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Original article

CLINICAL FEATURES AND PATTERNS OF CD4+ T LYMPHOCYTE COUNTS AMONG HIV/AIDS PATIENTS ATTENDING A UNIVERSITY TEACHING HOSPITAL IN NORTH-CENTRAL NIGERIA

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ABSTRACT

Background: The use of CD4+ T Lymphocyte count as a vital component to ascertain the stage of HIV/AIDS disease as well as monitor the progress of the disease continues to take centre stage in the management of HIV/AIDS in Africa and beyond. Most health centres in Sub-saharan Africa rely on cut off reference values from different races and distant parts of the world. Aim: This study was designed to establish the range of CD4+ T Lymphocyte counts among the HIV-negative individuals and also HIV-positive patients at initial booking in the anti-retroviral clinic of our hospital where clinical diagnosis was established. Methods: Patients were recruited into the study as they report to the hospital on daily basis; structured questionnaires were administered where socio-demograhic and relevant clinical information were obtained. Blood samples (3-5mls) were collected using aseptic technique and processed where HIV screening was conducted, and CD4+ T Lymphocyte cell count was carried out using Cyflow (Partec, Germany). Results were fed into Microsoft excel 2007 version and analysed using SPSS 14. Results: A total of 386 HIV-positive and 145 HIV-negative individuals were recruited into the study. The average CD4+ T Lymphocytes count among the HIV negative individuals was 850 cells /µL and ranged from 200 to 1950 cells/µL with CD4+ T Lymphocyte counts of less than 300 cells/µL being 5 (3.4%). The CD4+ T Lymphocyte counts of less than 500 cells/µL among the HIV-negative individuals was 19(13.1%). However, the CD4+ T Lymphocyte counts among HIV-infected individuals ranged from 50 to 1450 cells/µL, 0.8% (n=3) while 45.9% (n=177) presented with CD4+ T Lymhocyte counts of 50 or less and less than 250 cells/µL respectively. The fact that 75.9% (n=293) of the patients had a CD4+ T Lymphocyte counts of less than 500 cells/µL shows the general late presentation of patients with HIV infection at our health settings , and as much as 50% of these were aware of their HIV status the very first time. Conclusion: Late presentation of patients at the HIV clinic is still a major challenge as many are still not aware of their HIV status. More awareness and sensitization campaigns should be deployed to bridge this gap. Also very Low CD4+ T Lymphocyte counts may as well be recorded in HIV-negative individuals and hence CD4 T Lymphocyte values should be interpreted based on this understanding.

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1. Introduction

Human immunodeficiency virus (HIV) Acquired immunodeficiency syndrome (AIDS) infection since its discovery in 1983 the disease has infected at least 70 million people and claimed about 35 million lives globally by the end of 2017. Also the disease claimed about One million lives in 2017 and 37 million people globally were living with it by the end of the same year[1-4]. Over the last decade the disease appear to have been substantially brought under control in the most developed parts of the world while Africa presently houses about half of the entire global disease burden among the league of developing nations of the world[4-9].

CD4+ T lymphocyte counts have remained the tool for laboratory measurement of disease progression, prognosis and anti-retroviral treatment outcome monitoring. From available literatures this has always given a strong negative correlation between the increasing CD4+ T Lymphocyte counts and decreasing constitutional symptoms and signs associated with HIV/AIDS disease. These symptoms and signs, studies show, often disappear as the CD4+ T Lymphocyte count in a previously

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depleted HIV/AIDS patient are restored back to normal[10-12]. In most health institutions across the country and most parts of sub-saharan Africa, interpretation of CD4+ T Lymphocyte counts among HIV/AIDS patients is based on statistics from other races. This leaves out environmental, geographic, genetic as well as other socio-cultural factors that might influence interpretation of these results with possibility of wrong treatment regime[13-16].

This study was therefore set up to ascertain the changing patterns of CD4+ T Lymphocyte counts among HIV/AIDS patients in association with the individual symptoms and signs they present with. This would serve as a reference guide to a more decisive management of HIV/AIDS patients in the locality and her environs and avoid unnecessary exposure of patients to the side effects of highly active anti-retroviral therapy (HAART) drugs[17-20].

MATERIALS AND METHODS

Experimental Setting

The study was carried out over a one year period (July 2016 to June 2017) at the Benue State University Teaching Hospital (BSUTH), a 350 bed capacity hospital located in Makurdi, the Benue state capital. The hospital offers primary, secondary and tertiary health services and also serves as a referral centre to the entire state and beyond. Subjects for the study were selected from those attending hospital for various ailments, their relations, those referred to and attendees of anti-retroviral clinic for the first time, staff and students. Subjects were recruited on a daily basis as they presented for the first time at the anti-retroviral clinic and consented to be part of the study. Structured questionnaires were either self or interviewer administered and relevant information on past medical history, socio-demographic, ingestion of drugs or otherwise, morbid and pre-morbid conditions among others were obtained. Blood samples were collected from each respondent where HIV test and CD4+ T cell counts were carried out. Results from other laboratory investigations to ascertain the scope and depth of the disease in line with the broader management of the disease by the attending physicians were also compiled and analysed to associate signs and symptoms.

Blood Sample Collection

Blood samples were collected (3-5mls) from superficial veins using sterile procedures into EDTA anticoagulant coated test tubes for CD4+ T cells and plain bottles for HIV antibody testing respectively. .

Estimation of C4+ T Lymphocytes Using Flow Cytometry

Venous blood samples (3-5 mls) were collected into ethylenediamine tetraacetic acid (EDTA) coated test tubes. T cell subset profiles were determined by flow cytometry using a Coulter Epics XL equipped with System II software (Sysmex Partec GmbH Gorlitz, Germany) within 4 hours of blood collection. This flow cytometer was run, in a double platform setting where the absolute counts for both white blood cells and lymphocytes were obtained on a Celldyn 3500R haematological analyzer (Abbott, GmbH, Germany). Then from the combined results, the absolute CD4+ and CD8+ cell counts, CD4/CD8 ratios, as well as the % CD4 and %CD8 values among lymphocytes were automatically calculated[21-23].

HIV Testing

This was carried out using the Rapid Test Kits which are Determine (Abbott Laboratories, Berkshire, United Kingdom), Uni-gold (Trinity Biotech, Republic of Ireland) and Stat Pak (Chembio Diagnostics, New York USA). In line with the recommended algorithm for routine testing of HIV infections by the Federal republic of Nigeria, HIV testing and interpretation were carried out as follows: Initial blood sample was taken and tested using Determine and if the result was positive, the blood sample was tested using a different test principle. If the second test is also positive HIV infection is confirmed, and if the second test was found to be negative, a tie-breaker was used and HIV status of the patient was ascertained[24-27].

Ethical Considerations

Ethical approval for the study was obtained from the ethics review board of the BSUTH. Informed consent was obtained from each subject before his/her voluntary enrolment into the study. Patient's confidentiality and anonymity was maintained throughout the study and in all forms of communications on the outcome of the research findings. All the religious, cultural beliefs and values of the people were taken into consideration in the course of the study.

Analysis of Results

Results obtained were collated using Microsoft Excel version 7. Data was analysed using the Statistical Software for Social Sciences (SPSS) version 15. Chi square was used to compare variations among dependent variables while Regression and Analysis of variance (ANOVA) was used to compare independent variables. Correlation coefficient was used to compare degree of association among parameters with ranges from -1 to +1. P values ≤ 0.05 were considered significant. Measures of central tendency (Mean, Mode and Median) were used where applicable as well as measures of dispersion (Standard deviation and variance).

RESULTS

Data obtained in this study show that of the 386 subjects studied with age range of 18 to 73 years, the mean age was 37 (SD ±3) years with a modal age of 32. There were 162 (42.0) males and 224 (58.0) females with statistically significant difference ($P< 0.05$) (Table 1).

Analysis of the CD4+ T Lymphocyte counts among HIV-negative subjects showed that their values ranged from 200 to 1950 cells/μL with a mean CD4+ count of 1100 cells/μL, CD4+ T Lymphocyte counts $\leq$ 300 cells/μL were 5 (3.4%) and those with CD4+ T Lymphocyte counts $\leq$ 500 cells/μL were 19 (13.1%) (Table 2). There was average correlation between the number of males and females with different values of CD4+ T Lymphocyte counts ($r= 0.473$) (Figure 1).

Among the subjects who were HIV positive, CD4+ T Lymphocyte counts ranged from 50 to 1450 cells/μL. Those with CD4+ T Lymphocyte counts ≤ 50cells /μL were 3 (0.8%); those with CD4+ T Lymphocyte count ≤ 150 cells/μL were 63 (16.2%) and those with CD4+ T Lymphocyte count ≤ 250 cells/μL were 177 (45.9%). The CD4+ T Lymphocytes count ≤ 50 cells/μL M:F Ratio was Fisher Exact P= 0.24 (Table 3). Those presenting with CD4+ T Lymphocyte counts of less than 500 cells/μL were 75.9% (n=293). There was strong correlation between the number of males and females with different values of CD4+ T Lymphocyte counts (r= 677) (Figure 2).

Among the symptoms and signs associated with those who were HIV positive were fever 136 (19.1%), weight loss 133 (18.7%), dry cough 62 (8.7%), sore throat 46 (6.5%). Also those with althralgic myalgia were 14 (2.0%), unclassified 7 (1,0%), encephalitis 5 (0.7%), glomerunephritis 3 (0.4%) and peri-anal ulcerations 2 (0.2%). Those without clinical features were 57 (8.0%),; there was a mean value of 30, mode 0, standard deviation of 40 and median of 26 (Table 4).

Table 1. Age and gender distribution patterns of first attendees at the anti-retroviral clinic at BSUTH Makurdi, Nigeria

Age (Years)	Male (%)	Female (%)	Total (%)
<20	14 (3.6)	22 (5.7)	36 (9.3)
20-29	46 (11.9)	50 (13.0)	96 (24.9)
30-39	41 (10.6)	61 (15.8)	102 (26.4)
40-49	29 (7.5)	35 (9.0)	64 (16.5)
50-59	22 (5.7)	39 (10.1)	61 (15.8)
60-69	7 (1.8)	17 (4.4)	24 (6.2)
≥70	3 (0.8)	0 (0.0)	3 (0.8)
Total	162 (42.0)	224 (58.0)	386 (100)

Mantel-Haenszel Chi Square = 6.652, df= 1, P= 0.005

Table 2: Gender and CD4+ T Lymphocyte counts patterns among HIV-Negative persons in Makurdi, Nigeria.

CD4+ Ranges (Cells/μl)	Male (%)	Female (%)	Total (%)
≥200	2 (1.4)	0 (0.0)	2 (1.4)
201-300	1 (0.7)	2 (1.4)	3 (2.1)
301-400	2 (1.4)	5 (3.4)	7 (4.8)
401-500	3 (2.1)	4 (2.7)	7 (4.8)
501-600	9 (6.2)	3 (2.1)	12 (8.3)
601-700	7 (4.8)	14 (9.7)	21 (14.5)
701-800	9 (6.2)	16 (11.0)	25 (17.2)
801-900	11 (7.6)	2 (1.4)	13 (9.0)
901-1000	5 (3.4)	7 (4.8)	12 (8.2)
1001-1100	5 (3.4)	4 (2.7)	9 (6.1)
1101-1200	3 (2.1)	3 (2.1)	6 (4.2)
1201-1300	1 (0.7)	5 (3.4)	6 (4.1)
1301-1400	2 (1.4)	3 (2.1)	5 (3.5)
1401-1500	1 (0.7)	3 (2.1)	4 (2.8)
1501-1600	6 (4.1)	1 (0.7)	7 (4.8)
1601-1700	0 (0.0)	3 (2.1)	3 (2.1)
1701-1800	0 (0.0)	1 (0.7)	1 (0.7)
1801-1900	0 (0.0)	1 (0.7)	1 (0.7)
1901-2000	0 (0.0)	1 (0.7)	1 (0.7)
Total	67 (46.2)	78 (53.8)	145 (100)

Key: CD4+ T Lymphocyte counts <300 cells/μL= 5 (3.4%), CD4+ T Lymphocyte counts <500 cells/μL = 19 (13.1%)

Figure 1: Gender and CD4+ T Lymphocytes patterns among HIV-Negative persons in Makurdi, Nigeria.

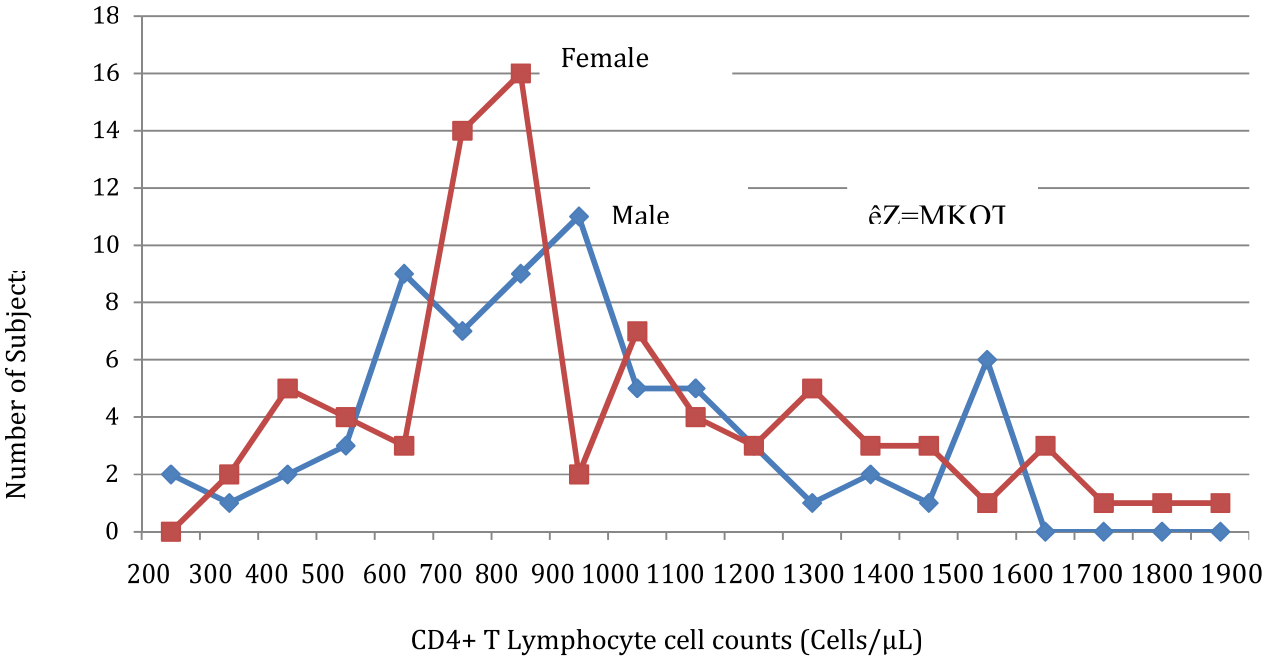


Table 3. Gender and CD4+ T Lymphocytes count among first attendees with HIV/AIDS at anti-retroviral clinic of BSUTH Makurdi, Nigeria.

CD4+Ranges (Cells/µl)	Male	Female	Total
≤50	0 (0.0)	3 (0.8)	3 (0.8)
51-100	17 (4.4)	5 (1.3)	22 (5.7)
101-150	13 (3.4)	25 (6.4)	38 (9.8)
151-200	19 (5.0)	34 (8.8)	53 (13.8)
201-250	22 (5.7)	39 (10.1)	61 (15.8)
251-300	16 (4.1)	32 (8.3)	48 (12.4)
301-350	14 (3.6)	8 (2.1)	22 (5.7)
351-400	9 (2.3)	6 (1.6)	15 (3.9)
401-450	10 (2.6)	12 (3.1)	22 (5.7)
451-500	6 (1.6)	3 (0.8)	9 (2.4)
501-550	2 (0.5)	11 (2.8)	13 (3.3)
551-600	9 (2.3)	10 (2.6)	19 (4.9)
601-650	8 (2.1)	11 (2.8)	19 (4.9)
651-700	2 (0.5)	13 (3.4)	15 (3.9)
≥701	8 (2.1)	19 (4.9)	27 (7.0)
Total	155 (40.2)	231 (59.8)	386 (100)

Key: CD4+ T Lymphocyte count ≤ 50 cells/µL M:F Ratio: Fisher Exact P= 0.24, CD4+ T Lymphocyte count ≤ 50 cells/µL = 3 (0.8%), CD4+ T Lymphocyte count ≤ 150 cells/µL = 63 (16.2%), CD4+ T Lymphocyte count ≤ 250 cells/µL = 177 (45.9%)

Figure 2: Gender and CD4+ T Lymphocytes count among first attendees with HIV/AIDS at anti-retroviral clinic of BSUTH Makurdi, Nigeria.

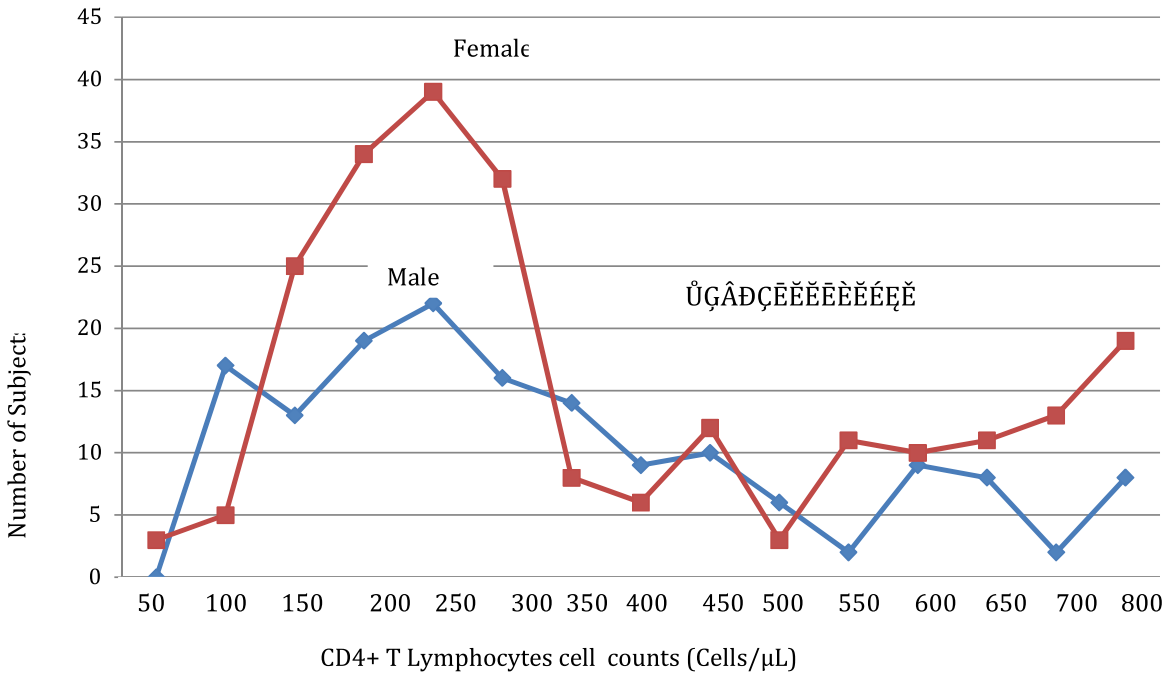


Table 4. Signs and Symptoms of patients with HIV/AIDS with low CD4+ T Lymphocyte count at first presentation at the anti-retroviral clinic of BSUTH Makurdi, Nigeria(N=386).

Signs and Symptoms	Number	Percent
Nil	57	8.0
Fever	136	19.1
Sore throat	46	6.5
Generalised Lymphadenopathy	72	10.1
Trunk rash	21	2.9
Oral thrush	25	3.5
Dry Cough	62	8.7
Pulmonary tuberculosis	26	3.7
Althralgic myalgia	14	2.0
Weight loss	133	18.7
Diarrhoea	31	4.4
Encephalitis	5	0.7
Oesophagial Candidiasis	19	2.7
Herpes Zoster	15	2.1
Glomerulonephritis	3	0.4
Pneumonitis	38	5.3
Peri-anal Ulcerations	2	0,2
Unclassified	7	1.0
Total	712	100

Key: Multiple features were recorded in individual patients., SUM= 712, MAX= 136, MIN= 2, AVERAGE= 30, STANDARD DEVIATION= 40, MODE= 0, MEDIAN= 26

DISCUSSION

The average CD4+ T Lymphocytes count among the HIV negative individuals was 850 cells /µL and ranged from 200 to 1950 cells/µL with CD4+ T Lymphocyte counts of less than 300 cells/µL being 5 (3.4%). Also the CD4+ T Lymphocyte counts of less than 500 cells/µL among the HIV-negative individuals was 19(13.1%). Against the backdrop of generally acceptable normal cut off point for CD4+ T Lymphocyte count of 500 cells/µL and above, at least 13.1% of the apparently HIV-free individuals had low counts. This shows that a low CD4+ T Lymphocyte count in a HIV- positive patient was not really as a result of the HIV infection. There have been several documented findings on idiopathic CD4+ T Lymphocytopenia from several parts of the world just as the 2.1% recorded in the present study[28-31]. With sub-saharan Africa particularly still being plagued by endemic infections and infestations, the possibility of other infectious agents causing CD4+ T Lymphocyte depletion cannot be ruled out. The actual non-HIV infectious agents and other non-biological agents responsible may need to be identified [32,33].

The CD4+ T Lymphocyte counts among HIV-infected individuals ranged from 50 to 1450 cells/µL, 0.8% (n=3) and 45.9% (n=177) respectively presenting with CD4+ T Lymhocyte counts of 50 or less and less than 250 cells/µL. The fact that 75.9% (n=293) of the patients had a CD4+ T Lymphocyte counts of less than 500 cells/µL shows the general late presentation of patients with HIV infection at our health settings , and as much as 50% of these got to know their HIV status the very first time. Why no doubt this late presentation has contributed to the high mortality still associated with the disease in our both rural and urban settings; the aspect of public enlightenment aimed at breaking all barriers of stigma should be strengthened and intensified[34-36].

Fever, weight loss, dry cough and sore throat were the most common symptoms and signs recorded among persons who were HIV positive. These along with several others such as diarrhea, trunk rash, pneumonitis and oral thrush are clinical features also often found among HIV-negative individuals. These clinical features however should serve as a pointer to the possibility of a retroviral disease especially in our community still endemic for the disease. The finding of these same symptoms and signs in a few subjects who were HIV-negative, and the finding of severely depleted CD4+ T Lymphocyte counts also in few persons who were HIV-negative means CD4+ T Lymphocyte count should only be interpreted against several clinic-pathologic parameters for clarity [37-39].

In conclusion, this study has identified signs and symptoms among patients with HIV/AIDS presenting at our facility with low CD4+ T Lymphocyte counts and also revealed the late presentations of patients with the disease. More awareness and enlightenment should be deployed to encourage patients to seek to know their HIV status early enough. Furthermore the probability of idiopathic CD4+ T lymphocytopenia should be factored in interpreting those counts.

Declaration

We declare no conflict of interest.

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