Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

European Journal of Experimental Biology, 2013, 3(3):661-665

ISSN: 2248 –9215
CODEN (USA): EJEBAU

CD_4^+ T cell count in patients concomitantly infected with HIV and Hepatitis B virus in Sokoto state, Nigeria

[1]Alo M. N., [2]Alhassan H. M., [2]Saidu A. Y., [3]Ugah U. I. and [2]Umar F. A.

[1]Department of Biological Science, Federal University, Ndufu-Alike, Ebonyi State, Nigeria
[2]Department of Immunology, Usmanu Danfodiyo University, Sokoto, Sokoto State, Nigeria
[3]Department of Medical Laboratory Science, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria

---

ABSTRACT

Concomitant infection of HIV and HBV is a single most important factor that predispose to poor clinical outcome among patients infected with HIV. This study was aimed at evaluating the CD_4^+ T cell profile as a marker of immune response and stability in patients infected with HIV and HBV. Five hundred and seventy two HIV infected persons were screened for concomitant infection with HBV using HBV screening kit (Sketec, USA). The CD_4^+ T cell count were also determined using cyflow cytometer (Patec, Germany) out of these number, 88 persons were positive for HBV representing 15.4%. The mean CD_4^+ T cell count was 112.3cell/µL, which was significantly lower than the mean CD_4^+ T cell count of 312.3cells/µL among those infected with only HIV. This indicates that HBV infection could be associated with rapid decline in CD_4^+ T cell count in HIV infected persons.

Keywords: HIV, HBV, CD_4^+ T cell

INTRODUCTION

One of the greatest challenges of the medical world today is Human Immunodeficiency virus (HIV) infection. HIV/AIDS is a disease of the human immune system [1]. The infection results in immune suppression especially in the absence of treatment. People infected with HIV are prone to concomitant infection with other pathogens. The most common initial conditions that alert the presence of AIDS are pneumocystis pneumonia, HIV wasting syndrome and esophageal candidiasis [2].

Opportunistic infections may be caused by bacteria, virus, fungi and parasites that are normally controlled by the immune system [3]. HIV and Hepatitis B (HBV) co-infection is common due to shared routes of transmission [4]. Co infection of HIV and HBV is known to influence the natural course of Hepatitis B virus adaptive immune response [5]. Although HBV is a DNA virus, its replication occurs through an RNA intermediate requiring a viral reverse transcriptase. The HBV reverse transcriptase lacks the proof reading function found in other polymerase enzymes. As a result, HBV exhibits a mutation rate that is ten-fold greater than other DNA viruses and hence closely resembles HIV in the replication cycle. The route of HBV transmission is similar to that of HIV transmission. However, HBV is 50 to 100 times more infectious than HIV and 10 times more than Hepatitis C virus [6],[7].

Sub-Saharan Africa has the largest burden of HIV infections in the world and is also an HBV endemic area. HBV co-infection with HIV is common, affecting 5-10% of patients infected with HIV. Most data from sub-Saharan Africa show less than 2-fold or no increase in the prevalence of chronic HBV infections in patients infected with HIV [8]. HIV infection has a significant effect on the natural history of HBV infection. Persistent HBV infection is likely to develop in HIV infected patients and reactivation may occur despite seroconversion to antibody to HBV surface antigen (HBsAg) particularly if the CD4 cell count is low [9],[10].

This study was aimed at evaluating the CD_4^+ T cell profile as a marker of immune response and stability in patients infected with HIV and HBV.

MATERIALS AND METHODS

2.1 Ethical Consideration
Ethical clearance was sought for and obtained from the ethical committee of Specialist Hospital, Sokoto. Informed consent was also obtained from all the participants or from the parents of those participants that were children.

2.2 Study Population
The study was conducted among five hundred and seventy two (572) HIV infected individuals that had not commenced antiretroviral therapy (Non – ART patients) at various stages of infection, attending Specialist Hospital, Sokoto. Relevant clinical details were also obtained from all the patients.

2.3 Eligibility Criteria
Inclusion criteria comprise of HIV positive individuals regardless of their age and sex that are not on antiretroviral therapy. Patients who were on antiretroviral therapy were excluded from the study.

2.4 Sample Collection
5ml of whole blood was collected from each informed and consenting subject by venepuncture. 3ml of each sample was dispensed into sterile EDTA sequestered container, and 2ml was dispensed into sterile plain container and allowed to clot and retract, then it was centrifuged at 4000rpm for 5minutes and the serum was separated into uniformly pre – labeled sterile plain containers. This was used for Hepatitis B surface antigen (HBsAg) test while the sample in the EDTA container was used for CD_4^+ T cell count.

2.5 Detection OF Hepatitis B Surface Antigen
The serum was used for detection of Hepatitis B surface antigen. The serological assay was done using commercial third generation rapid chromatographic immunoassay. Rapid diagnostic HBsAg test strips were used (Sketec, USA) which has a relative sensitivity and specificity of 99.0% and 97% respectively and accuracy of 98.5%. Strict adherence to manufacturer's instructions was observed. The test and result interpretations were done according to the manufacturer's instruction. Results were reported as being either positive or negative.

2.6 CD_4^+ T Cell Count
CD_4^+ T cell count was performed using EDTA anticoagulated whole blood. Cell count was performed using Cyflow cytometer (Patec, Germany) which is an automated system. Strict adherence to manufacturer's instructions and all standard operating procedures were judiciously observed. The results were printed out after each count and recorded accordingly.

2.7 Data Analysis
Data was analysed using Chitest, p value of 0.05 was considered significant at 95% confidence interval. Data analysis was done with the aid of Statistical Programme for Social Sciences (SPSS) version 17.0

RESULTS

The HBsAg status and CD_4 count of HIV patients attending the Antiretroviral therapy clinic was determined. These patients had previously been diagnosed of HIV by a battery of laboratory tests, including Retroconfirmatory test. A total of 572 HIV infected patients participated in this study. Among this population, 256(44.8%) subjects were females while 316(55.2%) were males as shown in figure 1. the age of the subjects that participated in this study ranges from 1year to above 50years. Among the overall population of 256 patients that participated in this study, 88

patients had HBV and HIV co-infection while 484 patients had only HIV infection, this amounts to a prevalence rate of 15.4% (88 of 572) among the population studied.

The CD_4^+ T cell count was observed to be higher among subjects with only HIV infection when compared with the count of subjects with concomitant HBV infection. The overall CD_4^+ T cell count ranges from counts <100cells/µl to counts above 350cells/µl. When the CD_4 count of patients with only HIV infection and those with HIV/HBV co-infection was compared, it was observed that a total of 56 patients with HIV/HBV co-infection had CD_4 counts below 350cells/µl in contrast to 92 patients with only HIV infection who had CD_4 counts below 350cells/µl. However, 32patients with HIV/HBV co-infection as compared to 392patients with only HIV infection had CD_4 counts above 350cells/µl. The difference in HBsAg status among the HIV patients was statistically non significant ($p>0.05$). The mean CD_4^+ T cell count was 112.3cell/µL for patients with concomitant HIV/HBV infection; this was significantly lower than the mean CD_4^+ T cell count of 312.3cells/µL among those infected with only HIV ($p<0.05$).

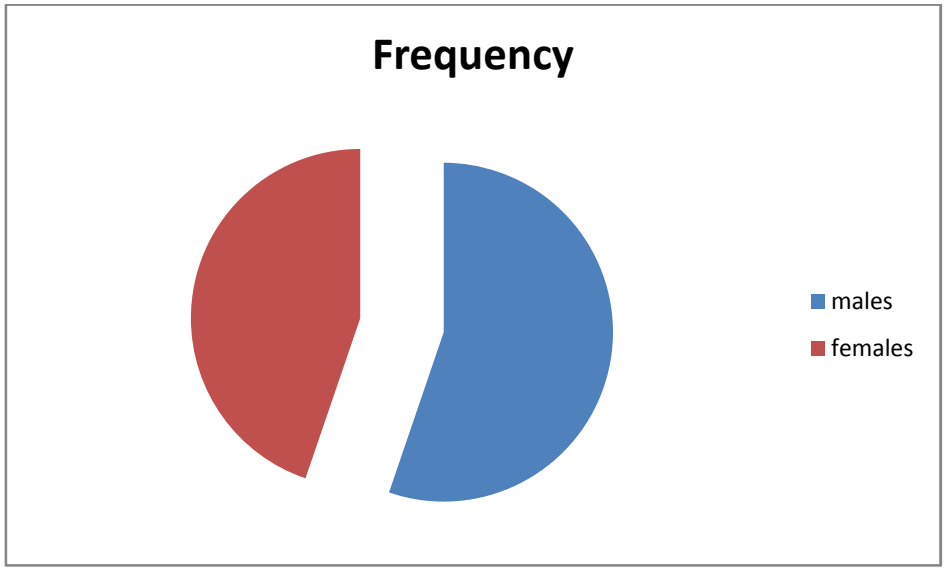

Figure 1: pie chart showing the frequency of male and female subjects

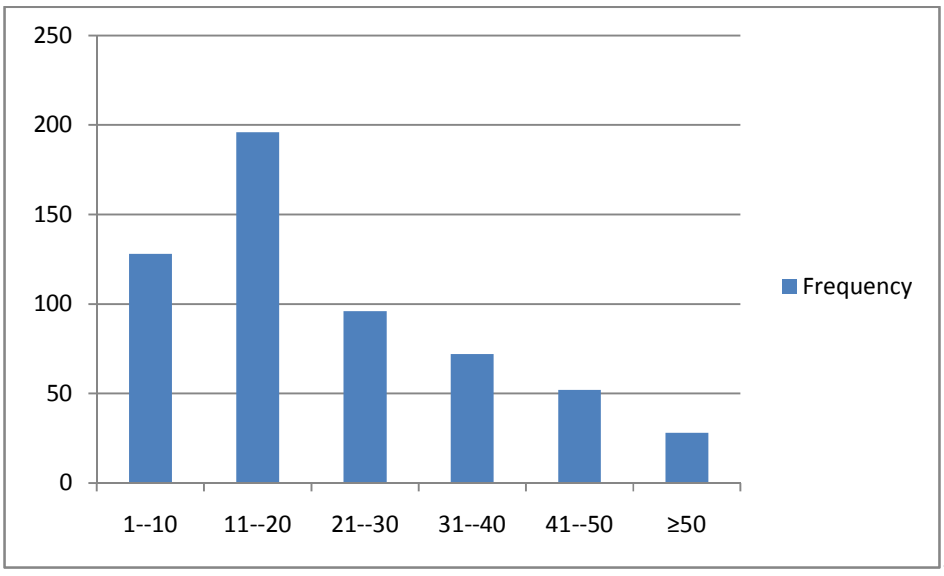

Figure 2: bar chart showing the frequency of the age range (years) of the subjects

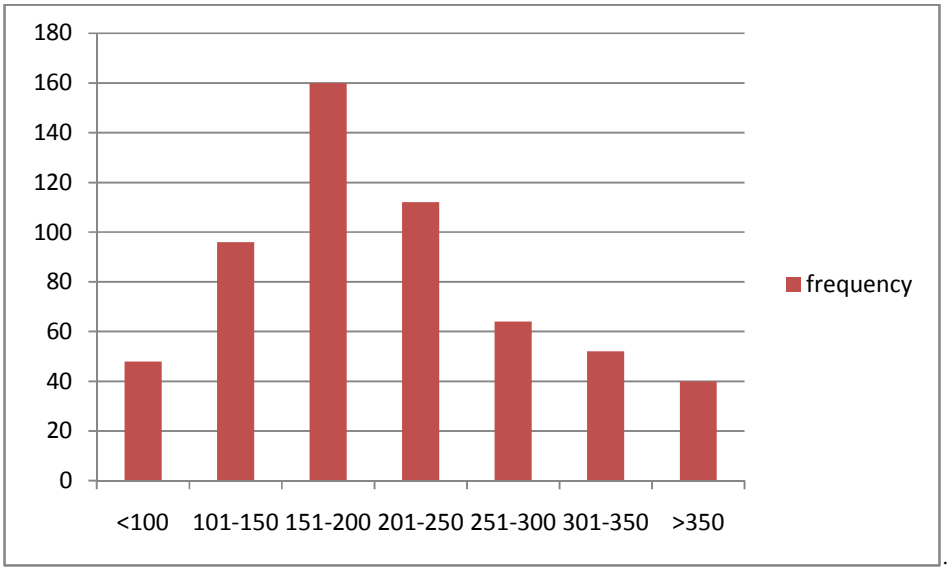

Figure 3: Bar chart showing the frequency of CD4 count among the subjects

DISCUSSION

HBV and HIV share common source and routes of transmission and epidemiology. HBV co-infection is common among HIV patients in various parts of the world like in the United States, with 70-90% of HIV infected individuals having evidence of past or active HBV infection [11],[12].

In this study, the prevalence of hepatitis B infection among HIV infected individuals was observed to be 15.4% (88 0f 572). This prevalence is relatively low compared to a prevalence of 25.5% reported by Piroth and colleagues [13], and a prevalence rate of 25.0% reported among HIV infected individuals in Jos, Nigeria [14].

The CD_4 count of HIV infected patients was performed on patients who had not initiated highly active antiretroviral therapy (HAART), this is to detect the difference in the CD_4 count among patients with only HIV infection and those with HBV co-infection, because CD_4 count gives and estimation of the immune status of the patient. Out of the 88 HIV positive subjects with concomitant HBV infection, 56 had a CD_4^+ T cell count of ≤350cells/µL, while 32 subjects had a CD_4^+ T cell count of ≥350cells/µL. This amounts to a ratio of 7:4, hence most of them with concomitant HIV/HBV infection had CD4 cells below the baseline count of 350cells/µL [15]. This may be an indication that HBV infection aggravates the propensity of the pathogenesis of AIDS in HIV infected persons as CD4 count is directly proportional to the level of immunosuppression. This is comparable to the study by Mayaphi and colleagues [16] which observed that an increased HBV prevalence in HIV patients with CD_4 count of ≤100cells/µL had a major risk factor of increased HBV replication.

In our study, majority of the subjects had a CD_4 count of between 151-200cells/µL with 160 subjects having a CD_4 count within this range. This is because in most rural areas, as have been consistently observed by the authors, most HIV infected persons refuse to report early to the antiretroviral therapy clinics immediately after diagnosis, mostly as a result of ignorance a greater proportion of these patients reported to the hospital for other various diseases that may have arose as a result of immune suppression.

When CD4 count is <200 cells/µL and ART has been initiated there is a risk of a severe reactivation of hepatitis B during immune reconstitution, which may include a life-threatening hepatitis flare. Irrespective of indications for HBV treatment, the ART regimen for these patients must therefore include two dual-activity drugs in order to minimize the risk of HBV reactivation. Management of patients with HIV and HBV co-infection should be done following guidelines by the WHO to ensure optimal therapy results and improve the health of the patient.

CONCLUSION

Hepatitis B virus has continued to pose a serious public health burden globally and has been shown to be the most common infectious disease in the world. Patients with compromised immune system such as HIV infected individuals are usually at high risk of being infected with Hepatitis B virus due to shared routes of transmission. It is therefore important to screen HIV patients for HBV co-infection as HBV has been shown to speed up the pathogenesis and the propensity of HIV pathological changes. Also, antiretroviral therapy should contain anti-HBV regimen.

REFERENCES

[1] Sepkowitz K.A. *New England Journal of Medicine*, **2001**, 344(23), 1764-1772.
[2] Del, R., J. Cand and Curran, W Epidemiology and prevention of acquired immunodeficiency syndrome and Human immunodeficiency virus infection. In Principles and Practice of Infectious Diseases. 7th ed. Eds., Mandell G.L., Douglas, R., D. and Bennett J., E. Churchill Livinstone Elsevier. Philadelphia, **2010**, Volume1 pp: 1635-1661.
[3] Holmes C.B., Losina E., Walensky, R.P., Yazdanpanah Y., Freedberg K.A. *Journal of Clinical Infectious Diseases*, **2003**, 36(5), 656-662
[4] Alter, M. *Journal of Hepatology*, **2006**, 44(1), 6-9
[5] Chun H.M., Roediger M.P., Huppler K.H., Thio C.L., Agan B.K., Bradley W.P., Peel S.A., Jagodzinski L.L., Weintrob A.C., Ganesan, A., Crum-Cianflone N.F., Maguire J.D., Landrum M.L. *Journal of Infectious Diseases, online edition*, **2011**, Doi:10.1093/infdis/jir720
[6] Center for Disease Control and Prevention (CDC). (**2011**). *CDC MMWR*, **2011**, 50(RR-11):1-42
[7] WHO. Hepatitis B factsheet. World Health Organisation, Geneva, Switzerland, **2012**, Available from http://www.who.int/mediacentre/factsheet/fs204/en/ retrieved 27/02/2013
[8] Burnett R.J., Francois G., Kew M.C., Leroux-Roels, G., Mehause, A., Hoosen, A. A and Mphahlele, M. J. *Liver International*, **2005**, 25, 201-213
[9] Bodsworth N.J., Cooper D.A., Donovan B. *Journal of Infectious Diseases*, **1991**, 163, 1138-1139
[10] Vento S. Di Parri G., Garofano T., Concia E., Basseti D. *Lancet*, **1989**, 2, 108-109.
[11] Rodriguez-Mendez M.L., Gonzalez-Quintela A. and Aguilera A. *American Journal of Gastroenterology*, **2000**, 95(5), 1316-1322.
[12] Scharschmidt B.F., Held M.J., Hollander H.H. *Annals of Internal Medicine*, **1992**, 117(10), 837-838.
[13] Piroth L., Sene D., and Pol S. *AIDS*, **2007**, 21(10), 13323-1331.
[14] Uneke C.J., Ogbu P.U.I., Anyanwu G.I., Njoku M.O and Idoko J.H. Prevalence of Hepatitis B surface antigen among blood donors and HIV infected patients in Jos, Nigeria. *Memorias do Instituto Oswaldo* cruz *Cruz Rio de Janerio*, **2005**, 100(1), 13-16
[15] Eaton D.K., Kann L., KinchenS., Shanklin S., Ross J., Hawkins J., Harris W.A., Lowry R., McManus T., Chyen D., Lim C., Brener N.D., Wechsler, H. Youth risk behavior surveillance- United States, 2007. *MMWR Surveillance Summaries*, **2008**, 57(4), 1-131
[16] Mayaphi S.H., Rossow T.M., Masemola D.P., Olorunju S.A.S., Mphahlele M.J. *South African Medical Journal*, **2012**, 102(3), 157-162.
[17]Taura D.W., Oyeyi T.T. and Hafsat M.N. *International Journal of Biomedical and Health Sciences*, **2008**, 4(1), 33-39.