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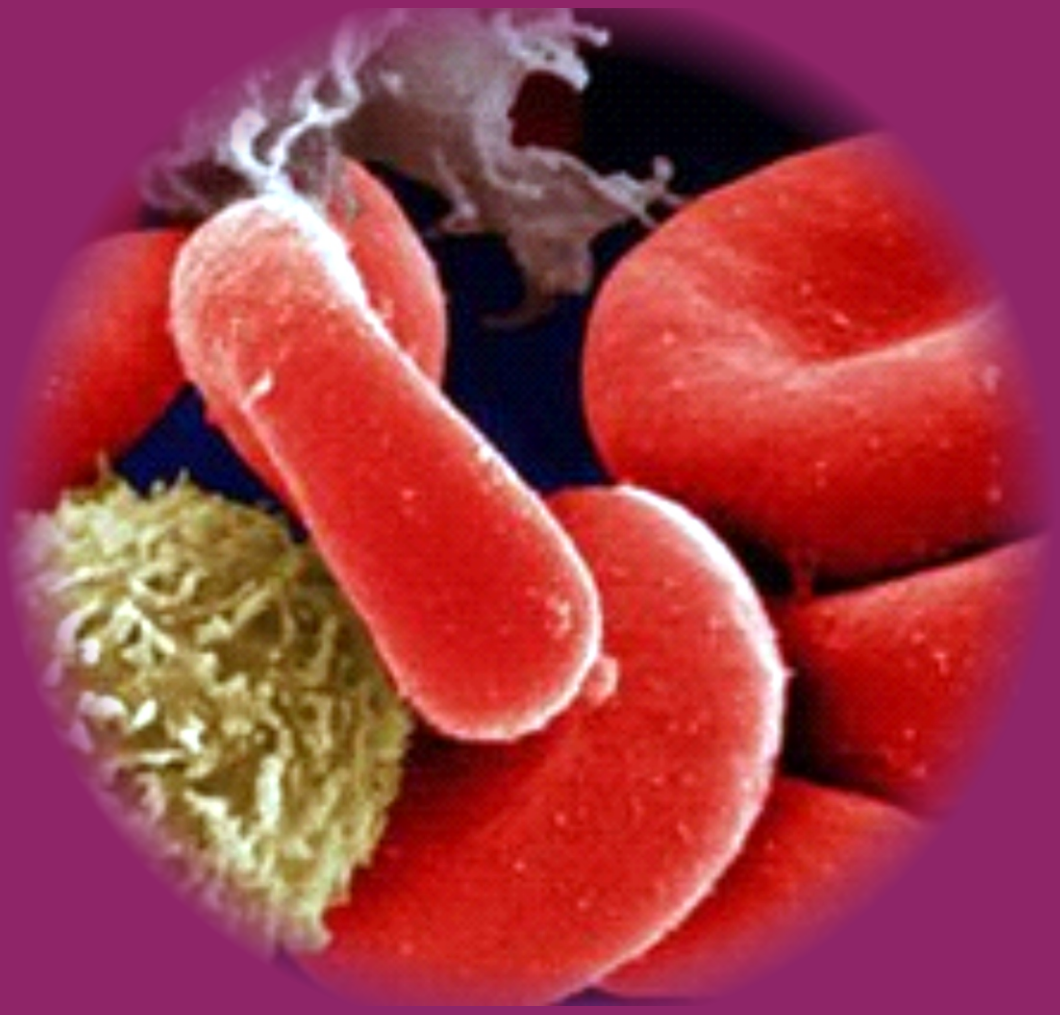

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Sociodemographic Characteristics and Immunologic Parameters of Newly Diagnosed Patients with HIV at OAUTHC, Ile-Ife, Nigeria

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ABSTRACT

Background:

Sociodemographic characteristics of newly diagnosed patients with an infection help in determining the risk factors and management plan of that disease.

Aims and Objectives:

This study was aimed at determining the sociodemographic characteristics, risk factors, clinical presentation and laboratory parameters of newly diagnosed patients with HIV infection compared with matched controls at Bowen University Teaching Hospital, Ogbomoso, Nigeria.

Materials and Methods:

Forty-six HIV positive, HAART-naïve and 46 HIV sero-negative matched controls were recruited into the study at OAUTHC, Ile-Ife. Data was collected on socio-demographic characteristics. Subjects were physically examined and staged, using the WHO criteria. Blood samples were analysed for total IgE, CD4+ lymphocytes, ESR and FBC. The results obtained were compared between groups.

Results:

The mean age of the subjects was 36±10.8 years with females making up 58.7%. Most of them had stage II disease. The commonest risk factor in them was multiple sexual partners; the commonest presenting complaint was significant weight loss. The median serum IgE level was significantly higher in HIV+ subjects 658.33iu/ml vs 145.83iu/ml (*P=0.004*, 95% CI, 250.0-916.7HIV$^+$,75.0-179.2HIV$^-$), while the median CD4+ counts were found to be significantly lower in HIV+ subjects 424cells/mm vs. 791.5 cells/mm (*P=0.036,* 95% CI, 174-527HIV$^+$,675-894HIV$^-$) than controls. The mean ESR was significantly higher in HIV+ subjects 82±44 vs. 17±13 (p=0.008), while the PCV was significantly lower in HIV+ 33±5 vs. 39±5 (p=0.036).

Conclusion:

There is a female preponderance among newly diagnosed HIV patients with multiple sexual partners being the commonest risk factor. Reduced CD4$^+$ count and haematocrit were associated with elevated IgE and ESR in these patients.

Keywords: sociodemographic, characteristics, laboratory, parameters, HIV/AIDS

INTRODUCTION

Obafemi Awolowo University Teaching Hospital (OAUTHC) is domiciled in Ile-Ife; an ancient Yoruba city, in Osun state, southwestern Nigeria founded around 500 B.C. with a population of 501,952. It is located between latitudes 7°28′N and 7°45′N and longitudes 4°30′E and 4°34′E. [1] The prevalence of HIV in Osun state is 2.6%. [2]

OAUTHC being the only tertiary health institution in Ile-Ife serves as the major referral centre for people living with HIV/AIDS and findings in the hospital can be said to be representative of the disease characteristics in the city at large. We considered it important to determine the sociodemographic characteristics of people newly diagnosed with HIV in the health institution and their laboratory parameters since immune deficiency

associated with this disorder has been found to influence the results. [3]

MATERIALS AND METHODS

The study was carried out in the Haematology and Blood Transfusion, Department of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile- Ife, Osun state, Nigeria.

Ethical clearance was sought and obtained from the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife (ERC/2014/02/09). A written consent was also obtained from every participant. Patients' refusal to participate in the study was respected with no attempt at coercion or inducement. Newly diagnosed HAART-naïve HIV positive patients who were 16 years or older were included in the study; while those with known history of allergy were excluded. Socio-demographic information including the age, sex, occupation, marital status, and family size, level of education, alcohol history, smoking history, history of allergy and drug history were obtained from them using structured questionnaire. They were also interviewed about how the disease was contacted, the clinical presentations and complications. General and specific clinical examinations were also done on each patient. The clinical stage of the disease was determined using WHO criteria. Age and sex-matched staff and medical students with similar demographic and social characteristics who were HIV seronegative with no history of allergy served as control. A total of 10 milliliters of venous blood was collected according to standard phlebotomy technique. Four and a half milliliters of venous blood was transferred into a K^{+}EDTA (Ethylenediamine tetra acetic acid) bottle, well mixed for the assessment of FBC, ESR estimation and CD4+ cells count. The remaining 5.5 milliliters of the venous blood was put into a plain bottle, centrifuged and plasma separated and stored at -83^{o}C for the assessment of total serum IgE. Packed Cell Volume, WBC and differentials, and platelets counts were done using automated analyser (Sysmex poch-100i), while the differential counts were manually done. The ESR was manually done and results expressed in millimeters in the first hour. The CD4+ lymphocytes were analysed within 6 hours of sample collection using Partec CyFlow (Laser Product, Partec Germany). The cell concentration is automatically calculated by the FlowMax software. The total serum IgE quantitation was measured using human IgE ELISA Kits (ALPCO Diagnostics, 26G Keewaydin Drive, Salem, New Hampshire 03079, USA). Data obtained was processed using the computer software, Statistical Package for Social Sciences (SPSS) version 20.

RESULTS

A total of 92 subjects and controls were investigated (Table 1). Forty-six were HIV positive while the remaining 46 were HIV negative and served as controls. The two groups were matched for age (36.0 ± 10.8 and 36.30 ± 10.40, p = 0.96) and sex (p > 0.99). Most of the participants were between ages 30 and 39 years (34.8%) with the mean (±SD) age of the HIV positive group being 36.0 ± 10.8 years; while that of the control group was 36.3 ± 10.4 years. Nineteen (41.3%) were male while 27(58.7%) were female in both groups. There were no statistically significant differences in the mean age, age group distribution and sex distribution between both groups; showing that they matched for those parameters. There was, however, a statistically significant difference between the marital status of both groups. Thirty-two (69.6%) of the HIV positive group were married as against 29 (63.0%) of the control HIV negative group; while only seven (16.2%) of the HIV positive group were single as against 16 (38.8%) in the HIV negative group. A significant number (8.7%; p = 0.034) of the HIV positive group were divorced as against none in HIV negative group.

Table 1: Sociodemograpic Characteristics of Subjects and Controls

Variable	HIV positive N=46	HIV negative N=46	p value
Age (years)	36.0±10.8	36.3±10.4	0.96
Age group (years)			>0.99
<20	01(2.2%)	01(2.2%)	
20-29	12(26.1%)	12(26.1%)	
30-39	16(34.8%)	16(34.8%)	
40-49	13(28.3%)	13(28.3%)	
50-59	02(4.3%)	02(4.3%)	
60-69	01(2.2%)	01(2.2%)	
70-79	01(2.2%)	01(2.2%)	
Sex			>0.99
Male	19(41.3%)	19(41.3%)	
Female	27(58.7%)	27(58.7%)	
Marital status			0.034
Single	07(16.2%)	16(34.8%)	
Married	32(69.6%)	29(63.0%)	
Divorced	04(8.7%)	0	
Widow	03(6.5%)	01(2.2%)	
Level of Education			<0.001
None	4(8.7%)	0	
Primary	1(2.2%)	0	
Secondary	28(60.8%)	01(2.2%)	
Tertiary	13(28.3%)	45(97.8%)	

Table 2: Characteristics of HIV positive patients

Variable	Frequency N= 46
Stage of disease**	
I	15(32.6%)
II	20(43.5%)
III	11(23.9%)
Risk factors for HIV	
Multiple sexual partner	37(80.4%)
Positive partner	12(26.1%)
Sharing of sharps	11(23.9%)
Blood transfusion	06(13%)
Injection from quacks	06(13%)
Long distance driver	02(4.3%)
Symptoms at diagnosis	
Weight loss	20(43.5%)
Skin rash	16(34.8%)
Fever	13(28.3%)
Cough	10(21.7%)
Diarrhoea	09(19.6%)
Weakness	05(10.9%)
Oral thrush	02(4.3%)

**Obtained using WHO clinical staging[13]

While all the HIV negative controls had formal education, four (8.7%) HIV positive subjects had no formal education. 60.8% of the HIV positive subjects had secondary education compared to only one (2.2%) in the HIV negative group. The majority of the HIV negative (45 or 97.8%) received tertiary education, compared to only 13 (28.3%) of the HIV positive subjects had tertiary education. There was a statistically significant difference in the educational level of both groups (p<0.001).

The clinical characteristics of HIV positive subjects were shown in Table 2. Forty-three percent of them were classified as being in

stage II disease, fifteen (32.6%) were in stage I while eleven (23.9%) were in stage III. None was in stage IV. Thirty-seven (80.4%) of them acquired the virus through multiple sexual exposure; while 20 (43.5%) presented with significant weight loss; followed by skin rash in 34.8% of them. Ten (66.7%) of the HIV positive with stage I disease had elevated serum IgE, 17(85.0%) with stage II disease had elevated serum IgE while 8(72.7%) of the HIV positive with stage 3 disease had elevated serum IgE.

The laboratory parameters of the subjects and controls are as shown in table 3. The median serum total IgE levels of HIV positive subjects were higher than that of the controls 658.33IU/ml vs. 145.83IU/ml (*P= 0.004, 95% CI,* 250.0-916.7 HIV+, 75.0-179.2 HIV-*).* The mean ESR in the HIV positive group was also significantly higher than in the HIV negative group (82 ± 44 mm/hr. vs 17 ± 13 mm/hr. p = 0.008). The median CD4+ lymphocytes count found in HIV positive subjects 424 cells/mm^3 vs. 791.5 cells/mm^3 (*p= 0.036 95% CI,* 174-527 *HIV*†*,* 675-894 *HIV*) was lower than what was found in the control group. Similarly, the mean PCV in the HIV positive group was significantly lower than what was found in HIV negative control group ((39 ± 5%, 33 ± 5%; p = 0.036). There was, however, no significant difference in the mean values of white cell count between the two groups with the HIV positive group having 6911 ± 3657 cells/mm^3 compared to 4872 ± 2061 cells/mm^3 found in the HIV negative group. However, there was a statistically significant difference in the neutrophil 51 ± 15 cells/mm^3 vs 50 ± 11 cells/mm^3 (p = 0.035) and eosinophil count between the two groups, 12 ± 8 cells/mm^3 vs 3 ± 2 cells/mm^3 (p <0.001). Similarly, no significant difference was noted between the platelet counts of both the HIV negative and HIV positive groups.

DISCUSSION

This cross sectional study assessed the sociodemographic characteristics of newly diagnosed patients with HIV/AIDS at OAUTHC, Ile-Ife. All the respondents and controls were of Yoruba ethnicity. This is due to its location in southwestern Nigeria and the sample size.

The proportion of the study population that were female was similar to what others such as Akinola and co-workers (2004) and Banjoko and co-workers (2012) in their separates studies obtained in Ile-Ife. [4,5] It is also similar to the findings of Nwabuko *et al, 2013 i*n Port Harcourt. [6] The gender distribution is also similar to the reported national figure of 60% versus 40% in Nigeria and a 52% versus 48% global female: male distribution among HIV positive patients. [7,8]

Table 3: Laboratory parameters of subjects and Controls

Variable	HIV positive	HIV negative	P value
IgE (iu/ml) *	658.33†	145.83‡	0.004
ESR (mm/hour)	82 ± 44	17 ± 13	0.008
CD4 count (cells/mm^3) *	424.0§	791.5$^{\|\|}$	0.036
⩾500	17(37%)	43(93.5%)	
200-499	12(26%)	03(6.5%)	
<200	17(37%)	0	
PCV (%)	33 ± 5	39 ± 5	0.036
White cell count(/mm^3)	6911±3657	4872±2061	0.143
White cell differentials			
Neutrophil(%)	51±15	50±11	0.035
Lymphocyte(%)	37±13	46±12	0.459
Eosinophil(%)	12±8	3±2	<0.001
Basophil(%)	1±1	1±2	0.178
Monocyte(%)	0	0	>0.99
Platelets(/mm^3)	2.22±0.85^5	2.41±1.11x10^5	0.500

*median, †95% CI= 250.0-916.7, ‡95% CI= 75.0-179.2, §95% CI= 174-527, $^{||}$-95% CI= 675-894

The female preponderance among the HIV positive clients in Nigeria could be explained by the fact that approximately 80 percent of HIV infections in Nigeria are as a result of heterosexual sex with gender inequality among women been identified as a key driver of the HIV epidemic among them[9]. Differential access to services and sexual violence also increase women's vulnerability to HIV, and women, especially younger women, are biologically more susceptible to HIV. [8]

Most of the patients were in WHO clinical stage II. This could be due to appearance of symptoms which can no longer be ignored; so at this point, patients have no other option but to seek for medical help in the hospital. The finding of multiple sexual partners and partners that are positive for HIV as the commonest risk factors for HIV infection among the HIV positive subjects showed that there may be a high level of high-risk sexual networking in the studied population, be it within or outside marriage,which could expose large sections of the population to the risk of HIV and other sexually transmissible diseases.

Most of the patients presented on account of weight loss and skin rash. This was in consonance with the findings of an earlier study by Adediran and Durosinmi (2006) in Ile-Ife that showed that weight loss was the commonest form of presentation. [10] Udoh *et al,* (2012) in Uyo, South-south Nigeria, also reported that the commonest complaint at presentation was weight loss followed by unexplained fever, then skin rashes. 11] However, according to a study done in Makurdi found oral thrush as the commonest presentation with skin rashes being the least common presentation among newly diagnosed HIV patients. [12] The higher prevalence of weight loss in this study could be due to loss of body cell mass from inadequate intake as a result of the HIV infection or adverse socioeconomic conditions. [10] Other possible causes include nausea, vomiting, diarrhoea and oppotunistic infections which, however, were not common in the patients studied. [13]

Expectedly, the CD4+ cell count was significantly lower in the HIV positive subjects than in the controls. This is similar to the findings of Ndakotsu *et al* (2009) and Banjoko and co-workers (2012) in Ile-Ife. [14,5] This was also in consonance with the findings of Nwabuko et al (2013) in Port Harcout. [6] The lower CD4+ cell count recorded in the study population is not surprising considering the fact that the chief target cells for HIV are CD4+ T-lymphocytes and macrophages. [15] As the infected T lymphocytes leave the lymph nodes, new uninfected cells arrive to become infected leading to a slow but progressive destruction of the cells. [16]

Several other workers have also reported significantly lower haematocrit in HIV infected individuals as found in this study. [3,10,14].This may be due to direct suppression of CFU-GEMM or parvovirus B19 infection of the bone marrow. [10] In people with AIDS, other possible causes include infiltration of the marrow by malignant cells and reduced synthesis of CFU-GEMM; while those on therapy may also suffer drug induced haemolysis and drug related bone marrow suppression are possible causes. Further analysis showed that the incidence of anaemia increased in the study population with reduction in CD4+ cell count; with as high as 94% of those with CD4+ <200 cells/mm^3 having anaemia compared to 30% in the group with CD4+ $\geqslant$ 500 cells/mm^3. Adediran and Durosinmi, 2006 in Ile-Ife found 67% of their subjects to be anaemic in their study. [10] This also lends credence to anaemia being the commonest haematologic abnormality in HIV patients. [10,17] The mean WBC found in this study was not statistically different from that of the control group which is similar to the findings of Nwabuko in Port Harcourt (2013); this is contrary to the finding of others. [6] Adediran and Durosinmi (2006) found leucopenia in majority of the respondents unlike this study where it was seen in only 6.5%; with majority (85%) having white cell count within the normal range. [10] The finding of white cell count within the normal range in this study could be due to the fact that most of the patients are in early stages of the disease. It is a known fact that frequency of leucopaenia increases with stage

of the disease, associated complications and the type of therapy given. [10]

As expected, the mean ESR in the study population was significantly higher than what was found in the control group. Ndakotsu in Ile-Ife, 2009 and Nwabuko and co-workers, 2013 in Port Harcourt have also reported similar findings. [14,6] HIV infection is known to elicits an increase in the whole body's protein turnover, particularly the globulins (including acute phase proteins and lipoproteins) which cause red cell clumping and which enhances greater sedimentation of red blood cells and, therefore, elevated ESR.[18]

Serum total IgE was found to be elevated in both the HIV positive and the control group; with a mean serum total IgE of 1362iu/ml in HIV positive subjects as against 297iu/ml found in HIV negative controls. The elevated total IgE in the control group might be explained by the fact that there is documentation of elevated serum levels of IgE in tropical populations where the prevalence of parasites infestation is very high.[19,20] This is due to the fact that parasitic infestation are potent stimulators of IL-4 dependent synthesis of both parasite specific IgE and polyclonal IgE.[18] There is also documented evidence that apart from IgE, the concentration of most immunoglobulins in HIV positive subjects of African origin tend to be higher than their counterparts from other parts of the world.[21] This variation may be genetically determined or may arise from numerous antigenic challenges especially in the tropics from chronic viral and parasitic antigen exposure. This may result in chronic stimulation of B cells and increased production of immunoglobulins even in HIV negative individuals. This was corroborated by Eziyi *et al* (2014) who studied normal controls without parasitic infection. [19] However, there was a statistically significant increase in serum total IgE levels between both the study group and the control group. Although conflicting data exist, most published studies worldwide report markedly elevated serum IgE levels in adults with HIV infection compared to HIV negative cohort. [1,2,19,21,22,23] The increased IgE synthesis observed in HIV infection is said to be explained by the switch from Th1 to a Th2 cytokine profile and it is further supported by increased IL-4 production when compared to the decrease noted in IL-2 production. [24] The finding of a statistically significant increase in mean serum total IgE in HIV positive subjects is, however, at variance with the findings of Rahamon and Arinola (2012); who found out that the mean level of total IgE was significantly lower in the HIV positive subjects when compared with the HIV negative subjects. [25] The occurence of significantly lower IgE in the HIV positive subjects in their study could be due to the fact that their subjects had been exposed to antiretroviral therapy. [25]

CONCLUSION

It could be concluded that there is a female preponderance among newly diagnosed HIV patients with multiple sexual partner being the commonest risk factor. The laboratory parameters showed an elevated IgE and ESR as well as reduced $CD4^+$ count and haematocrit.

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Conflict of Interest:

The authors have no conflict of interest

Author's Contributions:

This study was conducted by KJO-A, while OOA, TAO, AAA, GHA-E and LS contributed to the study design and writing of the paper. LS initiated the study.

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