Research Journal of Biological Sciences 6 (1): 40-43, 2011
ISSN: 1815-8846

Immune Status of HIV/AIDS Patients with Hepatitis B Virus in Benue State, Nigeria

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Abstract: The CD4 counts of HIV positive individuals with hepatitis B surface antigen was a factor used to determine the immune status among infected individuals in Benue state. Total 966 males infected with HIV, 15 (1.55%) were positive for HbsAg+ with CD4 counts <335 cell μL^{-1} and in the female category, 10 (0.95%) of 1042 were positive for HbsAg+ with the CD4+ counts <420 at the initial CD4 cells counts. According to age, individuals aged between 30 and 39 years were positive for HbsAg+ with their CD4 counts ≤335 cell μL^{-1}. The least in terms of HbsAg+ carriage (0.34%) were those ≥50 years whose CD4 read <224 cell μL^{-1}. After an interval of 6 months, the CD4 level declined to <100 cell μL^{-1}. However, there was a significant relationship in the degree of infection among sexes ($Z = 0.40 <\pm 1.96$). HbsAg+ carriage rate was dependent on age ($x^2 = 7.82 < 0.05$).

Key words: Immune, status, HIV/AIDS, patients, hepatitis B virus, Nigeria

INTRODUCTION

Information is few or lacking on the seroprevalence of HIV and Hepatitis B (HB) infection in Benue state and indeed most other parts of the country. Most studies have shown that HIV infection leads to more aggressive hepatitis B infection and a high risk of liver damage. According to Mashingadze *et al.* (1998), the univariate association of HbsAg and HIV seropositivity may be explained by the association of HbsAg with the low-socioeconomic strata in other words, HbsAg may have unrecognized sexual transmission and therefore, there is a definite association between HbsAg and HIV seropositivity. HIV and HBV co-infection have resulted in more rapid deterioration of liver due to hepatitis B which is now recognized as a leading cause of death in patients with HIV. According to WHO (2000) in the developing world, most people become chronically infected with HBV during infection. By estimate, 18 million Nigerians (20%) are chronically infected with HBV and about 4.7 million (25.40%) of these die from its complications. The HIV/AIDS epidemic in Nigeria has extended beyond the commonly classified high risk groups and is now common in the general population with the adult prevalence rate at 5.8% in 2001 therefore, the threshold of an exponential explosive growth epidemic is attainable. This investigation was undertaken in some selected communities of Benue state with a view to ascertaining immune status of HIV infected individuals positive for HbsAg by studying their CD4+ lymphocytes level.

MATERIALS AND METHODS

Study area: Benue state, Nigeria lies on the pre-Cambrian to the Jurassic Northern Nigeria which covers about 9,400 km^2 of the crystalline complex. Its average elevation is about 1,250 m above mean sea level. The land surface consists of plains, hills, depression and rocks of various forms shapes and sizes (Davies, 1977). The population is largely rural and live in farming communities.

Hepatitis B surface antigen assay procedure: This antigen was accessed from commercially available ELISA kit (Murex Diagnostic Ltd., Dartford UK) obtained from the Federal Medical Center, Tosema Diagnostics Laboratory and Accuracy Specialist Laboratory all in Makurdi. The manufacturer's recommendation on the ELISA kit was strictly follow to determine the positivity or otherwise of HbsAg of each serum sample. Blood samples of sufferers were collected into EDTA containers after informed consent and ethical clearance from a research ethics committee.

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Coulter® manual CD4+ counts kit: This assay is based on the ability of monoclonal antibody-coated latex spheres to bind to the surface of cells expressing discrete antigen determinants. When the CD4 coated latex spheres come in contact with a cell that has the CD4 cell surface antigen, the two bind forming a cell-latex spheres rosette which is easily recognized by light microscopy. The CD4 coated latex spheres measured between 1.8-2.2 microns in diameter, representing 0.9-2.2% of the depth of most hemocytometers (CD4 coated latex spheres also react with monocytes).

Absolute CD4+ lymphocyte count was performed after combining an allquot of whole blood with the MY4 cyto-spheres monocyte blocking reagent, adding the CD4 cyto-spheres reagent and mixing. An alliquot of this mixing was added to a lysing reagent to lyse erythrocytes. Crystal violet, a component of the lysing reagent, enabled staining of the nuclear material of the leucocytes to facilitate identification in the hemocytometer. However, manufacturer's recommendation was strictly followed as progressive clinical and immunologic deterioration generally correlates with a falling CD4+ lymphocytes count.

RESULTS AND DISCUSSION

Hepatitis B infection determined in HIV infected individuals revealed that among the 966 males 15 (1.6%) were positive for hepatitis B with CD4 lymphocytes count <335 cell μL^{-1} while in the females of 1042, 10 (1.0%) were positive for HbsAg+ with CD4 counts <420 cell μL^{-1} at the 1st CD4 lymphocyte count. One HIV+ infected individual who had his CD4 counts = 90 cell μL was aged 40 years and at this time, he had developed symptoms of Acquired Immune Deficiency Syndrome (AIDS) passing out putrid diarrhoic stool 3-8 times day^{-1} (Fig. 1 and Table 1).

Based on age, no positive result in HbsAg infection was observed among children between the ages of 0-19 years with CD4 lymphocytes count <100-200 cell μL^{-1}. Again, the most exposed and risk vulnerable group who were between the ages of 20-29 years mostly students and the 30-39 years old working class category, HIV infection was in the order, 5 (1.8%) and 10 (40.0%) with the overall HbsAg+ carriage rate and the CD4 counts <335 cell μL^{-1}, respectively. Similarly between the age of 40-49 years, 200 males and 140 females had an overall infection rate of 9 (2.6%) and the CD4 counts <420 cell μL^{-1}. The least infected was adults >50 years old with CD4 lymphocytes count <224 cell μL^{-1}. Table 2 and Fig. 2 shows serious

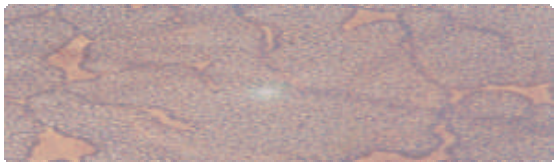

Fig. 1: Agglutination of positive clinical HbsAg of specific antibody of HIV individuals. Magnification ×1000

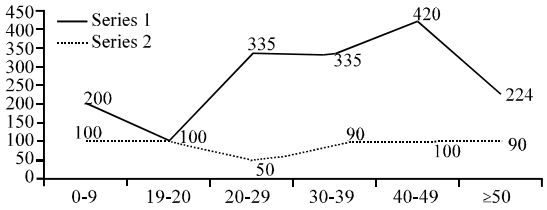

Fig. 2: Estimated frequency of CD4+ lymphocyte count to determine status of HIV+ infected individuals in Benue state, Nigeria

depletion in CD4 lymphocytes count after 6 months (2nd CD4 counts). Subjects aged 2 0-29 years had their CD4 falling <50 cell μL whereas, the 30-49 years old had CD4 <90 cell μL^{-1} and <100 cell μL^{-1}. As from age 50, the CD4 counts stayed at <90 cell μL^{-1}. In any case, there was an association between sexes ($Z = 0.40 \leq \pm 1.96$). However, the HbsAg+ carriage rate was not significant among the age groups examined ($X^2 = 7.82 > 0.05$).

With reference to endemicity of HB virus, data is lacking on the seroprevalence of HbsAg specific serum antibody among HIV infected individuals in Benue state. In this study, overall 1.2% of HIV+ infected individuals were positive for HbsAg and clinical manifestation of HbsAg+ was evident in both the males and their female counterparts. However, the HbsAg+ carriage rate was significantly different in the two ($Z = 0.40 \leq \pm 1.96$).

In this case study, death of two HIV+ infected individuals was recorded. In other words, HbsAg+ carriage rate could be an important cause of death among HIV+ individuals and depletion in the CD4 T-lymphocytes level. Observed in a decomposed liver, disease such as encephalopathy, ascites, jaundice or rather complications directly related to it (gastrointestinal bleeding, hepatorenal syndrome, peritonitis) were diagnosed and 8.6% hospital admission were observed to be positive for Chronic Viral Liver Disease (CVLD) with death directly associated with CVLD occurring in 15 patients (Soriano *et al.*, 1999).

Similarly, Mashingadze *et al.* (1998) in assessing the relationship between HbsAg and HIV positivity observed

Table 1: CD4 lymphocytes count by age and sex among HIV infected individuals with HbsAg+ in Benue state, Nigeria (at the beginning)

	Males		Females			
Age (years)	Total no. of HIV+ examined	Total no. of HbsAg+ (%)	Total no. of HIV+ examined	Total no. of HbsAg+ (%)	Overall HbsAg+ (%)	CD4+ lymphocytes count (cell μL^{-1})
0-9	780	0 (0.0%)	780	0 (0.0%)	0 (0.0%)	<200
10-19	281	0 (0.0%)	353	0 (0.0%)	0 (0.0%)	<100
20-29	128	3 (2.3%)	136	2 (1.5%)	5 (1.8%)	<335
30-39	100	4 (4.0%)	135	6 (4.4%)	10 (4.2%)	<335
40-49	200	7 (3.5%)	140	2 (1.4%)	9 (2.6%)	<420
≥50	170	1 (0.6%)	200	0 (0.0%)	1 (0.3%)	<224
Total	966	15 (1.6%)	1042	10 (1.0%)	25 (1.25%)	-

CD4+ = Clone Designation of latex spheres antigen; HbsAg = Hepatitis B surface Antigen; No. = Number

Table 2: CD4 lymphocytes count in the same groups of individuals with HbsAg in Benue state, Nigeria (6 months later)

	Males		Females			
Age (years)	Total no. of HIV+ examined	Total no. of HbsAg+ (%)	Total no. of HIV+ examined	Total no. of HbsAg+ (%)	Overall HbsAg+ (%)	CD4+ lymphocytes count (cell μL^{-1})
0-9	78	0 (0.0%)	78	0 (0.0%)	0 (0.0%)	<100
10-19	281	0 (0.0%)	353	0 (0.0%)	0 (0.0%)	<100
20-29	128	3 (2.3%)	136	2 (1.5%)	5 (1.8%)	<50
30-39	100	4 (4.0%)	135	6 (4.4%)	10* (4.2%)	<90
40-49	200	7 (3.5%)	140	2 (1.4%)	9 (2.6%)	<100
≥50	170	1 (0.6%)	200	0 (0.0%)	1 (0.3%)	<90
Total	966	15 (1.6%)	1042	10 (1.0%)	25** (1.25%)	-

*Two HIV+ patients died with the CD4 lymphocytes count >162 cell μL^{-1}. **Twenty-five HIV infected individuals had hepatitis B and 11 had CD4+ lymphocytes count <91 cell μL^{-1}. HbsAg+ = Hepatitis B surface Antigen. No. = Number

that 6% of the men were HbsAg positive. Independent predictors considered high risk factor among sexes and found that males were more vulnerable but in this study, there was no significance in the HbsAg serodiagnosis in HIV positive males and females in benue state. Moreso, Sirisena *et al.* (2002) confirms higher carriage rate amongst females at 44.1% with the males showing 1.6% HbsAg+ carriage rate giving an overall carriage rate of 10.3%. Berger *et al.* (1998) and Maggi *et al.* (2000) had observed a lower level of HbsAg in the females. However, HbsAg carriage rate worsened the condition of HIV infected individuals with evidence of chronic weakness and general debility.

A 36 years old man who was ill with fatigue, weight loss and accompanying diarrhoea which progressed to jaundice and fever expirienced worsening condition, died 3 months after the onset of symptoms. At an advanced stage of HbsAg+ carriage rate, his CD4 lymphocytes count fell <90 cell μL^{-1} probably because the hepatic cells were damaged causing necrotic granules in the liver. Two HIV-infected individuals with CD4 counts <162 cell μL^{-1} also died and 11 among the 25 HIV+ had CD4 counts <90 cell μL^{-1} at the 2nd CD4 lymphocytes count. Notable among the categories of HIV/AIDS was those between 20-29 years who fell within the definition of HbsAg positivity as this group is considered to be the most sexually active. Miao *et al.* (2000), Mashingadze *et al.* (1998) and Soriano *et al.* (1999) had observed that HbsAg+ carriage rate was more common among the age of 1-14 years. In the study both sexes independent of age had hepatitis B infection. Again, Sirisena *et al.* (2002) found a carriage rate of 8.8% in people between the ages 21-30 years old.

CONCLUSION

In any case, the occurrence of HbsAg+ amongst HIV infected individuals in Benue state is evident in this study which could create great concern on the ethno-pathogenicity of the illness in most of the communities, who could witness quick depletion in their CD4 lymphocytes count. Further, observation on the HbsAg status in Benue state will provide data base on these infections. The illness should be treated with the available HBV drugs to reduce high morbidity and mortality rate among people living in communities of Benue state. HBV-vaccine should be included in the routine immunization of children.

AKNOWLEDGEMENTS

The researchers thank the Federal Medical Centre (FMC), Tosema Diagnostic Laboratory (TDL) and Accuracy Specialist Diagnostic Laboratory (ASDL) Makurdi for supplying the reagents and for facilities used during this research .

REFERENCES

Berger, C.M., A. Leentvaar-Kuijpers, G.J. van Doornum and R.A. Coutinho, 1998. Accidental exposure to blood and the risk of transmission of virus infections for various occupational groups in Amsterdam, 1986-1996. Ned. Tijdschr. Geneeskd., 142: 2312-2314.

Davies, H., 1977. Tsetse Flies in Nigeria. Oxford University Press, Ibadan.

Maggi, P., A.M. Larocca, M. Quarto, G. Serio, O. Brandonisio, G. Angarano and G. Pastore, 2000. Effect of antiretroviral therapy on cryptosporidiosis and microsporidiosis in patients infected with human immunodeficiency virus type 1. Eur. J. Clin. Microbiol. Infect. Dis., 19: 213-217.

Mashingadze, A., M. Bassett, R. Machekano and D. Katzenstein, 1998. The relationship of hepatitis B virus and HIV seropositivity in a group of male factory workers in Harare Zimbabwe. Int. Conf. AIDS., 12: 146-146.

Miao, Y.M., F.M. Awad-El-Kariem, C. Franzen, D.S. Ellis and A. Muller *et al*., 2000. Eradication of cryptosporidia and microsporidia following successful antiretroviral therapy. J. Acquir. Immune Defic. Syndr., 25: 124-129.

Sirisena, N.D., M.O. Njoku, J.A. Idoko, E. Isamade and C. Barau *et al*., 2002. Carriage rate of hepatitis B surface antigen (HbsAg) in an urban community in Jos, Plateau, Nigeria. Nig. Postgrad. Med. J., 9: 7-10.

Soriano, V., J. Garcia-Samaniego, E. Valencia, R. Rodriguez-Rosado, F. Munoz and J. Gonzalez-Lahoz, 1999. Impact of chronic liver disease due to hepatitis viruses as cause of hospital admission and death in HIV-infected drug users. Eur. J. Epidemiol., 15: 1-4.

WHO., 2000. AIDs epidemic update. Joint United Nations Programme on HIV/AIDS, http://www.aegis.com/files/unaids/waddecember2000_epidemic_report.pdf.