Original Article

Seroprevalence of hepatitis B virus infection among pregnant women attending antenatal clinic in Dalhatu Araf Specialist Hospital, Lafia, Nasarawa State

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ABSTRACT

Context: Hepatitis B virus (HBV) infection is a cause of chronic liver disease, causing cirrhosis and hepatocellular carcinoma, and pregnant women are not spared. Perinatal transmission is a significant way that the disease is spread from mother to children who will eventually become adults and chronic carriers. This study sought to determine the burden of the disease among pregnant women.

Aims: To estimate the prevalence and investigate possible factors associated with HBV infection among pregnant women attending antenatal clinics in DASH, Lafia.

Settings and Design: A hospital-based descriptive cross-sectional survey conducted at the Obstetrics and Gynecology Department of DASH, Lafia, Nasarawa

Methods and Material: Around 200 pregnant women who attended the ANC clinic were consecutively enrolled, their venous blood samples collected, and hepatitis B profile was carried out using commercially available rapid chromatographic kits

Statistical Analysis Used: Data were collected by trained data collectors using a proforma, then entered into a predesigned program in the Epi-info version 3.5.4 (CDC, Atlanta, Georgia, USA) and analyzed.

Results: The seroprevalence of HBV infection was high (8%) and there were no statistically significant associations between the infection and the investigated sociodemographic and other risk factors.

Conclusions: The study showed that HBV is hyperendemic in this region, and antenatal screening for this virus is desirable to avert its sequelae in both mothers and their newborn babies.

Key words: Antenatal; hepatitis B virus; Lafia.

Introduction

Hepatitis B virus (HBV) infection primarily affects the liver and causes hepatocellular necrosis and inflammation-causing both acute and chronic diseases.[1] It has been identified as a serious public health problem worldwide and is reported to be 50–100 times more contagious than HIV.[2,3] In 2015,

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Access this article online	
Website: www.tjogonline.com	Quick Response Code
DOI: 10.4103/TJOG.TJOG_107_19	

How to cite this article: Ogbe EA, Bello RN, Audu ES, Seroprevalence of hepatitis B virus infection among pregnant women attending antenatal clinic in Dalhatu Araf Specialist Hospital, Lafia, Nasarawa State. Trop J Obstet Gynaecol 2020;37:126-31.

Received: 13-12-2019 **Revised:** 25-03-2020
Accepted: 01-04-2020 **Published Online:** 14-08-2020

an estimated 257 million people were chronically infected with HBV worldwide resulting in 1.34 million deaths, a figure higher than that caused by HIV.[4] Most of the deaths from hepatitis B are from cirrhosis and hepatocellular carcinoma. About 43% of liver cancer is due to late testing and treatment of HBV infection.[4,5]

The most common transmission of the virus is from a pregnant mother to a child, as well as through contact with blood or other body fluids.[1] Pregnant mothers who test positive for both hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg) have a 70–90% risk of transmitting the infection to their newborn infants and about 10–40% risk if they test positive for only HBsAg.[6,7] The risk of becoming a chronic hepatitis B infection carrier is 95% for infections acquired during the perinatal period compared with only 5% for those acquired during adulthood.[8,9]

Viral hepatitis during pregnancy is also associated with a high risk of maternal complications, as well as a high rate of causing fetal and neonatal hepatitis via vertical transmission, which can have serious effects on the neonate, leading to impaired mental and physical health later in life.[10] Unfortunately, routine antenatal screening for HBV infection is not done in many Nigerian hospitals.[11]

The African sub-region is second only to the Western Pacific region, in terms of number of people living with this virus.[12] The prevalence of HBsAg in the normal population in Nigeria is thought to be high and ranges from 2.7 to 13.3%.[13,14]

Despite this, no national study on the seroprevalence of HBV has been done for the Nigerian population as well as in pregnant women. Most individual studies done were only on seroprevalence of HBsAg, with a few identifying other serological markers of HBV infection.[15]

In a systematic review and meta-analysis of the prevalence of HBV infection in Nigeria done in 2015, Musa *et al*. had reported a pooled prevalence of 14.1% in pregnant antenatal women in Nigeria highlighting the fact that Nigeria is a hyperendemic region for HBV infection.[16]

Justification of the study

Despite Nigeria being classified among countries highly endemic for viral hepatitis and variations in prevalence rates across the country, routine screening for HBV infection is currently not incorporated as part of the booking investigations in our hospital. The paucity of data concerning the prevalence of HBV infection in pregnant women in our facility and the state has also made it difficult to make recommendations to this effect. This study will, therefore, help to determine the prevalence of HBV infection and associated factors among pregnant women attending antenatal care clinics in DASH Lafia, Nasarawa state Nigeria, to help generate information that could be used to make recommendations and monitor the trend of the disease in this area.

Aim of Study

To estimate the prevalence and investigate possible factors associated with HBV infection among pregnant women attending antenatal clinics in DASH, Lafia.

Specific objectives

- To determine the prevalence of HBV infection among these pregnant women
- To investigate the associated sociodemographic and risk factors associated with HBV infection in these pregnant women.

Subjects and Methods

Study area

This study was conducted at the Obstetrics and Gynecology Department of Dalhatu Araf Specialist Hospital, Lafia, Nasarawa State between September 2017 to December 2017. The hospital is a specialist training and referral center located in Lafia town, the capital of Nasarawa state in Nigeria. The department has two teams A and B which conduct antenatal clinics on Mondays and Fridays, respectively. Averages of 130 women are seen on each clinic day by each of the teams.

Study population

All pregnant women attending ANC at Dalhatu Araf Specialist Hospital maternity unit were consecutively recruited for this study.

Inclusion criteria

- Women who gave informed consent for the study.

Exclusion criteria

- Women who declined to give informed consent for the study.

Study design

The study was a hospital-based descriptive cross-sectional survey.

Sample size estimation

The sample size was calculated using the formula for prevalence studies.[17]

$$N = \frac{Z^2P\ (1P)}{d^2}$$

Where N = minimum sample size

Z = statistic for the level of confidence at 95% is 1.96

P = expected prevalence

D = precision of 5% is 0.05

A prevalence rate of 11% was reported among pregnant women attending antenatal clinics in Makurdi, a neighboring town.[18] Hence the value $P = 0.11$ was used to calculate sample size for the study.

Thus, $n = 1.96^2 \times 0.11\ (1\text{-}0.11)/0.05^2 = 150$

Giving allowance for a 10% attrition rate for non-responders or improperly filled questionnaires, the minimum sample size for the study was therefore 165. As this was the minimum sample size, 200 women were recruited for the study.

Sample selection

On every antenatal day, the pregnant women were given health talk on infectious diseases in pregnancy including HBV infections and the need to know their status. Only consenting attendees were recruited and included in the study. According to the sequence of their registration, they were allowed to enter into the ANC room for routine follow-up care one by one. The purpose of the study was explained to each subject, and she was asked to participate voluntarily in the study. To avoid recruiting subjects multiple times, a unique mark was put on cards of all enrolled mothers. Accordingly, pregnant women who attended the ANC clinic were consecutively enrolled until the desired sample size was attained. Information on sociodemographic and other pertinent data was collected by trained data collectors using a proforma, then entered into a predesigned program in the Epi-info version 3.5.4 (CDC, Atlanta, Georgia, USA) and analyzed.

Blood sample collection, processing, and procedure for detecting HBsAg

Around 3mL of venous blood was collected using a properly labelled plain bottle by an experienced laboratory technologist from each study participant under the aseptic procedure. Afterward, the blood was allowed to clot at room temperature and the serum separated by centrifugation. Part of the serum was collected and analyzed.

Hepatitis B profile was done using commercially available rapid chromatographic immunoassays for the qualitative detection of HBsAg, HBsAb, HBeAg, HBeAb, and HBcAb (ACRO BIOTECH Inc, Rancho Cucamonga, CA, USA). The qualitative assay was performed using one-step test strips for the detection of hepatitis B profile in serum samples. The test was within few minutes of specimen collection and separation. The immunochromatographic reaction was allowed to take place within a few minutes and the result read exactly 15 min after.

The hepatitis B profile assay has manufacturer reported diagnostic specificity, sensitivity, and accuracy. The results of the test were reported as positive, negative or invalid accordingly. For each invalid test, there was a repeat with a new strip.

Ethical considerations

Ethical clearance was obtained from the DASH Ethics Review Committee. All study participants were informed about the study and assured about confidentiality, protection, and anonymity of data. Written consent was obtained from each study participant before data collection as evidence to show that they participated voluntarily in the study.

Results

Two hundred women gave consent and had their data taken for analysis. The mean age of the women was 27.1 ± 6.2 (range 17–45 years) but that of hepatitis B infected women was 26.0 ± 4.9 and that of the noninfected women 27.0 ± 6.2. Although most of the women were within the age range of 25–29 years (31.5%), hepatitis B infection was found to be highest among those in the 30–34 years age group (50.0%) followed by those in the 25–29 years age group who had 25% as shown in Table 1.

The mean parity of the women was 2.6 ± 2.4, but that of the hepatitis B infected women was 3.7 ± 2.7, and it was 2.5 ± 2.3 for the noninfected group. Most of them were urban dwellers 178 (89%). Most of the respondents were married women 196 (98%). A majority of the women had at least a primary education, leaving 57 (28.5%) with no formal education. However, more than half of

Table 1: Age group and hepatitis B infectivity

Age group (years)	Frequency	Percentage (%)	Hepatitis B infection
15-19	14	7	1 (6.2%)
20-24	53	26.5	3 (18.8%)
25-29	63	31.5	4 (25.0%)
30-34	39	19.5	8 (50.0%)
35-39	24	12	0
40-44	6	3	0
≥45	1	0.5	0

Table 2: Sociodemographic characteristics for hepatitis B virus (HBV) infection

Variable	HBV Positive	HBV Negative	*P*
Mean age±SD (years)	26.0±4.9	27.0±6.2	0.79
Mean Parity±SD	3.7±2.7	2.5±2.3	0.07
Marital status			
Married	16 (8.2%)	180 (91.8%)	
Single	4 (100%)	0.71	
Educational level			
None	6 (10.5%)	51 (89.5%)	
Primary	3 (12.0%)	22 (88.0%)	
Secondary	5 (7.6%)	61 (92.4%)	
Tertiary	2 (3.8%)	50 (91.7%)	-
Occupation			
Unemployed	12 (10.6%)	101 (89.4%)	
Student	-	9 (100%)	
Self-employed	2 (3.7%)	52 (96.3%)	
Government employed	2 (8.3%)	22 (91.7%)	-
Ethnicity			
Hausa	3 (5.0%)	57 (95.0%)	
Eggon	2 (7.1%)	26 (92.9%)	
Kanuri	4 (16.0%)	21 (84.0%)	
Alago	1 (5.3%)	18 (94.7%)	
Fulani	-	15 (100%)	
Gwadara	1 (10%)	9 (90%)	
Igbo	-	10 (100%)	
Others	5 (15.2%)	28 (84.8%)	
Religion			
Islam	12 (7.8%)	141 (92.2%)	
Christianity	4 (8.7%)	42 (91.3%)	
Traditional	-	1 (100%)	

Table 3: Immunological test/Prevalence of hepatitis B infection

Category	Immunology	Frequency	Prevalence%
Infected	HBsAg +ve	16	8
	HBcAb +ve		
	HBsAb −ve		
Immune from	HBsAg −ve	24	12
Hep B vaccination	HBcAb −ve		
	HBsAb +ve		
Immune from	HBsAg −ve	0	0
natural infection	HBcAb +ve		
	HBsAb +ve		
Susceptible patients	HBsAg −ve	127	63.5
	HBcAb −ve		
	HBsAb −ve		

the respondents (56.5%) were unemployed. The sample population comprised mostly of women of the Hausa tribe (30%) and Islam was the predominant religion identified. Other sociodemographic characteristics are as shown below in Table 2.

The result of the immunological test and the prevalence of the HBV are shown in Table 3. Sixteen of the women were found to be infected (positive for HBsAg and HBcAb), giving a prevalence rate of 8%. Twenty four (12%) of the women showed evidence of immunity to hepatitis B vaccination and 127 (63.5%) of these women are susceptible to infection from the table as shown. No woman tested positive for HBeAg.

Table 4 highlights the other associated risk factors, with ear piercing, scarifications, and TBA home delivery being commonest among those who tested positive for HBsAg.

Discussion

The prevalence of hepatitis B infection from our study population was found to be 8% and there was no statistically significant association found between hepatitis B infection and the investigated sociodemographic and other risk factors.

The HBV seroprevalence found in this study is slightly higher than the finding of 7.2% from a recent study in the same institution by Audu and her colleagues.[19] The difference between the two studies could be from the study design and population, as that was a retrospective study in both males and non-pregnant females who were accessing antiretroviral drugs in the hospital. Conversely, the finding is lower than a previous study carried out in a different facility in another part of the state which found a prevalence of 11%.[20] That study by Akyala and his colleagues was carried out in both males and non-pregnant females, and this difference in the study population may also explain the lower prevalence of our study. Nonetheless, the seroprevalence from our study showed that this study group falls into the category of high endemicity as defined by the WHO[21] and efforts need to be geared towards incorporating routine screening for HBV in the antenatal clinic as inadequate coverage for testing and treatment has been identified as a most important gap in global efforts toward eliminating viral hepatitis by 2030.[4]

Besides, vaccination of susceptible individuals is another strategy that will help in eliminating viral hepatitis. From our study, only 24 (12%) out of the women showed any serological evidence of immunity from vaccination. Likewise, 127 (63.5%) of the women were found to be susceptible to hepatitis B infection from the serological profile and had not had prior vaccination. Vaccination against HBV in Nigeria has been sub-optimal because of poor funding by the government and community misconceptions about the vaccines.[22-24] Therefore, addressing these issues will require political will, community education and re-orientation to change the narrative and allow better coverage.

When the association between HBV infection and sociodemographic factors was investigated, none was found to be significantly associated with the occurrence of infection.

Table 4: Risk factors

Variable	HBsAg Positive	HBsAg Negative	Odds ratio	95% CI	*P*
Blood Transfusion					
Yes	3 (13%)	20 (87%)	1.9	0.5-7.2	0.27
No	13 (7.3%)	164 (92.7%)			
HIV status					
Yes	2 (15.4%)	11 (84.6%)	0.4	0.1-2.2	0.28
No	14 (7.5%)	173 (92.5%)			
Ear piercing					
Yes	16 (8.3%)	176 (91.7%)	-	-	0.51
No	0 (0%)	8 (100%)			
Nose Piercing					
Yes	5 (11.1%)	40 (88.9%)	1.6	0.5-5.0	0.28
No	11 (7.1%)	144 (92.9%)			
Tattoo					
Yes	3 (9.1%)	30 (90.9%)	1.2	0.3-4.4	0.51
No	13 (7.8%)	154 (92.2%)			
Scarification					
Yes	11 (10.2%)	97 (89.8%)	2.0	0.7-5.9	0.17
No	5 (5.4%)	87 (94.6%)			
Uvulectomy/Tonsillectomy					
Yes	4 (7.0%)	53 (93.0%)	0.8	0.3-2.7	0.50
No	12 (8.4%)	131 (91.6%)			
TBA Home delivery					
Yes	10 (12.0%)	73 (88%)	2.5	0.9-7.3	0.04
No	6 (5.1%)	111 (94.9%)			
Recreational (IV) drugs					
Yes	0 (0%)	3 (100%)	-	-	0.78
No	16 (8.1%)	181 (91.9%)			
Sexual partners					
≥2	1 (6.7%)	14 (93.3%)			
1	15 (8.1%)	170 (91.9%)	1.2	0.2-10.1	0.66
Parity					
≥5	5 (11.9%)	37 (88.1%)			
0-4	11 (7%)	147 (93%)	1.8	0.6-5.5	0.22

In the study by Nongo and his colleagues,[25] they reported that the majority of the population that tested positive were within the age range of 25–29 years. This is unlike in our study were we found that the majority (50%) of the hepatitis B infected women are within the age group of 30–34 years.

Besides, evaluating the association of hepatitis B infection with other risk factors showed that three risk factors were outstanding among the seroprevalence group and these include: ear piercing, TBA home delivery, and scarifications. However, none of them was found to be statistically significant. Public enlightenment and awareness campaigns should be put in place to educate women on the dangers of such practices. Similarly, the other risk factors such as the history of tattoos or traditional uvulectomy/tonsillectomy, number of sexual partners, history of blood transfusion, recreational drug use or parity did not reveal any significant statistical relationship with HBsAg positivity.

Conclusion

The prevalence of hepatitis B infection is high in this study population but there was no significant association found between the occurrence of infection and the evaluated sociodemographic and other risk factors.

We recommend a regime of routine antenatal screening for this infection among pregnant women to enable identification of cases and appropriate management of the mother and newborn as we join the global effort to eliminate the disease and hopefully its complications by 2030.

Acknowledgment

Mrs. Beatrice Amough and Mr. Abdullahi Sale of the Department of Medical laboratory services of the Dalhatu Araf Specialist Hospital (DASH) for their assistance during the laboratory procedure.

Financial support and sponsorship

Funds were independently provided by the contributing authors.

Conflicts of interest

There are no conflicts of interest.

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