Seroprevalence and Clinico-Epidemiological Correlates of Hepatitis B Infection in Pregnancy at a Booking Antenatal Clinic, Federal Medical Centre, Yenagoa

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Abstract

Background: Hepatitis B virus infection is considered a major worldwide public health problem. While adults that acquire acute infection usually recover, the chronic type is ultimately fatal both to them and their foetuses. In endemic areas, individuals are infected by vertical transmission or infection in early childhood. The seroprevalence rates of Hepatitis B in pregnancy vary according to the endemicity of a given area with very high prevalence rates mostly reported among developing nations in Asia and Africa. **Objective:** To determine the seroprevalence of hepatitis B surface antigen in pregnant women attending the antenatal clinic, identify the clinical and epidemiological correlates for hepatitis B in pregnancy and to make evidence based recommendations on screening protocols for our obstetric population at the Federal Medical Centre, Yenagoa. **Methodology:** This is a descriptive cross sectional study. Two hundred and twenty (220) consecutive healthy pregnant women attending the antenatal booking clinic of the hospital who met the inclusion criteria were recruited into this study after pretest counselling and obtaining consent from them. This was tested for HBsAg with commercially available in vitro diagnostic kits (one step test strips). Data was collected via a structured interviewer administered questionnaire. Data entry and analysis was done using SPSS (statistical package for social sciences) 22 statistical package (SPSS Inc., Illinois, U.S.A). P value less than 0.05 was

taken as being significant. **Results:** The mean age of the pregnant women studied was 28.8 years ± 5.2 while the mean parity was 1.20 ± 1.16. 220 pregnant women who came for antenatal booking were recruited into this study. Of these, 4.6% (n=10) were seropositive for hepatitis B surface antigen (HBsAg). Multiple sexual partners and Female circumcision were the significant risk factors for HBsAg seropositivity ($p<0.05$). There was no significant association with respect to a history of jaundice or contact with a jaundiced patient, previous blood transfusion, intravenous drug abuse or sharing of sharps, previous surgery, episiotomies or dilatation and curettage ($p>0.05$). **Conclusion:** The intermediate endemicity of Hepatitis B virus infection in this study according to WHO classification, justifies the need for routine screening in pregnancy to identify and treat the infection accordingly as this will reduce the mother to child transmission. Multiple sexual partners and female circumcision are significant risk factors associated with Hepatitis B virus infection in this environment. Active and passive immunization to infants of HBsAg seropositive mothers is advocated.

Keywords: Hepatitis B virus, Hepatitis B surface antigen, Hepatitis in pregnancy

Introduction

According to the Centre for Disease Control and Prevention, "Hepatitis'' means inflammation of the liver. The liver is a vital organ that processes nutrients, filters blood and fights infection. When a liver is inflamed or damaged, its function can be affected. [1]

Historically, hepatitis B surface antigen (HBsAg) was formerly called Australia antigen because it was first described in the serum of an Australian aborigine in 1963.[2,3] Okochi and Murakami [3] in 1968, discovered that the Australian antigen was related to type B Hepatitis.

The Hepatitis B virus (HBV) is the prototype member of the Hepadnaviridae (hepatotropic DNA virus) family.[4,5] HBV virions are double-stranded particles, 40 to 42 nm in diameter with an outer lipoprotein envelope that contains three related envelope glycoproteins (or surface antigens).[5,6] Within the envelope is the viral nucleo-capsid, or core. [6,7]

Whereas Hepatitis may be caused by several viruses, it can also be caused by drugs or toxic chemicals with similar clinical manifestations of all forms. [4]

Globally, more than 2 billion people have been infected with HBV at some time in their lives.[8] In the past, it was estimated that over 350 million people were chronically infected worldwide and over 1 million die annually of HBV related chronic liver disease. [9] However, currently an estimated 240 million people are chronically infected with Hepatitis B (defined as hepatitis

B surface antigen positive for at least 6 months) and more than 780, 000 people die annually due to complications of Hepatitis B, including liver cirrhosis and liver cancer. [10] Even with the decrease in the disease burden, globally it's still a major public health problem. Adults infected with HBV usually acquire an acute Hepatitis B infection and recover without sequelae, but 5-10% [6] may develop the chronic carrier state. Infected children rarely develop acute disease, but 25 - 90% become chronic carriers. [11] Neonates who acquire hepatitis will have an almost 90% risk of developing chronic HBsAg carrier state and chronic liver disease. Infants may also spread the disease to siblings and to their community. [11]

Transmission occurs when blood or body fluid of an infected person enters the body of a person who is not immune.[12,13] In developing countries, the main routes of transmission are perinatal with Hepatitis B surface antigen (HBsAg) carrier mothers infecting their infants usually during birth. Other means of transmission are transfer of HBV through cuts, sexual transmission, transfusion of infected blood or blood products, needle stick injury, contamination of eye, re-use of HBV contaminated needles, syringes, lancets and instruments used in tribal markings, and possibly through blood sucking insects and bed bugs.[14]

Nigeria is classified among the group of countries endemic for HBV infection with a current infected population of 18 million.[15] Despite the existence of a safe and effective vaccine, Nigeria has remained a hyper-endemic area for HBV infection, with an estimated 12% of the population being chronic carriers. [16]

In South South Nigeria, Akani et al[17] in Port Harcourt reported a seroprevalence of 4.3% and also Aigere et al [18] in Irrua reported 6.8%. In South West Nigeria, Agbede et al.,[19] 2007 reported 5.7% from Ilorin. 8.3% from Zaria in North west Nigeria (Luka et al., 2008) [20] and in North Central Nigeria, Mbaawuaga et al [21] reported 11% to mention but a few. Consequently, studies on HBV infection in Nigeria have shown that the seroprevalence of the infection in pregnant women range from 3.8-13.3%. [16,22-28]

Accepting, enshrining and implementing new policies and interventions by institutions, policy makers and administrators in resource or economically constrained countries must be evidence based particularly so in urban areas where the pace is set for rural and suburban areas to follow. Also, being a new training or research centre in the region, no previous study has been done on the seroprevalence and clinico-epidemiological correlates of Hepatitis B surface antigen in pregnancy at the Federal Medical Centre, Yenagoa. In view of these existing fact and the need to have a robust literature on viral Hepatitis in Africa, it's of utmost importance to enable us reappraise our continued dependence on Western data, while we provide evidence based local data for policy making.

Objectives

The general objective is to determine the seroprevalence and clinico-epidemiological correlates of Hepatitis B surface antigen in pregnancy in Yenagoa.

The specific objectives are (1) To find out the seroprevalence of HBV in pregnant women that present in clinic. (2) To identify known risk factors for HBV infections in pregnant women. (3) To make evidence based recommendations on screening protocols for our obstetric population.

Methodology

Study Area

This study was carried out at the Antenatal clinic of the Federal Medical Centre, Yenagoa, Bayelsa state in the South-south region of Nigeria between 4th September to 28th October, 2016.

Study design

A descriptive cross sectional study.

Inclusion criteria

This included all pregnant women who presented for booking at the antenatal clinic of FMC Yenagoa and gave consent.

Exclusion Criteria

- This included all pregnant women who declined to participate.
- Patients who withheld their consent for inclusion in the study.
- Those immunised within the last six (6) months

Sample size

The sample size was calculated using the statistical formula [29] based on reported prevalence rates of hepatitis B of 13.3%[16] from previous a study and a confidence interval of 95%.

Study population

The minimum sample size was thus calculated to be 212 with an attrition of 20%. However, a total of 220 consecutive healthy pregnant women attending the antenatal booking clinic of the hospital who met the inclusion criteria were recruited into this study after pre test counselling and obtaining consent from them. This was tested for HBsAg.

Sample collection and processing

Five millilitres (5ml) of peripheral venous blood was collected from consecutive subjects in the antenatal booking clinic into plain sterile bottles.

Blood samples were centrifuged for ten minutes at 6,000 rpm, serum was obtained and stored at -20^{O}C until used.

Samples were analysed in batches with commercially available in vitro diagnostic kits (one step test strips). The HBsAg one step test is a rapid lateral flow immunoassay which qualitatively detects the presence of HBsAg in serum utilizing a combination of monoclonal and polyclonal antibodies to selectively detect elevated levels of HBsAg in serum. The membrane is percolated with anti- HBsAg antibodies on the test line region of the strip. During testing, the serum specimen reacts with the particles coated with anti-HBsAg antibody. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti- HBsAg antibodies on the membrane and generate a coloured line in the test region.

To serve as procedural control, a coloured line always appeared at the control line region indicating that proper volume of specimen had been added and membrane wicking had occurred. Tests in which two distinct red lines appeared, one in the control region and another in the test region, was regarded as positive. Tests in which only the control line was distinctly coloured red was recorded as negative while tests in which the control line fails to appear was regarded as invalid and was repeated.

Each sero-positive woman for HBsAg had a liver enzyme assay done particularly the serum transaminases (alanine and aspartate transaminase), as these have been shown to increase in active liver disease. The Randox test kit by RANDOX Laboratories Ltd., United Kingdom was used (because this is the standard test kit being utilized by the hospital). Levels above 12 U/L were regarded as elevated for both AST and ALT.

Questionnaire

Women were enrolled and underwent pretest counselling and were administered a structured interviewer- administered questionnaire.

Data analysis

Data was analysed using SPSS (statistical package for social sciences) 22 statistical package (SPSS Inc., Illinois, U.S.A). Univariate analysis for categorical variables was performed using chi-square. P value less than 0.05 was taken as being significant.

Ethical considerations

Approval for the study was obtained from the ethical committee of the Federal Medical Centre, Yenagoa. The study was carefully explained to the patients and their informed consent obtained before being recruited into the study.

Results

A total of two hundred and twenty (220) pregnant women were interviewed.

The predominant age group was 20-29 years (50.0%). The mean age is 28.8 years ± 5.2. Majority (50.0%) of the respondents were from the Ijaw ethnic group and it is followed closely by the Igbo ethnic group (28.2%). Most (96.8%) of the respondents were Christians. Majority (41.8%) of the respondents were involved in doing business as an occupation. Majority (91.8%) also, of the respondents were married, and most of the marriages were of the polygamous type or setting (83.7%). Most (77.8%) had a secondary education.

Table 1: Awareness, risk factors/transmission mechanisms of Hepatitis B viral infections.

Variables	Frequency (%)			Total
	Yes	No	I don't know	
Do you know about Hepatitis B infections?	31 (14.6)	182 (85.4)	213 (100.0)	
Can this virus be transmitted from person to person	29 (13.6)	1 (0.5)	186 (86.1)	216 (100.0)
If yes, through which means				
Blood/blood products	15 (51.7)	0 (0)		
Body fluids-urine, saliva	2 (6.9)	0 (0)		
Sexual intercourse	10 (34.5)	0 (0)		
Physical contact with infected person	2 (6.9)	0 (0)		
Total	29 (100.0)	0 (0)		
Can these virus/infection be transmitted from mother to baby	12 (5.5)	0 (0)	206 (94.5)	218 (100.0)
If yes, when				
In utero	2 (16.7)	0 (0)		
During delivery	4 (33.3)	0 (0)		
Breastfeeding	1 (8.3)	0 (0)		
I don't know	5 (41.7)	0 (0)		
Total	12 (100.0)	0 (0)		
Have you had more than one sexual partner in your life	158 (72.5)	60 (27.4)		218 (100.0)
Does your husband have other sexual partners	6 (2.8)	26 (12.0)	185 (85.3)	217 (100.0)
Have you ever had sexually transmitted infections	31 (14.1)	189 (85.9)		220 (100.0)
Have you ever had blood /blood product transfusion	13 (6.0)	205 (94.0)		218 (100.0)
Do you share razor blades/needles with other people	7 (3.2)	211 (96.8)		218 (100.0)
Have you ever engaged in injecting yourself with illicit(hard) drugs	3 (1.4)	216 (98.6)		219 (100.0)

Only 31 (14.6%) of the respondents knew hepatitis B infection. If this virus could be transmitted from person to person, 29 (13.6%) agreed that it could be transmitted from person to person; while 1 (0.5%) said no, that it could not be transmitted from person to person; and 186 (86.1%) did not know. Amongst those that agreed that the virus could be

transmitted from person to person, 15 (51.7 %) said it is through blood/blood products; while 10 (34.5%) said it is through sexual intercourse; and 2 (6.9%) said it is through body fluids- urine, saliva and physical contact with infected persons.

Twelve (5.5%) of the respondents said yes, that the virus could be transmitted from a mother to her baby, while 206 (94.5%) did not know if there could be transmission of the viruses from a mother to her baby. Amongst those that said yes, 4 (33.3%) said the infection occurs during delivery; while 5 (41.7%) do not know how the transmission occurs; 2 (16.7%) said it occurs in-utero; and 1 (8.3%) said it occurs during breastfeeding.

Majority (72.6%) of the respondents has had more than one sexual partner in their life. Most (85.3%) of the respondents did not know if their spouses had other sexual partners. Eighty-five point nine percent (85.9%) said they have not had sexually transmitted infections in the past; and 94% of the respondents has not had transfusion of blood and blood products; 96.8% do not share needles/blades with other people; and 98.6% do not inject illicit drugs.

Table 2: The seroprevalence of Hepatitis B amongst the different parity groups.

Variables	Frequency (%)	
	Reactive	Non reactive
Parity		
Para 0-1	5 (50.0)	118 (56.2)
Para 2-3	3 (30.0)	50 (23.8)
Para 4-5	2 (20.0)	23 (11.0)
Para 6-7	0 (0)	12 (5.7)
Para 8-9	0 (0)	7 (3.3)
Total	10 (100.0)	210 (100.0)

From the table above, the mean parity is 1.20 ± 1.16. It was observed that respondents with parity of 0-1 had the highest 5 (50.0%) reactive HBsAg result; and had the highest prevalence of 50.0%.

Table 3: The seroprevalence of Hepatitis B amongst the different Gestational Age groups.

Variables	Frequency (%)	
	Reactive	Non reactive
GA (In weeks)		
1 – 12	4 (40.0)	34 (16.2)
13– 24	2 (20.0)	89 (42.4)
25 - 40	4 (40.0)	87 (41.4)
Total	10 (100.0)	210 (100.0)

Those respondents with a booking gestational age of between one week and twelve weeks (1 – 12), i.e. the first trimester; and those above twenty five weeks gestation i.e. those in third trimester gestation, were both found to

be 40.0% reactive to HBsAg. Hence, the prevalence of hepatitis B was equal in respondents of both the first trimester and third trimester.

Table 4: The seroprevalence of Hepatitis B amongst those with history of abortion by Dilatation and Curettage.

Variables		Frequency (%)	
		Reactive	Non reactive
History of abortion by D & C			
	Yes	0 (0)	18 (8.5)
	No	10 (100.0)	192 (91.5)
Total		10 (100.0)	210 (100.0)

Amongst those that have carried out abortion by dilatation and curettage, none were reactive to HbsAg.

Table 5: The relationship between having more than one sexual partner and the seroprevalence of Hepatitis B infection.

Variables	**Having more than one sexual partner**		**Total**	**Test/p -value**
		Yes (%)	**No (%)**	
HBsAg				
Reactive	4 (40.0)	6 (60.0)	10 (4.6)	X^2= 5.59
Non- reactive	155 (74.2)	54 (25.8)	209 (95.4)	df = 1
Total	**159 (72.6)**	**60 (27.4)**	**219 (100.0)**	**p<0.05**

The table above shows that there is a statistically significant association between respondents with more than one sexual partner and Seroprevalence of Hepatitis B Infection (P < 0.05). There was no association between respondents with more than one sexual partner.

Table 6: The relationship between Circumcision and Seroprevalence of Hepatitis B viral infection.

Variable	**Circumcision**		**Total**	**Test/p-value**
		Yes	**No**	
Reactive	4 (40.0)	6 (60.0)	10 (4.5)	X^2 = 4.28
Non-reactive	20 (9.5)	190 (90.5)	210 (95.5)	df = 1
Total	**24 (10.9)**	**196 (89.1)**	**220 (100.0)**	**p < 0.05**

The table above shows that there is a statistically significant association between respondents with female circumcision and prevalence of hepatitis B infection (p < 0.05). In other words, female genital circumcision in this study was found to be a significant risk factor to the development of hepatitis B infection.

Table 7: The seroprevalence of Hepatitis B amongst those with history of tattoos/scarifications, and circumcision.

Variables	**Frequency (%)**	
	Reactive	**Non reactive**
Presence of tattoo/scarifications		
Yes	0 (0)	2 (1.0)
No	10 (100.0)	203 (99.0)

Total	**10 (100.0)**	**205 (100.0)**
History of Circumcision		
Yes	4 (40.0)	19 (9.0)
No	6 (60.0)	191 (91.0)
Total	**10 (100.0)**	**210 (100.0)**

From the table above, there was zero percent reactive results for both HBsAg test amongst the respondents that had tattoos/scarifications. Amongst those that were circumcised, 40.0% had positive HBsAg test.

Table 8: Relevant Clinical Parameters.

Variables	Frequency (%)		Total
	Yes	No	
Presence of jaundice	2 (0.9)	214 (99.1)	216 (100.0)
Presence of right upper quadrant tenderness	2 (0.9)	216 (99.1)	218 (100.0)
Presence of hepatomegaly	2 (0.9)	213 (99.1)	215 (100.0)

Only 0.9% of the respondents agreed that they have had jaundice, right upper quadrant tenderness, and hepatomegaly in the past.

Table 9: Results of Laboratory Investigations.

Variables	Frequency (%)		Total
	Reactive	Non reactive	
Result of HBsAg	10 (4.6)	213 (96.8)	220 (100.0)

Four point six percent (4.6%) of the respondents were reactive to HBsAg.

All HBsAg seropositive pregnant women had normal serum aspartate aminotransferase (AST: normal <12U/L), alanine aminotransferase (ALT: normal <12U/L), and alkaline phosphatase values (ALP: normal, 9-35U/L).

Discussion

This is a hospital based study to determine the seroprevalence of HBsAg in an urban population of pregnant women and to evaluate the clinico-epidemiological correlates of risk factors in this group.

The seroprevalence of HBsAg in our pregnant women population was 4.6%. This means that our pregnant women have an intermediate endemicity for hepatitis B virus infection according to the WHO classification[30]. This is similar to what was reported in Port Harcourt[17], Enugu[26], Ilorin[19] and Irrua [18] which were 4.3%, 4.6%, 5.7% and 6.8% respectively. A higher prevalence rate of 8.3% and 11.6% were reported in Zaria[20] and Maiduguri [31] respectively. A similar but slightly lower prevalence rate of 3.6% and 3.7% were reported

among a study population in Abuja and Ethiopia respectively [23,32]. The prevalence in our study is however lower than the 12% in Taiwan or the 17.8% in Burkina Faso. [33,34]

In this study, the seroprevalence of Hepatitis B was found to be highest amongst the 30 – 39 age group with 60.0% seroprevalence. There was a rise in the seroprevalence up to 39 years with an abrupt decline. Infection risks for Hepatitis B also increases with age naturally [35]. This may be due to a greater probability of exposure of these women to risk factors with age. However, other studies have reported 20-24 age group from Irrua [18], Zaria [16] and Ethiopia [32]. This may have been due to the lower number of subjects in the much older age groups in their reports and perhaps the indulgence in high risk practices such as unprotected sexual intercourse and tattooing by the younger age groups in their environment.

Ijaw women had the highest seroprevalence rates. This is simply because majority (50.0%) of the subjects were from the Ijaw ethnic group which is the major ethnic group in this environs. The prevalence of HBsAg was more in nulliparous and primiparous females with a mean parity of 1.20 ± 1.16 in this study. This can be explained by the increased rate of multiple sexual partners (72.5%) in the past seen in our nulliparous and primiparous women as compared to our multiparous women. This finding was supported by Alegbeleye et al in Port Harcourt[36]. It is common reasoning that HBsAg prevalence would have been higher in multiparous women because of repeated risk of exposure to contaminated surfaces and instruments during delivery [16,18,20]. However, this was not the case in this study where the prevalence is higher in nulliparous and primiparous women.

The prevalence for HBsAg was highest in the first and third trimesters. This was comparable with findings by Aigere et al[18] who observed that the third trimester in pregnant women had the highest prevalence rate. However, in this study, first trimester also topped the highest prevalence equally with third trimester.

Furthermore, in this study, notable risk factors such as intravenous drug use, blood transfusion, liver disease in our nulliparous and primiparous women respectively, were not associated with either HBV. None of the seropositive subjects had a history of blood transfusion. This may have been due to the aversion to receiving blood among our people. In Nigeria, illicit (hard) drugs including narcotics are strictly under control and attract severe sanctions thus limiting availability and or accessibility. This is why it's not surprising that as low as 1.4% of the women alluded to have taken illicit drugs in this study. Also, the poor economic situation may preclude the majority of our women of reproductive age from having access to these drugs even if they will dare the law [27]. Tattooing/scarifications (0.9%) did not also contribute to HBsAg seropositivity. The cultural practice in this environment is on the

decline, as such it is not a surprising occurrence. Amongst the surgical risk factors, female circumcision(40%) even though a harmful traditional practice, posed a higher risk to HBsAg seropositivity than caesarean section (20%) and appendectomy (20%).

Previous studies have shown an inverse relationship between educational status and HbsAg positivity with less educated women showing the highest positivity.[37,38,39] However, in this study, educational level was not found to statistically, significantly influence knowledge of hepatitis B infections ($p > 0.05$). Educational level was not also found to significantly influence both knowledge of virus/infection transmission from person to person and having more than one sexual partner in life ($p > 0.05$). The reason may not be farfetched without any form of prejudice, unlike in the Northern part of the country where most of the women are uneducated, there are more educated women in this southern part of the country. This finding is similar to the study in Port Harcourt. [36]

Majority (72.5%) of the obstetric women has had a history of multiple sexual partners in their life and in addition, most (85.3%) of them did not know if their spouses had other sexual partners. Of the HBsAg seropositive women, 40% had history of multiple sexual partners and there was a significant association between the history of multiple sexual partners and seropositivity for HBsAg. There was a significant association between the history of multiple sexual partner and seropositivity for HBsAg. Dilatation and Curretage was not found to statistically, significantly influence Hepatitis B viral infections ($p > 0.05$). This could be because most of the D and C was done in the hospital and the instruments used could have been well sterilized. These findings were similar to reports in Irrua [18]. However, it was found in their study that Dilatation and curettage had a significant contribution to HBsAg seropositivity.

Previous screening reports show that universal prenatal screening for HBsAg is cost effective if the HBsAg carrier rate is greater than 0.06%.[40] With a seroprevalence of 4.6%, the findings of this study affirmed the need for routine HBsAg screening among pregnant women in developing countries particularly in urban areas like Yenagoa for rural/suburban areas to mimic.

Conclusion

The intermediate endemicity of Hepatitis B virus infection in this study according to WHO classification, justifies the need for routine screening in pregnancy and to treat the infection accordingly as this will reduce the mother to child transmission of the virus. Multiple sexual partners and female circumcision are significant risk factors associated with Hepatitis B virus infection in this environment. Active and passive immunization to infants of HBsAg seropositive mothers is advocated.

Recommendations

- Sensitization and routine screening for Hepatitis B virus in pregnancy.
- Treatment of Hepatitis B virus infection in pregnancy to reduce mother-to-child transmission.
- Availability and accessibility of Hepatitis B immunoglobulin to babies born to HBsAg-positive mothers by Government and Non-governmental organizations.
- Sensitization and vaccination of adults against HBV especially those at risk e.g multiple sexual partners etc.
- Campaign against Female Genital Mutilation.

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