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Variation of Haematological Parameters in Human Immunodeficiency Virus Patients in Braithwaite Memorial Specialist Hospital, Port Harcourt, Nigeria

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Mbata C. A

Department of Medical Laboratory Sciences, Rivers State University, Nkpolu Oroworukwo, Port Harcourt, Nigeria.

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ABSTRACT

This study was conducted to investigate the observed variation in the Haematological Parameters in Human Immunodeficiency Virus (HIV) Patients in Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt.A total of 100 subjects participated in the study comprising 60 males of which 30(30%) were HIV positive subjects while 30 were negative and used as control. Also, 40 females were used out of which 20 (20%) were HIV positive and 20 were negative and used as control. The overall rate showed 50 (50%) as positive and 50 (50%) as negative and used as control.The report from the laboratory analysis of the blood samples showed that packed cell volume (PCV), Haemoglobin (Hb), white blood cell (WBC) and Platelets (PLT) counts reduced significantly in the HIV positive subjects as compared to the negative subjects. Male HIV positive subjects showed significant decrease in PCV, Hb, WBC and PLT as 32.7 ± 2.1%, 10.1 ± 1.2g/m, 3.5 ± 0.6 x 109/l and 152 ± 23 x 109/l respectively as compared to the control as 40.5 ± 3.1%, 14.0 ± 1gldl, 6.2 ± 0.6 x 109/l and 206 ± 32 x 109/l. Similarly, the female HIV positive subjects showed significant decrease in the parameters. The PCV, Hb, WBC and PLT showed 30.3 ± 1.3%, 9.9 ± 1.2gldl, 4.0 ± 0.2 x 109/l and 148 ± 17 x 109/l which were lower and statistically significant as compared to the control as 36.8 ± 1.3%, 12.5 ± 0.4g/l, 6.2 ± 0.5 x 109/l and 198 ± 20 x 109/l.Due to the campaign about HIV/AIDs management, practical knowledge and supportive information become necessary. It is therefore imperative for healthcare providers to ensure that HIV positive patients are placed on antiretroviral drugs. This further entails that the decrease in their hematological parameters are subject to the infiltration of the virus and antiretroviral naivety of the subjects, Hence the antiretroviral drugs would be aimed at boosting the immune system of infected patients.

INTRODUCTION

Human immunodeficiency virus infection and acquired immunodeficiency syndrome (HIV/AIDs) are a Spectrum of conditions caused by infection with human immunodeficiency virus (HIV). (Sepkowitz, 2001). AIDs was first clinically observed in 1981 in the United States of America (Mandell *et al.,* 2010), According to centers for disease control and prevention. CDC (2011), the initial cases were a cluster of injecting drug users and homosexual men with no known cause of impaired immunity who showed symptoms of Pneumocystis CariniiPneuomonia (PCP), which is a rare opportunistic infection that was known to occur in people with very compromised immune systems. Soon after, an unexpected number of homosexual men developed a previously rare skin cancer called Kaposi's Sarcoma (KS). Many more cases of PCP and KS emerged, alerting US centers for disease control and prevention (CDC) and a CDC task force was immediately formed to monitor the outbreak (Mandella *et al.,* 2010). In the early days, the CDC used the name as Kaposi's Sarcoma and Opportunistic infection for it since they had no official name. At one point the CDC coined the phrase ***"The 4H disease since the syndrome seemed to affect Haitans, homosexuals hemophilics and heroin users".*** In general, the term (GRID) which stood for Gay-related immune deficiency had been coined. However, after determining that AIDs was not isolated to the gay community, it was realized that the term GRID was misleading and the term AIDs was introduced at a meeting in July 1982 (Liu *et al.,* 2003).

Following initial infection, a person may experience a brief period of influenza like illness. This is followed by a prolonged period without symptoms. As the infection progresses it interferes more and more with the immune systems, making the person much more susceptible to common infection like Tuberculosis, as well as opportunistic infections and tumors that do not usually affect people who have working immune systems. The stage is often complicated by an infection of the lung known as Pneumocystis pneumonia, severe weight loss, Kaposi's Sarcoma and other AIDs – defining conditions (Sepkowitz 2001).

According to Boily*et al.,* 2007, HIV is transmitted primarily via unprotected sexual intercourse (including anal and oral sex), contaminated blood transfusion (Reid, 2009) Hypodermic needles and from mother to child during pregnancy, delivery or breastfeeding. (Markowitz, 2007, Coutsoudis*et al.,* 2019). Similarly, somebody fluids such as saliva and tears do not transmit HIV (Yu and Vaijdy, 2010). Prevention of HIV infection is primarily through safe sex and needle exchange programmes. There is no cure or vaccine, however, antiretroviral treatment can slow the course of the disease and may lead to a near normal life

expectancy (Markowitz, 2007). With appropriate treatment, the risk of mother to child infection can be reduced to about 1% (Thorne and Newel, 2007).

Retroviral infection impacts negatively on hematological parameters of infected patients which are notable features in blood and blood forming organs. The infection triggers numerical variations and loss of functions of some blood components. These abnormalities increase as the disease advances. In both antiretroviral treated and untreated individuals, different types of hematological abnormalities are common (Grange *et al.*, 2004). Anaemia is the most common hematological abnormalities in HIV patients. Its prevalence ranges from 1.3% - 95%, normocytic normochromic anemia being the predominant type followed by microcytic anemia (Dikshit *et al.*, 2009 and Akinbami *et al.*, 2010). As HIV disease progresses the prevalence and severity of anemia also increase (Behler, *et al.*, 2005).

Thrombocytopenia was also reported as the second most frequent complication of human immunodeficiency virus infection which is found in 3-4% of individuals with HIV infection and could occur at any stage of HIV infection. Chronic infection with HIV is well characterized caused of chronic immune thrombocytopenic purpura (ITP) (Liebman, 2008) and this is characterized by very low platelet counts with normal hematocrit and white blood cell count (Kouri *et al.*, 1992, Akinbami *et al.*, 2010). Dikshit *et al., (*2009*)* reported that Leukopenia occurs in HIV infected individuals. It may occur in 10 – 30% of HIV patients, with advanced disease. It decreases the levels of white blood cells in the bone marrow and affects the granulocyte-macrophage lineage, resulting in leucopenia and neutropenia. Furthermore, HIV infection can directly result in lymphopenia as the infection progresses, leading to a decrease in $CD4^+$ lymphocytes (Akinbami *et al.*, 2010).

This study is aimed at establishing the baseline hematological values of HIV infected patients in order to aid diagnosis and effectively monitor therapy which could enhance public awareness on the associated hematological disorders.

MATERIALS AND METHODS

The study was carried out in Braithwaite Memorial Specialist Hospital which serves as Port Harcourt General Hospital. The study was carried out with a population of 100 subjects, fifty (50) of them were known HIV positive patients comprising 30 males and 20 females. Fifty (50) subjects apparently healthy and negative comprising 30 males and 20 females were used and served as control. They were randomly selected from the Hospital. All were aged between 15-55years.

Eligibility of the subjects

Informed consent was obtained from all the subjects. Those included in the study had their HIV status confirmed positive.

Collection of samples and methodology

Three milliliters (3ml) of blood sample was collected through various puncture into EDTA bottle and the hematological analysis carried out within 3 hours of collection.

i) ***Packed cell volume (PCV)*** was determined by microhaematocrit method by filling three quarter of plain capillary tubes. The tubes were sealed with a sealant and centrifuged in microhaematocrit centrifuge at 12,500rpm for 5 minutes and result recorded in %.

ii) ***Cyamethaemoglobin method*** was adopted for the determination of hemoglobin concentration by adding 0.02ml of blood to 2ml of drab skins solution and read with a colorimeter at 540nm wavelength. This was calculated thus.

$$\text{Hb (g\%)} = \frac{\text{Absorbance of test} \times \text{Concentration of Standard} \times \text{Dilution Factor}}{\text{Absorbance of Standard} \qquad 1000}$$

iii) ***White blood cell count (WBC count)*** was done using Turk's method by making a 1 in 20 dilutions of the blood (0.02ml) in 0.38ml of Turk's solution in a Test Tube. This was mixed and used in charging an improved Neubauer counting chamber under a coverslip. The cells were counted as follows:

$$\text{Leukocyte count/L} = \frac{\text{No of cells counted} \times \text{dilution factor} \times 10^6}{\text{Volume Counted } (\mu/l)}$$

iv) ***Platelet count*** was estimated using Cronkite's ammonium oxalate method by making a 1:20 dilution of blood (0.1ml) in 1.9ml of Ammonium oxalate (diluents).

The suspension was mixed and improved Neubauer counting chamber charged and covered with a coverslip and left untouched in moist Petri dish for 20mins to allow the platelets settle.

The cells were counted per liter and calculated thus:

$$\frac{\text{No of Cells counted x Dilution factor x } 10^6}{\text{Volume counted } (\mu/l)}$$

DATA ANALYSIS

Data were analyzed using statistical software package, SPSS version 20 and excel. Data were presented as mean ± SD, mean ± SEM for comparisons of mean, Student t-test was used to determine the significance of subjects and controls P–values < 0.05 was considered statistically significant.

RESULTS

The age distribution of all the subjects was between 15-55 years. The HIV positive patients were 50 (50%) made up of 30 males (30%) and 20 females (20%). The highest number infected was ages 31-35 which were 19 (38%) followed by ages 25-30 which were 13 (26%) while the least was ages 15-20 which is 3(6%). All these are as shown in figure 1.

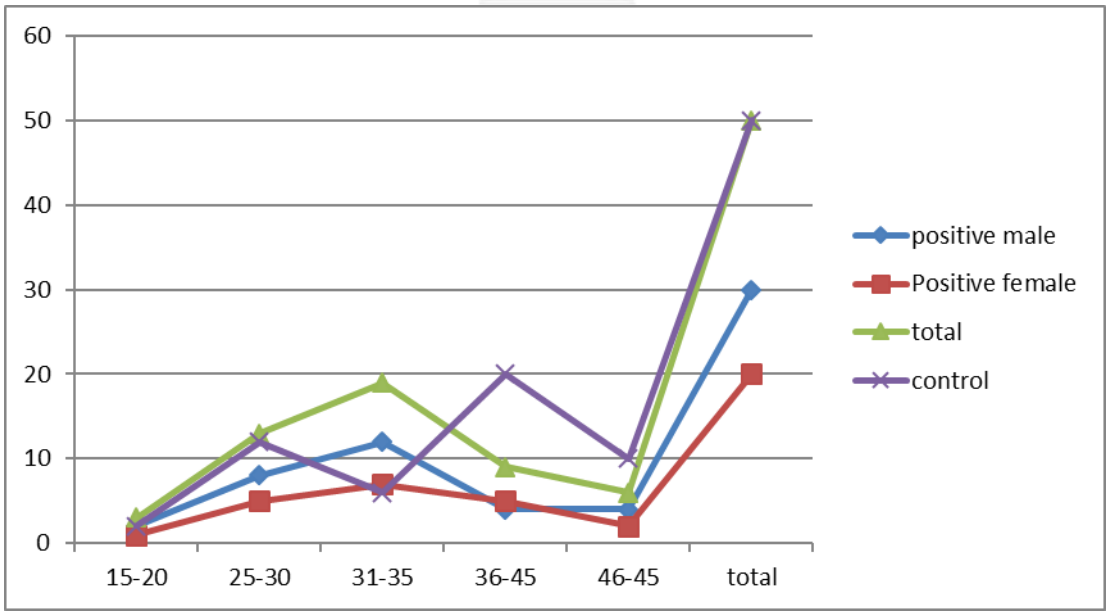

Figure 1: Age distribution of subjects

Table 1 shows the Haematological Parameters of male HIV positive subjects and controls. There was drastic reduction in the parameters of positive subjects as compared to control subjects. The Haemoglobin levels of positive subject are 10.1 ± 1.9 as compared to control

subjects at 14.0±1.0. The PCV level for positive subjects as 32.7 ± 2.1 as compared to 40.5 ± 3.1, Wbc value for positive subjects as 3.5 ± 0.6 as compared to 6.2 ± 0.6 for control while Platelet for positive subject is 152 ± 23 and 206 ± 23 for control subject. There was statistical difference between positive subjects from control subject ($P < 0.05$).

Table 1: Comparison of Haematological Parameters in male HIV positive subjects and controls.

	Subjects	Control	
Parameters	Mean ± SD	Mean ± SD	
Hb (gldl)	10.1 ± 1.9	14.0 ± 1.0	$P < 0.05$
PCV (%)	32.7 ± 2.1	40.5 ± 3.1	$P < 0.05$
Wbc (10^9/l)	3.5 ± 0.6	6.2 ± 0.6	$P < 0.5$
PLT (10^9/L)	152 ± 23	206 ± 32	$P < 0.05$

The Haematological parameters for female subjects also show low values as compared to the control subjects. It was only statistically different in the platelet count and PCV where the positive subjects had 48 ± 17 as compared to control subjects at 198 ± 20 and 30.3 ± 1.3 and 36.8 ± 1.3 ($P < 0.05$) respectively. The count in Hb and WBC was not significant. All these are shown in table 2.

Table 2: Comparison of Haematological Parameters in female HIV positive subjects and controls.

	Subjects	Control	
Parameters	Mean ± SD	Mean ± SD	
Hb (gldl)	9.9 ± 0.5	12.5 ± 0.4	$P < 0.05$
PCV (%)	30.3 ± 1.3	36.8 ± 1.3	$P < 0.05$
Wbc (10^9/l)	4.0 ± 0.2	6.2 ± 0.5	$P < 0.5$
PLT (10^9/L)	148 ± 17	198 ± 20	$P < 0.05$

DISCUSSION

From the study, it is observed that persons between the ages of 31-35 years and 25-30years were the most infected. This is due to the fact that, that is the sexually active stage of life. They should be adviced to adopt a means of protection. Also in the study, it is observed that anemia, leukopenia and thrombocytopenia were common findings. This was also documented in different studies of Grange *et al.*,(2003) and Dikshit *et al.*,(2009). The variation in anemic state may be due to the characteristics of study subjects and study design methods.

Leukopenia was significant in this study. The white blood cell count in positive patients reduced drastically and was statistically significant at $P<0.05$.

There was significant difference in the platelet count between control subjects and HIV positive patients. This is because Thrombocytopenia probably increases as immunological competence worsens thus leading to increase risk of excessive bleeding (Adane*et al.*, 2012).

People with HIV who have low CD_4 count sometimes experience reduction in the number of certain cells in their blood. Some of these problems may be caused by damage to the bone where blood cells are produced. Many cases of HIV tend to damage the bone marrow by infecting its cells directly or by disrupting levels y natural chemical (called growth factors) that help bone marrow cells develop. The bone marrow may also be affected by some drugs or the illnesses that can develop in a weak immune system (opportunistic infections).

CONCLUSION

The commonest haematological abnormalities in this study were anemia and leucopenia. It was observed that the patients were antiretroviral drug naïve. This fact was largely responsible for the decrease in haematological parameters. It is therefore by my sincere wish and desire that HIV positive patients should be closely monitored and adviced to commence antiretroviral therapy as soon their status is made known with reference to fall in CD4 count. Consequently, CD4 count should be made a priority test to enhance the immune system.

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