HEPATITIS B SURFACE ANTIGENAEMIA AMONG PREGNANT WOMEN IN A TERTIARY HEALTH INSTITUTION IN EKITI STATE, NIGERIA

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ABSTRACT

Background: It has been recognized that Hepatitis B virus infection is endemic in Nigeria. Despite this, routine screening in pregnancy and treatment are not widely practiced in the country.

Objective: To identify the prevalence and pattern of the disease among the obstetric population in Ekiti State.

Materials and Methods: A review of the records of 505 consecutively booked and consenting pregnant women at the antenatal clinics of the Ekiti State University Teaching Hospital, Ado - Ekiti. The duration of the study was from April 2011 to November 2011. All the patients were screened for Hepatitis B surface antigen (HBsAg). Using a questionnaire, information retrieved included their socio-demographic characteristics, possible risk factors (blood transfusion and surgery) and HBsAg screening result.

Results: 20 of the 505 pregnant women were seropositive for HBsAg giving prevalence of 4.0%. Multiparous women aged between 30 - 34 years and with secondary education had the highest proportion of infected people although these associations did not reach significant levels. More women in the latter half of pregnancy were HBsAg seropositive ($p < 0.05$).

Conclusion: It is recommended that all pregnant women be routinely screened for HBV, and preventive measures emphasized to reduce the burden of HBV infection.

Keywords: Hepatitis B surface antigen, pregnancy, seroprevalence, Ekiti

INTRODUCTION

Hepatitis B virus (HBV) is a blood borne and sexually transmitted pathogen that could be acquired through intravenous drug use, sexual intercourse with infected partners, and perinatal transmission from mother to child among others. Hepatitis B is one of the most common infectious diseases reaching hyper-endemic proportions in sub-Saharan Africa and Asia. While it results in 2million deaths annually, about 400million people are chronically infected with the virus with the attendant risks of liver cirrhosis and hepatocellular carcinoma which are responsible for 5 – 10% of cases of liver transplantation.[1,2,3,4]

In Nigeria, HBV spot surveys amongst pregnant women revealed rates ranging between 2.19% and 15.1%.[5] Without intervention, the risk of peri-natal HBV transmission could be as high as 70 – 90% by the sixth month of life, especially in infants born to women who are Hepatitis B core antigen (HBeAg)-positive, with about 90% of these children remaining chronically infected. Children born to HBsAg-positive mothers who do not become infected during the peri-natal period remain at a high risk of infection during early childhood. Vertical transmission of HBV can be minimized by vaccination of the newborn, but this can only be administered when the HBV status of the pregnant woman is known.

Although it does not appear that acute HBV infection increases mortality during pregnancy or that it has teratogenic effects, a higher incidence of low birth weight and prematurity has been reported.[10] Also, Tse *et al* described an association of maternal HBV infection (HBsAg positive) with gestational diabetes mellitus and antepartum haemorrhage. Some studies have shown that in a proportion of women, there are effects of pregnancy on hepatitis B including hepatitis flares with or without HBeAg seroconversion within the first months after delivery, exacerbation of chronic hepatitis and even fulminant hepatic failure in the peripartum period.

Also, HBV can be transmitted to family members and healthcare providers who care for the infected postpartum women possibly by contact of non-intact skin or mucous membrane with secretions or blood (e.g. lochia) containing HBV.

The benefits of detection of infected pregnant women include not only identification of infants who require prophylaxis, but of women who might need treatment, and sexual and household contacts who will benefit from testing, counselling,

vaccination or therapy if indicated.

This study is thus, aimed at generating information on the pattern of HBV infection amongst pregnant women in the apex health institution in Ekiti state and hopefully provide a basis for the monitoring of the trend and formulation of strategies aimed at controlling the spread of the disease.

MATERIALS AND METHODS

Design: A retrospective review of the case records of consecutively booked and consenting pregnant patients obtained from the Medical Records Department.

Setting: The Antenatal Clinics of the Ekiti State University Teaching Hospital (EKSUTH), Ado – Ekiti, Ekiti State. EKSUTH is the apex health institution in the state, receiving both physician- and self-referrals from all the government hospitals in the state, private health facilities and neighbouring states. About 1000 new clients are registered for antenatal care annually.

Study Duration: April 2011 to November 2011.

Method: At the booking (antenatal) clinic, every woman was counselled and consent obtained for HBV screening along with other routine tests (Packed Cell Volume [PCV], Haemoglobin Genotype, Blood Group and Human Immunodeficiency Virus status).

Sample Collection and Preparation

Blood samples for HBV screening were collected aseptically by venepuncture using 5 ml sterile disposable hypodermic syringes and needles during the booking clinic, dispensed into labeled specimen bottles and transferred to the laboratory. Each clotted sample was centrifuged at 3,000 rpm for 5mins to separate the serum. Only clear, non-haemolyzed specimens were used. If the test could not take place immediately, the sera were extracted using micropipettes into plain tubes and stored at 2 - 8^{0}C until required, but not beyond 3 days after collection.

The Principle of the Test Kit

Hepatitis B surface antigen (HBsAg) detection was done using the *in vitro* diagnostic kit manufactured by Grand Medical Diagnostic Limited, USA. The kit's test strip is a rapid chromatographic immunoassay for the qualitative detection of HBsAg in serum or plasma. The test strip contains a membrane (which is pre-coated with anti-HBsAg antibodies on the test line region of the strip) and anti-HBsAg-coated particles. During testing, the serum or plasma reacts with the particle to form a mixture. This mixture then migrates upward on the membrane chromatographically by capillary action to react with the antibodies on the membrane and generate a coloured line. The presence of the coloured line in the test region indicates a positive result, while its absence indicates a negative result.

Detection of HBsAg

Specimens and test strips were allowed to equilibrate to room temperature prior to testing. The test strips were removed from their foil pouches and immersed into serum samples with arrows pointing towards the specimen for about 10 - 15secs. The strips were then placed on a non-absorbent flat surface for 15minutes, after which the results were read. Positive samples generated two distinct red bands, one in the test region of the strips and another in the control region while negative samples had a colour band in the control region only.

Data Retrieval

Using a pre-structured questionnaire, information about the socio-demographic characteristics of the patients, risk factors such as history of blood transfusion and surgical procedures and laboratory screening results were obtained.

Data Analysis: Data was encoded and analyzed using the SPSS version 16 statistical software package. Analysis included simple percentages and chi-square test where appropriate. A p value < 0.05 was regarded as significant.

RESULTS

Out of 505 women screened during the study period, 20 were seropositive for HBsAg giving a prevalence of 4.0%. From Table 1, women who were multiparous (para 2), aged 30 – 34 years with a secondary education and in the third trimester had the highest prevalence of the disease, though this finding did not reach statistically significant levels.

Significantly more patients in the latter half of pregnancy were HBsAg positive (Table 2). There were more HBsAg-positive women who had been transfused in the past and with a previous history of surgeries than those without such histories. However, this observation was not significant (Table 3).

Table 1: Patients' Characteristics versus HBsAg Seropositivity

CHARACTERISTICS	FREQUENCY	HBsAg POSITIVE	%
AGE (years)			
= 19	2	0	0
20 – 24	41	2	4.9
25 – 29	185	4	2.2
30 – 34	177	12	6.8
35 – 39	91	2	2.2
= 40	9	0	0
Mean Age = 30.41±4.48 years; $\chi2 = 6.559$, p = 0.256			
LEVEL OF EDUCATION			
No Formal	2	0	0
Primary	8	0	0
Secondary	114	5	4.4
Tertiary	379	15	4.0
$\chi2 = 0.465$, p = 0.927			
PARITY			
0	217	9	4.1
1	157	5	3.2
2	76	5	6.6
3	35	1	2.9
= 4	20	0	0
$\chi2 = 2.575$, p = 0.631			
GESTATIONAL AGE (weeks)			
= 13	55	1	1.8
14 – 26	334	12	3.6
27 – 40	116	7	6.0
$\chi2 = 2.094$, p = 0.351			

Table 2: Pregnancy Stage versus HBsAg Seropositivity

STAGE OF PREGNANCY	HBsAg STATUS		TOTAL
	NEGATIVE	POSITIVE	
1st Half (≤20 weeks)	236	5	241
2nd Half (21 – 40 weeks)	249	15	264
TOTAL	485	20	505
$\chi2 = 4.310$, p = 0.038			

Table 3: Risk Factors versus HBsAg Seropositivity

HISTORY	FREQUENCY	HBsAg POSITIVE (%)
BLOOD TRANSFUSION		
YES	6	1 (16.7)
NO	494	19 (3.8)
NOT STATED	5	0 (0)
$\chi2 = 2.770$, p = 0.250		
SURGERY		
YES	239	10 (4.2)
NO	266	10 (3.8)
$\chi2 = 0.06$, p = 0.807		

DISCUSSION

Estimates have shown that about one-third of the population of the world has serological evidence of past or present infection by HBV and 350 million people are chronically infected.[9,] The prevalence of HBV infection is especially high in South-East Asia and Sub-Saharan Africa, where more than 8% of the population are HBsAg chronic carriers.[5] The prevalence of Hepatitis B surface antigenaemia from this study is 4.0%. This compares with other studies on perinatal HBV infection as follows:

AUTHORS	*YEAR OF PUBLICATION*	*LOCATION*	*PREVALENCE (%)*
NIGERIA			
Onakewhor *et al*[i]	2008	Benin City, Edo State	2.19
Obi *et al*[ii]	2006	Port Harcourt, Rivers	2.89
Akani *et al*[iii]	2005	Port Harcourt, Rivers	4.3
Agbede *et al*[iv]	2007	Ilorin, Kwara State	5.7
Olokoba *et al*[8]	2011	Yola, Adamawa State	8.2
Luka *et al*[v]	2008	Zaria, Kaduna State	8.3
Mbaawuaga *et al*[vi]	2008	Markurdi, Borno State	11.0
Harry *et al*[vii]	1994	Maiduguri, Bauchi State	11.6
Ndams *et al*[1]	2008	Minna, Niger State	12.3
AFRICA			
Awole & Gebre-Selassie[viii]	2005	Ethiopia	3.7
Wurie *et al*[ix]	2005	Sierra Leone	6.2
Roingeard *et al*[x]	1993	Senegal	13.8
OTHER NATIONS			
Todd *et al*[xi]	2008	Afghanistan	1.53
Sahaf *et al*[xii]	2007	Iran	2.5
Kong *et al*[xiii]	1997	Hong Kong	10
Sharma *et al*[xiv]	1995	India	10
Lin *et al*[xv]	2003	Taiwan	12

Significant variations exist in the seroprevalence of HBV in pregnant women as can be deduced from the table above. Considerable variations have been noted even among various races and ethnic groups as is the case in the United States where the prevalence among the Asians is 6%, blacks 1%, whites 0.6% and Hispanics 0.14%.[11] Also, cultural differences, diverse geographic variations, sexual behaviour and practices, and various study methodology may account for this wide disparity.

Most of the women with the antigenaemia in this study were within the 30 – 34-year bracket. The age at which the individual becomes infected with HBV correlates with the route of infection.[6] In areas of high endemicity like sub-Saharan Africa, infections are generally acquired early in life, either at or shortly after birth, or early in childhood from exposure to members of the extended family who

may be carriers of HBV. Up to 95% of neonates and children under 5 years of age who are infected with HBV become chronic HBV carriers, although infection is generally subclinical because of their immature immune systems.

Significantly more women in the latter half of pregnancy were positive for the HBsAg. Although this study did not distinguish active infections from carrier status, other authors have shown that acute HBV infection early in pregnancy is associated with a 10% perinatal transmission rate, and the rate increases substantially with HBV infection in the third trimester.[11] Thus, the risk of transmission of HBV to neonates increases the later in gestation the acute infection occurs. This perinatal transmission or transmission during early childhood is responsible for the high rate of chronic infection in Asia and Africa. In fact, of the estimated 350 million individuals chronically infected with hepatitis B virus (HBV) worldwide, it is generally accepted that at least 50% acquired their infections either perinatally or in early childhood, especially in countries where HBV is endemic.[11] Therefore, preventing perinatal transmission is of high priority in the attempt to decrease the global burden of chronic HBV infection. Immunoprophylaxis with hepatitis B immune globulin (HBIG) and hepatitis B vaccine have been shown to be safe and effective strategies provided they are properly administered. Also, Lamivudine, an antiviral agent, has been employed during pregnancy. There are two principal indications for administration of antiviral agents to HBV-infected pregnant women: treatment of chronic hepatitis in the mothers and prevention of perinatal HBV transmission to the newborns.[11]

A limitation in this study was the use of HBsAg alone for screening as this approach does not discriminate between carrier state, viral replication or active infection. Assaying for other serological markers of HBV infection such as anti-HBs and anti-HBc antibodies (i.e. antibodies to the surface and core antigens respectively) [which are indicators of previous exposure to HBV infection], could have resulted into higher seroprevalence rate than reported in this study. Further studies are needed in this regard. Also, the benefits and cost implications of nationwide Hepatitis B vaccination and the safety and effectiveness of antiviral therapy in the reduction of the HBV burden need to be evaluated through large controlled trials.

CONCLUSION

The seroprevalence of antenatal Hepatitis B surface antigenaemia from this study falls within the previously quoted figures from studies within the nation, confirming what has been long recognized. Though the study did not discriminate between acute infections and chronic carrier status, more women were seropositive in the latter half of pregnancy which could imply an increased risk of perinatal transmission. Therefore, strategies to decrease this mode of acquisition should be considered to reduce the HBV burden. This would emphasize the need for an improvement in preventive measures because even with proper vaccination, 5 – 10% of infants of HBeAg-positive women become infected.[11]

The possibility of managing HBV infection in pregnancy and in the newborn naturally increases the need for physician education about these strategies and their advantages. These include recognition of maternal HBV status through routine screening of all pregnant women, and minimizing the risk for perinatal transmission of infection via monitoring of antigen status, avoiding neonatal contact with lochia, antiviral therapy and immunoprophylaxis for the exposed newborns.

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