

HEPATITIS B SURFACE ANTIGENAEMIA AND RISK FACTORS OF TRANSMISSION AMONG APPARENTLY HEALTHY STUDENTS OF UNIVERSITY OF ILORIN, ILORIN-NIGERIA

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ABSTRACT

This study aimed at determining the prevalence of Hepatitis B surface antigenaemia among first year students of University of Ilorin, Ilorin Nigeria. A total of 200 students (119 males and 81 females: ages 16 to 40 years), who consented voluntarily after thorough explanation of the purpose of the study, were selected. The sera of the participants were tested for the presence of HBsAg by parallel diagnostic method using Diaspot® HBsAg test kit and Smart Check™ HBsAg device. Of the 200 samples tested, 18 (9.0%) were HBsAg positive. The result also showed that 13 (10.9%) out of the 119 males were positive, while 5 (6.2%) out of the 81 females were positive. Analysis of the results by age groups showed that subjects ≤20 years had a prevalence of 9.8%, subjects of age range 21-30 years had a prevalence of 8.1% while subjects of age range 31-40 years had zero prevalence. Analysis of the results according to the risk factors of transmission showed that subjects who reported circumcision only had a prevalence of 7.4%, while subjects who reported history of medical operation and blood transfusion had a prevalence of 10.0%. Among subjects who reported HBV vaccination only, prevalence of 8.3% was recorded, while 12.5% prevalence was recorded for subjects who reported a combination of circumcision, medical operation and blood transfusion. This study however confirmed the presence of Hepatitis B surface antigenaemia among apparently healthy first year students of the University of Ilorin. General surveillance, mass immunization and public health education to stop the spread of the infection on campus and indeed the whole society is advocated.

Key words: Prevalence, HBsAg, antigenaemia, students

INTRODUCTION

Viral hepatitis is a systemic disease primarily involving the liver. Most cases of acute viral hepatitis are due to hepatitis-A virus (HAV), hepatitis-B virus (HBV) or hepatitis-C virus (HCV). Globally, it is estimated that about 320-350 million individuals are chronic carriers of HBV and about 1.5 million people die annually from HBV-related causes (Alao *et al.*, 2009). Originally known as serum hepatitis, hepatitis B has only been recognized as such since World War II and has caused epidemics in parts of Asia and Africa (Ryan and Ray, 2004). The virus causes 60-80% of all primary liver cancer and is a major cause of cancer death in East and South-East Asia, the Pacific Basin and Sub-Sahara Africa (Monnica, 2000). Hepatitis B virus is a member of the hepadnavirus family, which is partly double stranded and enveloped, virus in the family Hepadnaviridae and genus Orthohepadnavirus. The complete infective form of the virus is usually referred to as Dane particle. This carries hepatitis-B core antigen (HBcAg), hepatitis-B surface antigen (HBsAg), and viral DNA. There are also small, spherical and rod-like particles of envelope origin which only carries the HBsAg and are non-infective. Hepatitis-B envelope antigen (HBeAg) is part of the core protein of Dane particles that is associated with infectivity (Monica, 2000). Infection with HBV has two major forms: (1) Acute (new and short-term) hepatitis-B:, which occurs shortly after exposure to the virus. A small number of people develop a severe, life-threatening form of acute hepatitis called fulminant hepatitis. (2) Chronic (ongoing and long-term) hepatitis-B: which is an infection with the virus that lasts longer than six months. HBV has been estimated to be the cause of up to 80% of all cases of hepatocellular carcinoma worldwide, second only to tobacco, among known human carcinogens (Hollinger *et al.*, 2001; WHO, 2001).

HBV shares similar routes of transmission with HIV (Willey *et al.*, 2008), namely through blood and blood products transfusion, intravenous drug abuse, unsafe injections and sexual activity, shared needle, other body fluids such as semen, vaginal fluid and breast milk; from mother to child, needlestick injury, ear piercing, tattooing and other tribal ceremonies (scarification), barbers razors etc. (Otegbayo *et al.*, 2003; Umolu *et al.*, 2005; Agbede *et al.*, 2007; Cavalleiro *et al.*, 2008; Chen *et al.*, 2009; Pennap *et al.*, 2010). However, the most important mode of HBV transmission globally is perinatal, from the mother to her newborn baby. If a pregnant woman is an HBV carrier and is also HBeAg positive, her newborn baby has 90% likelihood to be infected and become a carrier. Of these children, 25% will die later from chronic liver disease or liver cancer (Hollinger *et al.*, 2001). Although the modes of transmission of HBV in hot climates are similar to those in other parts of the world, additional factors may be of importance, particularly repeated biting by blood sucking arthropod vectors, traditional tattooing and scarification and circumcision.

HBV has relatively higher prevalence in the tropics and an estimated 12% of the Nigeria total population being chronic carriers of HBsAg (Alao *et al.*, 2009; Ugwuja and Ugwu, 2010). Several factors have been blamed for this which include; increase in road accidents, pregnancy-related haemorrhage, armed robbery attack and other violent events which tend to increase the possibility of transmission through contaminated blood (Uneke *et al.*, 2005). Vaccines against hepatitis viral antigens are given over a period of six months; resulting in protection against the virus in 95% of individuals. Immunity against HBV lasts for at least fifteen years, and probably for life. HBV infections can generally be prevented only by avoiding the routes of transmission previously stated (Robert, 2009).

In Nigeria, a lot of works have been carried out to determine the dynamics of the infection in different subpopulations including; doctors in Nigeria (Olubuyide *et al.*, 1997), primary school children in Nnewi, Nigeria (Chukwuka *et al.*, 2004), pregnant women in southeast Nigeria (Ikeme *et al.*, 2006), prospective HIV positive blood donors in Ibadan-Nigeria (Lawal *et al.*, 2009), blood donors attending Ahmadu Bello University Teaching Hospital (ABUTH) Zaria, Nigeria (Ado *et al.*, 2010), hepatocellular carcinoma patients in north eastern Nigeria (Ugwuja and Ugwu, 2010). However, there is dearth of information on the infection amongst students of tertiary institutions. This group is drawn from people of diverse ethnic and socio-cultural backgrounds. It also represents sexually active population and population most often involved in the risky behaviours for HBV transmission (intravenous drug use, multiple sexual partners *e.t.c.*). This study, therefore, was carried out to determine the prevalence of this infection and to evaluate the impact of some of the risky behaviours inherent in the students subpopulation with a view to generating useful data for appropriate health authorities.

MATERIALS AND METHODS

Study population

The subjects included in this study are 200 apparently healthy, first year students of the University of Ilorin, Ilorin, Nigeria who were undergoing medical examination at the University Health Services Center. Sample size was determined using Fischer's formula (Araoye, 2003). The subjects were recruited for the study after informed consent. Approval for the study was also obtained from the Hospital management.

The ages of the subjects ranges from 16 – 40 years, comprising 119 (59.5%) males and 81 (40.5%) females. The collected subjects' variables are age, gender, type of family, history of blood or blood product transfusion, history of circumcision, history of previous medical operation and history of HBV vaccination

Specimen collection and processing

Five milliliters of venous blood was collected from each student into EDTA tubes and centrifuged for 5 minutes at 200 revolutions per minute (rpm). The plasma was then aspirated into sterile eppendorf tubes and stored at -20°C for further analysis.

Assay for HBsAg

Parallel tests were carried out on each of the samples to determine the status. The screening was carried out using immunoassay based DiaSpot® test strip for qualitative detection of HBsAg in plasma (relative sensitivity and specificity of > 99% and 97.0% respectively with accuracy of 98.5%) and biotech® hepatitis B surface Antigen (HBsAg) kits 2/920, 2/922 and 2/924. The tests and result interpretations were done according to the tests kits' manufacturer's instructions. Discordant results were regarded as negative.

RESULTS

A total of 200 subjects {119 (59.5%) males and 81 (40.5%) females: age range 16-40 years} were tested for HBsAg. Of these, a total of 18 subjects were positive for HBsAg giving an overall prevalence of 9.0%. Gender distribution showed 10.9% prevalence for the males while the females had prevalence of 6.2%. This is shown in table 1.

Table 1: Gender related prevalence of HBsAg

Gender	Number tested	Number (%) positive	P value
Male	119	13 (10.9)	0.25
Female	81	5 (6.2)	
Total	200	18 (9.0)	

Analysis of the result by family type showed prevalence of 13.0% among subjects from polygamous families and 7.8% among subjects from monogamous families as shown in table 2.

Table 2: Distribution of HBsAg according to Family type

Family type	Number tested	Number (%) positive	P value
Polygamous	46	6 (13.0)	0.28
Monogamous	154	12 (7.8)	
Total	200	18 (9.0)	

Higher prevalence (9.8%) of HBsAg was found among subjects ≤ 20 years, followed by subjects in the age range 21-30 years with prevalence of 8.1% while subjects in the age range 31-40 years had zero prevalence. This is shown in Table 3.

Table 3: Age related prevalence of HBsAg

Age range (years)	Number tested	Number (%) infected
≤ 20	112	11 (9.8)
21-30	87	7 (8.1)
31-40	1	0 (0)
Total	200	18 (9.0)

Analysis of the results showed that 7.4% of subjects who reported circumcision as the only risk factor tested positive to HBsAg. Out of the 10 subjects who reported history of medical operation and blood transfusion, 1 tested positive to HBsAg giving a prevalence of 10.0%. One out

of the 12 subjects who reported vaccination only tested positive to HBsAg giving a prevalence of 8.3% while 12.5% prevalence was recorded for subjects who reported a combination of factors (Circumcision, medical operation and blood transfusion) as shown in Table 4.

Table 4: Distribution of HBsAg according to the risk factors of transmission

Risk Factors	Number tested	Number (%) Positive
Circumcision only	122	9 (7.4)
HBV Vaccination only	12	1 (8.3)
Medical operation and blood transfusion	10	1 (10.0)
Circumcision, medical operation and blood transfusion	56	7 (12.5)
Total	200	18 (9.0)

DISCUSSION

Hepatitis B is a liver disease caused by HBV. It ranges in severity from a mild illness, lasting a few weeks (acute), to a serious long-term (chronic) illness that can lead to liver cirrhosis or cancer. Nigeria has been classified as one of the countries highly endemic for viral hepatitis. The prevalence of 9.0% obtained in this study supports the endemicity of the infection in Nigeria. This result is also in conformity with the report of Patience *et al.*, (2005) that the prevalence of HBsAg in normal population in Nigeria ranges from 2.7% to 13.3%, based on a range of community reports and hospital-based studies. In a similar study carried out among first year students of Obafemi Awolowo University, Ile Ife, a prevalence of 8.0% was reported (Ojo *et al.*, 1998), indicating a similar trend of the infection in our Universities. The prevalence is also very close to 9.1% observed among the rural and urban populace of Eastern Nigeria (Amazigo and Chime, 1990) and more recently, prevalence of 9.5% reported by Mabayoje *et al.* (2010) in Osogbo, Osun State, Nigeria.

result, however, is higher than the 7.6% prevalence reported among primary school children in Nnewi, Nigeria (Chukwuka *et al.*, 2004). It is also higher than 5.8% prevalence among blood donors in Benin City, Edo state, Nigeria (Patience *et al.*, 2005). In addition, the prevalence of HBsAg among these subjects is higher than 4.1% prevalence reported among adolescents in Abakaliki, South-Eastern Nigeria (Ugwuja and Ugwu, 2010). The differences in prevalence rates in these studies could be attributed to differences in subject selection and the target population. The subjects for our study which are students of diverse socio-economic background are apparently healthy young students aged between 16-40 years. The subjects in the aforementioned studies were pupils (aged 4-12), blood donors and apparently healthy adolescents

(aged 12-17 years) respectively. The discrepancy is not unexpected as the age range for our study contains greater number of subjects in the sexually active stage.

On the other hand, the prevalence of 9.0% is lower than the findings of Bada *et al.* (1996) which reported prevalence rates of 16.0% and 36.0% among ante-natal clinic patients and patients of sexually-transmitted diseases respectively. Higher prevalence among patients of sexually-transmitted diseases is not unexpected, since sexual intercourse is a major route of hepatitis B virus transmission. However, the reason for higher prevalence reported among women attending ante-natal clinic is not immediately known to this study since the subjects were not patients but pregnant women attending their routine antenatal health care clinics.

Gender distribution revealed a higher prevalence among the males (10.9%) than their female counterparts with 6.2% prevalence. The two groups were however comparable ($P=0.25$). This is in line with an earlier finding by Uneke (2005) but contradicts the finding of Bwogi *et al.* (2009). The higher prevalence in male than female subjects in this study may not be unconnected with multiple sexual relationships, promiscuity habits that occur more in males than females in Nigeria (Uneke, 2005). Additionally, male circumcision is mandatory in this area compared to female circumcision which has drastically reduced if not discontinued. Higher prevalence among the subjects from polygamous families concurs with the finding of Adoga *et al.* (2009) among prison inmates in Nasarawa state, Nigeria. Higher household contacts and sharing of sharp objects such as razor blades for fingernail cutting with the carriers might account for the higher prevalence found among the subjects from polygamous family.

HBsAg prevalence with age distribution in this study shows subjects with age range ≤ 20 years with the highest percentage prevalence (9.2%) followed by 8.1% for those subjects 21-30 years while subjects 31-40 years had zero prevalence. The high prevalence observed in these age groups may be attributed to high sexual activity and intravenous drug usage which is more often associated with these age groups. With respect to the risk factors of transmission, the 7.4% prevalence obtained for circumcised individuals is an indication of the risk inherent in this practice. In the same vein, subjects who reported history of medical operation and blood transfusion had a prevalence of 10.0%, also underscoring the need for proper sterilization of surgical equipments and proper blood screening prior to medical operation and blood transfusion. Prevalence of 8.3% recorded among subjects who reported history of HBV vaccination in this study suggests infection before vaccination, vaccine failure, presence of HBV mutants that can escape vaccination (Ashraf *et al.*, 2004) or anti-HBsAg antibody/HBsAg complexes (Richard, 2007). Relatively high prevalence (12.5%) was recorded among subjects who reported a combination of circumcision, medical operation and blood transfusion also pointing to the fact that multiple factors lead to increased risk of transmission. Although there seems to be a decline in the practice of female genital mutilation, some socio-cultural and behavioural practices such as tattooing, tribal markings, sharing of sharp objects and scarification exist, most of which were not reported in this study. The result of these findings on the risk factors of HBV suggests that horizontal transmission of HBV among the subjects are likely, aided by cultural or behavioural practices and clustering of carriers, rather than blood transfusion, as none of the subjects in this study reported blood/blood product transfusion only.

Hepatitis-B virus infection is endemic in the population of the fresh University of Ilorin students. Majority of them might have been infected at earlier stage of their life. Possibility also exists of an ongoing horizontal spread of the infection. General surveillance through mass screening to identify those with infection and instituting appropriate treatments, mass immunization of the uninfected new students against the virus and public health education to enlighten the new students of the possible risk factors and routes of infection are advocated.

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