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PREVALENCE OF HEPATITIS B SURFACE ANTIGEN, HEPATITIS C AND HUMAN IMMUNODEFICIENCY VIRUS ANTIBODIES IN A POPULATION OF STUDENTS OF TERTIARY INSTITUTION IN NIGERIA

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ABSTRACT

Objective: Human immunodeficiency virus (HIV), hepatitis B virus, and hepatitis C viruses (HCV) are major causes of mortality and morbidity worldwide. They are also among the commonest transfusion-transmissible infectious agents. Students of higher institutions are often used as voluntary unpaid donors by many hospitals in Nigeria. In this study, the prevalence of HIV and HCV and HBsAg is determined in a population of students attending Ladoke Akintola University of Technology in south west Nigeria, to provide background information on the burden of these infections in this population.

Materials and Methods: Serum samples were obtained from students of the Pre-degree Science programme of Ladoke Akintola University of Technology, Ogbomosho and tested for antibodies to HIV, HCV and HBsAg using the ELISA procedure.

Results: The prevalence rates of antibodies to HIV and HCV in the student population were 0% and 4.8%, respectively and that of HBsAg was 9.5%.

Conclusion: The findings of this study which showed that the prevalence of antibodies to HIV and of HBsAg in this group of students is somewhat similar to those carried out in similar populations. This strongly suggests that the viral burden amongst this population of students is similar and that probably similar factors (demographic) are responsible for maintaining this level of viral load. Further studies would be needed to elucidate the reasons why this is the case. Also it would be necessary to re-emphasize the methods of prevention of transmission of these viruses, and to ensure their implementation in order to reduce the viral levels and therefore avoid the long term sequalae.

Key words: Transfusion, Infection, Blood Donation

INTRODUCTION

Human immunodeficienciency virus (HIV), hepatitis B virus and hepatitis C virus (HCV) are major causes of morbidity and mortality worldwide. Today, HIV is a leading cause of death in many parts of the world, especially in African countries. It is estimated that over 40 million people world wide are living with the virus with over 75 % of them living in Africa (1). HIV/AIDS is spreading fast globally and in Nigeria, the virus infection is now endemic in rural and urban areas (2). UNIAIDS estimates that in Nigeria around 3.9% of adults between the

ages 15-49years are living with HIV/AIDS (1).

Hepatitis B virus infection is endemic in many developing parts of the world. It is

estimated that globally, there are over 400 million chronic carrier of the virus (3, 4). Studies by several investigators have shown that a large percentage of the Nigerian population has been infected by HBV and that the virus contributes significantly to the aetiology of liver diseases in the country (5, 6).

About 3% of the world's population has been infected by HCV and over 170 million people are chronic carriers (7). Although much is known about the epidemiology of HBV in Nigeria, limited investigation has been carried out on Hepatitis C virus infection.

Among the features common to HIV, HBV and HCV is the transmissibility via blood transfusion from the donor to the recipient of the donated blood. Apart from these three viruses many other infectious agents can be transmitted through blood transfusion. These include *Treponema pallidum,* Plasmodium sp., human T-lymphotrophic virus (HTLV), Babesia, Leishmania, *Trypanosoma cruzi*, variant Creutzfeldt-Jacob Disease (*v*CJD) agent, cytomegalovirus (CMV)and Epstein Barr virus (EBV). Therefore, the need to render donated blood and blood products safe before they are transfused into a patient has become a major challenge for the blood transfusion services worldwide.

To ensure that donated blood is safe for transfusion, the World Health Organization (WHO) has put in place strict criteria for safe donation. These include donation by voluntary, unpaid, young, healthy, non-pregnant, adult, low risk and fully counseled donors (8). Unfortunately, this category of donors is scarce in Nigeria; therefore, most blood donations are obtained from replacement and paid donors who are at high risk for these infections.

.The future of safe blood donation in Nigeria lies in the ability of the blood transfusion services to recruit and retain voluntary unpaid donors. Enquiries made among students of Ladoke Akintola University revealed many students are willing to serve as voluntary unpaid donors. The aim of this study was to determine the prevalence of HIV infection, HBsAg and HCV antibody in students of LAUTECH at the time of enrollment into the University and compare the results obtained to those from similar studies carried out elsewhere.

MATERIALS AND METHODS

Study Participants

The participants in this study were freshmen enrolled in the Pre-degree Science (PDS) programme of Ladoke Akintola University of Technology (LAUTECH), Ogbomosho, Oyo State. They were recruited into an on-going longitudinal study of HIV infection in a cohort of students of the institution in 2003. A study proforma was used to obtain demographic data such as

age, sex, state of origin, occupation and state of residence of parents were obtained from the participants. Informed consent was sought at the point of recruitment and blood samples were collected only from the students who consented to participate in the study. Pre-test HIV counseling was also given to all participants tested for HIV antibody.

Specimens

Blood samples were collected by venipuncture from all consenting study participants at the LAUTECH Health Center, Ogbomosho, with sterile 5ml plastic syringes and 22 gauge needles. After collection, blood samples were transported in a cooler containing ice pack to the Virology Laboratory, Department of Medical Microbiology and Parasitology, Faculty of Basic Medical Sciences, LAUTECH College of Health Sciences, Oshogbo, Osun State. Serum was separated by low speed centrifugation at 1,500 revolutions per minute (r.p.m.) and stored at -20^{o}C in 2 ml Eppendorf tubes before testing.

Laboratory Tests

Serum samples were tested for antibody against HIV-1, and Hepatitis C virus, and for Hepatitis B surface antigen (HBsAg). All assays were performed using the ELISA procedure.

Assay for HIV antibody was performed using GenScreen ELISA kits, Immunocomb and Genie 2 rapid test kits. (details of test procedure is as described by the manufacturer)

Test for HBsAg was carried out using the Blinotech Diagnositics kit, following the procedure described by the manufacturer

The HBsAg EIA is a solid-phase simultaneous sandwich immunoassay, which employs monoclonal antibodies and polyclonal antibodies specific for HBsAg. Microtiter well is coated with monoclonal antibodies specific for HBsAg. A serum specimen is added to the antibody coated Microtiter wells together with enzyme conjugated polyclonal antibodies. HBsAg, if present, will form an antibody-HBsAg-antibody-enzyme complex. The plate is then washed to remove unbound material. Finally, a solution of substrate is added to the wells and incubated. A blue color will develop in proportion to the amount of HBsAg present in the specimen. The enzyme-substrate reaction can be stopped and the result is visualized by naked eye or read by EIA plate for absorbance at the wavelength of 450nm.

Hepatitis C antibody was also assayed using the clinotech diagnostics kit, following the procedure described by the manufacturer.

Principle of the Test

This ELISA uses recombinant proteins derived from core region of HCV virus to detect the presence of HCV antibodies in human sera. Multiple epitopes of HCV proteins are bonded to the microtiter wells. When antibodies to HCV are present in the test sample, they react with recombinant proteins and attach to the solid-phase. Non-reactive antibodies are removed with the wash buffer. Human IgGs bound to the antigen are reacted with goat-anti-human IgG peroxides conjugate and visualized by subsequent reactions with a chromogenic substrate. Positive sample generates a medium to dark blue color. No color or very pale blue color indicates a negative reaction. The intensity of the reaction is photometrically quantitated.

RESULTS

A total of two hundred and ninety seven students were recruited into the study. The mean age for males was 19.54 years and for females was 18.59 years with an age range of 15-26 years. There were 137 males and 160 females giving a male to female ratio of .1: 1.19. Out of all those screened none tested positive for HIV-1 with Genscreen ELISA.

Twenty eight (9.5%) participants tested positive for HBsAg, while fourteen (4.8%) tested positive for HCV antibody. Those who tested positive for HBsAg were found to be older than those who tested negative. Statistical analysis found this to be statistically significant.($p<0.05$). So also with HBsAg there was a significant association between sex and incidence. Males were found to be at higher risk for HbsAg than females. ($p < 0.05$). This was however at variance with incidence of HCV where no significant association between sex and hepatitis C status was found. It was noted though, that those found to be positive for HCV were younger, however this was not statistically significant.

Table 1: Demographic characteristics of Students test for HBsAg, HCV an HIV antibodies

GENDER	HEPATITIS C VIRUS	
STATUS	POSITIVE	NEGATIVE
MALE	8	129
FEMALE	6	154

Table 2: HBsAg, HCV and HIV antibodies among students of a Tertiary Institution

GENDER	HIV	
STATUS	POSITIVE	NEGATIVE
MALE	NIL	NIL
FEMALE	NIL	NIL

GENDER	HEPATITIS B VIRUS	
STATUS	POSITIVE	NEGATIVE
MALE	20	117
FEMALE	8	152

DISCUSSION

Studies carried out by various authors have shown that HIV, HBV and HCV infections are highly prevalent among Nigerians (9,10,11,12). Infection by two of these viruses, HIV and HBV was the leading cause of discarding donated blood at the University of Benin Teaching Hospital (13). This is probably the case in many blood transfusion centers in the country. The financial cost of discarding so many units of blood is enormous, thus constituting a major burden on the health budget.

The present study showed that none of the students tested in this study had HIV infection. The prevalence of HIV infection in the Nigerian population in 2003, the time these blood specimens were collected was 4.5%. The absence of HIV infection in this group of students may be due to the fact that most of the students tested were very young and were from the high socioeconomic group, and were probably well-informed through HIV/AIDS awareness campaigns about how to avoid being infected by HIV.

The prevalence of HBsAg (9.4%) found in this study is similar to findings determined among university freshmen in Ife (8%) (14). However studies in 1985, 17% of antenatal clinic patients were positive for HBsAg (15). In studies carried out among paid blood donors the HIV seroprevalence rate was slightly higher (2.1%) (16) compared to 0% obtained here probably due to the fact that this group (paid donors) are a well known high risk group.

The 4.7% prevalence of HCV antibody in the student population is a little higher or somewhat similar to reports in previous studies in Nigeria (17). However it has been shown that it has been shown that HCV antibody prevalence is much higher in older adults than in young adults. For example, it was shown that HCV antibody prevalence was much higher (8%) in clergy men aged 30-39 years (18).

Future similar studies would specifically include HIV II , Nigeria being a West African nation.

The clinical implications of the findings is that a significant number of those found positive depending on individual immunity and other factors , are likely to go on to develop the long term sequalae of harboring these viruses including cirrhosis and hepatocellular carcinoma. Demographically it however implies that there are similar social and environmental factors operating to ensure the maintenance of the viral burden .

CONCLUSION

In conclusion, this study showed that the prevalence of HIV and HCV antibodies and HBsAg is generally comparable to results obtained from similar studies carried out elsewhere. From this it can be concluded that among this population of students the

viral burden is similar because there are probably similar factors operating demographically, assisting in the maintenance of this viral load.

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