

# Prevalence of Hepatitis B Surface Antigen (HBsAg) Among Pregnant Women Attending Antenatal At Plateau State Specialist Hospital, Jos.

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## ABSTRACT

Hepatitis B is a global health problem, endemic in sub-Saharan Africa including Nigeria. The most common mode of transmission is the perinatal vertical transmission in developing countries. The prevention of mother to child transmission requires screening of hepatitis B surface antigen (HBsAg) in pregnant women, so as to know the mothers and newborns that must be treated or immunized. This study was aimed at determining the prevalence of HBsAg among pregnant women attending antenatal clinic at Plateau State Specialist hospital, Jos. This work was a hospital based random cross-sectional study which included 256 women during the period of April to June 2015. One step rapid diagnostic test kit was used for the screening for HBsAg. Out of the 256 women tested, 23 (9.0%) were positive. The highest prevalence based on age was found among those aged 37-48 years with 15.78% seropositivity. Considering the social status of the patients, the highest prevalence was found among the low class with 9.9%. Women with blood group AB had the highest prevalence of 21.43%. Lastly women in their second trimester of pregnancy had the highest

prevalence of 14.81%. Hepatitis B infection in pregnancy is emerging as an increasingly important issue as evident in this work. Therefore, the need for routine screening of pregnant women, early passive/active immunization of infants born to HBsAg positive mothers and public health awareness should be greatly enhanced in all health institutions.

**Key words:** Hepatitis B, Prevalence, Pregnant women, Trimester,

## 1.0 INTRODUCTION

Hepatitis is a medical condition which is defined by the inflammation of the liver. The most common causes of Hepatitis are the five unrelated hepatotropic viruses, hepatitis A, hepatitis B, hepatitis C, hepatitis D which requires hepatitis B to cause disease and hepatitis E. Hepatitis B causes between one and two million deaths per year and is most often transmitted sexually (it does not affect the sexual organs but is highly contagious in its early stage). Hepatitis B virus (HBV) infection is a critical public health problem and is endemic in Africa which includes Nigeria [1,2]. Hepatitis B Surface Antigen (HBsAg) is the first serological

marker to appear in acute HBV infection whose persistence for more than six (6) months suggests chronic HBV infection [3].

Transmission of HBV results from exposure to infectious blood and bodily fluids, blood transfusions and blood products using unscreened blood, medical or dental intervention without adequate sterilization of equipment, sharing equipment for injecting drugs, sharing straws and notes for snuffing cocaine, sharing razors, toothbrushes or other household articles, tattooing and body piercing if done using unsterilized equipment and vertical transmission from mother to child [4]. Without intervention the risk of perinatal HBV transmission is greatest for infants born to women who are hepatitis B surface positive [5]. There are three mechanisms of HBV transmission from HBsAg positive mothers: (i) trans-placenta intra-uterine transmission; (ii) during delivery by contact with maternal infected fluids in the birth canal; and (iii) post natal transmission from mother to child through breastfeeding or during child birth [6]. Children who do not become infected during the perinatal period remain at high risk of infection during early childhood [7]. HBV-related end-stage liver disease or hepatocellular carcinoma (HCC) are responsible for over one million deaths per year and currently represent 5– 10% of cases of liver transplantation[8,9,10]. Nigeria has remained a hyper-endemic area for hepatitis B virus infection, with an estimated 12% of the total population being chronic carriers, despite the existence of a safe and effective vaccine [11].

About 70% – 90% of the population of areas such as sub-Saharan Africa, the Amazon basin, South-east Asia, the Pacific basin which excludes Japan, New Zealand and Australia, the central Asian republics, and some countries in eastern Europe becomes HBV-

infected before the age of 40, and 8 – 20% of people are HBV carriers, which means there is high endemicity there [12]. However, in a previous study done in India, 2.25% of children under five were found to be positive for HBsAg despite immunization, and no statistically significant difference was observed between the age groups, suggesting that most of the infections occurred via vertical transmission [13].

Low endemicity areas include western and northern Europe, Australia, North America and parts of the South America. The carrier rate is 2% and less than 20% of the population is infected with HBV [14,12]. The prevalence of HBsAg in serum may be more than 25% in countries such as Senegal, China and Thailand. Infection rates are very high and continue through early childhood [12] (Hollinger and Liang, 2001). The rest of the world fall into the intermediate range of HBV prevalence, with 2 – 8% of a given population being carriers [14]. In the continents of Africa and Asia especially, Hepatitis B virus infection remains a major cause of morbidity and mortality [15]. The prevalence of Hepatitis B Virus infection is relatively high in Africa [16].

Studies have shown that vertical transmission of hepatitis B virus occurs in up to 10% of neonates when the infection occurs in the first trimester and in 60% – 90% of babies in the third trimester [17, 18]. The reported prevalence of HBV infection among pregnant women in African countries ranges from 6% to 25%. Acute HBV infection usually occurs in 1 – 2 of every 1000 pregnancies with 1 – 5% of pregnant women being chronic carriers [19]. Some studies carried out on the prevalence of HBsAg among pregnant women in Nigeria showed the prevalence to be 2 – 15.8% [20, 21, 22]. In another study done in

Southern Tanzania the reported perinatal transmission was 8% [23]. In another study done among pregnant women in Dar Salaam it was found that the rate of vertical transmission was 11.8% [24]. The reported prevalence of HBsAg in Kenya was 9.3% [25]. It was concluded in that study that there was a high carrier rate, while in Sudan the prevalence was 5.6% [26]. Pregnant women are not spared from HBV infection in which case the great concern is that their babies may also be affected. If acute maternal infection occurs in the first trimester and resolves, the risk of neonatal infection is low. However an infection during the second and third trimester poses a threat of 10-90% for vertical transmission [27]. Indeed it is reported that 70%-90% of chronic HBV infections occur following the acute infections taking place during childhood [28]. Fortunately HBV vertical transmission can be prevented by immunization. Consequently, routine antenatal screening for HBsAg to all pregnant women, followed by vaccination of their babies at birth has been recommended by World Health Organization [29]. A study done in Cuba showed 95.9% to 99.3% effective prevention of HBV infection if the “at birth” dose of vaccine was given after screening pregnant women for HBsAg [30].

Vertical transmission from the mother to the child is one of the major modes of transmission. The rate of transmission increases if the mother is HBsAg positive. Furthermore, it is not only the mothers that are at risk but also their new born babies and sexual partners and health workers as well. Despite recommendations proposed by WHO since 2002 of screening pregnant women against HBV and universal immunization of all infants against HBV infection, the prevalence of HBV infection among pregnant women may be an indicator of hepatitis B

virus prevalence rate in the general population. Therefore, screening antenatal women for HBsAg can give a reliable prevalence of the disease in a population and provide an avenue for preventing mother to child transmission of the virus [31]. Routine screening of HBV among pregnant women is not really practiced in the country. Hence, recent data is lacking and this could be influenced by the HIV endemicity which has a shared mode of transmission with HBV. There is thus a need for a study in order to get a clearer picture of hepatitis B virus infection in this era, most especially among pregnant women since vertical transmission is one of the frequent modes of transmission of the disease. Prevention of vertical transmission is extremely important because HBV infection in early life can result in a chronic carrier state [32].

Testing for HBV infection is very relevant in view of the high mortality and morbidity rate that characterize the disease. Pregnant women could be vulnerable to the disease, it could have effect on the process of parturition and the risk of vertical transmission from mother to child is a possibility. Current magnitude of HBV infection in pregnant women attending antenatal at Plateau state specialist hospital is not known and could be on the increase. Therefore, this study is aimed at determining the prevalence of hepatitis B surface antigen in pregnant women attending antenatal in Plateau State Specialist Hospital, Jos.

The objectives pursued in this work include determining the presence or otherwise of HBsAg in the serum of antenatal patients in Plateau State Specialist Hospital, determining the frequency of the disease, identify risk factors of the disease among the antenatal patients, and to determine the association of

social-demographic factors and hepatitis B infection (HBsAg positivity) among pregnant women attending antenatal at Plateau State Specialist Hospital. This work will also provide a data base on the prevalence of the infection and provide recommendations for possible measures to be taken to keep the disease under check.

The study was limited to the investigation of the prevalence of Hepatitis B surface antigen among pregnant women attending antenatal at Plateau State Specialist Hospital, Jos.

## 2.0 MATERIALS AND METHODS

### 2.1 Study Area

This study was carried out in the antenatal ward of Plateau State Specialist Hospital, Old Bukuru Road Jos, Plateau state, Nigeria. The hospital caters for the health needs of residents and it is highly patronized by the lower, middle and high economic classes of the people.

### 2.2 Study Population

Two hundred and fifty six blood samples were obtained from the pregnant women attending antenatal clinic (ANC) in Plateau state specialist hospital, Jos.

### 2.3 Ethical Consideration

Ethical approval for the study was obtained from the ethics and research committee of the Plateau State Specialist Hospital Jos, Nigeria. A written informed consent was also obtained from every participating woman.

### 2.4 Sample Collection

Five milliliters of blood was collected from each subject using venupuncture method. The blood samples collected were centrifuged at 15000 rpm for 5minutes to separate the serum for each sample. The serum obtained was stored in the refrigerator at

temperature of  $-15$  to  $-20$  degree Celsius for subsequent laboratory analysis.

### 2.5 Test Procedure

The test strip used was Skytec for HB and C (USA).Each serum specimen was allowed to equilibrate to room temperature after removal from the refrigerator, and then each test strip was removed from the foil pouch by tearing at a notch and placing it on a flat surface. The test strip was then immersed into serum sample with the arrow pointing towards the specimen. The strip was then taken out after 10 seconds and laid flat on a clean dry non-absorbent surface. The result was read after 15 minutes and recorded into the record book as positive, negative or according to the code number of each serum specimen. Invalid test results were repeated to ascertain whether such samples were actually positive or negative. Caution was taken so as not to allow the specimen level to exceed the max(marker line) otherwise the test would not be valid.

## 3.0 RESULTS

Out of 256 pregnant women attending antenatal that were tested for HBsAg, 23 tested positive to HBsAg, giving a prevalence rate of 9.0% in the study population (Table 1).

Table 2 shows the prevalence rate for Hepatitis B infection with respect to age of the subjects in the study population. The infection rate was highest among the 38– 47 years age group where 3out of 19 women (15.79%) in that category tested positive to HBsAg. This was followed by the age group 18– 27 where 11 out of 116 women (9.48%) tested positive to the infection. The lowest prevalence came from the age group 28-37 years where 9 out of 121 women (7.44%) tested positive. Hepatitis B infection was statistically related to age ( $P>0.05$ ).

Table 3 shows the prevalence of the infection with respect to the social status of the women. The infection was statistically related to socioeconomic status of the women ( $P > 0.05$ ). The women were classified into three: High class, Middle class and Lower class. The high class in which 60(23.44%) women were examined had 5(8.33%) that were positive to HBsAg. Out of 95(37.11%) examined in the middle class 8(8.42%) were positive. Finally in the lower class, 101 patients were examined and 10(9.90%) were positive to HBsAg.

Table 4 shows the incidence of the infection in respect to blood group. Hepatitis B infection was statistically related to blood group ( $P > 0.05$ ). The

highest prevalence was found among blood group AB where 3 out of 14(21.43%) tested positive and the lowest prevalence was recorded among women with blood group A, which had 4 out of 74(5.41%). The other two groups, B and O had 7 out of 79(8.86%), and 9 out of 89(10.11%), respectively.

With respect to the period of pregnancy, the prevalence rate is shown in table 4 where the second trimester had the highest prevalence with 4 out of 27(14.81%), while the first trimester had the lowest prevalence with 15 out of 187(8.02%). The third trimester had 4 out of 42(9.52%) prevalence (Table 5). Hepatitis B infection was not statistically related to trimester ( $P < 0.05$ ).

**TABLE 1: THE OVERALL PREVALENCE OF HEPATITIS B AMONG PREGNANT WOMEN IN SPECIALIST HOSPITAL, JOS.**

Infection screened for	Number of people examined	Number of people infected	Number of uninfected people	Prevalence (%)
Hepatitis B	256	23	233	9.0

**TABLE 2: PREVALENCE OF HEPATITIS B SURFACE ANTIGEN IN RESPECT TO AGE**

AGE (YEAR)	NUMBER OF POSITIVE (%)	NUMBER OF NEGATIVE (%)	NUMBER EXAMINED (%)
18–27	11(9.48)	105(90.52)	116(45.31)
28–37	9(7.44)	112(92.56)	121(42.27)
38–47	3(15.79)	16(84.21)	19(7.42)
TOTAL	23	233	256

**TABLE 3: PREVALENCE OF HEPATITIS B SURFACE ANTIGEN WITH RESPECT TO SOCIAL STATUS**

SOCIAL STATUS	NUMBER OF POSITIVE (%)	NUMBER OF NEGATIVE (%)	NUMBER EXAMINED (%)
HIGH CLASS	5(8.33)	55(91.66)	60(23.44)

<b>MIDDLE CLASS</b>	8(8.42)	87(91.58)	95(37.11)
<b>LOWER CLASS</b>	10(9.90)	91(90.09)	101(39.45)
<b>TOTAL</b>	23	233	256

**TABLE 4: PREVALENCE OF HEPATITIS B SURFACE ANTIGEN IN RESPECT TO BLOOD GROUP**

<b>BLOOD GROUP</b>	<b>NUMBER POSITIVE (%)</b>	<b>NUMBER NEGATIVE (%)</b>	<b>NUMBER EXAMINED (%)</b>
<b>A</b>	4(5.41)	70(94.59)	74(28.91)
<b>B</b>	7(8.86)	72(91.14)	79(30.86)
<b>AB</b>	3(21.43)	11(78.57)	14(5.47)
<b>O</b>	9(10.11)	80(89.99)	89(34.77)
<b>TOTAL</b>	23	233	256

**TABLE 5: PREVALENCE OF HEPATITIS B SURFACE ANTIGEN IN RESPECT TO PERIOD OF PREGNANCY**

<b>PERIOD OF PREGNANCY</b>	<b>NUMBER POSITIVE (%)</b>	<b>NUMBER NEGATIVE (%)</b>	<b>NUMBER EXAMINED (%)</b>
<b>1<sup>ST</sup> TRIMESTER</b>	15(8.02)	172(91.97)	187(73.04)
<b>2<sup>ND</sup> TRIMESTER</b>	4(14.81)	23(85.19)	27(10.55)
<b>3<sup>RD</sup> TRIMESTER</b>	4(9.52)	38(90.48)	42(16.41)
<b>TOTAL</b>	23	233	256

**4.0 DISCUSSION**

In this study a prevalence of 9.0% was obtained, a prevalence considered high based on WHO criteria that defines low prevalence to be < 2%, moderate prevalence as 2-8% and high prevalence as >8% HBsAg positivity [6, 29]. Although pregnant women have been considered generally as a low risk group for HBV infection, rates as high as 11% have been reported in Nigeria [33]. The prevalence found in this study is higher than the 5.5% found in Bayelsa State [34]. It is also higher than the 6.06% found in Lagos [35]; 4.3% in Port Harcourt [36]; but similar to that found in Awka, which was 9.3% [37].

The prevalence of 9.0% obtained in this study is, however, lower than the prevalence of 11.6%, 11%, 12.3% found in Maiduguri, Markurdi and Minna [38,16,39]. This variability in prevalence in different parts of the country is not uncommon as studies have shown that different rates of prevalence may exist even among regions found in the same country. The differences in the seroprevalence of HBV in pregnant women as reported in literatures may be due to geographical variations, differences in sexual behavior and practices and differences in cultural practices as suggested by [40].



The highest prevalence was found among women of 38– 47 years of age. This is similar to the study done by Mustapha and Jibrin, who noted that the highest rate of HBsAg seropositivity was in the 40– 49 years old age group [41]. [42] also found the highest prevalence in their study to be among 40– 44 years age group. The age group of 38– 47years can be regarded as sexually active group, thus the highest prevalent rate. The high prevalence rate of HBV among relatively older people in the study indicates that most of them might have gotten the infection through sex and transfusion of unscreened infected blood and it may also be due to compromised immunity as suggested by [43, 19] also reported that serological prevalence of HBV infection varied with age.

Contrary to the study done by [44] they found HBV prevalence to be highest among people aged 18– 24 years of age. The lowest prevalence in this study was found among those of 28– 37 years, who are equally supposed to be sexually active. This suggests that transmission here might not be solely sexual.

Social status may be responsible for variation in prevalence rates. The highest prevalence rate of HBV infection among pregnant women in relation to the social status in the present work was among the lower class, and the lowest prevalence among the high class (9.90% and 8.33%, respectively). This is in line with a study done in a neighboring country of Kenya which reported the highest prevalence of 9.3% in the lower class and the lowest was found in higher class [25]. Reasons for the above scenario may be due to poor hygiene and lack of finances to take care of themselves. The high class may not have the problem of finance, thus the least prevalence. Also in the lower class, because of their economic challenges,

they may be easily prone to exchanging sex for economic empowerment. This may be an important factor responsible for high prevalence of HBV infection among the lower class, especially in developing countries.

In relation to ABO blood groups our study showed the highest prevalence in the blood group AB (21.43%), and the lowest to be blood group A (5.41%). This is contrary to the study carried out by [45] where the blood group O donors had the highest rate of 4.3% as against the 0% frequency for AB donors. Although according to [46,47] several studies have been conducted and found that ABO blood groups are a risk factor for HBV infection, the relationship between the two has not been established in this work. Therefore, in agreement with the submission of [48] the exact mechanism underlying the association of ABO Blood groups with HBV infection is unclear.

The prevalence rate in respect to the period of pregnancy was highest in the second trimester and the lowest was seen in the first trimester (14.81% and 8.02%, respectively). This is similar to the study done in Maiduguri, the pregnant women in their second trimester had the highest rate of prevalence with 9.2%, followed by those in their third trimester while those in first trimester had zero prevalence rate [49]. In another study done in Katsina, 21% of the overall positive cases were in the second trimester, while 13% were in the third trimester of their pregnancy [50]. Studies have also shown that vertical transmission of hepatitis B virus occurs in up to 10% of neonates when the infection occurs in the first trimester and in 60% to 90% of babies in the third trimester [17].

The variable vertical transmission rates from HBsAg positive mothers to their infants depend on several factors, namely, HBV DNA levels, HBV variants, HBV genotype, viral load, sensitivity and accuracy of diagnostic test. These factors can correlate with the level of infectivity of the mother in transmitting the virus to the fetus [51].

The prevalence of HBsAg varies between 2% in developed countries where the prevalence is low, to about 8% in developing countries where infection is endemic with age, sex and socio economic status as important factors for infection [52]. Analysis of the various submissions above, including the present results suggest that other factors, apart from age, determine the occurrence and distribution of this disease. Therefore, further investigations need to be carried out, evaluating each factor that has been suggested to affect the occurrence and prevalence of HB infection.

### 5.0 CONCLUSION

In conclusion, this study has shown an overall prevalence of HBsAg to be 9.0% among the pregnant women in Plateau state specialist Hospital, Jos. This is of moderate intensity according to the World Health Organization classification, suggesting a status of endemicity of the infection. This rate calls for concern as it indicates a clear danger of perinatal transmission.

### 6.0 RECOMMENDATIONS

This study revealed a high occurrence of HBsAg infection. The intervention to stop vertical transmission can only be applied when the status of the pregnant women is known. It is therefore recommended that all pregnant women should be routinely screened for HBsAg infection as a part of antenatal care services, all infants born to mothers who are positive to HBsAg should also be

administered vaccination at birth so as to reduce and prevent the spread of hepatitis, public health education is also recommended to stop the spread of the infection among pregnant women and the general public on the risk factors, also discouraging communal sharing of blade/sharp instruments used for shaving, bar, manicure and body piercing/cutting. It is also recommended that health care workers in hospitals be offered hepatitis B vaccination.

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