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Research Article

Seroprevalence of Hepatitis B Surface Antigen Positivity Among Antenatal Attendees in A Tertiary Hospital in Nigeria

Ihechinyerem Kelechi Osuagwu[1*]; Chioma Nwaonu Unachukwu[2]; Charlotte Blanche Oguejiofor Chijioke[3,4] ;Ogomegbunam Ezeigwe[3,4], Malarchy Ekwunife Nwankwo[3,4], Chimezie Monica Eze[1], Chukwuemeka Jude Ofojebe[3,4], Chukwudi Anthony Ogabido[3,4], Onyecherelam Monday Ogelle[3,4], Ngozichukwu Gertrude Uzoewulu[5], Chukwuemeka Chidindu Njoku[4], Kingsley Chidiebere Nwaogu[6], Ifeanyichukwu Jude Ofor[7], Chidinma Theresa Ezidiegwu[8], William Amebeobari Mube[9], Agabus Iheanacho Nwachukwu[1], Stanley Chigaemezu Egbogu[4], Kesito Chikwendu Nwachukwu1, Chukwunwendu Franklin Okeke[3,4], Nnaedozie Paul Obiegbu[4], Obinna Kenneth Nnabuchi[3], Chukwudi Anthony Ogabido[3], Johnbosco Emmanuel Mamah[10], George Uchenna Eleje[3,4]

[1]*Department Obstetrics and Gynecology, Faculty of Health Sciences, Madonna University Teaching Hospital, Elele Campus, Rivers State, Nigeria.*
[2]*Department of Medicine, University of PortHarcourt Teaching Hospital, Rivers state, Nigeria.*
[3]*Department of Obstetrics and Gynaecology, Nnamdi Azikiwe University, Awka, Nigeria.*

[4]*Department of Obstetrics and Gynaecology, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria.*

[5]*Department of Medical Microbiology/Parasitology, Nnamdi Azikiwe University, Awka, Nigeria.*

[6]*Department of Radiology, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria.*

[7]*Department of Obstetrics and Gynaecology, ESUT College of Medicine, Parklane, Enugu, Nigeria.*

[8]*Department of Internal Medicine, Aiken Regional Medical and Mental Health Center, Aiken, South Carolina, USA.*

[9]*Department of Obstetrics and Gynecology, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.*

[10]*Department of Obstetrics and Gynecology, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria*

ABSTRACT:

BACKGROUND: Hepatitis B virus infection is a public health problem in our environment. Vertical transmission from mother to baby is an important route of transmission of the virus. Neonates who contact hepatitis B have an almost 90% risk of developing chronic HBsAg carriage and chronic liver disease. Neonatal immunization interrupts this carriage. Adult immunization and treatment reduce the transmissibility and the viral burden.

AIMS: The study is aimed to determine the prevalence of Hepatitis B surface antigen positivity and possible associated risk factors to the spread of the virus among antenatal attendee.

METHODS: A cross sectional study was conducted among 158 pregnant women attending the antenatal clinics of the Federal Medical Centre, Owerri, Nigeria. Serum was extracted from venous blood collected from each subject and tested for the presence of HBsAg using one step HBsAg test strip. A pre-structured questionnaire was used to collect sociodemographic data as well as to ascertain possible risk factors. A p-value less than 0.05 was considered as statistically significant association.

RESULTS: Fifteen out of one hundred and fifty-eight women were seropositive for HBsAg giving a seroprevalence rate of 9.5%. The seroprevalence of HBsAg increased significantly with increasing age of the patients. There were significant associations between the disease and the patient's occupations, occupations related to needlework, past history of traditional surgery amongst others. There were no significant associations between Hepatitis B surface antigen seroprevalence and religion of the patients', educational level, past history of jaundice or liver disease amongst others.

CONCLUSION: The seroprevalence of HBsAg in the study was high. This reinforces the need for routine antenatal screening for HBsAg, routine neonatal passive immunization for neonates of HBsAg positive mothers and active immunization for all

Corresponding author: DR. IHECHINYEREM KELECHI OSUAGWU

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neonates, as well as all HBsAg negative adults. There is need for widespread awareness programs, to educate the public on the risks of transmission and effects of the virus.
Keywords: *Antenatal attendee; HBsAg; Owerri; seroprevalence*

INTRODUCTION

Of the hepatotropic viruses, hepatitis B virus (HBV) is the most virulent and most versatile[1]. It is probably also the most prevalent of all viruses that infect humans: The World Health Organisation [WHO] has estimated that about 296 million people were living with hepatitis B infection in 2019 with 1.5 million new infections each year. In 2019, hepatitis B resulted in about 820,000 deaths mostly from cirrhosis and hepatocellular carcinoma[1,2,]. Infection with this virus manifests in a number of clinical syndromes namely acute hepatitis, chronic non progressive hepatitis, progressive disease ending in cirrhosis, fulminant hepatitis with massive liver necrosis, asymptomatic carriers and hepatocellular carcinoma[3].

The prevalence of hepatitis B infection varies geographically with highest endemicity in high of the Africa region (8.83%) and Western Pacific region (5.26%). Worldwide seroprevalence is 3.61%[4]. In Nigeria HBV infection is a serious public health problem with a national prevalence rate of 9.5-12.2% which translates to about 20-26 million people.[5,6] The prevalence amongst pregnant women in Nigeria is about 6.49%.[7] In regions of low endemicity (Europe, America and Canada), transfusion of blood and its products, dialysis, needle stick accidents among health workers, intravenous drug abuse and homosexual activity constitute the primary sources of infection and as such neonatal infection is uncommon[8].In endemic regions such as Africa, South of the Sahara, South-East Asia and Latin America, most adult carriers acquired the infection perinatally[4].

The prevalence of hepatitis B, mode of transmission, human behaviour and socio-cultural practices combine to mould geographical differences in the epidemiological pattern[1,5,6]. The most dreaded of all the complications of HBV infection is hepatocellular carcinoma. The global distribution of this cancer is strongly linked with the prevalence of HBV infection particularly among chronic carriers[9]. Vertical transmission of HBV from infected mothers leads to as much as 90% of the baby developing chronic hepatitis B infection which is a precursor of hepatocellular carcinoma by adulthood[10]. Thus prevention of neonatal infection has been acclaimed as a major way of eliminating chronic infection and the incidence of primary hepatocellular cancer is believed to have the potential of being drastically reduced through the use of hepatitis B vaccine[11.]

The use of rapid diagnostic tests can provide prompt epidemiological data for health authorities. In Nigeria many women with hepatitis B infection may not be aware of the infection and so transfer it to their neonates[7], hence the need for the study. The study is aimed at determining the prevalence of Hepatitis B surface antigen positivity and possible associated risk factors to the spread of the virus among antenatal attendees in Owerri, Nigeria.

METHODS

The study was a prospective cross-sectional study carried out at the Federal Medical Centre (FMC) Owerri, Imo state, Nigeria. Federal Medical Centre Owerri serves as a referral centre for primary and secondary health institutions in Imo state as well as neighbouring Abia, Anambra and Rivers States of Nigeria. The study was carried out between 1st November 2007 and 30th April 2008.

Women with confirmed pregnancy (by pregnancy test, and ultrasound scanning) attending the antenatal clinics of FMC, Owerri, Nigeria who consented were co-opted into the study. The sample selection was done by systematic sample. Every 4th of consecutive attendees [who met the inclusion criteria] was recruited. Patients with Clinical features of liver disease were excluded from the study.

The study was approved by the Ethics Committee of Federal Medical Center, Owerri, Nigeria. Written informed consent was obtained from study participants. About 5mls of venous blood was obtained from each subject into plain tubes and allowed to clot; the sample was sent to the haematology laboratory of the federal medical Centre, Owerri. The serum

obtained from each sample was analysed for HBsAg using the HBsAg one step hepatitis B Surface Antigen test strip {one step HBsAg test strip [Global strips made in USA [LOT; Hbsg6020074. exp 02-2010, NO; RO15237-04]}. The test is a qualitative lateral flow immunoassay for the detection of HBsAg in serum or plasma. More data from the patients was collected using questionnaires that were completed by the patients themselves or through oral interview by the authors. Essential information obtained included patient's age, occupation, level of education, religion, past history of traditional surgery (tattoo or female circumcision), past history of sexually transmitted diseases, positive family history of jaundice etc.

Data analyses was done using simple descriptive statistics such as mean, percentages, frequency, chi- square, tables and figures. Hepatitis B surface antigen positive rate (HBsAgPR) for each category of variables was determined by dividing the number of HBsAg Positive patients in each category by the total number of patients in the category. The p-value was significant if < 0.05.

RESULTS

The number of antenatal clients seen within that period was one thousand, nine hundred and ninety six and one hundred and fifty eight of them were recruited into the study by systematic sampling technique. Fifteen out of one hundred and fifty-eight tested positive to hepatitis B surface antigen giving a prevalence of 9.5%. Table 1 shows the relationships between the patients' age and prevalence of HBsAg. The age distribution for the study subjects ranged from 19-39 years, with a mean age of 28.8 years.

TABLE 1: Relationships between the patients' age and prevalence of HBsAg

Age (years)	Test negative	Result positive	Total	HBsAg PR
19-23	11(7.0)	0	11(7.0)	_
24-28	63(39.9)	3(1.9)	66(41.8)	0.05
29-33	55(34.8)	9(5.7)	64(40.5)	0.14
34-38	13(8.2)	3(1.9)	16(10.1)	0.19
≥ 39	1(0.6)	0	1(0.6)	_
Total	143	15(9.5)	158	

The age range was 19 – 39 years. The modal age for seropositivity was age range 34 - 38 years, HBSAg positivity rate of 0.19%. Table 2 shows the relationship between the patients' occupation and HBsAg seropositivity.

TABLE 2: The relationship between the patients' occupation and HBsAg seropositivity.

Occupation	HBsAg status Negative (%)	Positive (%)	Total	HBsAg Positivity rate (%)
Civil servant	34(21.5)	1(0.6)	35(22.1)	0.03
Student	27(17.1)	0(0.0)	27(17.1)	0.00
Trader	35(22.1)	3(1.9)	38(24.0)	0.08
Hair dresser	2(1.3)	2(1.3)	4(2.6)	0.50
Fashion designer	8(5.1)	4(2.5)	12(7.6)	0.33
Nurse	4(2.5)	1(0.6)	5(3.1)	0.20
Lecturer	2(1.3)	0(0)	2(1.3)	0.00
Housewife	25(15.8)	3(1.9)	28(17.7)	0.11
Police woman	0(0)	1(0.6)	1(0.6)	1.00
Pharmacist	1(1.3)	0(0)	2(1.3)	0.00
Lawyer	1(0.6)	0(0)	1(0.6)	0.00

Hotelier	2(1.3)	0(0)	2(1.3)	0.00
Banker	1(0.6)	0(0)	1(0.6)	0.00
Total	120[90.5]	15 [9.5]	158 [100]	--------

Results of chi-square test of significance showed that there was significant association between occupations which involved needle stick injury and HBsAg seropositivity [p-value= 0.001]. One hundred and fifty-five [98.1%] of the patients were Christians, three [1.9%] were muslims. There was no significant relationship between religion and HBsAg seropositivity [p value =0.097].

All the patients obtained formal education; twenty-five [15.8%] had primary education, fifty-six [35.4%] had secondary education, sixty-two [39.2%] had postsecondary education.

There was no significant relationship between level of education and HBsAg seropositivity [p-value= 0.193]. Table 3 shows other possible risk factors tested, the HBsAgPR, and p- values for each category.

Table 3: Risk factors to HBsAg Carriage.

Risk Factor	HBs Ag positivity rate	P-value
Past History of jaundice	0.29	0.116
Positive family history of jaundice	0.07	1.933
Past history of Tattoo/ Traditional Surgery	0.23	0.026*
Previous Surgical Operation	0.100	0.056
Multiple Sexual Partners	0.14	0.199
Past History of Sexually Transmitted Disease	0.62	0.005*
History of Blood Transfusion	0.24	0.218
Previous deliveries	0.67	0.002*
Previous abortions/ miscarriages	0.76	0.001*

Results of chi-square test of significance of association of risk factors to seropositivity were past history of tattoo/traditional surgery 3.2% (p value-0.026), past history of sexually transmitted diseases 6.3% (p value=0.005), previous deliveries 5.1% (p value=0.001), previous abortions/miscarriage 5.1% (p value=0.001).

DISCUSSION

The seroprevalence of hepatitis B surface antigen in the study was 9.5% which is similar to the national average gotten by the systematic review by Ajuwon and colleagues5. Similar results are also seen with regional studies. Mustapha et al reported a seroprevalence rate of 6.2% in Bauchi state, Nigeria,12 and Olokoba et al reported a prevalence of 8.2% in North East, Nigeria13. These show a reduced prevalence rate, when compared with previous studies from the North which showed prevalence of 12.6-15.8%.14,15 Lower values of 4.3%, 2.9%, 2.89% have been reported by Ajayi 12, Onakewhor13 and Obi14 in Southern parts of Nigeria.

The result from other African countries reported similar prevalence rates with 7.7% reported from Korle-Bu Teaching Hospital in Ghana16, and 9.2% in the Gambia.17 However, a reduced prevalence rate of 4.7% was reported in Ethiopia.18 The wide variation in the seroprevalence of the disease in these studies is

probably as a result of the marked differences in the epidemiological characteristics, geographical differences of the various study populations, study designs or diagnostic methods used.1,2,9 However, a seroprevalence of 9.5% in this study is in conformity with the established fact that Hepatitis B virus infection is endemic in Sub-Saharan Africa.19

In this study, the age range of patients that were screened for hepatitis B surface antigen was 19-39years and the mean age was 28.8 years. This is a reflection of the patients attending antenatal clinics in this hospital. The seroprevalence of HBsAg increased with increasing age of patients. The highest prevalence rate was found among those that were aged 34-38years, followed by 29-33years, with the least prevalence among those aged 24-28years. The increase in seroprevalence up to age 38years could be due to increased horizontal exposure to the virus with age as seen in previous studies.20,21

The seroprevalence of HBsAg was noted to be relatively higher among some occupational groups policewomen, hairdressers, fashion designers and nurses had the highest prevalence rates. This corroborates with results by Olayinka et al and Ekouevi et al,6,22 where occupation related to needlework was found to be a significant risk factor. The possible explanation for this observation may be due to stability of HBV on environmental surfaces such as razors, needles, toys, toothbrushes, baby bottles, eating utensils and clothing.1,6 Transmission of HBV from such environmental surfaces has been shown to occur through contact with mucous membranes or open skin breaks. Microscopic skin breaks may also be an occupational hazard amongst fashion designers as a result of frequent use of needles.2,23 Nurses are at high risk as a result of their frequent contact with blood, blood products and needles.23 These further highlight the need for universal precautions and increased awareness among health workers. The high prevalence rate noted among policewomen may be due to unproven societal bias that they may be less economically empowered and more sexually exposed. They may also have been involved in rescue operations like in accident victims. Sexual transmission of HBV is well documented.1,2,6,22,23 There was no discernable pattern of association between educational level and seroprevalence of HBsAg. However, some studies have observed that HBV like other sexually transmitted infections is more prevalent in the illiterate population.24 All the study subjects attained at least primary education.

There was no statistically significant difference between the seroprevalence of HBsAg and previous history of jaundice. Other reports have documented this observation.1,23Those past history of jaundice may have been either due to other hepatitis viruses or due to severe malaria which is commonly misdiagnosed as hepatitis by some health practitioners in our environment.

Family history of jaundice or liver disease was not identified as a risk factor. Similar findings have been reported by Kwon23 and Mohammed.24 The family history of jaundice or hepatic disease may be from other hepatic viruses or due to misdiagnosis.

Past history of traditional surgery, tattooing, and circumcision had statistically significant association with HBsAg seroprevalence.5,6,22,23,25 This study revealed a population that still adopts unsafe traditional practices despite a relatively high orthodox educational level.

There was no significant statistical difference between previously planned surgical operations and HBsAg seroprevalence. This observation has been corroborated by Mohammed et al.24 Planned surgeries are usually carried out in

established government or private settings with sterilized instruments.

Though the HBsAg PR increased with exposure to heterosexual partners, there was no significant relationship between HBsAg seropositivity and exposure to heterosexual partner in our study, this finding varied with some other studies.24,26 There was a statistically significant association between the past history of sexually transmitted disease and HBsAg seroprevalence in the study. This further supports the study by Kwon, Ataei and Vallejo.23,25,26

Blood and blood products are proven channels of transmission of hepatitis B virus; hence the hepatitis B surface antigen positive rate (HBsAg PR) for those with past history of blood transmission (0.24) was higher than those without past history of blood transfusion (0.09). This association was however not statistically significant. Thus, past history of blood transfusion was not a significant risk factor. This finding was corroborated by Mohammed.24 However, this is at variance with findings by Ataei and Al-Shamahy25,27 where blood transfusion was found to be a significant risk factor for HBV infection. Currently blood is well screened for HBV infection at the National blood transfusion centre, Federal medical Centre and State Hospital laboratories. Only one respondent who had a history of blood transfusion tested positive for HBsAg; she had the transfusion in a private hospital.

The HBsAg PR increased from 0.03 in 1 to 2 deliveries to 0.5 in 5-6 deliveries. The mean number of deliveries was 1.5. This association was statistically significant. The increase in HBsAg PR with increasing number of deliveries may be due to horizontal transmission. However, Akani et al found reduced prevalence with increasing parity in Portharcourt28. In Nigeria today, about 20.5% of deliveries are conducted by unskilled birth attendants where the use of unsterilized or inadequately sterilized contaminated instruments is common.29 There may also be the case of illegal reuse of needles and syringes in these centres to save cost. HBV has been shown to be transmitted from environmental surfaces through contact with mucous membranes or open skin breaks.1,2,26

There was a significant association between number of abortions/miscarriages and HBsAg seroprevalence. Mohammed et al24 also found that the history of abortions increased the risk of HBV infection more than twice. Abortion is directly related to sexually active women, and one most important mode of transmission for HBV is exposure to a heterosexual partner.2,25,30-32

The findings of this study have important clinical implications for antenatal care in Nigeria. With a seroprevalence rate of 9.5% for Hepatitis B surface antigen (HBsAg) among pregnant women in Owerri, the study underscores the need for routine screening of all pregnant women for Hepatitis B during antenatal visits. Given the high risk of vertical transmission, especially with a prevalence this significant, early detection and intervention are crucial30-32. Implementing universal screening can ensure that infected mothers receive appropriate management, including antiviral therapy when necessary, to reduce the risk of transmitting the virus to their newborns.

The study also highlights specific risk factors associated with higher seroprevalence, such as occupations involving needlework and a history of traditional surgery. This information can guide targeted education and prevention efforts in these at-risk groups. Furthermore, the results support the importance of administering the Hepatitis B vaccine to all newborns as part of routine immunization to prevent the development of chronic Hepatitis B infection,

which can lead to serious liver disease later in life30-32.

This study provides a basis for further research into Hepatitis B virus (HBV) infection among pregnant women in Nigeria and similar settings. The relatively high seroprevalence rate found in this population suggests the need for larger, multicenter studies to confirm these findings and assess the generalizability across different regions and demographics. Such studies could help identify additional risk factors and variations in prevalence that may exist in different populations32.

Future research should also explore the effectiveness of current antenatal screening and immunization programs in reducing vertical transmission rates and long-term outcomes for both mothers and their children. Understanding the barriers to effective screening and treatment could inform strategies to improve uptake and adherence to recommended protocols.

Additionally, investigating the reasons behind the significant associations between HBsAg seroprevalence and certain occupations or traditional practices could provide insights into how HBV is transmitted in these settings. This could lead to the development of targeted interventions aimed at reducing these specific risks.

Thus, this study opens the door for exploring the role of education and community engagement in increasing awareness about Hepatitis B, particularly in high-risk populations. By understanding the knowledge gaps and misconceptions surrounding HBV, future research can help shape more effective public health campaigns to reduce the burden of this disease.

The study demonstrates several notable strengths. It tackles a critical public health concern—vertical transmission of hepatitis B virus—which carries significant long-term implications for both mothers and their newborns. By focusing on antenatal clinic attendees, the study targets a population where screening and preventive interventions can be most impactful. The use of serological testing alongside a structured questionnaire allowed the researchers to obtain both objective biological data and contextual information on possible risk factors. This comprehensive approach enabled the identification of significant associations between hepatitis B surface antigen (HBsAg) positivity and specific demographic and occupational risk factors. Furthermore, the findings have direct policy implications, underscoring the need for routine antenatal screening and immunization strategies that can be integrated into existing maternal and child health programs.

However, the study is not without limitations. The relatively small sample size of 158 participants and belated period of data collection may reduce the generalizability and statistical robustness of the findings. Additionally, being a single-center study conducted in Owerri, the results may not be representative of other regions in Nigeria. The cross-sectional nature of the research design precludes any causal inference between risk factors and HBsAg seropositivity. Moreover, the use of a rapid diagnostic test strip, while convenient, may not match the diagnostic accuracy of more advanced methods such as ELISA or PCR, potentially affecting the validity of the results. The reliance on self-reported data for certain risk factors introduces the possibility of recall and social desirability bias. Furthermore, the absence of HBV DNA testing means that viral load and infectivity could not be assessed. Lastly, the study did not evaluate participants' hepatitis B vaccination status, which could have influenced the observed prevalence and risk factor associations.

CONCLUSION

Hepatitis B Virus (HBV) infection is a significant public health issue in Owerri, Nigeria, with high seroprevalence among antenatal women, particularly those over 38 years, likely due to horizontal transmission. Identified risk factors include needlework occupations, traditional surgeries, and a history of sexually transmitted diseases or miscarriages. The study recommends universal screening and neonatal immunization for HBV, along with public awareness campaigns akin to those for HIV/AIDS. Additionally, routine screening for other associated viruses and implementing universal precautions in healthcare settings are crucial to control the spread of HBV.

Disclosure of conflict of interest

The authors declare no conflicts of interests.

Ethics approval

The study protocol was approved by the by FMC Owerri, Nigeria Ethics committee.

Consent for publication

All the participants gave consent for publication.

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Data sharing statement

All relevant data are within the manuscript and its Supporting Information files. The datasets used and/or analyzed during the current study are available from the authors on reasonable request.

Statement of informed consent

A written informed consent was obtained from all individual participants included in the study.

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