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Hepatitis B Virus Carriage among Students of a Nigerian Tertiary Institution: A Cohort of Eligible Blood Donors

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Abstract: Hepatitis B virus infection may go unnoticed because >50% of the cases are subclinical. Infected people therefore either unconsciously contribute to the transmission of the virus or do not seek medical attention with a resultant liver cirrhosis or hepatocellular carcinoma. This study was mooted to provide a prevalence baseline data in a cohort that is eligible for blood donations with a view to instituting proactive prevention programmes. About 200 students that indicated willingness to participate in this study were recruited. About 5 mL of venous blood was taken from each student and the resultant serum screened for Hepatitis B surface antigen (HBsAg) using smart Check HBsAg ELISA (Globalmed, South Africa (PTY) Cape Town). Positive samples were confirmed with Clinotech HBsAg test kit (Clinotech diagnostic and Pharmaceuticals, Canada). Screening was performed according to the manufacturers instructions. Of the 200 samples screened, 23 (11.5%) tested positive. There was no statistically significant association between the viral infection and gender, age, having multiple sex partners, possession of tribal marks and drug injections ($p>0.05$). This prevalence of 11.5% is a cause for alarm especially in a cohort that is eligible for blood donation. It is therefore necessary to intensify health promotion efforts in the tertiary institutions.

Key words: Hepatitis B surface antigen, seroprevalence, blood donors, risk factors, data, Nigeria

INTRODUCTION

Hepatitis B Virus (HBV) is a DNA virus with a very high transmissibility. Very small quantities of blood could transmit hepatitis B infection. The virus gains entry through cuts, abrasions and mucous membranes although, biting and scratching are also important in transmission (Talwar and Arora, 2010). HBV is 50-100 times more infectious than HIV and 10 times more infectious than hepatitis C virus and because it replicates profusely and produces high titer in the blood (108-1010 virions mL^{-1}) any parenteral or mucosal exposure to infected blood poses a high risk of HBV acquisition. In fact the risk of transmission from just a needle stick is 1-6% if the source of blood is positive for hepatitis B surface antigen but negative for hepatitis e antigen and 22-40% if positive to both antigens (Elgouhari *et al*., 2008). This virus has been detected in peripheral mononuclear cells, tissues of pancrease, spleen, kidney, skin and fluids like saliva, semen, sweat, breast milk, tears, urine and vaginal secretion (Elgouhari *et al*., 2008)

It causes acute and chronic hepatitis with a tendency to progress to liver cirrhosis and hepatocellular carcinoma (Mbaawuaga *et al*., 2008; Pungpapong *et al*., 2007) killing over 1 million people annually (Ziraba *et al*., 2010) thus making HBV a growing public health concern. HBV infection is widely referred to as a silent killer because many carriers do not realize they are carrying the virus (Libbus and Phillips, 2009) and hence fail to seek appropriate medical attention. Similarly when pregnant women are involved they constitute a serious health risk not only to their unborn child but to the society at large (Mbaawuaga *et al*., 2008).

Globally there are 2 billion people infected and 360 million with a chronic infection (Drosten *et al*, 2004; Ziraba *et al*., 2010) while the World Health Oganisation estimates that the prevalence of the viral infection in Africa is >10% on the average (Ziraba *et al*., 2010). HBV prevalence has been reported from other countries with varying prevalence rates among selected populations. Prevalence of 0.25% among blood donors, 2.5% in a rural population, 25.9% among patients with hepatocellular carcinoma and 6.3% among HIV/AIDS patients have been reported in Darfur, Turkey, Egypt and Japan, respectively (Abou and Eltahir, 2009; Akeam *et al*., 2009; Koike, 2010).

Nigeria is one of the numerous countries in which HBV infection is highly endemic (Mbaawuaga *et al*., 2008; Sirisena *et al*., 2002). It is estimated that about 12% of Nigerians are chronic carriers although studies among selected populations have reported varying prevalence rates (Alao *et al*., 2009).

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Whereas the literature on HBV infection in Nigeria is growing there is paucity of information among the youth who are known to be a group that is highly sexually active and also forms the bulk of the group that is usually required when there is the need for blood donation. This study is a complement to the existing reports on such an important issue in this group.

MATERIALS AND METHODS

The study was carried on a Nigerian University student population who after a health talk volunteered to participate in the study. The population was made up of male and female students with a mean age of 22.4 years. Each student provided information on his/her basic socio-demographic data. This was a blind study unless for students that wanted to know their HBV status. About 5 mL of blood was collected by venepuncture and placed in plain tubes. This was allowed to clot, centrifuged and the resultant serum screened for HBsAg. The presence of HBsAg was detected using Smart Check HBsAg immunoassay kit (Globalmed, South Africa (PTY) Ltd., Capetown. Catalogue number 06019104NCA) and confirmed by Clinotech hepatitis B test kit (Clinotech diagnostics and Pharmaceuticals Canada). The procedure was according to manufacturers instructions.

Ethical clearance: Ethical clearance was obtained from the University Health Research Ethical Committee in line with the code of ethics for Biomedical Research involving human subjects.

RESULTS AND DISCUSSION

A total of 200 students with a mean age of 22.4 years volunteered to participate in this study. Of these 122 (61%) were males and 78 (39%) were females. About half of the participants (51%) were aged 21-25 years. Those aged ≥31 years were comparatively few (3.5%) (Table 1). Of the 200 students 23 were reactive to the test giving a general HBV carriage in the population of 11.5%. Although, male students had a prevalence of 14.7% against 6.4% among females this was not found to be statistically significant. The general distribution of prevalence by age was also not statistically significant (Table 2). None of the risk factors examined in this study was significantly associated with the carriage of the virus (Table 3).

A HBsAg prevalence of 7% has been used as a classification for high endemicity (Uneke *et al*., 2005). The prevalence of 11.5% in this study population lends credence to the fact that the virus is endemic in Nigeria

Table 1: Age and sex distribution of the study population

Age	No. of males screened (%)	No. of females screened (%)	Total (%)
15-20	30 (24.5)	32 (41.1)	62 (31.0)
21-25	65 (53.3)	37 (47.4)	102 (51.0)
26-30	21 (17.2)	8 (10.3)	29 (14.5)
31-35	3 (2.5)	1 (1.3)	4 (2.0)
36-40	3 (2.5)	0 (0.0)	3 (1.5)
Total	122 (100.0)	78 (100.0)	200 (100.0)

Table 2: Prevalence of hepatitis B virus infection with respect to gender and age among the study population

Gender	No. screened	No. positive	Prevalence (%)
Male	122	18	14.7
Female	78	5	6.5
Total	200	23	11.5
Age (years)			
15-20	62	5	8.0
21-25	102	13	12.7
26-30	29	4	13.7
31-35	4	1	25.0
36-40	3	0	0.0
Total	200	23	11.5

Gender $\chi^2 = 3.23$, $p = 3.8$; Age $\chi^2 = 2.06$, $p = 9.49$

Table 3: Prevalence of hepatitis B infection with respect to risk factors in the study population

Risk factors	No. screened	No. positive	Prevalence (%)
TM	73	13	17.8
BT	29	2	6.8
DI	28	3	10.7
MSP	9	3	33.3
ALC	61	2	3.2
Total	200	23	11.5

$\chi^2 = 11.9$; p-value = 2.77; TM-Tribal Marks; BT-Blood Transfusion; DI-Drug Injection; MSP-Multiple Sex Partners; ALC-Alcohol Consumption

especially as this is an apparently healthy population. Some researchers have observed that among the sexually transmitted and blood borne infections, there is a higher probability of getting infected with HBV than the others because of its low infectious dose (Uneke *et al*., 2005). The result of this study was similar to reports from Makurdi among pregnant women (Mbaawuaga *et al*., 2008). However, it was >2.1% prevalence reported from a similar study in Port Harcourt among University students (Jeremiah and Tony, 2009) and 3.8% among pregnant women in Abuja (Bassey *et al*., 2009). Higher values of 14.3 and 20% among blood donors in Jos and Benue (Alao *et al*., 2009), 18.2% among pregnant women in Zaria (Luka *et al*., 2008) and 25% among HIV infected patients in Jos (Uneke *et al*., 2005) have also been reported from these parts of the country.

The sex-related analysis of the viral carriage showed that males were more infected than females (14.7% vs 6.4%). Although, this difference was not found to be statistically significant. The reason for this male preponderance is not obvious. However, it might not be unconnected with the higher rate of promiscuity among males than females which had been reported for Nigeria (UNSN, 2001). A similar observation was reported among

blood donors (Uneke *et al*., 2005). With respect to age the highest prevalence of infection was 25.0% found among those aged 31-35 years while infection was completely absent among those aged ≥36 years (Table 2). There was no statistically significant association between viral infection and age ($p>0.05$). This peak of infection was similar to that reported in Benin city (Umolu *et al*., 2005) and Port Harcourt (Jeremiah and Tony, 2009) although in another study in Jos it was highest among those aged 51-60 years (Uneke *et al*., 2005). Mbaawuaga *et al*. (2008) had reported a high peak of infection among teenage pregnant mothers. The age of peak infection in this study falls within the age range of greatest sexual activity thus supporting the role of sex in the viral transmission. However, the paucity of participants in some of the age groups might have affected the clear picture of the age related prevalence of HBV infection. It is also very possible that other than HIV many people may not be aware of other sexually transmitted viral infections and so continue to have unprotected sex with fellow HIV/AIDS negative partners who might be chronic carriers. It has been noted that in Africa more than half of the population become HBV infected during their life time and about 8% of inhabitants become chronic carriers.

Some of these students were found to indulge in behaviours that have been reported as possible risk factors in HBV transmission. For example, those with multiple sex partners had the highest rate of infection (33%) and it was least among those that consume alcohol (3.2%). Other risk factors studied included the acquisition of tribal marks (17.8%), history of blood transfusion (6.8%) and drug injection (10.7%) (Table 3). All these are practices that can easily expose one to blood or other body fluids. In fact it has been reported that there is an unprecedented rise in the number of intravenous drug users especially among students of secondary and tertiary institutions in central Nigeria (UNSN, 2001). However, these differences were not found to be statistically significant ($p>0.05$). This supports the fact that it is becoming clearer now that many cases of HBV infection are known to result from less apparent modes of non-percutaneous or covert percutaneous transmission (Dienstag and Isselbacher, 2005; Talwar and Arora, 2010). This has even led to the call not to screen for the viral infection based on risk factors (Rabiu *et al*., 2010).

CONCLUSION

The 11.5% of HBsAg prevalence reported in this study apart from confirming its endemicity is a cause for alarm and calls for its inclusion among the diseases for surveillance in Nigeria. This is especially as this high prevalence is in a population that was thought to be healthy and also falls within the group of prospective blood donors. The outcome of this study also serves as a baseline information for proactive programs for youths especially as regards avoiding practices that enhance HBV infection and transmission.

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