

SEROPREVALENCE OF HEPATITIS B VIRUS AMONG STUDENTS OF FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE, NIGERIA

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Abstract

This study was carried out to determine the seroprevalence of hepatitis B virus surface antigen (HBSAg) among students of Federal University of Technology Minna, Nigeria. Blood samples were collected from a total of one thousand (1000) students and screened using the one step Hepatitis B surface antigen test strip (Diaspot HBSAg). The screening revealed that 43 (4.30%) subjects out of the total 1000 screened were positive for HBSAg. The age distribution of HBV infection among the subjects showed that age group 17-20 years had 1 (0.3%) positive out of the 322 subjects screened, 21-24 years had 31 (8.1%) positive out of the 381 screened while 25-28 years had 11 (3.97%) positive out of the 297 subjects screened. The gender distribution of HBV infection revealed prevalence rates of 3.0% and 5.5% for the males and the females respectively. No significant difference was observed in the distribution of HBV infection with respect to age and sex in the study area ($p < 0.05$). The result of this study suggests a declining trend in the prevalence of hepatitis B virus infection in the study area, it however underscores the need for a renewed campaign on the essence of vaccination against HBV.

Keywords: Surface, Screen, Hepatitis, Gender, Antigen.

Introduction

Hepatitis B is an infectious inflammatory illness of the liver caused by the Hepatitis B virus (HBV) that affects Hominoidea, including humans. Originally known as "Serum Hepatitis" (Barker et al., 1996), the disease has caused epidemics in parts of Asia and Africa, and it is endemic in China (Alshayea et al., 2006). About a third of the world population has been infected at one point in their lives (Navabakhsh, 2011), including over 360 million people who are chronic carriers of the virus (Musa et al., 2015). The disease is hyper-endemic in Sub-Saharan Africa accounting for an average of 80 infections per every 1000 persons and is believed to be a major cause of chronic liver disease in Africa and particularly Nigeria (Ola & Odaibo, 2007).

Hepatitis B virus is a member of the Hepadnaviridae viral family comprising viruses with a strong predilection for the liver and it has a circular genome of partially double-stranded DNA. The viruses replicate through an RNA intermediate form by a reverse transcription, an attribute which HBV shared with the retroviruses (Hu & Liu, 2017). Although replication takes place in the liver, the virus eventually spreads within the blood circulation where viral proteins and anti-HBV specific antibodies are found in infected people (Ayatollahi et al., 2014). The Hepatitis B virus is believed to be about 50 to 100 times more infectious than HIV (Kew, 2012). The virus is mainly transmitted by exposure to infectious blood or body fluids such as semen and vaginal fluids but viral DNA has also been reportedly detected in the saliva, tears and urine of chronic carriers. Perinatal infection is a major route of infection in endemic (mainly developing) countries (Franco, 2014).

Risk factors for developing HBV infection include working in a health care setting, blood transfusions, dialysis, acupuncture, tattooing, sharing razors or toothbrushes with an

infected person, travel in countries where it is endemic and residence in an institution (Kidd-Ljunggren *et al.*, 2006; Sleisenger *et al.*, 2016;). However, Hepatitis B viruses may not be spread by holding hands, sharing eating utensils or drinking glasses, hugging, coughing or sneezing. The acute illness causes liver inflammation, vomiting, jaundice and rarely death. Chronic Hepatitis B may eventually lead to liver cirrhosis and/or cancer (Hashem, 2012).

The infection is preventable by vaccination with a very cheap and effective recombinant DNA vaccine developed against hepatitis B virus in 1982 (Pongpapong *et al.*, 2007). The vaccine has since been introduced into Nigeria for public health use in 1995 (Musa *et al.*, 2015). This study was designed to investigate the prevalence of HBV among students of the Federal University of Technology, Minna to assess the success recorded so far since the introduction of the anti-HBV vaccination program

Materials and Methods

Study Population: The study was conducted among the students (both males and females) of the Federal University of Technology, Minna, Nigeria aged between the ages of 15 to 30 years. The choice of the study population was purposefully made to accommodate subjects born before and after the introduction of the vaccine as a public health intervention in Nigeria in 1995. Participation in the study by the subjects following an ethical approval by the University Health Service Unit was based on informed consent.

Sample Collection: Five Millilitres (5mL) of blood sample was collected from each subject through venepuncture using sterile syringes and needles. Each blood sample was transferred into a sterile EDTA bottle, labelled appropriately and transferred immediately to the laboratory of the Department of Microbiology, Federal University of Technology, Minna, Nigeria for HBV screening.

Sample Processing: Each appropriately labelled blood sample was centrifuged at 3000 revolutions per minute (rpm) for five (5) minutes to obtain serum. The detection of the HBSAg screening was done using a rapid, one step test kit designed for the qualitative detection of Hepatitis B surface antigen (HBSAg) in serum or plasma. The interpretation of the test result was done within 5-10 minutes and recorded.

Interpretation of Test Result

The one Step Hepatitis B Surface Antigen (HBSAg) Test (Serum/Plasma) is a qualitative, lateral flow immunoassay for the detection of HBSAg in serum or plasma. The membrane is pre-coated with anti-HBSAg antibodies on the test line region of the strip. During testing, the serum or plasma specimen reacts with the particle coated with anti-HBSAg antibody. The mixture migrates upward on membrane chromatographically by capillary action to react with anti-HBSAg antibodies on the membrane and generates a coloured line. The presence of this coloured line in the test region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a coloured line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred, as designed by Diaspot TM. The result is invalid if control band fails to appear, which may either arise from insufficient specimen volume or incorrect procedure or techniques used (Blumberg, 1971).

Data Analysis

Data obtained from the study were analysed using statistical analysis software (SAS) version 9.4. Chi-square analysis was used to determine the relationship between the rate of infection and the risk factors at 95% ($p < 0.05$) confidence interval.

Results

Out of the total one thousand (1000) blood samples screened for Hepatitis B virus infection among student of Federal University of Technology, Minna, Nigeria, forty-three (43) students were found to be positive revealing a prevalence rate of 4.3%. Age distribution of HBV infection among students revealed that the age group (17-20), (21-24) and (25-28) years had 1(0.31%), 31(8.14%) and 11(3.70%) cases of HBV infection respectively (Table 1). The distribution of HBV with respect to sex of the students were, 15(3.04%) for the male students and 28(5.52%) for the female students as shown in Table 2.

Table 1: Age Distribution of HBV Infection among Subjects

Age Group	Number Tested	Number Positive	Percentage Positive (%)
17-20	322	1	0.3
21-24	381	31	8.1
25-28	297	11	3.7
Total	1000	43	12.1

Table 2: Sex Distribution of HBV Infection

Sex	Number Tested	Number Positive	Percentage Positive (%)
Male	493	15	3.0
Female	507	28	5.5
Total	1000	43	8.5

Table 3: Relationship between Age and Sex in HBV Infection

Factors	No of Positives	No of Negatives	p-values
Ages			
(1) 17-20	1	321	<0.0001
(2) 21 – 24	31	350	
(3) 25-29	11	286	
Sex			
(1) Male	15	478	0.0533
(2) Female	28	479	

Discussion

In this present study, 43 subjects out of the total 1000 screened for HBV were found to be positive giving a prevalence rate of 4.3%. Compared to the prevalence rates of 12.5% among students in the main campus of Ahmadu Bello University, Zaria, Nigeria (Aminu et al., 2013), 6.0% among students of the Federal University Wukari (Imarenezor et al., 2016), 8.0% among students of the University of Ilorin (Udeze *et al.*, 2015), 4.7% among students of the University of Uyo, Nigeria (Mbotto and Edet, 2012) and 11.5% among students of the Nassarawa State University, Keffi (Pennap *et al.*, 2011) and considering WHO classification of HBV severity in environments where the disease is endemic (WHO, 2010), the prevalence rate of HBV infection in the study area may be considered as moderate. The moderate prevalence rate of the infection observed in this study may not be unconnected with the easy availability of the vaccine against HBV in the study area and the increasing awareness on the need to become vaccinated against the disease. However, considering the highly infectious nature of HBV, the prevalence rate of 4.3% observed in this study area remains public health problem that calls for continuous surveillance.

The distribution of the Hepatitis B virus infection observed on the basis of age revealed that the age groups 17-20, 21-24 and 25-28 years had a significant prevalence rates ($p > 0.05$)

of 0.31%, 8.14% and 3.70% respectively (Table 3). A finding regarding the prevalence of HBV infection by age has been similarly reported by Terwase and Emeka (2015) in parts of Abuja, Nigeria, with the age group 15-19 having a low prevalence rate compared to the older age groups. The low prevalence rate of the infection among the <20 age group who are mostly fresh in the university may not be unrelated to their reduced level of exposure to sexual activities, tattooing and incision made during societal initiation because of parental control. The high rate of infection observed among subjects within the (21-24) age group on the other hand which is in agreement with the previous finding of Imarenezor *et al.* (2015) in a study carried out among the students of the federal University of Wukari, Nigeria, may be due to the high rate of sexual activities and tattooing that commonly characterize this age group because of reduced parental control and the increased freedom occasioned by university life.

The distribution of HBV infection on the basis of gender revealed that the rate of HBV infection was higher among the females (5.52%) compared to the males (3.04%). This finding differs from the findings of the majority of earlier studies (Mehmet *et al.*, 2005; Balogun *et al.*, 2009; Terwase & Emeka, 2015; Imarenezor *et al.*, 2016) in which males were reported as having the highest rates of infection. This difference with earlier studies may not be unconnected with the tendency to promiscuity among some female students of high institutions of learning who engage in sexual activities with multiple partners for monetary benefit. Another reason may be the increasing trend of tattooing among females which was hitherto unknown.

Conclusion

It may be concluded, that while anti-HBV vaccination maybe making an impact on the spread of HBV, the progress being made through vaccination is really slow. It is therefore recommended that HBV screening should be an important component of the registration process for tertiary institutions so that those who are found to be negative may be compelled to take the vaccine to avoid future infection. There is also the need for the creation of awareness on the availability of anti-HBV vaccine as well as the implication of infection with HBV.

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