

Seroprevalence of Hepatitis B Virus among antenatal clinic attendees in Gamawa Local Government Area, Bauchi State, Nigeria

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Abstract

Background: Hepatitis B is a potentially life-threatening liver infection and a major global health problem. It causes chronic infection and puts people at high risk of death from cirrhosis and liver cancer. WHO estimated 257 million people are living with hepatitis B virus (HBV) infection and in 2015 alone HBV resulted in to 887,000 deaths globally. We determined the prevalence and associated factors of hepatitis B virus infection among Antenatal Care (ANC) attendees in Gamawa Local Government Area, Bauchi State. **Methods:** We conducted a descriptive cross-sectional, health facility-based study between March and April 2018. We used systematic random sampling technique to recruit 210 pregnant women aged 15-49 years. With a structured questionnaire, we interviewed the respondents and collected blood sample to test for hepatitis B surface antigen. We calculated frequencies, means, proportions, and tested for associations using Epi Info 7.2 and Microsoft Excel. **Results:** The mean age of respondents was 24.5 ± 6.0 years; 112 (53%) of whom were younger than 25 years. All were married, 183 (87%) had no formal education and up to 190 (90%) were employed. Overall, 14 (6.7%) tested positive for HBsAg; women aged ≥ 35 years had the highest prevalence (10%). None with tertiary education tested positive and women married before 18 years had 13 (6.2%) prevalence. **Conclusions:** The prevalence of HBsAg among pregnant women in Gamawa LGA was 6.7% which is quite lower than the national prevalence reported. We recommended improved surveillance of HBV infection and screening of women attending ANC. **Keywords:** Hepatitis B virus, Hepatitis B Surface antigen, Prevalence, Pregnancy, Health facilities, Hepatitis B

Background

Hepatitis B is a potentially life-threatening liver infection and a major global health problem. Hepatitis B infection is associated with the risk of death arising from cirrhosis, liver and non-liver cancers.¹ Transmission of Hepatitis B virus (HBV) results from exposure to contaminated blood or body fluids, unprotected sexual contact with an infected person, blood transfusion, use of contaminated needles, syringes, and sharps as well as vertical transmission from mother to child. There is risk of HBV transmission to the newborn delivered by a hepatitis B surface antigen (HBsAg)-positive woman. This risk is amplified with positivity of hepatitis B envelope antigen (HBeAg).²

Globally, WHO estimates that in 2015, 257 million persons, or 3.5% of the population, were living with chronic HBV infection. The African and Western Pacific regions accounted for 68% of those infected. In Nigerian health system, Hepatitis B vaccine targets only infants and the coverage range from 50.6% for infants receiving first dose, 45.6% receiving second dose and 38.2% for third dose. In Bauchi State the vaccination coverage ranges from 25.4% for first dose, 18.9% second dose and 12.5% for third dose.³

Several authors have reported on the prevalence of HBV among sub-populations worldwide with estimates varying depending on population studied and methods used. Reported prevalence of HBsAg among pregnant women varies from one region to another. The prevalence of chronic HBV infection was estimated to be 3.5% among women of reproductive age globally.⁴ In African countries the prevalence

ranges within 6–25%.⁴ A national survey of hepatitis B in Nigeria showed prevalence of 12.2% among the general population⁵, a systematic review of hepatitis B infection among pregnant women in Nigeria found a prevalence of 14.1%. HBsAg prevalence documented among pregnant women in Bayara, Bauchi State was 17.2%.⁶

Many authors report on the prevalence of HBV among sub-populations in Nigeria in secondary and tertiary healthcare settings and usually in urban areas, with estimates varying depending on population studied and methods used. However, there is dearth of reliable data on prevalence of HBV infection among pregnant mothers at primary health care level especially remote areas. Also, despite Nigeria being categorized among countries where HBV infection is highly endemic,⁷ Gamawa LGA reported zero case of HBV infection to the state surveillance system for five consecutive years (2011-2015). We therefore aimed to determine the prevalence of HBV infection among pregnant mothers attending ANC at PHCs of Gamawa LGA.

Methods

Study design and setting

We conducted a cross-sectional study among women receiving antenatal care (ANC) in Primary Health Centres (PHCs) of Gamawa LGA, Bauchi State between March and April 2018. Gamawa LGA has an estimated projected population of 427,761 (2018).⁸ It is a rural LGA and farming is the predominant occupation of the people. The LGA has 18 political wards and 62 PHCs out of which 24 offered ANC services. Among the PHCs that offered ANC, the services were offered once weekly in most of the health facilities and average ANC attendance was 30 clients per facility per day.

Sample size determination

We calculated a sample size of 210 using the formula for cross sectional studies¹⁶ based on the documented HBsAg prevalence of 14.1% among pregnant women in Nigeria³ at 95% confidence interval (CI), 0.05 precision and 10% non-response rate.

Sampling Technique

We employed multistage sampling method to recruit 210 pregnant women. At the first stage, we recruited eight health facilities (HFs) from the list of 24 HFs that provide ANC using balloting method of simple random sampling. At the second stage, we recruited patients attending ANC in the selected hospitals using systematic random sampling. We planned to collect the sample over 8 weeks. Using the average daily attendance to ANC in the selected hospitals, we estimate a sampling interval of 10. The first attendee is sampled by balloting and subsequently every 10th attendee was approached for the study till the sample size was achieved. After explained the purpose of the study, written informed consent was obtained, the questionnaire was administered and one millilitre of blood sample was collected through an aseptic venipuncture for HBV serology.

Study instrument and data collection

The participants were interviewed by the investigator and research assistants using a semi-structured questionnaire to obtain information on socio-demographic characteristics, history of vaccination, blood transfusion, surgery, tonsillectomy, dental procedure, sharing of needles, and history of cupping, scarification and episiotomy. The questionnaires were both in English and Hausa. After this one millilitre of blood was collected aseptically for hepatitis B serology. We excluded ANC attendees that were not residing in Gamawa LGA.

Laboratory Method

HBsAg was assayed using an enzyme-linked immunosorbent assay (ELISA) kit produced by LabACON^R (Hangzhou Biotest Biotech Co., Ltd, China) which has sensitivity and specificity of 99.9% and 99.0% respectively. The kit has in-built controls and the manufacturer's instruction were closely followed. The results were reported as positive or negative.

Statistical analyses:

Data analysis was performed using Microsoft Excel and Epi-info 7.2. We estimated the proportion of the patient that were positive to HBsAg, frequency and proportion of the various sociodemographic and clinical characteristics. We examined the relationship between the HBsAg status and the sociodemographic and clinical characteristics using the chi square statistics at the 95% confidence interval.

Results

Sample characteristics

A total of 210 pregnant women were enrolled in the study. The mean age was 24.5 ± 6.0 years, median age was 24 years and interquartile range is 8 years. (Table 1). All were married, 87% had no formal education and up to 91% were employed. Overall, 6.7% tested positive for HBsAg, those older than 35 years had the highest prevalence of 10.5% (Table 1). None was positive among those with tertiary education, and women married before 18 years had 6.5% prevalence. There was no statistically significant difference between the proportions of HBsAg positives and negatives with respect to history of vaccination, blood transfusion, surgery, tonsillectomy, dental procedure, sharing of needles, history of cupping, scarification and episiotomy. There were also no statistically significant difference in the proportion of HBsAg positives and negatives with respect to age, level of education, employment status, husband's occupation, parity, age at the time of first marriage and number of marital units. (Table 2) All the women contacted for the study have agreed and participated in the Study, there were no issues with test method and collection of data.

Discussion

HBV infection affecting pregnant women may result in maternal morbidity and mortality to the mother and chronic infection in the newborn. Prevalence of hepatitis B infection varies between different parts of the world. Even within the same country there are regional and population specific variations. Immunological compromise in pregnancy is of clinical and epidemiological relevance with regards to hepatitis B viral infection⁹. In this study the overall prevalence of HBsAg among women attending primary health care centres of Gamawa LGA was 6.7% indicating an intermediate endemicity. This contrasts with reports by Colin *et al*⁷ that classified Nigeria in the high endemicity group, this could be due to the fact that this study was done among women attending ANC services. It shows that despite the hyperendemicity, the prevalence of HBV infection varies widely based on location and subpopulations. This group of participants may not be disposed to other risk factors like alcoholism and drug abuse. The implication of this finding is that HBV infection is spreading among pregnant women hence the need for antenatal screening. The result from our study is similar to that from a study done by Oluboyo *et al*⁸ and is in agreement with prevalence of 6-25% in the WHO African region. Suffice to note that similar results by all study groups may be linked to identical WHO approved test kits.

The prevalence is lower than a similar study conducted in Bayara hospital, Bauchi State where a prevalence of 17.2% was documented.⁶ The difference could be due to the fact that it was conducted in secondary facility situated in urban area. A prevalence of 8.2% was reported also from north eastern Nigeria in FMC Yola, Adamawa State.¹⁰ In the North-Central geopolitical zone, a prevalence of 12.3% was reported from Minna Niger State by Ndams *et al*¹¹ and 11.0% was reported in Makurdi, Benue State by Mbaawuaga *et al*.¹²

In the south-western part of the country, a prevalence of 16.5% was reported in Osogbo, Osun State by Kolawole *et al*¹³ and 8.3% in Ibadan by Chinenye *et al*.¹⁴ Southern states reported a prevalence of 12.5% in Edo State by Ugbebor *et al*.¹⁵ It is also lower than the 9.6–18.6% observed by Musa *et al*¹⁶ in a country wide systematic review. Furthermore, it is lower than the 9.7% found among pregnant women attending ANC in Bue`a Health District¹⁷, 10.2% found by Noubiap *et al*¹⁸, 20.4% found by Ducancelle¹⁹ *et al* in Cameroon. It's also lower than the 9.5% found in Ghana by Ephraim *et al*²⁰ and 9.3% found in Kenya by Okoth *et al*²¹. The differences in the reported seroprevalence rates of HBV among pregnant women may be due to variation in the geographical location, socio-cultural practices, study design, level of care for the study facility, sample size and test methods employed. Most of the studies quoted above were carried out at secondary and tertiary level of care but this study was carried out at primary health care setting and it not surprisingly as the prevalence of HBV is slightly lower from other previous Nigerian studies may be due to more awareness about the disease²².

However, the prevalence from our study is higher than the 4.3% found among pregnant women in Zaria, north-western-Nigeria, 5.3% in Yenagoa, Bayelsa State; 1.6% found in Iran²³; 3.9% found in pregnant women attending ANC in Muhimbili national hospital Tanzania²⁴ and 5.6% in Sudan.²⁵ It was similar to a difference of 6.8% reported in Ekiti State, southwestern Nigeria,²⁶ and 6.6% in Cross River State²⁷ southsouth Nigeria. The differences may reflect variations in overall health care status of the study

locations. The cost of screening could have accounted for lack of surveillance reports from Gamawa. The cost of screening for HBV in the community was \$1.39 per client. The amount is considered high for the average person in the community due to high level of poverty in the rural community. Since they are apparently healthy, it became difficult to convince the woman to part with the money that would have rather been used for food. Making these screenings free during antenatal visits would help a lot in ensuring that every woman knows her status and take steps to improve her health and protect her unborn baby. PHC facilities hence do not routinely screen for HBV infection.

Conclusions

In conclusion the prevalence of HBsAg among pregnant women in Gamawa LGA was 6.7% which is much lower than the national prevalence of 14.1% among ANC attendees. Women older than 35 years had the highest prevalence of 10% and of the documented associated factors studied, none was found to be associated with HBV infection. We recommended free HBV screening for women attending ANC and more awareness campaigns on hepatitis B virus infection and its consequences especially among pregnant women.

Abbreviations

ANC	-	Ante Natal Care
CI	-	Confidence Interval
ELISA	-	Enzyme Linked Immunosorbent Assay
FMC	-	Federal Medical Centre
HBV	-	Hepatitis B Virus
HBeAg	-	Hepatitis B envelope antigen
HBsAg	-	Hepatitis B surface antigen
HF	-	Health Facility
LGA	-	Local Government Area
PHC	-	Primary Health Centres
WHO	-	World Health Organisation

Declarations

Ethics approval and consent to participate

We obtained ethical approval from Bauchi State Research Ethics (reference#: MOH/GEN/S/1409/1). Informed written consent was obtained from each pregnant woman who agreed to participate in the study before questionnaire administration and sample collection. All the participants aged 15 - <18 years were married and pregnant, so we considered them emancipated minors and did not need parental/guardian consent. they consented for themselves. Participant's identifiers were kept securely, and confidentiality was maintained.

Study participants were notified of their HBsAg status and advised for further action that may be needed. Results were also shared with the eight Health Facilities where the study was conducted, Local Primary Health Care Development Authority and State Ministry of Health for their action.

Consent for publication

Not Applicable

Availability of data and material

The datasets used and/or analysed during this study are available from the corresponding author on reasonable request.

Competing interests

The authors do not have any competing interests.

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There was no any funding for the study.

Authors' contributions

GMU carried out the dissertation, analysed and interpreted the data. AIM was the chairman supervisory committee and a major contributor in writing the manuscript. AI supervised the project and support the interpretation of the data. MSB reviewed the manuscript. CDU support the analysis and interpretation of data and reviewed the manuscript. All authors read and approved the final manuscript.

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References

1. Song C, Lv J, Liu Y, Chen JG, Ge Z, Zhu J, et al. Associations Between Hepatitis B Virus Infection and Risk of All Cancer Types. *JAMA Netw Open*. 2019 Jun 14;2(6):e195718.

2. Gentile I, Borgia G. Vertical transmission of hepatitis B virus: Challenges and solutions. *Int J Womens Health*. 2014;6(1):605–11.
3. Survey H. Nigeria. 2013;
4. Ott JJ, Stevens GA, Groeger J, Wiersma ST. Global epidemiology of hepatitis B virus infection : New estimates of age-specific HBsAg seroprevalence and endemicity. *Vaccine*. Elsevier Ltd; 2012;30(12):2212–9.
5. Olayinka AT, Oyemakinde A, Balogun MS, Ajudua A, Nguku P, Aderinola M, et al. Seroprevalence of Hepatitis B Infection in Nigeria: A National Survey. *Am J Trop Med Hyg*. 2016 Oct;95(4):902–7.
6. Ndako J, Echeonwu G, Nwankiti O, Onovoh E, Ujah A, Ikani P, et al. Hepatitis B Virus Sero-Prevalence among Pregnant Females in Northern Nigeria. *Res J Med Sci*. 2012;6(3):129–33.
7. Shepard CW, Simard EP, Finelli L, Fiore AE, Bell BP. Hepatitis B Virus Infection : Epidemiology and Vaccination. *Johns Hopkins Bloom Sch Public Heal*. 2017;28(October):112–25.
8. National Population Commission, Data for National Development. 2016.
9. Oluboyo B, Ugochukwu V, Oluboyo A, Ihim A, Chukwuma G, Ogenyi S, et al. Prevalence of Hepatitis B And C Viral infections in Pregnant Women Attending Antenatal Clinic In Nnewi, Nigeria. *Eur Sci J*. 2014;10(3):434–41.
10. Olokoba AB, Salawu FK, Danburam A, Olokoba LB, Midala JK, Badung LH, et al. Hepatitis B virus infection amongst pregnant women in North-Eastern Nigeria - A call for action. *Niger J Clin Pract*. 2011;14(1):10–3.
11. Services H. EPIDEMIOLOGY OF HEPATITIS B INFECTION AMONG PREGNANT WOMEN IN MINNA , NIGERIA ABSTRACT. 2008;3:5–8.
12. Mbaawuaga E, Enenebeaku M, Okopi J, Damen J. Hepatitis B Virus (HBV) Infection among Pregnant Women in Makurdi, Nigeria. *African J Biomed Res J Biomed Res African J Biomed Res*. 2008;11(11):155–9.
13. Kolawole OM, Wahab AA, Adekanle DA, Sibanda T, Okoh AI. Seroprevalence of hepatitis B surface antigenemia and its effects on hematological parameters in pregnant women in Osogbo, Nigeria. *Viol J*. 2012;9:2–7.
14. Chinenye G, Adeola F, Chukwuma E, Rasheed A. Prevalence, socio-demographic features and risk factors of Hepatitis B virus infection among pregnant women in Southwestern Nigeria. *Pan Afr Med J*. 2015;8688:1–11.
15. Ugbebor O, Aigbirior M, Osazuwa F, Enabudoso E, Zabayo O. The prevalence of hepatitis B and C viral infections among pregnant women Background : Aims : Patients and Methods : Results : Conclusion : 2018;3(5):238–41.
16. Musa BM, Bussell S, Borodo MM, Samaila a a, Femi OL. Prevalence of hepatitis B virus infection in Nigeria, 2000-2013: a systematic review and meta-analysis. *Niger J clin Pr*. 2015;18(2):163–72.
17. Besong Frambo AA, Atashili J, Nde Fon P, Martins Ndumbe P. Prevalence of HBsAg and knowledge about hepatitis B in pregnancy in the Buea Health District, Cameroon: a cross-sectional study.

18. Noubiap JJN, Nansseu JRN, Ndoula ST, Bigna JJR, Jingi AM, Fokom-Domgue J. Prevalence, infectivity and correlates of hepatitis B virus infection among pregnant women in a rural district of the Far North Region of Cameroon. *BMC Public Health*. 2015;15(1):454.
19. Ducancelle A, Abgueguen P, Birguel J, Mansour W, Pivert A, Guillou-guillemette L, et al. High Endemicity and Low Molecular Diversity of Hepatitis B Virus Infections in Pregnant Women in a Rural District of North Cameroon. *PLoS One*. 2013;8(11):10–2.
20. Ephraim R, Donko I, Sakyi SA, Ampong J, Agbodjakey H. Seroprevalence and risk factors of Hepatitis B and Hepatitis C infections among pregnant women in the Asante Akim North Municipality of the Ashanti region , Ghana ; a cross sectional study . *Afr Health Sci*. 2015;15(3):1–5.
21. Okoth F, Mbuthia J, Gatheru Z, Murila F, Kanyingi F, Mugo F. Seroprevalence of hepatitis B markers in pregnant women in kenya. *East Afr Med J*. 2006;83(9):485–93.
22. Locarnini S, Hatzakis A, Chen D, Lok A. Review Strategies to control hepatitis B: Public policy , epidemiology , vaccine and drugs. *J Hepatol. European Association for the Study of the Liver*; 2015;62(1):S76–86.
23. Afzali H, Heravi MM, Moravveji S, Poorrahnama M. Prevalence of Hepatitis B Surface Antigen in Pregnant Women in Beheshti Hospital of Kashan , Isfahan. *Iran Red Crescent Med J*. 2015;17(7):22–6.
24. Rashid S, Kilewo C, Aboud S. Hepatitis B Virus Infection Among Antenatal Clinic Attendees At the Muhimbili National Hospital , Seroprevalence and Associated Factors. 2011.
25. Elsheikh RM, Daak AA, Elsheikh MA, Karsany MS, Adam I. Hepatitis B virus and hepatitis C virus in pregnant Sudanese women. *Viol J*. 2007;3(4):8–10.
26. Esan AJ, Omisakin CT, Owoseni MF, Fasakin KA, Ogunleye AA. Sero-Prevalence of Hepatitis B and Hepatitis C Virue Co-Infection among Pregnant Women in Nigeria. *Am J Biomed Res*. 2014;2(1):11–5.
27. Utoo BT. Hepatitis B surface antigenemia (HBsAg) among pregnant women in southern Nigeria. *Afr Health Sci*. 2013;13(4):1139–43.

Tables

Table 1: Socio-demographic characteristics and prevalence of HBsAg among women attending ANC in PHCs of Gamawa LGA, Bauchi State, Nigeria (N=210)

Variable	HBsAg +ve	HBsAg-ve	Prevalence (95% CI)	Total
Total prevalence	14	196	6.7 (3.8-10.7)	210
Age group (years)				
15-24	7	105	6.3 (2.8-12.0)	112
25-34	5	74	6.3 (2.4-13.5)	79
≥35	2	17	10.5 (1.8-30.6)	19
Educational Level				
No formal/Qur'anic	11	172	6.0 (3.2-10.2)	183
Primary	1	15	6.2 (0.3-27.2)	16
Secondary	2	8	20.0 (3.5-52.0)	10
Tertiary	0	1	0.0 (0-95)	1
Occupation				
Farmer	6	83	6.7 (2.8-13.5)	89
Trader	4	57	6.6 (2.1-15.1)	61
Tailor	2	25	7.4 (1.3-22.4)	27
House Wife	1	19	5.0 (0.2-22.3)	20
Others	1	12	7.8 (0.4-32.5)	13
Employment Status				
Employed	10	163	5.8 (3.0-10.1)	173
Unemployed	4	47	7.8 (2.5-17.8)	51
Parity				
Primiparous	6	56	9.7 (4.0-19.0)	62
Multiparous	8	140	5.4 (2.5-10.0)	148
Age at First Marriage				
<18	12	174	6.5 (3.5-10.7)	186
≥18	2	22	8.3 (1.4-24.9)	24
Number of Marital Units				
1	10	148	17.2 (3.3-11.0)	158
>1	4	48	7.7 (2.5-17.5)	52

Table 2: Factors associated with HBV infection among women attending ANC in PHCs of Gamawa LGA, Bauchi State, Nigeria (N=210)

Risk factor	Hepatitis B status		OR (95% CI)
	Positive n (%)	Negatives n (%)	
Age (Years)			
≤30	12 (6.5)	174 (93.5)	0.8 (0.16-3.61)
>30	2 (8.3)	22 (91.7)	
Education			
≤Primary	12 (6.0)	187 (94.0)	0.3 (0.06-2.17)
>Primary	2 (18.2)	9 (81.8)	
Employment Status			
Employed	13 (6.7)	181 (93.3)	1.1 (0.13-8.81)
Unemployed	1 (6.2)	15 (93.8)	
Parity			
Primiparous	6 (9.7)	56 (90.3)	1.9 (0.62-5.65)
Multiparous	8 (5.4)	140 (94.6)	
Age at first marriage			
≤18	12 (6.5)	174 (93.5)	0.8 (0.16-3.61)
18 and above	2 (8.3)	22 (91.7)	
Number of marital units			
1	10 (6.3)	148 (93.7)	0.8 (0.24-2.70)
>1	4 (7.7)	48 (92.3)	
History of blood transfusion			
Yes	2 (9.5)	19 (90.5)	1.6 (0.32-7.46)
No	12 (6.3)	177 (93.7)	
History of surgery			
Yes	1 (25.0)	3 (75.0)	4.9 (0.48-50.96)
No	13 (6.3)	193 (93.7)	
History of Uvulectomy			
Yes	0 (0.0)	18 (100.0)	
No	14 (7.3)	178 (92.7)	
Local dental procedure			

Yes	0 (0.0)	4 (100.0)	
No	14 (6.8)	192 (93.2)	
Sharing of needles			
Yes	0 (0.0)	4 (100.0)	
No	14 (6.8)	192 (93.2)	
Cupping			
Yes	2 (4.1)	47 (95.9)	0.5 (0.11-2.45)
No	12 (7.5)	149 (92.5)	
Scarification			
Yes	4 (8.5)	43 (91.5)	1.4 (0.43 - 4.76)
No	10 (6.1)	153 (93.9)	
Vaccination			
Yes	0 (0.0)	9 (100.0)	
No	14 (7.0)	187 (93.0)	

Supplementary Files

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