Hepatitis B Surface Antigenaemia and Risk Factors of Transmission among Students of Kogi State University in Anyigba, North Central Nigeria

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Abstract: Hepatitis B virus infection remains a serious health related threat especially in developing countries like Nigeria. This study was designed to determine the seroprevalence and risk factors of HBV infection among students of Kogi State University in Anyigba, Nigeria. Sera samples obtained from 200 consented students were screened for HBsAg using the commercial ABON® test kit manufactured in China. Information on student's socio-demographic risk factors was collected using structured questionnaire. Twelve (6%) of the students tested positive to HBsAg with the highest seropositivity rate in students within the ages of 31-35 years and student's age was not found to be statistically associated with HBV infection ($p > 0.05$). More males 7(6.73%) than their females 5(5.20%) counterparts were positive to HBsAg although, hepatitis B viral infection was not significantly associated with gender. Factors such as multiple sexual partnerships, being married, intravenous drug use and frequent intake of alcohol were associated with higher HBsAg seropositivity. However, none of these was statistically related to HBV infection. The pattern of HBV infection in this study buttresses the need for a rigorous health education of the general public on the modes of prevention with particular emphasis on abstinence among sexually active group.
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1. Introduction

Hepatitis B virus (HBV) infection is a major global health related problem with preponderance of cases in developing countries with large population such as South East Asia, China, sub-Saharan Africa and the Amazon basin (Li et al., 2010; Ali et al., 2011). The clinical course of HBV infection ranges from asymptomatic carrier state to acute self-limiting infection or fulminant hepatic failure, chronic hepatitis with progression to cirrhosis and hepatocellular carcinoma (HCC) (Zhu et al., 2008). The global burden of hepatitis B remains alarming, due largely to lack of universal Hepatitis B vaccination which still remains a goal rather than an accomplished fact (Alexander and Kowdley, 2006). Vaccination against HBV infections is given over a period of six months. The vaccine is potent and offers protection against the virus in approximately 95% of the recipients. Immunity against HBV can lasts for at least fifteen years and in some cases for life. However, the surest way to prevent HBV infections is by avoiding the routes of transmission (Robert, 2009).

Worldwide, over 2 billion people are infected with HBV (Paraskevis et al., 2002; Zhu et al., 2008; Li et al., 2010), with approximately 350 million people being chronic HBV carriers (WHO,2012) and over 8% carrier rate in Sub Saharan Africa (Williams, 2006). Each year, HBV related liver diseases such as cirrhosis and hepatocellular carcinoma accounts for 500,000 to 1.2 million deaths and infection by the virus has been ranked the 10th leading causes of death globally (Levanchy, 2004). Worldwide, HBV infection distribution varies markedly in terms of its prevalence from one geographical region to another. In most developed countries such as North America, Australia, Northern and Western Europe, HBV endemicity is low. In these regions, the prevalence of HBV ranges from 5.0 to 7.0% of the population with only about 0.5 to 2.0% of the population being chronic carriers (WHO, 1998). In developing countries like Nigeria, HBV infection is endemically distributed with sex, age and socio-economic status being the variables frequently identified as predisposing risk factors to infection by HBV (Okonko et al., 2012; Alikor and Erhabor, 2007).

Infection caused by HBV occurs frequently in Nigeria (Alao et al., 2009) and according to Ott et al., (2012), the infection has already attained hyper-endemic levels, with sero-prevalence of hepatitis B surface antigen (HBsAg) estimated to range from 10% to 40% (Forbi et al., 2009). Numerous reports from different geographical regions in Nigeria have established the endemic nature of HBV infection in different population groups. Examples of such studies

that buttressed HBV endemicity include the reports by Okonko et al. (2012) among Attendees of Reproductive Family and Health center in Ibadan, Southwestern Nigeria; Alo et al. (2013) among asymptomatic students in Usman Dan Fodio University Sokoto, Northwestern Nigeria; Omatola et al. (2017) among HIV positive patients in Kakuri, Kaduna State, North-west Nigeria; Sule et al. (2010) among farming and non-farming individuals in Anyigba, Kogi State, North-central Nigeria; Esan et al. (2014) among pregnant women in Ido Ekiti, Southwestern Nigeria and by Bukbuk et al. (2005) among children in Borno, Northeastern Nigeria. Although several studies among different selected groups have yielded much information on HBV infection in Nigeria, there is paucity of information on HBV infection among Nigerian youths who are expectedly known to be a group that is highly sexually promiscuous and of eligible blood donors. Reasons have been attributed to the lack of good health facilities, poor socio-economic status and low public awareness about HBV transmission (Alam et al., 2007; Pennap et al., 2011).

HBV is transmitted through exposure to infective blood, semen, and other body fluids or from infected mothers to infants during delivery (Kidd et al., 2006). Transmission may also occur through transfusion of Blood and blood products, contaminated injections during medical procedures, sharing of sharp contaminated objects used in piercing or tattooing (Barker et al., 1996). HBV is so resilient in the environment that it can remain infectious for long periods without inactivation in bodily fluid. Consequently, the risk of transmission of the virus which is principally through contact with infected bodily fluids is enhanced (Harry et al., 1994). This is of great concern considering the low level of public awareness about HBV transmission and the high level of promiscuous behaviour among students of tertiary institutions. Lack of routine screening policy that can identify infected but apparently healthy-looking subpopulation promptly may delay treatment with an attendant risk of developing liver related complications. Hence, studies that can address the current virological status of students and also provide information on associated risk factors are needed. This is necessary as it will provide an estimate on the prevalence of HBsAg among asymptomatic students which is important in planning for any intervention to control this infection among them.

2. Materials and Method

2.1 Study Area/ Population

Study was carried out at the Kogi State University located in Anyigba community, a semi-urban community in Dekina Local Government Area of Kogi State in the North central region of Nigeria. Anyigba is located on latitude $7^0$15'- 7^0 29' North of the Equator and longitude 7^0 11'- 7^0 32' East of Greenwich meridians and with an average altitude of 420m above sea level (Ifatimehin et al., 2009). Two hundred (200) apparently healthy consenting students of Kogi State University were consecutively recruited into the study. This was a prospective cross-sectional study carried out over a 4 month period spanning from November 2014 to February 2015.

2.2 Ethical Consideration

An ethical approval was obtained from Kogi State Ministry of Health in line with the Helsinki's code of ethics for Biomedical Research involving human subjects.

2.3 Inclusion and Exclusion Criteria

All students of Kogi State University were eligible for participation in the study. However, blood samples were collected only from 200 students whose consents were given. Study excluded non-students of the University and those whose consents were not obtained.

2.4 Sample Collection/Storage

Approximately 2ml of blood was collected from each student through the antecubital vein into non-EDTA tube. Overall, a total of 200 sera samples were collected from consenting students of Kogi State University, Anyigba. Questionnaires were administered to each student in order to collect information on socio-demographic data and risk factors. Sera were separated from the whole blood by centrifugation and stored at about -20^{o}C until tested for HBsAg.

2.5 Assay for HBsAg

The one step Hepatitis B Surface Antigen (HBsAg) Test Strip (Serum/Plasma) is a qualitative, lateral flow immunoassay for detection of HBsAg in serum or plasma. The solid phase is pre-coated with anti-HBsAg antibodies on the test line region of the strip. During testing, the serum specimen reacts with the particle coated with anti-HBsAg antibody. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HBsAg antibodies on the membrane and generate a colored line. The presence of this colored line in the test region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred. The test has 99.9% sensitivity and 98.6% specificity when read in-vitro. The test and interpretation of the results were performed in accordance with the manufacturer's specifications.

2.6 Data Analysis

Differences in proportion were determined using Chi Square Test. P_ value <0.05 was considered statistically significant. Statistical analysis was done using the SPSS Software, version 16.0 for Windows (SPSS Inc. Chicago, II).

3. Results

A total of 200 samples were analyzed for Hepatitis B Surface Antigen (HBsAg) out of which 12 (6.0%) were positive. The result in table 1 from cross tabulation showed that of the 200 samples tested, 104 were males while 96 were females. More males 7(6.73%) than the females 5(5.20%) were positive to HBsAg. However, HBV was not found to be significantly associated with the sex of the student (P>0.05).

Table 2 depicts the distribution of HBsAg seropositivity in relation to student's age groups. The result revealed a marked difference in the distribution of HBsAg by age group. Students who were within the age range (31-35) years had the highest prevalence (33.3%) while those within ages 21-25 years had the least (2.4%). The association between age and HBV infection was not significant statistically (P>0.05).

Table 3 shows HBV infection distribution in relation to possible predisposing risk factors. Factors such as multiple sexual partnerships, history of intravenous drug use and alcoholism were associated with higher HBV seroprevalence, although their associations with HBV infection were not statistically significant (P>0.05).

Table 1: Gender distribution of HBV infection

Gender	No. Tested	No. Positive (%)	P-value
Male	104	7 (6.73)	
			0.65
Female	96	5 (5.20)	
Total	**200**	**12 (6.0)**	

Table-2: Age distribution of HBV infection

Age range (%)	No. tested	No. positive	P- value
15-20	44	3(6.8)	
21-25	83	2(2.4)	0.081
26-30	70	6(8.5)	
31-35	3	1(33.5)	
Total	**200**	**12 (6.0)**	

4. Discussion

A seroprevalence of 6.0% HBsAg was detected among students of Kogi University in this study. This finding is consistent with the report of Muula (2000) and Umolu *et al*. (2005) that the prevalence of HBsAg in apparently healthy population in Nigeria is within the range of 2.7% to 13.3%, based on a range of community reports and hospital-based studies. In accordance with the WHO classification of assessing severity of HBV infection in HBV endemic countries, the rate observed in this study is regarded as moderated seroprevalence level of HBV infection. WHO in 2010, defines low prevalence to be <2%, moderate prevalence as 2-8%, and high prevalence as > 8% HBsAg positivity. Finding from this study is comparable to previous investigation among pregnant women in Ido Ekiti, Nigeria (Esan *et al*., 2014) and Tanzania (Mendez, 1999) where prevalence of 6.78% and 6.3% respectively were reported. This rate is however higher than the seroprevalence of 4.1% reported by Ugwuja and Ugwu, 2009 among apparently healthy adolescent in Abakiliki, South Eastern Nigeria; 4.1% reported by Mboto and Edet (2012) among students in University of Uyo, Northern Nigeria; and 2.1% by Jeremiah and Toney (2009) in students of the University of Portharcourt, Southern Western Nigeria. Similarly, Betayneh and Bdour (2002) reported 4.3% in Jordan, the Middle East and Khalil *et al*. (2005) reported 2.4% in Saudi Arabia, all of which were lower compared to the findings in this present study. The HBV seroprevalence rate observed in this study is however lower than the 12.5%, 11.5% and 15.5% earlier reported in Nigeria among asymptomatic students in Ahmadu Bello University (Aminu *et al*., 2013), Nassarawa State University (Pennap *et al*., 2011) and Usman Dan Fodio University (Alo *et al*., 2013) respectively. In Uganda, Pido and Majid (2005) reported 11.0% among Makerere University Medical Students.

Comparison of our result with other studies from different countries and most universities in Nigeria revealed a variable result. Reason could be attributed to the fact that infection tend to vary from one country or geographical location to another depending on the level of associated risk factors. The difference in demographic characteristics of the study population such as tribal practices, cultural and economic factors, sexual practice, and the population dynamic in these countries and geographical locations might partly explain these discrepancies.

HBV prevalence was highest among students aged 31-35 years. This observation correlates with the finding of Dawaki and Kawo (2006) in pregnant women attending an urban maternity hospital in Kano, Northern Nigeria. This period coincides with the peak age of greatest sexual activity thus supporting the role of sexual intercourse in the transmission of HBV. This result also support the report of Aganga *et al.* (1999) that in population in which HBV is relatively common; the majority of infection and peak prevalence of HBsAg as well as of specific antibody were in the age group 30-40 years. Finding from the present study correlates well with the previous

investigation by Mehdi *et al*. (2000) which showed that the prevalence of hepatitis B increases with increasing age.

Table 3: Distribution of HBV infection in relation to possible Risk factors

No. of Respondent by risk factor	**HBV Status of Students**		**P-value**
	No. positive (%)	**No. negative (%)**	
Knowledge of infection			
Yes (n=96)	5(5.21)	91(94.79)	0.651
No (n=104)	7 (6.73)	97(93.27)	
Mouth-to-mouth kissing			
Yes (n=139)	8(5.76)	131(94.24)	0.826
No (n=61)	4(6.56)	57 (93.44)	
Shared sharp object(s)			
Yes (n=125)	7(5.60)	118(94.40)	0.758
No (n=75)	5 (6.67)	70 (93.33)	
No of sexual partners			
One (n=83)	5(6.02)	78(93.98)	0.833
Two (n=35)	2 (5.71)	33(94.29)	
More (n=19)	2 (10.53)	17 (89.47)	
None (n=63)	3 (4.76)	60 (95.24)	
Marital status			
Single status (n=179)	10(5.59)	169(94.41)	
Married (n=20)	2(10.00)	18(90.00)	0.710
Divorced (n=1)	0(0.00)	1(100.00)	
History of STDs			
Yes (n=73)	3(4.11)	70(95.89)	0.393
No (n=127)	9 (7.09)	118(92.91)	
Use of condom			
Regular (n=43)	5(11.63)	38(88.37)	0.212
Occasional (n=84)	4(4.76)	80(95.24)	
Never (n=73)	3(4.11)	70(95.89)	
Had blood transfusion			
Yes (n=16)	0(0.00)	16(100.00)	0.292
No (n=184)	12(6.52)	172(93.48)	
History of surgery			
Yes (n=25)	1 (4.00)	24(96.00)	0.653
No (n=175)	11 (6.29)	164(94.71)	
History of intravenous drug use			
Yes (n=7)	1(14.29)	6(85.71)	0.347
No (n=193)	11 (5.69)	182(94.30)	
Immunized for HBV			
Yes (n=68)	5(7.35)	63(92.65)	0.563
No (n=132)	7(5.30)	125(94.69)	
Alcohol consumption rate			
Low (n=121)	6(4.96)	115(95.04)	0.873
Moderate (n=66)	5 (7.58)	61(92.42)	
High (n=12)	1 (8.33)	11(91.67)	
None (n=1	0 (0.00)	1 (100.00)	

Although the rate of HBV infection was higher among the male than the female students, the association was not significant statistically (P>0.05). The reason for the preponderance of male infection has not been proven scientifically. Although, UNSN (2001) reported that the higher HBV infection rate among Nigerian males than females from most reported studies might be due to higher level of promiscuity among males than their females counterparts. Kouassi-mBengue *et al*. (2011) and Pennap *et al*. (2011) earlier reported similar finding. The result in this study however contradicts report of Mustapha and Jibrin (2004) in which more females than males were infected with HBV.

The prevalence of HBsAg was found to be higher among students who were married than those who were single/ divorced. This result is not comparable with the observations of Ejele *et al*. (2004) and Okonko *et al*. (2012) who reported a higher infection rate among single/unmarried people. Infection with HBV was more prevalent among those who were not engaged in sharing of sharp objects and mouth-mouth kissing. This observation may however be due to chance and not a certainty as several other authors such as Mboto and Edet (2012) and Ndako *et al*. (2011) in their studies among students in university of Uyo and secondary school students in North-Central Nigeria respectively reported a higher prevalence among those who shared sharp objects and engaged in mouth-mouth kissing. High prevalence of HBV infection was also seen in students who practice multiple sexual partnerships and with history of intravenous drug use. This observation is consistent with the findings of Pennap *et al*. (2011) and Mboto and Edet (2012) among students of Nigerian tertiary institutions.

5. Conclusion

The seroprevalence rate observed in an apparently healthy population in this study reflects the endemic nature of HBV infection in a Nigerian tertiary institution. Awareness creation among this teeming population of youths on ways of not becoming infected with the virus has become a necessity as significant number of students examined in this study tends to lack the knowledge. In addition, screening of asymptomatic people especially the sexually active group is strongly advocated as it will enable early detection of the disease for prompt intervention before it becomes unabated.

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