Direct RESEARCH JOURNALS
Vol.5 (1), pp. 1-6, July 2017
ISSN 2449-0814
Article Number: DRJA23535189

Direct Research Journal of Health and Pharmacology
http://directresearchpublisher.org/journal/drjhp

Research Paper

Seroprevalence of hepatitis B surface antigen (HBsAg) among pregnant women in kabba, Bunu Local Government Area of Kogi State

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Received 25 May 2017; Accepted 7 July, 2017

This study was carried out to determine the seroprevalence of hepatitis B surface antigen (HBsAg) among pregnant women attending antenatal clinic in Kabba and to identify risk factors for hepatitis B viral infection in pregnant women. One hundred and ninety-eight (198) pregnant women who consented voluntarily after thorough explanation of the purpose of the study were recruited for this study. The blood samples were tested for the presence of antibodies against HBV using rapid test strip. With SPSS 16.0, Chi square statistical test was used to establish association between the risk factors and HBsAg seropositivity. Analysis of the result shows that 3(1.51%) of the pregnant women had HBsAg which categorize Kabba among low prevalence of HBV infection. Statistical analysis, however, showed no significant difference (p>0.05) between the prevalence and the age of patients. Tattoo/tribal mark (p = 0.057); marital status (p = 0.479), Number of sexual partner (p = 0.493), blood transfusion (p = 0.687), History of surgery (p = 0.160), history of vaccination (p = 0.779), were not significantly associated with HBsAg seropositivity among the study patients because p>0.05, on the contrary educational status showed a statistical significance (p = 0.010). This study, however, confirmed Hepatitis B Surface antigenemia among apparently healthy pregnant women in Kabba, Kogi State, Nigeria.

Key words: Hepatitis B virus, Hepatitis B surface antigen (HBsAg), pregnant women, Kabba

INTRODUCTION

Hepatitis B virus (HBV) belong to the member of the Hepadnaviridae (Liver infecting DNA virus) family with virions which are double-stranded particles, measuring about 40 to 42 nm in diameter having an outer lipoprotein envelope that have three related glycoprotein envelope (Alegbeleye *et al*., 2013). Hepatitis B infection (HBV) is common or prevalent in Nigeria. It poses serious health challenge globally and a major risk factor of chronic hepatitis, liver cirrhosis and hepatocellular cancer (HCC) (CDC, 2012; Alegbeleye *et al*., 2013).

The three major possible routes of transmission of HBV are from infected mothers to infants: transplacental transmission during care of infants or through breast milk (Zhang *et al*., 2004). Viral hepatitis B during pregnancy is associated with a high risk of maternal complications such as conjugated hyperbilirubinemia commonly resulting from blockage of the hepatic or bile duct, most often due to a gallstone or to cancer of the head of the pancreas. Because of the obstruction, bilirubin diglucuronide cannot be excreted. It thus regurgitates into the hepatic veins and lymphatics, and conjugated bilirubin appears in the blood and urine (choleric

jaundice) (Murray *et al.,* 2003). Also, viral hepatitis B has a high rate of vertical transmission which results in the fetal and neonatal hepatitis and has been reported as a leading cause of maternal mortality (Oladimeji *et al.,* 2013). The clinical manifestations of HBV infection in acute infection are either prodromal (early symptom as warning of the onset of a disease), or icteric (yellowing of the eyes, mucous membrane and skin relating to jaundice) and recovery (Kasper *et al.,* 2005).

Patients clinically present with chills, headache, nausea, vomiting and may precede jaundice after the incubation period (Kasper *et al.,* 2005; Hasslett *et al.,* 1999; Cunninghan *and* Leveno, 2005). Tenderness and enlargement of liver may occur in the upper quadrant which may be painful. Splenomegaly and adenopathy may also occur in 10% to 20% of cases (Kasper *et al.,* 2005). During the incubation period of the virus, serological markers of infection (HBsAg) appear in the blood. This is followed within a few weeks by evidence of viral replication (HBeAg and HBV-DNA). These markers and liver enzymes reach their highest level at about the time of onset of symptoms, which abate or come to an end within 2-3 weeks but may persist for months. Although in the majority of the patients (49%), HBsAg disappear from the blood as the liver enzyme normalize (Haaheim *et al.,* 2002), some individual do remain chronically infected with HBV and may progress to liver cirrhosis and, or to hepatocellular carcinoma (Kasper *et al.,* 2005; Hasslett *et al.,* 1999). On ageneral note, transmission of HBV may results from exposure to infectious blood or blood product or body fluids, unprotected sexual contact, blood transfusion, reuse of contaminated needles or syringes (Olokoba *et al.,* 2011).

HBV infection can be acute or chronic. In adults with acute HBV infection, recovery is usually possible or the infection on the contrary, chronic HBV infection is ultimately fatal. Hepatitis B surface antigen (HBsAg) is the hallmark of HBV infection and is the first serological marker to appear in acute HBV infection, and persistence of HBsAg for more than 6 months suggest chronic HBV infection.

Despite the existence of a safe and effective vaccine, Nigeria remained a high-endemic area for hepatitis B virus infection, with estimated 12% of the total population being chronic carriers (Alegbeleye *et al.,* 2013). The study therefore aim to determine the seroprevalence of hepatitis B surface antigen (HBsAg) among pregnant women attending antenatal clinic in Kabba and to identify risk factors for hepatitis B viral infection in pregnant women in Kabba, Bunu Local Government Area of Kogi State.

MATERIALS AND METHODS

A cross sectional study was carried out for a period of one month (October) in 2014. The study was conducted in Kabba, headquarter of Kabbba/Bunu Local Government Area of Kogi State. It is a town located at the western senatorial district of Kogi State having a common language called 'owe' among Okun people. It covers the total area of 2,706 km^2 (1,045sq mile). It has a total population of 145,446 according to 2006 census. Kogi state is in the North Central zone of Nigeria of geopolitical map of Nigeria having border with Abuja and Nassarawa state at the north, Ondo and Ekiti by the west, Kwara State at the North West, Benue state by the East, Edo by the south west and Enugu at its south.

Study population

The study included 198 pregnant women assessing antenatal care at corner stone, Fehintolu, Glory, Goshen and ST John Hospitals Kabba.

Ethical consideration

Ethical clearance was obtained from the health research committee from the hospitals in accordance with the code of ethics for biometrical research involving human subjects. Signed and informed consent form was also obtained for each subject.

Inclusion and exclusion criteria

Only pregnant women were provided signed consent form and self-administered questionnaire. The exclusion criteria were ages below 17 or above 40 and failure to sign the consent form.

Specimen collection

From each of the pregnant women recruited for the study, 2 ml of blood sample was withdrawn using needle and syringe by venipuncture. The blood samples were quickly transferred into EDTA bottle. The plasma was separated by centrifugation and samples were tested for HBsAg using ANA care and ABON one step HBsAg test strip. Packaged in icepack for transportation Analysis was carried out in St John Hospital laboratory and corner stone laboratory in Kabba. Positive and negative controls were included per each batch of the test to ensure proper working of the kit and that the technical procedure was carried out correctly. With the manufacturer assay procedure followed strictly. The results were interpreted accordingly.

Assay technique

One step hepatitis B surface antigen test strip (ANA care and ABON HBsAg test kits) provided material (Ante

HBsAg particles) for rapid chromatographic immune assay for the qualitative detection of hepatitis B surface antigen in serum or plasma.

Principle of the test

The HBsAg one step Hepatitis B surface antigen test strip (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 the membrane chromatographically by capillary action react with the anti-HBsAg antibodies on the membrane and generates a colored line.

The presence of colored line in the test region indicate a positive result, while its absent indicate negative result. To serve as a procedural control, a colored line will always appear on the control line region indicating the proper volume of specimen has been added and membrane wicking has occurred.

Assay procedure

The blood sample in EDTA bottle was centrifuged at 3000g for 5 min to obtain the plasma in the laboratory. The sealed end of the strip was cut along the notch. The HBsAg strip was removed and dipped into the plasma/serum with the arrow pointing towards the sample. The strip were removed and laid on plane non-absorbent bench surface and allowed to stay for 15-20 min before result was taken.

Statistical analysis

Computer software, SPSS version 16.0 was used to analyze collated data. Chi-square test was used to compare prevalence of HBV infection rate in pregnant women among various age groups with significance determined at p = 0.05 while percentage values were equally used to compare the risk factors.

RESULTS

Interpretation of result

Positive: when two distinct red lines appear on the test strip, with one on the line of control region (C) and the other is on the test region (T). In certain instances the test line may be faint due to the concentration of HBsAg present in the specimen.

Negative: when one red line appears in the control region and there is no apparent red or pink line appearing in the test region.

Invalid: when control line fail to appear. This indicates an error and requires a repeat of the test.

A total of 198 blood samples of pregnant women were analyzed for the seroprevalence of Hepatitis B surface antigen which indicate the presence of HBV in the blood. Out of the 198 tested samples, 3(1.5%) were positive while 195(98.5%) were negative. Among the positive samples 1(0.5%) fall in the age interval 37-40years, while 1(0.5%) fall within the class interval 33-36 and 1(0.5%) fall between age 25-28years. The percentage of the overall positive cases, that is, the total prevalence of HBV is 1.5% and the average age of positive cases is 33years.

Prevalence of HBsAg

The distribution of HBsAg by age groups shows that women in the age group 17-20, 29-32, 33-36 had zero (0) prevalence respectively while age 21-24, 25-28, and 37-40 has 0.51% respectively. The total prevalence of hepatitis B surface antigen HBsAg is 1.51% out of the 198 total pregnant women enrolled in the study, 3 positive cases were recorded (Table 1). This is statistically insignificant because the p value = 0.478 is greater than p_{cal} = 0.05.The risk factors associated with HBsAg among pregnant women in Kabba, Kogi State. Table 2 is a distribution of HBsAg in relation to associated risk factors. On this table is the number of pregnant women tested in relation to various risk factors. The prevalence as a result of each factor was also recorded and Chi-square and P_{value} of each risk are recorded.

DISCUSSION

The overall prevalence of HBsAg in pregnant women attending antenatal clinics in Kabba was 1.51% although, statistical analysis showed no significant difference. The classification of this low endemicity from HBV infection has been defined as HBsAg less than 2% in adult population (CDC, 2012). The distribution of HBsAg by age groups shows that women in the age groups 17-20, 29-32, 33-36 has 0 prevalence respectively while those in age groups 21-24, 25-28 and 37-40 has 0.51% prevalence respectively.

The classification of intermediate endemicity from HBV infection has been defined as HBsAg between 2-7% in an adult population (CDC, 2012). The HBsAg seropositivity of 1.51% among pregnant women in Kabba has low prevalence of HBV compare to other

Table 1. Prevalence of hepatitis B virus among pregnant women in relation to Age (years).

Age (year)	Number of sample	Number of positive	Number of negative
17-20	30(15.50%)	0(0.00%)	30
21-24	33(16.67%)	1(0.51%)	32
25-28	50(25.55%)	1(0.51%)	49
29-32	46(23.23%)	0(0.00%)	46
33-36	23(11.61%)	0(0.00%)	23
37-40	16(8.08%)	1(0.51%)	15
Total	198(100%)	3(1.51%)	195

P value = 0.478 x^2= 4.513 p_{cal} = 0.05

Table 2. Distribution of HBsAg in relation to associated risk factors.

Risk factors	Parameter	No. tested	%Number of positive	X^2	P-value
Blood transfusion					
	Yes	10(5.0)	0(0)	0.162	0.687
	No	188(95.0)	3(1.6)	-	-
History of Surgery					
	Yes	19(9.6)	1(5.3)	1.979	0.160
	No	177(90.4)	2(1.1)	-	-
History of Vaccination					
	Yes	5(2.52)	0(0)	0.079	0.779
	No	5(2.52)	3(1.6)	-	-
Tattoo/tribal mark					
	Yes	43(21.71)	2(4.7)	3.620	0.057
	No	155(78.29)	1(0.6)	-	-
Marital Status					
	Single	28(14.14)	0(0)	0.502	0.479
	Married	170(85.86)	3(1)	-	-
Number of Sexual Partner					
	1	162(81.81)	2(1.2)	0.470	0.493
	2	36(18.19)	1(2.8)	-	-
Academic Qualification					
	None	33(16.7)	0(0)	11.288	0.010
	Primary	20(10.10)	2(10)	-	-
	Secondary	73(36.87)	0(0)	-	-
	Post secondary	71(35.85)	1(1.4)	-	-
Occupation					
	Civil servant	36(18.2)	0(0)	9.875	0.079
	Trader/Business	46(23.23)	0(0)	-	-
	House wife	16(8)	1(6.3)	-	-
	Unemployed	57(28.8)	0(0)	-	-
	Self employed	33(16.7)	1(3)	-	-
	Health worker	10(5.05)	1(10)	-	-
Total	198(100%)	3(1.51%)			

areas in Nigeria that are endemic for HBV infection such as Anyigba. It is not in conformity with with the study reported by (Sule *et al.,* 2011) that recorded prevalence of 14% in Anyigba. This result 1.51% prevalence is not in conformity with an early report that sub-saharan Africa has HBV carrier rate range of high endemicity (Olokoba *et al.,* 2011).

The HBsAg prevalence of 1.51% in this study carried out among pregnant women in Kabba is similar to the prevalence of 1.51% in United Arab Emirate (Al-Awaidy *et al.,* 2006), it is also similar to the study carried out in Egypt with prevalence of 1.6% (Mortad *et al.,* 2013), similar prevalence to this study, HBsAg was found in 1.7% of pregnant women in Brazil (Bertolini *et al.,* 2006) and also in agreement with 1.5% that is obtained in Lybia.

Several other studies have been conducted on hepatitis B among pregnant women in different regions of the world. In the U.S, HBsAg positivity was reported in 5.8% of the Asians (Euler *et al.,* 2003). In Africa, HBsAg was positive in 4.6% of pregnant women in Nigeria (Obi *et al.,* 2006) and in 5.6% of pregnant women of Sudan (Elsheikh *et al.,* 2007) which is not in agreement to this study. The figure 1.5% prevalence from this study is however lower than the 11% recorded in Makurdi, North central Nigeria by Mbaawuaga *et al.* (2008). It is also lower than the 8.2% found by Olokoba *et al* (2011) in the North Eastern part of Nigeria. This wide variation in the seroprevalence of HBV in pregnant women from the literature may be due to geographical variation, difference in cultural practices, sexual behavior practices and difference in test method employed to detect HBV infection.

However, in relation to other risk factors, history of previous blood transfusion accounted for no proportion of HBV infection. This may be due to proper screening of blood and blood products before transfusion. It has been previously reported that human immunodeficiency virus (HIV), hepatitis C virus (HCV) have similar routes of transmission namely through blood and blood products, intravenous drug abuse, unsafe injections and sexual activity, shared needle, contact with other body fluids such a semen, virginal fluid,and breast milk; from mother to child transmission, needle stick injury, ear piercing, tattooing and other tribal ceremonies (scarification), barbers razors e.t.c. (Olokoba *et al.,* 2009). Hence, more persons avoid these risk factors that in the times past and routine blood screening has been entrenched against HBsAg contaminated blood and blood products. The pregnant women in this study were interviewed for the history of blood transfusion, history of surgery e.t.c. non out 10 mothers who had history of blood transfusion was positive, 1 out of 19(5.3%) with surgery, 3 out of 193(1.6%) of the unvaccinated mothers, 2 out of 43(4.7%) of mothers with tattoo/tribal mark, 1 out of 36(2.8%) among mothers having more than one sexual partner and 1 out of 10(10%) medical staff mothers respectively were recorded from this study.

Although, the result of the whole study is statistically insignificant but the history of medical staff and mothers with tattoo/tribal mark is statistically significant as risk factors associated with hepatitis B infection. Those without formal education from this study show no positive case and the highest prevalence among the education qualification is recorded among the primary school attendees with 2 out of 20(10%), and 1 out of 71(1.4%) among the secondary and uneducated group.

The 5.3% prevalence due to history of previous surgical operation may not be due to improper screening of blood and blood products before transfusion history recorded in this work. It could rather be due to the use of contaminated with HBV positive blood were not properly sterilized and disinfected before such instruments were used on a new individual.

Conclusion

It is clear from this study that Kabba is a region of low HBV prevalence of HBsAg among pregnant women in Kabba, Kogi State of Nigeria. There are many unvaccinated women in the child bearing age who are at risk of HBV infection.

Recommendation

From this study, the following are recommended; general surveillance, mass immunization and public health education should be carried out to stop the spread of the infection in Kabba. Tribal mark and tattoo should be discouraged; otherwise sterile material should be used for the operation. Routine screening for HBV should be conducted for medical staff. Free screening and immunization of all pregnant women and their infants should be incorporated in the antenatal and postnatal programmes in hospital to prevent postnatal infection of the infants by their infected mothers.

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