The Journal of Applied Sciences Research

Journal homepage: http://www.journals.wsrpublishing.com/index.php/tjasr

Online ISSN: 2383-2215

Original Article

Seroprevalence of Hepatitis B Surface Antigenaemia among Patients Attending Sokoto Specialist Hospital, Sokoto State, Nigeria

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ARTICLE INFO

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How to cite this article:
Isa, M.A., H.S. Bello, B. Aliyu and H.K. Mangga. 2014. Seroprevalence of Hepatitis B Surface Antigenaemia among Patients Attending Sokoto Specialist Hospital, Sokoto State, Nigeria. *The Journal of Applied Sciences Research.* 1(3): 242-249.

Article History:
Received: 3 December 2014
Revised: 14 December 2014
Accepted: 16 December 2014

ABSTRACT

Hepatitis B virus (HBV) is of public health importance globally. Viral hepatitis, especially B forms a considerable percentage of Liver disease worldwide. This study aims to determine the Seroprevalence of hepatitis B virus among patients attending Sokoto Specialist Hospital with a view to establish prevalence rate in the state. Serum samples were collected from patients and analyzed to determine the presence of hepatitis B surface antigen (HbsAg) using Biorex ELISA (HBV) of the 300 patients screened, 42(14.0%) were positive for hepatitis B virus. Gender, age, sex, education, marital status, history of blood transfusion, presence of tribal marks/ tattoos and intravenous drug abuse related prevalence of hepatitis B virus was determined. Only history of blood transfusion was strongly associated with the prevalence of hepatitis B infection with highly statistical significant difference ($P < 0.05$). Thus, the finding of this study emphasize the importance of good personal hygiene in the prevention of the infections since hepatitis B infection can be spread through body fluids such as blood and blood product.

Keywords: HBV, Seroprevalence, risk factors, Sokoto

INTRODUCTION

Viral hepatitis is an infection of the liver caused by one of the at least five distinct viruses. The most notable sign of the disease is jaundice, an orange yellow discoloration of the scleroproteins of the skin and conjunctivae seen with an increased plasma bilirubin resulting from faulty excretion of the bile pigment by damage hepatocytes (Fields *et al.*, 2001). Among the hepatitis viruses, hepatitis B virus has been described as a major public health, occurring endemically, in all areas of the world (Okonko *et al.*, 2010).

Hepatitis B virus (HBV) is a small double stranded DNA virus composed of an outer envelope containing hepatitis B surface antigen (HBsAg) and an inner nucleocapsid consisting of hepatitis B envelope antigen (HBeAg) and hepatitis B core antigen (HBcAg). Hepatitis B virus is a hepatotropic virus that replicates in the liver and causes hepatic dysfunction (Loguerci *et al.*, 1997; Lai *et al.*, 2003). Hepatitis B infection is 50 - 100 times

more contagious than HIV and 10 times more contagious than hepatitis C virus (HCV) with many carriers not realizing they are infected with the virus. Consequently, it is referred to as "silent killer "(Samuel *et al.,* 2004; Pennap *et al.,* 2010). The minimum infectious dose is so low, such that sharing a tooth brush or a razor blade can transmit infection (Chang, 2007; Pennap *et al.,* 2010).

Each year, up to one million people die due to the consequences of these infections such as liver cirrhosis and hepatocellular carcinoma (Eke *et al.,* 2011). The virus lives in the blood and other body fluids and is transmitted from person to person through unprotected sexual intercourse with an infected person, sharing infected needles, other sharp agent that breaks the skin (Olaitan and Zamani, 2010). Also, the virus has been detected in the peripheral mononuclear cell tissues of pancreas, spleen, kidney, skin, and fluids like saliva, semen, sweat, breast milk, tears, urine and vaginal secretion (Pennap *et al.,* 2010). Many people infected with hepatitis B rarely display no any symptom, although they can still transmit the virus to others (Ugbebor *et al.,* 2011).

Epidemiological data indicated that the introduction of routine screening for Hepatitis B-surface antigen (HbsAg) in the serum of blood donors have reduced the frequency of post transfusion Hepatitis B infection but certain cases still abound (Chukwurah, 2004). In the continents of Africa and Asia, it remains a major cause of morbidity and mortality (Eke *et al.,* 2011). Despite the existence of a safe and effective vaccine, Nigeria has remained a hyper- endemic area for hepatitis B virus infection, with an estimated 12% of the total population being chronic carriers. Hepatitis B virus infection continues to be a substantial and devastating health problem, with new cases still being reported annually (Eke *et al.,* 2011).

Animal models have been used to elucidate many stages of infection in the pathogenesis of HBV. The virus gains entry into a susceptible host through parenteral or percutaneous routes. Once inside the host, HBV is transported through the bloodstream to the liver, which is the primary site of infection. Since hepadnaviruses can infect nonhepatocytes, the existence of an intermediate compartment of replication before infection of the liver has been proposed (Fields *et al.,* 2001). Viremia can reach very high levels (>109 virions/mL) and may result in dissemination to other sites of potential viral tropism that include kidney, pancreas, testis/ovary, spleen and lymph nodes (Fields *et al.,* 2001).

In Africa, hepatitis B virus infection is the major cause of liver disease which is the third most common cause of death in medical wards with 15-60% seropositivity for HbsAg in normal population (Okonko *et al.,* 2010).

Nigeria is an endemic area of viral hepatitis, and Studies carried out by various authors had shown that HBV infections are highly prevalent among Nigerians. Okonko *et al.,* (2010) analyzed the results of HBsAg screening among patients in Abeokuta, South Western Nigeria, with a view to establishing the prevalence rate in the region. 200 samples were screened for HBsAg over the period of four months (April to July). The seropositivity rate among donors tested was found to be 4.0%. According to a recent study (Eke *et al.,* 2011) HBV prevalence of 8.3% was found among low resource setting in Nnewi, Nigeria.

In a research conducted by Pennap *et al.,* (2010) showed that the prevalence of hepatitis B virus (HBV) infection among people of a local community in Keffi, Nigeria was 13.2%. While 12.4% reported by Alikor and Erhabor (2007) in children attending tertiary health institution in Niger Delta, south-south of Nigeria. Atina *et al.,* (2004) also reported that the prevalence of HbsAg among patients with acute icteric hepatitis at the Kenyatta National hospital, Nairobi as 26.2% .However, no research had been conducted with regard to the seroprevalence of Hepatitis B virus in Sokoto metropolis, Nigeria. Therefore, the aim of this research is to generate knowledge of the seroprevalence of hepatitis B virus among patients attending Sokoto specialist Hospital with a view to establish prevalence rate in the State.

MATERIAL AND METHOD

Study Area

The study was conducted in Sokoto specialist hospital, Sokoto, Nigeria. Sokoto is located in the northwest geo-political zone of the country and was created as a State on February 3, 1976 by the then Military Government from the former North-Western State. It has a land area of about 28,232.37 km^2 (Sokoto State Government, 2009) with an estimated population of 3,702,676 (NPC, 2006). It is located in the dry Sahel region and surrounded by sandy savannah as well as isolated hills. The mean annual temperature is about 28.3˚C; the maximum daytime temperatures are under 40˚C for most months of the year. The warmest months are usually between February and April, when daytime temperatures can exceed 45˚C (Ikuomola, 2010).

Study Population

The study was a hospital based cross-sectional study conducted on June/July 2012. It consists of 300 patients whom attended Sokoto state specialist hospital, during the period of the study. The populations include patients with no history of hepatitis or prior treatments against hepatitis virus infection, attending Sokoto state specialist hospital were screened for the study.

Ethical Approval

Ethical approval informed consent was obtained from all individuals. For subjects under 18, parental consent was required. Each participant and/or parent was informed of the results of the serology. The study was approved by ethical and research committee of the hospital management.

Questionnaire

Questionnaires were used in this study to collect data from each patient. All the patients who fulfilled the inclusion criteria were interviewed in detail and the data was recorded on a prescribed questionnaire. The data consist of participants demographic variables considered as risk factor for contracting hepatitis B virus. These include sex, marital status, occupation, blood transfusion, tribal mark/tattoos, intravenous drug uses and education.

Collection of Samples

About 5ml of blood sample was aseptically collected by venipuncture from each subject and transfer into anticoagulant free bottles. The blood samples were left to clot, after which Serum samples were separated from the clot by centrifuging at 2000rpm for 10minutes. Sera were then separated from the clots, and stored at room temperature in labeled bottles until assay.

Hepatitis B Surface Antigen (HbsAg) Detection

Surface antigen for hepatitis B was detected using Biorex Diagnostic ELISA kit, it is an enzyme- immunoassay based on a ‘sandwich’ principle. Polystyrene microtitre strip wells have been coated with monoclonal anti- Hbs (Antibody to HbsAg), which constitutes the solid- phase antibody. The test sample is incubated in such a well; HbsAg, if present in the sample, will bind to the solid-phase antibody. Subsequently a-guinea-pig anti-HBs, which have been labeled with enzyme horseradish peroxidase (HPR), are added. With a positive reaction this labeled antibody becomes bound to any solid phase antibody HbsAg complex previously formed. Incubation with enzymes substrate produces a blue colour in the test well, which turns yellow when the reaction is stopped with sulphuric acid. If the sample contains no HbsAg, the labelled antibody cannot be bound specifically and only a background colour develops.

Statistical Analysis

The data was subjected to statistical analysis using statistical package (R version 2.13.1) to determine any significant relationship between infection rate, age and gender. The Pearson chi- square test was employed to determine the relationships between the demographic data and clinical information with HBsAg infection and P value < 0.05 was considered significant at 95% confidence interval.

RESULTS

Three hundred people among the patients attending Sokoto specialist hospital were volunteered to participate in this study. There were 136 females (45.3%) and 164 males (54.7%). They were categorized into those that were <1 - 17 years, 18 - 49 and those that were > 50 years old. Most of the patients were aged 18 - 49 years (61%). About 3.0% of the total population had tribal marks/tattoos and the proportion of patients having histories of blood transfusion was 8.0%. About 146 (45.6) of the patients do not undergone formal education while 187 (62.3%) were single. HBsAg were found positive in 42 (14.0%) people of the study population as shown in the table1.

Table 1: Risk factors for HbsAg among the tested patients at Sokoto Specialist Hospital

Risk factors	Total Samples	Total Samples (%)	HBsAg Positives	HBsAg Positives (%)	*P – value*
Age					
<1 – 17	69	23	11	15.9	
18 - 49	183	61	23	12.6	0.6667
>50	48	16	8	16.7	
Occupation					
Civil Servants	24	8	2	8.3	
Student	48	16	5	10.4	
House Wives	112	37.3	11	9.8	0.06915
Business Men	116	38.7	24	20.7	
Sex					
Male	164	54.7	26	15.9	0.3959
Female	136	45.3	16	11.8	
Marital Status					
Married	113	37.7	15	13.3	0.9125
Single	187	62.3	27	14.4	
Education					
Primary	41	13.7	7	17.1	
Secondary	98	32.7	11	11.2	
Tertiary	15	5	2	13.3	0.7789
Non formal education	146	48.6	22	15.1	
Blood Transfusion					
Yes	24	8	9	37.5	0.06915
No	276	92	33	12	
Intravenous Drug Uses					
Yes	0	0	0	0	< 2.2e-16
No	300	100	42.0	14.0	
Tribal Mark/Tattoos					
Yes	9	3	1	11.1	0.8149
No	291	97	41	14.1	

HbsAg was detected in 42 (14.0%) out of the 300 patients. None of them were previously aware of their condition. The prevalence of HbsAg was high among the > 50 age group, where 8 (16.7%) patients of the 48 tested were positive to HbsAg. Thus, hepatitis B virus was found more prevalent among person aged > 50 years old. However, there was no statistical significance difference between age and the viral infection ($p > 0.05$).

The social characteristics of the studied patients, educational attainment and occupation

were presented in the table below. Of the population studied (n=300), 41(13.7%) were at level of primary, 98 (32.7%) secondary, 15 (5.0%) tertiary and 146 (48.6%) were not attained formal education. An inverse relationship between the educational status of the patients and the seroprevalence of HbsAg was observed. Detail shows that the patients with high prevalence level of HBV were at the primary level (17.1%), followed by those without formal education (15.1%). While those with secondary and tertiary levels of education had lower prevalence 11.2% and 13.3% respectively. With respect to gender, males were infected more with HBsAg (15.9%) than female (11.8%). The distribution of HBsAg according to marital status was analysed and the result shown in Table below. There was no statistical significance difference between the single and married individual in relation to hepatitis B infection ($p > 0.05$).

Out of the 300 patients participate in this study, 24 (8.0%) had history of blood transfusion. Hepatitis B virus was found to be more prevalent among people that have history of blood transfusion (37.5%) than those that do not (12.0%). Also, there was statistically significance relationship between the blood transfusion and the viral infections ($p = 0.001619$). Thus, base on this result, histories of blood transfusion is an important risk factor associated with hepatitis B infections.

Also the risk factors such as intravenous drug uses and presence of tribal marks/tattoos of the studied patients were presented in the table below. All the patients were exonerated from intravenous drug use, but only 9 (3.0%) were found to have tribal marks/tattoos. Details showed that a patient without tribal marks/tattoos having the highest prevalence level of HBsAg (14.1%) than those with tribal marks/tattoos (11.1%).

DISCUSSIONS

To result of this study showed that the prevalence of HbsAg among patients attending Sokoto Specialist Hospital, Sokoto State, Nigeria was 14.0%. This result is contrary to several previous results reported in different geographical zones of Nigeria (Okonko *et al.*, 2010; Pennap *et al.*, 2010; Eke *et al.*, 2011; Olaitan and Zamani, 2010; Olokoba *et al.*, 2009; Atina *et al.,* 2004). The frequency of occurrence of HbsAg among different subject in Nigeria varies from one location to another with age, sex, occupation and history of blood transfusion as important risk factors. The prevalence of 14.0% recorded in this study was relatively higher than 13.3% reported by Pennap *et al.,* (2010) among people of a local community in Keffi, Nigeria. The value is also higher than 2.5% in Maiduguri (Baba *et al*., 1999), 12.4% reported by Alikor and Erhabor (2007) in children attending tertiary health institution in Niger Delta of Nigeria, 4.0% reported by Okonko *et al.,* (2010) among patients in Abeokuta, South- Western, Nigeria. The figure reported in this study is also higher than the 4.9% reported by Ejele and Ojule (2004) in Port Harcourt, 10.3% reported in by Sirisena *et al.,* (2002) in Jos, 9.5% reported by Olaitan and Zamani (2010) among ante- natal patients in Gwagwalada, Abuja, Nigeria and 8.3% reported by Eke *et al.,* (2011) among low resource setting. In contrast it is less than 26.2% reported by Atina *et al.,* (2004) among patients with acute Icteric hepatitis, 21.3% reported in Ibadan (Otegbayo *et al.,* 2003), 20.0% found by Alao *et al.,* (2009) in Otukpo, an urban area of Benue State, 14.5% overall HbsAg seroprevalence reported by Lawal *et al.,* (2009) in Ibadan, 18.6% reported by Buseri *et al.,* (2009) in Osogbo, Nigeria.

The prevalence of hepatitis B virus infection with respect to gender was found high in male (15.9%) than female. However, there was no statistical significant difference between the sexes. This finding is in contrast with Okonko *et al.,* (2010), who reported that, there is significant difference between male and female prevalence with respect to hepatitis B infection. But in consistent with the finding of Pennap *et al.,* (2010), which shows that, no significant association between gender and viral infection ($p > 0.05$) although, the prevalence was higher (24.1%) among the males. Also, this study is in agreement with

earlier findings Lawal *et al.,* (2009), Sule *et al.,* (2010) and Opaleye *et al.,* (2010) which all show that no statistical significant difference was observed among both sexes.

With respect to aged, individuals with > 50 years had a high prevalence of 16.7%. This result is in contrast with Eke *et al.,* (2011), who reported that the prevalence of HbsAg was found higher among 20- 24age group. Also, this finding is in contrast with Okonko *et al.,* (2010), which shows that, high prevalence of 5% was found between 15 and 29 years; this is due the high sexual activity are found within the aged of 15 and 29 years. The finding of this study is in line with Pennap *et al.,* (2010), who reported high prevalence of 13.8% occurred among those with aged 1– 40 years. However, there was no statistically significant established between the viral infection and age ($p > 0.05$). Also the aged of acquiring infection is the major determinant of the incidence and prevalence rate (Okonko *et al.,* 2010). Also, the result of this study coincided with Ezegbado *et al.,* (2004), who reported that, there was significant infection rates for HIV, HBV and HIV/HBV coinfection were associated with aged groups (16 – 20 years and 21 – 30 years).

The distribution of HBV infections according to educational qualification was analyzed and the result was shown in Table below. High prevalence occurred among those attained primary education (17.1%), followed by those with non - formal education (15.1%). However, no statistical significant was recorded between educational level and hepatitis B infection. This finding agree with Eke *et al.,* (2011), who shows that high prevalence was found among those with primary education (9.5%), followed by secondary education (9.1%) although, no statistical significant was observed between educational attainment and the prevalence of hepatitis B infection ($P > 0.05$). This in contrast with Okonko *et al.,* (2010), who shows that prevalence of hepatitis B virus was directly associated with educational status. Marital status also considered as a risk factor for hepatitis B infection. There was high prevalence of HBV among single (14.4%) than married individuals (13.3%).the reason for this, is that they are unmarried free to participate in sexual activity. This finding is in line with Okonko *et al.,* (2010), who indicates, prevalence of 8.0% among single with highly statistical significant difference ($P < 0.05$). This consistent with the report from Jos, Plateau state, Nigeria (Sirisena *et al.,* 2002). But, this finding is in agreement with Eke *et al.,* (2011) which show that, no statistical significant relationship was observed between the HBV infection and marital status. The distribution of hepatitis B virus infection according to history of blood transfusion was recorded in the table below. The finding of this study strongly associated the prevalence of hepatitis B virus and history of blood transfusion (37.5%) with highly statistical significant difference ($P < 0.05$). This finding correlate with Okonko *et al.,* (2010) whose shows that the major route of HBV transmission in the population study was blood transfusion (7.3%). This observation consistent with Agbede *et al.,* (2007) and Sahajian *et al.,* (2007) which considered the risk factor associated with HBV infection is transfusion of blood/ blood product, and have consistently demonstrated that unsafe injection from unqualified medical personnel using HBV contaminated needle and syringe might result from the infection (Okonko *et al.,* 2010). Similarly, in our community many people received treatment in a medical shop from unqualified medical personnel rather than go to hospitals. Lack of proper implementation of aseptic techniques might lead to contamination of the syringe and needle leading to infection.

With respect to Tribal marks/tattoos, high prevalence was recorded within the individuals that do not possess tribal mark/tattoos (14.1%) than those with tribal marks/tattoos (11.1%), but there was no statistical significant difference between the viral infection and tribal marks. This finding is in contrast with Okonko *et al.,* (2010), who indicate the major route of HBV transmission in the population study is through tribal marks/ circumcision/ scarification. Also finding of this study coincided with Eke *et al.,* (2011) who shows there was high prevalence of HBV among people with tribal marks/tattoos (40%) than those without tribal marks (7%). This study is like Pennap *et al.,* (2010), who demonstrated that, no statistical relationship between tribal marks and HBV prevalence. Unlike reports by Sahajian *et al.,*

(2007), this study was unable to demonstrate the contribution of traditional practices like body/facial marks as a statistically significant risk factor in the transmission of these viruses. This might not be unconnected with the fact that the instruments used for such procedures are usually washed and passed through naked flame before and after each procedure. This might have been serving as a good means of sterilization of the instruments (Pennap *et al.*, 2010). In addition, we observed other variables here, such as occupation and intravenous drug abuse also appeared not associated with the HBV infection among the studied groups ($P > 0.05$).

CONCLUSION

A total of 42(14.0%) of the patients attending Sokoto specialist hospital were found seropositive for hepatitis B virus. The result of this study highlighted the prevalence of hepatitis B in Sokoto metropolis, Nigeria, and its pattern among patients attending the hospital aforementioned. Therefore, people should be enlightened on the importance of good personal hygiene in the prevention of the infections especially hepatitis B infection that can be spread through body fluids such as blood and blood product.

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