, 2014.

MATERIALS AND METHODS
Materials used were Sysmex XP 300 haematology analyzer, XP300 cell pack, stromatolyser cellclean, eightcheck 3WP, JIK solution, 7½ surgical gloves, cottonwool and methylated spirit. Other materials were partec cyflow counter cylometer, partec cleaning, sheat and decontamination fluids. The materials also include partec CD_4 and CD_4% easy count kits, rohren tubes, pipettes, tubes rack, EDTA tubes (5mls), determine HIV Test kits with LOT number 38099k300 and unigold HIV test kits with LOT number 2010143. The research was prospective and experimental study that was conducted between January 1, 2014 to December 31, 2014. 404 HIV seropositive clients who attended Kogi State University Teaching Hospital Anyigba after screening with determine and umgold HIV test kits were studied. Ethical approval for the study was obtained from the Ethical committee of the Kogi State University Teaching Hospital Anyigba Kogi State Nigeria.

TABLE 1: DISTRIBUTION OF RESPONDENTS BY DEMOGRAPHIC AND CLINICAL CHARACTERISTICS

(A)   Age distribution of respondents:

Age	Frequency 404(100%)
0-9	22(5.4)
10-19	13(3.2)
20-29	125(30.9)
30-39	140(34.7)
40-49	64(15.8)
50-59	28(6.9)
>60	12(3.0)

(B)   Distribution of respondents by gender:

Gender	Frequency 404(100%)
Male	147(36.4)
Female	257(63.6)

(C)   Distribution of respondents by HIV disease stage:

Clinical Stage	Frequency 404(100%)
1	72(18.1)
2	121(30.9)
3	200(50.4)
4	11(2.7)

Verbal and written informed consent was obtained from all patients. History and examination was conducted on all patients to obtain biodata, weight, clinical staging and risk of opportunistic infections including pulmonary tuberculosis. Whole blood sample was collected between 8.00am to 10.00am by whole blood cells (WBC), granulocytes, lymphocytes, eosinophils and platelet counts. Flow cytometry using partec cyclow counter flow cylometer was used to determine CD_4 T lymphocyte. Data analysis was done using SPSS version 20 statistical software. The veno- puncture into 5ml vacutainer tubes containing EDTA anticoagulant and processed within 4hours of collection. Sysmex XP– 300™ automated hematology analyzer was used after calibration to estimate packed cell volume (PCV), haemoglobin (Hb), mean corpscular haemoglobin concentration (MCHC), study was conducted at a predetermined p<0.05 and 95% confidential interval. Data were generated into cross tabulations, T test and analysis of variance(ANOVA) were conducted to determine statistical significance among the variables.

RESULTS
A total of 404 HIV seropositive HAART naive patients comprising 147 (36.4%) males and 257(63.6%) females were examined. The overall mean age of patients was 33.0 ±12.7 years and female-male ratio was 1.7: 1. Half of respondents 200(50.4%) accessed HIV care and treatment for the time in stage three HIV disease.

TABLE 2: THE BASELINE MEAN HAEMATOLOGICAL PROFILE OF HIV SEROPOSITIVE HAART NAIVE CLIENTS IN KSUTH, ANYIGBA, KOGI STATE

HAEMATOLOGIC PROFILE	DISTRIBUTION OF MEAN AND STANDARD DEVIATION
CD$_4$	381.8 ± 240.8 Cells /mm^3
WBC	5.8 ± 3.6 x 10^9/L
Lymphocyte	2.3 ± 1.3
Granulocyte	0.8 ± 0.8
Platelet	260.0 ± 109.1 x 10^9/L
PCV	34.1 ± 5.9%
Haemoglobin	11.3 ± 2.1 g/dl
MCHC	31.5 ± 14.3 g/dl

TABLE 3: THE DISTRIBUTION OF HAEMATOLOGICAL PROFILE OF HIV SEROPOSITIVE HAART NAÏVE CLIENT BASED ON CLINICAL DISEASE STAGING

HIV DISEASE STAGING	CD$_4$	WBC	LYMPHOCYTE	GRANULOCYTE	PLATELET	PCV	HB	MCHC
1(n=72)	464.6±258.0	5.7±2.2	2.4±1.3	0.62±0.5	255.2±109.2	35.0±6.3	11.4±2.2	30.9±1.1
2(n=121)	390.9±219.7	6.4±5.4	2.3±1.3	0.8±0.8	225.3±97.7	34.5±4.8	11.4±1.9	33.3±26.0
3(n=200)	346.0±238.5	5.5±2.5	2.2±1.2	0.8±0.8	263.4±116.4	33.6±6.3	11.1±2.2	30.6±1.3
4(n=11)	390.9±242.9	5.8±3.0	2.9±2.1	0.7±0.4	304.3±104.8	31.7±6.0	10.6±2.0	31.3±2.2
F Test	4.523	1.602	1.344	1.165	3.974	1.836	0.998	0.948
P value	0.004	0.188	0.260	0.323	0.008	0.140	0.394	0.417
Df	403	403	403	403	403	403	403	403

Patients had overall mean CD4 cells count of 381.8 ± 240.8 cells/mm^3 , white blood cells count of 5.8 ± 3.6 × 10^9/L, lymphocyte count 2.3 ±1.3, granulocyte count 0.8 ± 0.8 and platelet count of 260.0 ± 109.1 × 10^9/L. The mean packed cell volume was 34.1± 5.9 %, haemoglobin 11.3 ± 2.1 g/dl and mean corpuscular haemoglobin concentration was 31.5 ± 14.3 g/dl. The packed cells volume (p=0.0001, T test= 4.0259) and haemoglobin (p=0.0001, T test= 4.1534) profiles of HIV clients were respectively statistically significance with gender, while CD4 cells count (p=0.004, F= 4.523) and platelet count (p= 0.008, F = 3.974) were significance respectively with HIV disease staging.

TABLE 4: THE GENDER DISTRIBUTION OF BASELINE HAEMATOLOGICAL PROFILE OF HIV SEROPOSITIVE HAART NAÏVE CLIENT IN KSUTH, ANYIGBA, KOGI STATE

Gender	CD$_4$ Cells/mm^3	WBC x 10^9/L	Lymphocyte	Granulocyte	Plalelet 10^9/L	PCV (%)	HB g/dl	MCHC g/dl
Male 147(36.4)	377.2±181.9	5.94±3.2	2.36±1.6	0.8±1.0	262.6±131.7	35.6±6.5	11.8±2.4	32.8±23.6
Female 257(63.6)	384.4±245.0	5.8±3.9	2.2±1.1	0.7±0.7	258.6±94.3	33.2±5.3	10.9±1.9	30.7±1.1
TOTAL 404(100)	381.8±240	5.8±3.6	2.3±1.3	0.8±0.8	260.0±109.1	34.1± 5.9	11.3±2.1	31.5±14.3
T Test	0.3106	0.3698	1.1866	1.1768	0.3537	4.0259	4.1534	1.4251
Df	402	402	402	402	402	402	402	402
P value	0.756	0.712	0.2361	0.240	0.7238	0.0001	0.0001	0.1549

DISUSSION

Two third of HIV clients were found in the 20 – 39 years age group categories. This finding was collaborated in many comparative studies[34-44]. Most respondents belonged to the female gender. The female genital anatomy was reported to increase the risk of sexually transmitted infection including AIDs[41]. Access to reproductive health including HIV treatment and care was noticed to be higher in female than males[42]. Half of the HIV client presented at the facility for the first time in HIV disease stage three to access treatment . This observation of client presentation in advance HIV disease when complications have developed was reported in sexually transmitted infection clinic in Ile Ife by **Olayinka[38].** Stigmatization, ignorance, belief and poor health seeking behavior were among many reasons attributed to such behavior. The mean CD$_4$ cell count was low among HIV clients, while the CD4 profile based on the HIV disease staging was statistically significance (p=0.004) in this study. This observation was also reported by many

Researchers [43-44]. CD$_4$ lymphocyte cells also known as T cells or T helper cells are the primary targets of HIV [45]. The degree of immuno-suppression as assessed by the CD$_4$ cell counts closely correlates with the HIV disease stage as reported in past studies[43-44]. The mean white blood cells count, granulocyte and platelet counts in this study lied within normal limit. The client's HIV disease staging was statistically significance with platelet count (p=0.008). Some researchers in their separate studies observed leucopenia, granulocytopenia and thrombocytopenia in patients with HIV infection[10,15,46]. Cytopenias are one of the most common complications of HIV. The mechanism of cytopenia in HIV clients is multi-factorial in dimension. The mechanisms were described to relate with direct effect of HIV on the bone marrow, opportunistic infections, autoimmune diseases, infiltrative disorders and dry toxicity [28-29]. However, lymphocyte count in this study was found to be high. This study recorded low mean packed cell

volume and haemoglobin concentration, which also correspond to findings obtained by many researchers [21,47-49]. The profile of packed cells volume and haemoglobin based on gender in this study were statistically significance (p= 0.0001). The main mechanism of anaemia of chronic disease is due to haemopoiesis suppression caused from direct suppression of bone marrow progenitors by HIV infected T cells. In this study the mean corpsular haemoglobin concentration (MCHC) was within normal limit. This finding was however in contrast to low MCHC value recorded by Osunkalu [50].

CONCLUSION

Most clients in this study were youth in the 20- 39 years age category and presented for the first time in HIV disease stage three. The clients have low mean CD4 cells count, packed cells volume and haemoglobin profile. Gender was statistically significance with packed cells volume and haemoglobin, while the client's HIV disease staging was significance with CD4 cells and platelet counts. This study recommended the need for awareness campaigns, nutritional education and micronutrients supplementation including multivitamins for HIV clients.

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