

Seroprevalence of Hepatitis B among Pregnant Mothers Attending Bichi General Hospital Kano State, Nigeria

Usman, J. N^{1.}, Mohammed, Y^{1.}, Akande, A. O^{1.}, Babayo, A^{1.}, Idris, A. M^{1.}, Hassan, M. S^{1.}, Safiyanu, M. B^{1.}, Rogo, L. D^{2.} and Umar, A. A^{3*}.

¹Department of Medical Microbiology and Parasitology, Faculty of Clinical Sciences, College of Health Sciences, Bayero University, Kano, Nigeria

²Department of Medical Laboratory Sciences, Faculty of Allied Health Sciences, College of Health Sciences Bayero University, Kano, Nigeria

³Department of Community Medicine, Faculty of Clinical Sciences, College of Health Sciences, Bayero University, Kano, Nigeria

*Corresponding author: amina7420@yahoo.com; +2348065652777

Abstract: Hepatitis B virus (HBV) continues to be a potentially life-threatening infectious disease transmitted from mother to child. The study aimed to evaluate the seroprevalence of Hepatitis B surface antigen (HBsAg), among pregnant mothers attending antenatal clinics (ANC) at a General Hospital in Bichi LGA, Kano State, Nigeria. A total of 125 pregnant women were screened for hepatitis B surface antigen (HBsAg) using Enzyme-Linked Immunosorbent Assay (ELISA) kit. Of the 125 pregnant mothers screened in the study, 11 (8.8%) were found to be seropositive for HBsAg. Subjects aged 36 – 45 years had the highest seroprevalence (2/7) (28.6%). The study only shows a statistically significant relationship between the incidence of HBV infection and sharing of sharp objects among all the observed possible risk factors ($P=0.0120$). This findings emphasizes the need for increased public awareness measures to prevent the transmission from mother to her newborn baby.

Keywords: Hepatitis B surface antigen, Pregnant Mother, Seroprevalence.

INTRODUCTION

Hepatitis B virus (HBV) is a potentially life-threatening cause of liver disease globally, that causes chronic infection and puts people at high risk of death from cirrhosis and liver cancer (WHO, 2020). Globally, it was estimated that 2 billion people are living with either HBV infection (WHO, 2021). Moreover, 1.5 million people are approximately newly infected every year, 300 million are chronically infected and an estimated 820,000 die each year from HBV infection and its related complications and only 10% of the infected populations are diagnosed (Hepatitis B Foundation, 2022). About 80 – 90% of the unborn infants were exposed to HBV infection through their HBV-infected mothers in the 3rd trimester or early postpartum period (UTMB Neonatology Manual, 2014). Most of the infected babies may become chronic HBV carriers; however about 25% may develop chronic active hepatitis, cirrhosis, or hepatocellular carcinoma (UTMB Neonatology Manual, 2014).

In a systematic review and meta-analysis of data published from 2010 – 2019 on HBV

infection. Approximately 60 million people are lived with chronic HBV infection in Africa and Nigeria is ranked as one of the countries that have a high rate (Ajuwon *et al.*, 2021).

According to WHO report of 2017, HBV infection in pregnancy recorded as one of the major cause of preterm birth with consequent of low birth weight, antepartum haemorrhage, gestational diabetes mellitus, and threatened preterm labour in addition to the vertical transmission (Nwoga *et al.*, 2021).

In developed countries, increased awareness, identification of mothers who are Hepatitis B seropositive as well as adequate prophylaxis among exposed newborns were found to reduce the overall prevalence of HBV infection (WHO, 2020). Thus, such measures if adopted especially in Nigeria will go a long way to ensure the prevention of perinatal transmission and hence decrease the burden of chronic HBV infection in the country. Intervention to stop vertical transmission can only be applied when the status of the pregnant woman is known, however, antenatal screening for HBV infection is currently not performed

adequately in the public health facility in Nigeria, even though it is the key step in identifying those women most at risk of transmitting infection and allowing the implementation of preventive strategies. The present study aimed to evaluate the seroprevalence of HBV infection using the ELISA detection technique among pregnant women attending antenatal clinics (ANC) at a General Hospital in Bichi LGA, Kano State, Nigeria.

MATERIALS AND METHODS

Study Area

The study was carried out at General Hospital Bichi, in Bichi Local Government Area of Kano State, Nigeria. Bichi Local Government is located in the northern part of Kano State, between 12°14'03 north of the equator and longitude 8°14'28 east of Greenwich. It has a landmass of 612 km² (236m²) with an estimated population of 387,100 as projection in 2016 by NBS (2018). The majority of the inhabitants are Hausa-Fulani by tribe and are engaged in farming and trading as their main source of income.

Ethical Clearance

The ethical clearance was obtained from the Kano State Ministry of Health, before the commencement of the study with reference number (MOH/OFF/797/T.I/908). Informed written consent was obtained from all pregnant women that were willing to participate in the study.

Sample Size Determination

A prevalence of 7.9% based on a previous study in Kano by Yahaya *et al.* (2012) was used to determine the sample size. The total sample size was estimated using the standard formula (Lwanga and Lemeshow, 1991).

$$n = \frac{Z^2 pq}{d^2}$$

Where,

n = sample size

Z = the normal deviation (1.96) corresponding to a confidence interval of 95%

p = prevalence from previous study (7.9%; 0.079)

$$q = (1 - p) = 1 - 0.079 = 0.921$$

d² = sampling error, which is taken as 5% (0.05)

$$n = \frac{(1.96)^2 \times 0.079 \times 0.921}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.079 \times 0.921}{0.0025}$$

$$n = \frac{0.2795}{0.0025}$$

$$n = 111.8$$

$$n = 112$$

The sample size was rounded up to 125 to increase precision and to allow for attrition (10%).

Data Collection

Self-administered structured questionnaires were given to each participant after consent. The questionnaire had two sections. Section A contained questions on the socio-demographic characteristics of respondents, while Section B addressed the possible risk factors of HVB.

Sample Collection

Five millilitres (5mL) of venous blood was aseptically taken from each of the participants by vein puncture and discharged into a labeled plain sterile vacutainer tube. The blood was allowed to clot at room temperature and sera separated by centrifugation at 3000 rpm for 10 minutes and stored in a freezer at -20°C until needed for analysis. This was done on every visit to the Antenatal clinic.

Laboratory Investigation

Serology Test

A total of 125 samples were screened for HBsAg, using an Enzyme-Linked Immunosorbent Assay (ELISA) kit according to the manufacturer's instructions (Prestige Diagnostics, USA).

Data Analysis

The data obtained were analyzed using the Statistical Package for Social Sciences statistical software (SPSS) version 25. Categorical variables were presented in descriptive statistics; variables were compared using Chi-square at a 95% confidence interval and values of p ≤ 0.05 were considered significant.

RESULTS

Of the 125 pregnant women enrolled in the study, 11 (8.8%) were found to be seropositive for HBsAg (Table 1).

The highest proportion of HBsAg seropositive women 8 (10.4%) was found among the participant's age group 16 – 25 years, followed by 2 (28.6%) among age groups 36 – 45 years and 1 (2.5%) among age 26 – 35 years respectively (P=0.1257) (Table 2).

Participants with a primary level of education have the highest HBsAg

seroprevalence of 10.2% followed by 5.6% among those in secondary (P=0.6730). Most of the seroprevalence participants are from monogamous marriage settings (P=0.1838) (Table 2).

HBsAg seropositivity was observed to be higher in the third trimester and multiparous, followed by the second trimester, none of the participants enrolled tested positive in the first trimester of pregnancy. Both did not show a statistically significant difference with a P=0.7558 and 0.9971, respectively (Table 3).

Table 1: Seroprevalence of HBV Infection among the Pregnant Women

Number Examined	Number Positive (%)	Number Negative (%)
125	11 (8.8)	114 (91.2)

Table 2: Distribution of HbsAg among the Studied Women base on Demographic Data

Variables	No. Examined	HbsAg Seroprevalence		<i>P – value</i>
		Positive (%)	Negative (%)	
Age (Years)				
16 – 25	77	8 (10.4)	69 (89.6)	0.1257
26 – 35	40	1 (2.5)	39 (97.5)	
36 – 45	7	2 (28.6)	5 (71.4)	
≥46	1	0 (0.0)	1 (100.0)	
Educational Level				
Primary	88	9 (10.2)	79 (89.8)	0.6730
Secondary	36	2 (5.6)	34 (94.4)	
Tertiary	1	0 (0.0)	1 (100.0)	
Residence				
Town	60	6 (10.0)	54 (90.0)	0.8894
Village	65	5 (7.7)	60 (92.3)	
Marriage Setting				
Monogamy	73	9 (12.3)	64 (87.7)	0.1838
Polygamy	52	2 (3.9)	50 (96.2)	

Table 3: HBsAg Seroprevalence Status According to Gestation and Parity

Variables		HbsAg Seroprevalence		P – value
		Positive (%)	Negative (%)	
Trimester				
Second	24	3 (12.5)	21 (87.5)	0.7558
Third	101	8 (7.9)	93 (92.1)	
Parity				
Primiparous	17	2 (11.8)	15 (88.2)	0.9971
Multiparous	108	9 (8.3)	99 (91.7)	

*Fisher Exact Test

DISCUSSION

A 8.8% HBsAg seroprevalence rate was obtained among the pregnant women tested, indicating that HBV is highly endemic in the area according to WHO classification (WHO, 1990 and Yoshihiko *et al.*, 2015). This is almost similar to the 8.3% prevalence found among pregnant women in a work done by Anaedobe *et al.* (2015) at Ibadan, and 8.2% in Yola North-East Nigeria, by Salawu *et al.* (2010), 7.9% in Kano Northwestern Nigeria by Yakasai *et al.* (2012) and 8.6% by Ezegbudo *et al.* (2004) from Anambra. This may be due to the similarity in the socio-demographic characteristics, as the four studies were hospital-based in an urban setting and similar laboratory methods for the analysis. Lower prevalence rates ranging from 2.5 – 6.8% were observed in the other parts of the countries; Omatola and Okolo (2021) recorded the lower prevalence of 2.5% from Kogi, 6.1% by Rabiun *et al.* (2010) in Lagos, and 6.5% by Olakunde *et al.* (2021).

In other studies done among pregnant women in different African countries, the lower prevalence rate of 3.7% was recorded in Ethiopia (Awole and Gebre, 2005). The finding of the current study WHO epidemiological survey report that the Global prevalence of HBV infection varies highest in Africa, Asia, and the Western Pacific (>8%) and lowest in Western Europe, and North America with prevalence rate in sub-Saharan Africa ranging from 9% to 12% (WHO, 2017). Differences in sexual behavior and practices, cultural practices, geographical variation, test methods employed for HBV detection, and the level of health education on the prevention of HBsAg acquisition, may all play a significant role in the wide variations of HBsAg seroprevalence.

The seroprevalence of HBsAg reported in this study poses a great concern regarding pregnant mother in the study area. This is supported by a survey report done by WHO which recorded that the most common route of transmission of HBV is from mother to child (vertical transmission), and that in the

absence of any preventive interventions, the risk of transmission ranges from 70% to 90% for mothers with HBeAg-positive and from 10% to 40% for those that are HBeAg negative (WHO, 2020).

The study shows a high frequency of HBV infection in the 16 – 25 years age group followed by those aged 36 – 45 and 26 – 35 years. The possible explanation for this finding could be that women in these age groups are more sexually active and fertile (Awoleke, 2012; Yakasai *et al.*, 2012). The finding of this study is consistent with a report of Yakasai *et al.* (2012) at Aminu Kano Teaching Hospital, Kano and that of Ezegbudo *et al.* (2004) at Anambra State. This distribution, however, is at variance with that of other studies where the highest prevalence rates were reported among those in the older age group as reported in a study done by Olakunde *et al.* (2021) in a systematic review and meta-analysis of the prevalence of hepatitis B virus infection among pregnant women in Nigeria, Omatola and Okolo, 2021, in Kogi State, North-central region of Nigeria, and Talla *et al.* (2021) in Benue State, North-central region of Nigeria.

Most HBsAg-positive women were of low educational status and an increasing level of education was noted to be inversely related to HBV infection, this finding was in agreement with similar studies in Nigeria, by Omatola and Okolo (2021), and Ezegbudo *et al.* (2004). This may be because the study done in hospital of semi-urban area, so it indicates the positive influence of education and public awareness on the carrier rate of HBV infection. However, the report of other studies indicated the high incidence among pregnant women with secondary level of education and higher than that (Yakasai *et al.*, 2012, Anaedobe *et al.*, 2015 and Olakunde *et al.*, 2021).

The rate of vertical transmission of HBV infection is influenced by the time of pregnancy at which acute HBV infection occurs in the mothers (Vu Lam *et al.*, 2010). In present study, the highest seroprevalence of HBV infection was found in those

pregnant women in the third trimester as compared to the second trimesters. However, there was no statistically significant difference in the prevalence of HBsAg seropositivity in different gestational ages of pregnant mothers and it was in agreement with other studies (Kolawole et al., 2012; Pennap et al., 2011).

CONCLUSION AND RECOMMENDATION

The prevalence of 8.8% HBsAg obtained among pregnant mothers attending ANC clinic in this study indicates the incidence of HBV in pregnant mothers of this study area. This finding suggests that the vertical transmission of HBV infection may be a serious public health problem in Bichi LGA, so there is a need for public awareness of the possible risk factors and mode of HBV transmission to prevent the transmission from mother to her newborn baby.

REFERENCES

- Ajuwon, B. I., Yujuico, I., Roper, K., Richardson, A., Sheel, M. and Lidbury, B. A. (2021). Hepatitis B virus infection in Nigeria: A systematic review and meta-analysis of data published between 2010 and 2019. *BMC Infectious Diseases*, 21: 1120–1135.
- Anaedobe, C. G., Fowotade, A., Omoruyi, C. E. and Bakare, R. A. (2015). Prevalence, socio-demographic features and risk factors of Hepatitis B virus infection among pregnant women in Southwestern Nigeria. *Pan African Medical Journal*, 1–11
- Awole, M., and Gebre-Selassie, S. (2005). Seroprevalence of HbsAg and its risk factors among pregnant women in Jimma, Southwest Ethiopia. *Ethiopian Journal of Health Development*, 19(1): 45-50.
- Awoleke, J. O. (2012). Hepatitis B surface antigenaemia among pregnant women in a tertiary health institution in Ekiti State, Nigeria. *Tropical Journal of Obstetrics and Gynaecology*, 29(2): 34-39
- Ezegbudo, C. N., Agbonlahor, D. E., Nwobu, G. O., Igwe, C. U., Agba, M. I., Okpala, H. O., Ikaraoha, C. I. (2004). The seroprevalence of hepatitis B surface antigen and human immunodeficiency virus among pregnant women in Anambra State, Nigeria. *Shiraz E-Medical Journal*, 5: 4-8
- Hepatitis B Foundation (HBF) (2022). Hepatitis B Facts and Figures. Hepatitis B Foundation, 3805 Old Easton Road, Doylestown, PA 18902, USA.
- Kolawole, O. M., Wahab, A. A., Adekanle, D. A., Sibanda, T. and Okoh, A. I. (2012). “Seroprevalence of hepatitis B surface antigenemia and its effects on hematological parameters in pregnant women in Osogbo, Nigeria,” *Virology Journal*, 9: 317.
- Lwanga, S. K. and Lemeshow, S. (1991). Determination of sample size in health studies. A practical manual. World Health Organization.
- National Bureau of Statistics (NBS) (2018). The latest population figures from National Bureau of Statistics you need to see; *Business Insider by Pulse*; Retrieved on 15th June 2022.
- Nwoga, H. O., Ajuba, M. O. and Igweagu, c. w. (2021). Prevalence of Hepatitis B Virus Infection and Its Associated Factors among Pregnant Women Accessing Ante Natal Care at a Tertiary Hospital in Enugu State, Nigeria. *Scholars International Journal of Obstetrics Gynecology*, 4(12): 495-500.
- Olakunde, B. O., Adeyinka, D. A., Olakunde, O. A., Uthman, O. A., Bada, F. O., Nartey, Y. A., Obiri-Yeboah, D., Paintsil, E. and

- Ezeanolue, E. E. (2021). A systematic review and meta-analysis of the prevalence of hepatitis B virus infection among pregnant women in Nigeria. *PLoS ONE*, 16(10): 1–17.
- Omatola, C. A. and Okolo, M. O. (2021). Hepatitis Band Asymptomatic Malaria Infection among Pregnant Women in a Semiurban Community of North-Central Nigeria. *Journal of Environmental and Public Health*, 1–7.
- Pennap, G.R., Osanga, E.T. and Ubam, A. (2011). Seroprevalence of hepatitis B surface antigen among pregnant attending antenatal clinic in Federal Medical Centre, Keffi, Nigeria. *Research Journal of Medical Sciences*, 51: 80-82.
- Rabiu, K. A., Akinola, O. I., Adewunmi, A. A., Omololu, O. M. and Ojo, T. O. (2010). Risk factors for hepatitis B virus infection among pregnant women in Lagos, Nigeria. *Acta Obstetrica et Gynecologica*, 89: 1024–1028.
- Talla, C., Itanyi, I. U., Tsuyuki, K., Stadnick, N., Ogidi, A. G., Olakunde, B. O., Patel, D., Oko, J. O., Aarons, G., Onoka, C. A. and Ezeanolue, E. E. (2021). Hepatitis B infection and risk factors among pregnant women and their male partners in the Baby Shower Programme in Nigeria: a cross-sectional study. *Tropical Medicine and International Health*, 26(3): 316–326.
- UTMB Neonatology Manual (2014). Infectious Diseases; Congenitally Acquired Infections Hepatitis Infections. *Neonatology Manual*. 16–17.
- Vu Lam, N. C., Gotsch, P. B. and Langan, R. C. (2010). “Caring for pregnant women and newborns with hepatitis B or C,” *American Family Physician*, 82(10): 1225–1229.
- World Health Organization (WHO) (1990). “Protocol for assessing prevalence of hepatitis B infection in antenatal patients,” *Tech. Rep. WHO/EPI/GEN/90.6*, World Health Organization, Geneva, Switzerland, Retrieved on 5th May, 2020.
- World Health Organization (WHO) (2020). Guidelines for the prevention, care and treatment of persons with chronic hepatitis B infection. Geneva, Switzerland: *World Health Organization*. Retrieved on 5th May, 2020.
- World Health Organization (WHO) (2021). *Hepatitis*. WHO Regional Office for Africa. Retrieved on 29th July, 2022.
- World Health Organization. (2017). Global hepatitis report. Geneva. Available at: www.who.int/hepatitis/publications/globalhepatitis-report2017/en/. Retrieved on 25th July, 2022.
- Yakasai, I. A., Ayyuba, R., Abubakar, I. S., Ibrahim, S. A. (2012). Sero-prevalence of hepatitis B virus infection and its risk factors among pregnant women attending antenatal clinic at Aminu Kano teaching hospital, Kano, Nigeria. *Journal of Basic Clinical Reproductive Sciences*, 1: 49-55.
- Yoshihiko, Y., Takako, U., Maria, I. L. and Yoshitake, H. (2015). Hepatitis B virus infection in Indonesia. *World Journal Gastroenterology*, 21: 10714–10720.