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PREVALENCE OF HEPATITIS B INFECTION AMONG PREGNANT WOMEN IN GOMBE, GOMBE STATE, NIGERIA

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ABSTRACT

Hepatitis B are endemic in tropical and sub-Saharan Africa. The Epidemiological Study of Hepatitis B infection among pregnant women in Gombe, Gombe State, Nigeria was carried out on 1521 patients reporting for their first antenatal clinic in hospitals and clinics, in Gombe, Gombe State. The serum/plasma test for hepatitis B using strip was done with their socio-demographic parameters were determined. Most of the participants were between 21-30years (56.34), while those with secondary education (49.85%) and housewives (99.41%). The prevalence of hepatitis B was 1.51% with the highest prevalence among age group 21-30years with (63.57%), while the highest prevalence was among those in second trimester (2.29%) and those in primigravidea (3.70%). Those that had secondary education had the highest prevalence of hepatitis B (1.85%), while the business-oriented women had the highest prevalence of hepatitis B (7.84%), and the highest prevalence of hepatitis B was among the married (1.51%). The prevalence of hepatitis B was statistically significant with age group. We advise that measures encouraging personal and environmental hygiene should be encouraged as well as blood screening for hepatitis B should be done.

Keywords: Hepatitis, Patients, age group, pregnant women, prevalence

INTRODUCTION

The national survey on seroprevalence of hepatitis B infection confirms that HBV infection is highly endemic in Nigeria providing a prevalence within the estimated prevalence of 5-15% of adultsin sub-Saharan Africa (WHO, 2009; Mac et al., 2019). Chronic hepatitis B virus (HBV) infection can lead to substantial morbidity and mortality (CDC, 2023). Although treatment is not considered curative, antiviral treatment, monitoring, and liver cancer surveillance can reduce morbidity and mortality. Effective vaccines to prevent hepatitis B are available (CDC, 2023). Persons with chronic hepatitis B virus (HBV) infection are at increased risk for liver cancer and cirrhosis and are 70%–85% more likely to die prematurely than the general population (Beasley *et al*., 1981; McMahon *et al*., 1990; Montuclard *et al.*, 2015; Bixler *et al.*, 2019). More than 2 billion people worldwide are estimated to have had hepatitis B virus (HBV) infection, with 350-400 million being chronic carriers of the virus (Yakasai *et al.*, 2012; Bhattarai *et al.*, 2014; Roberts *et al.*, 2021; Wong *et al.*, 2021;).

HBV accounts annually for an estimated 1 million deaths worldwide (Obi et al., 2006; WHO, 2009) and causes acute and chronic liver disease (CDC, 2023). Its prevalence varies throughout the world, but is highest in tropical regions (Alter, 2003; Apurva and Jordan, 2007) It is estimated that 5-15% of adults in sub-Saharan Africa are chronically infected with HBV (WHO, 2009).

HBV infection affecting pregnant women may result in maternal morbidity and mortality. Immunosuppression in pregnancy is of clinical and epidemiological relevance with regards to hepatitis B viral infection (Oluboyo *et al.*, 2014). The HBV infection could also result in chronic infections in the newborn baby. HBV may be contracted at birth, early childhood or through sex and blood transfusion (Ryder and Beckinghan, 2001). Prevalence of hepatitis B infection varies in different parts of the world. Even within the same country there are regional and population specific variations. A more recent report among pregnant women shows 5.67% in Owerri (Abah et al., 2019), 5.5% in Ilorin (Kolawole and Kana, 2018), and 6.7% in Bauchi (Mustapha et al., 2020).

Mac et al. (2019) reported a prevalence of 19.8% Keffi, Central Nigeria, a pooled prevalence of in across sectional studies of 6.49% (Olakunde *et al.*, 2021) and 33.2% in a Community North Central Nigeria (Ndako *et al.*, 2021). This study was carried out to determine the prevalence of hepatitis B virus among pregnant women attending antenatal care for the first time.

Study Area

The study covers all pregnant women in Gombe metropolis visiting some hospitals and clinics in Gombe metropolis for their first antenatal where blood samples for the tests will be obtained. The research work was limited to Gombe metropolitan with samples from Gombe specialist Hospital, Federal Teaching Hospital, Pantami maternity, Emirs palace maternity and Bolari maternity

Ethical Consent

Ethical clearance was obtained from the research ethics committee of Federal Teaching Hospital Gombe and Gombe State Ministry of health Gombe, Gombe State. Written permission was received from the Management of the Federal Teaching Hospital, Gombe and Gombe State ministry of Health while verbal consent was also sought and obtained from the study participants.

Research Study design

The study was conducted in Gombe metropolis from five hospitals and maternity clinics which include the following Gombe specialist Hospital, Federal Teaching Hospital, Pantami maternity, Emirs palace maternity, Bolari maternity from May 2021 to July 2022. All persons attending five of the hospital for their first antenatal were eligible for the study. A

questionnaire was used to collect data of women who consented to be part of the study prior to collection of blood sample.

Sample size determination and sampling technique

The sample size was calculated using the single population proportion sample size calculation formula, with a 95% confidence level, a 5% margin of error, and the proportion of hepatis B infection among pregnant women (P) from pilot sampling for one week and taken as 6.1% (Lwanga and Lemeshow, 1999).

$N = Z^2\alpha/2 \frac{P(1-P)}{d2}$

Key: N = sample size, Z the value corresponding to 95% level of significance, P = proportion of hepatitis B infection, and d = margin of error. In addition, from the five Hospitals in the study area participants were selected based on their consent (Kampe *et al.*, 2023; Lwanga and Lemeshow, 1999). The sample size was determined from Lwanga and Lemeshow, (1999) table and was proportionally distributed to each hospital as per the current number of pregnant women populations. Then, a multistage sampling technique was employed to get each study subject during the actual data collection period (Lwanga and Lemeshow, 1999).

Subject Selection

All the pregnant women attending Hospitals or Maternity centre in Gombe metropolitan for the first time during the present pregnancy without any complications were eligible for the study. Healthy pregnant women who have not given their consent or disagreed for their blood to be collected were excluded in the study. The participation was voluntary and only participants that gave their consent verbally were enrolled.

Test for Hepatitis B

Hepatitis B screening will be determined by One step Hepatitis Virus serum/plasma Test as described by (Blumberg, 1971; Zuckerman *et al.*, 1997; Kao, 2008)

RESULTS AND DISCUSSION

The Socio-demographic characteristics of the study of population (pregnant women) In the five selected hospitals and maternity is shown in Table1. One thousand, five hundred and twenty one (1521) of pregnant women attending antenatal care for the first time in the five selected hospitals were randomly selected and enrolled for the study. The result revealed that the age range 21–30 had the highest number of participants 857 (56.34%), followed by 31–40 year old with 486 (31.95%) and 10–20 year with 123 (8.09%). The least age group among participants was 51–60 years with 3(0.20%), followed by 41–50 year old with 52 (3.42%).

The literacy level of the participating pregnant women showed that participants with secondary education 758 (49.84%) had the highest, followed by primary education 501 (32.94%), non-formal education 132 (8.68%), while the least were those with tertiary education 130 (8.55%).

Most of the study population were house wives 1294 (85.08%), followed by civil servants 169 (11.11%), business oriented women 51 (3.35%), while the least were students 7(0.46%). Most of the studied patients were married 1512(99.41%), there was no widow among the sample participants, while 9(0.59%) were single.

Table 1: Demographic Information of the Study Population

Parameter	Number of participants	Percentage of Participants (%)
Hospital/maternity Clinic		
Gombe specialist Hospital	802	52.73
Federal Teaching Hospital Gombe	217	14.27
Emir's palace maternity	153	10.06
Bolari maternity	166	10.91
Pantami maternity	183	12.03
Total	1521	100.00
Age group (years)		
10-20	123	8.09
21-30	857	56.34
31-40	486	31.95
41-50	52	3.42
51-60	3	0.20
>60	0	0.00
Total	1521	100.00
Literacy level		
Primary	501	32.94
Secondary school	758	49.84
Tertiary	130	8.55
Non formal education	132	8.68
Total	1521	100.00
Occupation		
Civil servant	169	11.11
House wife	1294	85.08
Business	51	3.35
Farmer	0	0.00
Student	7	0.46
Unemployed	0	0.00

Total	1521	100.00
Marital Status		
Married	1512	99.41
Single	9	0.59
Widow	0	0.00
Total	1521	100.00

Table 2 show the prevalence of hepatitis B in relation to age of the study subjects. The result showed that out of 1521 sampled population, 23(1.51%) were reactive to hepatitis B infection. The result also show that the highest prevalence were observed among the age range 21–30 (52.17%), followed by 31–40 (43.48%). The least prevalence was observed among 10–20 (4.35%). The result shows a statistically significant correlation between hepatitis B and age range ($p<0.05$).

Table 2: Prevalence of Hepatitis B virus in relation to socio demographic characteristics.

Age group (years)	No. Screened (%)	Prevalence of hepatitis B (%)
10-20	123(8.09)	1(4.35)
21-30	857(56.34)	12(52.17)
31-40	486(31.95)	10(43.48)
41-50	52(3.42)	0
51-60	3(0.20)	0
>60	0	0
Total	1521(100.00)	23(100.00)
Trimester		
1st	1275(83.83)	18(1.41)
2nd	218(14.33)	5 (2.29)
3rd	28(1.84)	0(0.00)
Total	1521(100.00)	23(1.51)
Gravidae		
1	378(24.85)	14(3.70)
2-4	1076(70.74)	8(0.74)
4-7	59(3.88)	1(1.69)
>7	8(0.53)	0
Total	1521(100.00)	23(1.51)
Educational Level		
Primary	501(32.94)	6(1.20)
Secondary	758(49.84)	14(1.85)
Tertiary	130(8.55)	1(0.77)
Non-formal	132(8.67)	2(1.52)
Total	1521(100.00)	23(1.51)
Occupation		
Civil servant	169(11.11)	3(2.48)
House wife	1291(84.88)	16(1.25)
Business	54(3.55)	4(7.84)
Farmer	0(0.00)	0
Students	7(0.46)	0
Unemployed	0	0
Total	1521(100.00)	23(1.51)
Marital status		
Married	1512(99.41)	23(1.51)
Single	9(0.59)	0
Widow	0	0

Correlation of hepatitis B *positivity in relation to age at P=0.005 was r= 0.941***
Correlation of hepatitis B *in relation to* trimester *at P=0.667 was r= -0.500*
Correlation of hepatitis B *in relation to gravidae at P=0.600 was r= -0.400*
Correlation of hepatitis B *in relation to* literacy Level *at P=0.200 was r= 0.800*
Correlation of hepatitis B *in relation to* Occupation *at P=0.115 was r= 0.708*
Correlation of hepatitis B *in relation to m*arital status *at P=0.333 was r= 0.866*

The prevalence of hepatitis B in relation to trimester is shown in Table 2. Most of the participants (83.83%) reported for their antenatal in their first trimester, followed by (14.33%) that reported in their second trimester, while only (1.84%) reported in the last trimester. The result for the highest prevalence of hepatitis B was seen among those that reported in the second trimester (2.29%), followed by those in the first trimester (1.41%), none was positive among those in third trimesters. There was no

statistically significant ccorrelation of hepatitis B reactivity in relation to trimester at P=0.667 with r= -0.500.

The prevalence of hepatitis B in relation to gravidae of the patients attending antenatal for the first time during that pregnancy is shown in Table 2. The result revealed that majority of the participants (70.74%) had 2-4 pregnancies before the present one, followed by the primigravids (24.85%), then those that had 4-7 pregnancies before the present one (3.88%) and the least among those that more than 7 pregnancies before (0.53%)

The highest prevalence of those with hepatitis B infection was observed among the primigravida pregnant women (3.70%), followed by those that had 4–7 pregnancies (1.69%), while the least was observed among those that had 2–4 children (0.74%). There were no infection among those that had more than seven children before 0. There were no statistically significant correlation between hepatitis B reactive in relation gravidae at P=0.600 with r value of -0.400.

Table 2 reveal the result of the prevalence of hepatitis B in relation to literacy level. Majority of the sampled population (49.84%) had completed their secondary education, followed by those with primary school leaving certificate (32.94), those with non-formal education (8.67%), followed by tertiary education (8.55%) being the least. The result for those with hepatitis B show that the highest prevalence was seen among those with secondary education (1.85%), followed by non-formal education (1.52%), followed by those that had only primary education (1.20%), while the least was obtained among those that had completed their tertiary education (0.77%). There was no significant ccorrelation between hepatitis B reactivity and educational level at P= 0.200 with r value of 0.800.

The result in table 2 show the prevalence of hepatitis B in relation to occupation. The highest of the pregnant women (84.88%) were house wives, followed by civil servants (11.11%), business oriented women (3.55%), while the least number of those screened were students (0.46%). The highest prevalence of those infected with hepatitis B was business oriented women (7.84%), followed by the civil servants (2.48%), while the least was observed among the house wives (1.25). There was no statistically significant ccorrelation between hepatitis B infection and occupation at P=0.115 and r= 0.708

Table 2 also show the prevalence of hepatitis B in pregnant women in relation to marital status. The result indicates that most of those screened were married women (99.41%), while (0.59%) were single women. The prevalence of hepatitis B infection was only observed among the married women (1.51%). No significant ccorrelation between hepatitis B reactivity and marital status at P=0.333 with r = 0.866

Table 3: Prevalence of hepatitis B in relation to the selected hospitals/maternity clinics

Hospital/maternity Clinic	Number screened (%)	Prevalence of hepatitis B (%)
Gombe specialist Hospital	802(52.73)	10(1.25)
Federal Teaching Hospital Gombe	217(14.27)	7(3.23)
Emir's palace maternity	153(10.06)	3(1.96)
Bolari maternity	166(10.92)	1(0.60)
Pantami maternity	183(12.02)	2(1.09)
Total	1521(100.00)	23(1.51)

Table 3 show the distribution of the prevalence of hepatitis B in relation to the selected sampling hospital in Gombe metropolitan. The highest number of sample was collected from Gombe state specialist hospital 802(52.73%), followed by Federal Teaching hospital Gombe, while the least was collected from Emir's palace maternity clinic 153(10.06%). The highest prevalence of hepatitis B was observe form Federal teaching hospital 7(3.23%), followed by Emir's palace maternity clinic 3(1.96%), while the least from Bolari maternity clinic 1(0.60%), followed by Pantami maternity clinic 2(1.09%).

Discussions

Table 1 showed the socio demographic of the participant in the study. The highest number of respondents was in the age group of 21-30 years, which is the sexually active age group. The age range 31-40 years was the next age range with highest numbers of participant. This may also be the same reason as in the first age group. There was no participant among the age group 60years, and above which means that at that age, most of the women have passed the age of child bearing. This accounts for the low number of participants in the age range 51-60 years and 41-50 years. The age range 10-20 was the third with the least numbers of participants because only few ladies got married in the young age group. The reason also for the relatively high number of pregnant women in the age range 21-30years was due to the cultural and religious believes of the people living in Gombe Metropolitan of Gombe State.

With regards to the table also showed the distribution of literacy level of the participants, the highest number of participants were those that completed their secondary education, followed by primary education and non-formal education. The reason for the higher number of participants with only secondary, primary and non-formal education, might be due to religious and cultural believes of the people that a girl can be given out for marriage at an early age (immediately after primary or secondary education) so as to prevent them from having sex before marriage. The low level of education and early marriage observed among the participants may also be due to the financial challenges of their parents to carter for their grown up daughters thereby giving them out for marriage, this was considered the best thing left for them to do. Another reason for the high number of participants with low level of education was their desire to have more numbers of children compared to their co-wives. Those with tertiary education had the lowest number of participants, which might be due to the attitude of ladies in the group not willing to have many children, because some of the educated ladies believe the fewer the number of children they give birth to, the more the capacity to train them educationally and otherwise.

The socio-demographic detail also showed the distribution of occupation of the participants. The highest number of the participants were house wives which was due to the religious and cultural believe of the people that for a woman to be pregnant she must first be married. The high number of the house wives might also be because most of the pregnant women got married at an early age without good education to secure a job as a married woman. The marital status of participants indicate that 99.41% of the women were married. This may be due to the religious and culture believes of the

people that getting pregnant without getting married is a taboo and forbidden in their culture. There was no pregnant widow because it is forbidden to get pregnant outside wedlock since there husband is dead and they have not remarried.

The result in table 2 show the prevalence of hepatitis B infection and by the definition of HBV endemicity based on the Hepatitis B prevalence: low (<2%), lower-intermediate (2–4.99%), higher intermediate (5–7.99%), and high (>8%) (Ott *et al*., 2012) which indicate that the endemicity of the prevalence of 1.51% among pregnant women attending antenatal for the first time during that pregnancy in Gombe metropolitan is low.

Some of the reported research work that reported prevalence lower than the present study include a cross-sectional study of pregnant Omani women with the prevalence of 1.49% (Al-Ismaili *et al.,* 2022), a prevalence of 1.5% was reported in the UAE and 1.0% in Qatar in a cross-sectional study in 2006 (Awaidy *et al.,* 2006), in Bahrain, the prevalence was estimated to be 0.58% (Janahi, 2014), likewise a prevalence of 1.2% in Iran and slightly higher 2.1% in Turkey (Shoghli *et al.,* 2014).

The findings of this work was relatively comparable with some studies reported from other parts of Nigeria and across the globe. Prevalence of (3%) for Hapatitis B among pregnant women was reported in Oshogbo South Western Nigeria (Adeleke *et al.,* 2013) and the prevalence of 5.67% HBV was recorded among Pregnant Women Attending Federal Medical Center, Owerri (Abah, Onoja and Amadi, 2019). In Ilorin a prevalence of hepatitis B was 5.5% (Kolawole and Kana, 2018). Most workers reported a higher prevalence than our present study. Research studies conducted in some part of Nigeria showed prevalence in, Southern Nigeria (7.3%), and Northern Nigeria (7.9%, 8.2% and 8.3%) (Yakasai *et al.,* 2012; Chinenye *et al.,* 2015). The overall prevalence of (6.7%) was reported for HBsAg (Mustapha *et al.,* 2020). The Prevalence of 18.6% was reported by Kolawole, *et al*. (2012) in Ilorin while, Mac, Suleiman and Airiohuodion, (2019) reported a prevalence of 19.8% among pregnant women attending antenatal care at FMC, Keffi, Central Nigeria. The prevalence in Ibadan was 16.3% by Adeyemi, *et al.,* (2014) and a prevalence of 7.7% for HBV in Northern Ghana (Anabire *et al.,* 2019), while 3.7% was reported by (Ndams et al., 2008) in Minna, Nigeria.

In a hospital-based cross sectional study carried out at the antenatal clinic of the University College Hospital, Ibadan in South-western Nigeria the HBV seroprevalence of 8.3% was obtained among the pregnant women (Anaedobe *et al.,* 2015), indicating that HBV is highly endemic in Nigeria. This is similar to the 8.3% prevalence, found among pregnant women in South East (Okonko and Udeze, 2022), and North East Nigeria (Maureen, 2009), as well as 7.9% in North Central Nigeria (Olokoba *et al.,* 2011). The reported prevalence of HBV depicts a trend that follows a low prevalence from the southern parts of the country increasing to its highest of 15.8% in the northern parts (Anaedobe *et al.,* 2015). The pooled prevalence of HBV infection among pregnant women in across sectional studies was 6.49% (Olakunde *et al.,* 2021), while(33.2%) was found to be positive for Hepatitis B virus (Ndako *et al.,* 2021). The seroprevalence of 62.5% was recorded among pregnant women attending antenatal facility at Aminu Kano Teaching Hospital, Kano, Nigeria (Jatau and Yabaya, 2009).

The overall prevalence of 3.3% of HBV infection was reported among pregnant women receiving antenatal care at some selected antenatal clinics in the Ningo-Prampram District of the Greater Accra Region of Ghana (Kwadzokpui *et al.,* 2020). The prevalence of HBV reported in Ethiopia include: Gandhi Memorial Hospital (2.3%) by Negesse and Debelo (2019), Dawuro zone (3.5%) by, Chernet, Yesuf and Alagaw, (2017), Arba Minch Hospital (4.3%) by (Yohanes, Zerdo and Chufamo, (2016), Felegehiwot Referral Hospital (4.7%) by Gedefaw *et al.,* (2019), West Hararghe Zone, (6.1%) by Belay, Tesfaye and Lemessa (2020) and Agena Health Center 4.1% (Workye *et al.,* 2022). Prevalence of (5.9%) for HBV among pregnant women at ANC Clinic of Mizan-Tepi University Teaching Hospital and Mizan Health Center, Southwest Ethiopia was reported (Asaye *et al.,* 2021). The prevalence was also reported from Shenyang, China to be (3.1%,) (Sheng *et al.,* 2018), East Wollega Zone, Ethiopia (2.4%) (Dabsu, Ejeta *et al.,* 2018) and Addis Ababa, Ethiopia (4.3%) (Tegegne *et al.,* 2014).

In somestudies conducted among pregnant women in different African countries, showed the prevalence of 3.9% and 6.3% was recorded in Tanzania (Mbaawuaga *et al.,* 2008) and Northern Tanzania, (5.7%) (Tan, Liu and Mao, 2016) respectively. The report also include 6.2% in Sierra Leone, 6.5% in Congo and Zambia (Awole and Gebre-Selassie, 2005), while higher prevalence of 25.3% was observed in Cameroon (Kao *et al.,* 2004). In Kinshasa DR Congo had the prevalence of HBV infections among pregnant women 3.5%, 4.3%, 3.8% and 4.7%, respectively as reported by (Chernet, Yesuf and Alagaw, 2017; Yohanes, Zerdo and Chufamo, 2016; Zenebe *et al.,* 2014; Mpody *et al., 2019*).

The seroprevalence of hepatitis B virus infection among pregnant women living with HIV attending Prevention of mother-to-child transmission (PMTCT) clinics in the Mtwara region Tanzania was 10.5% (Shedura, Mchau and Kamori, 2023). A prevalence of 9.20% amongst pregnant women in the Gambia (Bittaye *et al.,* 2019). Ethiopia, Cameroon, China, and Ghana, also reported the seroprevalence of 9.2%, 9.3%, 11.3%, and 14.9%, respectively, among HIV infected pregnant women (Frempong *et al.,* 2019; Kfutwah *et al.,* 2012).

In other parts of the world, various prevalence were observed among their pregnant women and this agrees with WHO epidemiological survey report that global prevalence of HBV infection varies and are highest in Africa, Asia and Western Pacific (>8%) and lowest in Western Europe, North America and Australia, with prevalence in sub-Saharan Africa ranging from 9% to 12% (Kao *et al.,* 2004; Awole and Gebre-Selassie, 2005; Mbaawuaga *et al.,* 2008; Ndams *et al.,* 2008; Todd *et al.,* 2008; Maureen, 2009; Ola *et al.,* 2009; Agarry and Lekwot, 2010). Similarly the prevalence in Vientiane, Laos (5.44%) Choisy *et al.,* (2017); Yirgalem (10.1%) Amsalu *et al.,* (2018); Iran (2.1%), (Moghaddasifar *et al.,* 2016).

The national survey on seroprevalence of hepatitis B infection confirms that HBV infection is highly endemic in Nigeria with the literature suggest that in most African countries, the seroprevalence of HBV infection varies from intermediate to high endemicity which is not consistent with our findings. The difference in prevalence observed in our studycould be due to the variation in diversity of patients attending different health institutions, compared to only one localized health centre or hospital which is patronized by the people within a given community. Illiteracy is a contributory factor responsible for the high prevalence of HBsAg in Nigeria for lack of proper knowledge on how to avoid HBV infection (Mac, Suleiman and Airiohuodion, 2019).

The variation between result obtained from the current study and some reported works before might be due to the differences in socioeconomic status, socio-cultural environment, sexual practices, and medical exposure among study settings of Gombe metropolitan which harbours more enlightened people. Pregnant women who shared sharp

piercing object with others might be at a higher risk of being infected with HBV compared to those who did not share these sharp objects (Asaye *et al.,* 2021; Reinaldo *et al*., 2017). Women who had a history of multiple sexual partners were at a higher risk of being seropositive for HBV (Asaye *et al.,* 2021; Reinaldo *et al*., 2017; Belay, Tesfaye and Lemessa, 2020; Alemu, Zeleke and Aynalem, 2020).

The inconsistencies in our result with those reported could also be due to variations in sample size between our current study (1521) and other reported studies which were lower than our current study; Gambia (416), (Bittaye *et al.,* 2019), Yirgalem (475) (Amsalu *et al.,* 2018), Gambella (253) (Tanga *et al.,* 2019), Dawuro zone (289) (Chernet, Yesuf and Alagaw, 2017), Arba Minch hospital (232) (Yohanes, Zerdo and Chufamo 2016) and Felegehiwot referral hospital (338) (Gedefaw *et al.,* 2019).

The low prevalence of HBV might also be due to the recommendations (WHO, 2009) which stated that Nigeria currently offers a HepB-BD (Hepititis B given within 24 hours of birth) in the national immunization program for children, followed by 3 doses to complete the primary series (Sadoh and Sadoh, 2014; National AIDS/STIs Control Programme, 2016; Ochu and Beynon, 2017; Okenwa *et al.,* 2019; Okenwa *et al.,* 2020). The effective HBV vaccination being carried out in Gombe metropolitan on the general public by the heath care facilities (Federal Teaching Hospital, Specialist Hospital, Gombe and other government hospitals and clinics within Gombe town) may be responsible for the decline in the prevalence of HBV infection. The recommendation measures taken by the government of Gombe State for the prevention of HBV specifically on older children, adolescents, and adults, including high-risk populations such as sex workers, medical personnel, and students might have helped in reducing the incidence of the virus. (National AIDS/STIs Control Programme, 2016; Omotowo *et al.,* 2018; Dayyab *et al.,* 2020). The decline in the prevalence might also be because most women that knew their positive status of infection will deliberately refuse to get pregnant to avoid giving birth to positive children or even refuse to take part in the study. The reason for the wide disparity may suggest a decline in HBV prevalence among pregnant women in Nigeria.

The result in Table 2 also shows the prevalence of hepatitis B positivity in relation to age of the patients.The highest prevalence were observed among the age range 21–30 years with (52.17%), followed by age range 31–40 years with (43.48%), while the least was observed among the 10–20 age range with (4.35%). Similar result was reported, aaccording to Ndako *et al*. (2021) the highest prevalence was found among those aged 21-30years with (19.5%), while the highest prevalence of (37.1%) was found between 25-29 years old (Workye et al., 2022). Anaedobe *et al.,* (2015) reported the highest HBV infection among 25-29 year age group (Anaedobe *et al.,* 2015). In other reports Hepatitis B infection in, age group 15-24 years (16.95%) had the highest prevalence of infection, followed by 25-34 years (4.17%) and there was a statistically significant difference in prevalence across the age groups Abah, Onoja and Amadi, 2019). The Prevalence of HBsAg among Pregnant Mothers was highest with (41.4%) among women aged less than 25 years (Asaye *et al.,* 2021).

Others reported higher prevalence among women age above 35 years had the highest prevalence (10%) as reported by (Mustapha *et al.,* 2020). A highest proportion of HBsAg seropositive women was found among those at or above 45 years of age (33.3%) (Mac, Suleiman and Airiohuodion, 2019), while those within the age range of 26-35 years had the lowest prevalence of 17% (Mac, Suleiman and Airiohuodion, 2019). In a study, out of the total number of participants aged 30-39 years, (9.09%) tested positive for HBsAg, whereas (25.00%) of the study participants were aged forty years and above tested positive for the disease (Kwadzokpui *et al.,* 2020), which was similar to Olakunde *et al.,* (2021) who reported age > 25 years had the highest prevalence of HBV and was not statistically significantly with age different.

The high prevalence reported in our study was among those in the active younger sexual age group. The higher number of infection amongst the youthful age group could be attributed to their higher-risk behaviour to contracting HBV such as failure of unrestricted sexual activities and sex without protection, a greater tendency for drug and substance abuse, indulgence in fashionable tattooing and body piercing.

The result for the prevalence of hepatitis B in relation to trimesters is also shown in table 2. The result of our findings were in agreement with the report of Ndako *et al*. (2021), that women in their second trimester of pregnancy had a highest prevalence of 22.2%. According to Shedura *et al.* 2023 in Tanzania highest prevalence of hepatitis B 19.1% was observed in second trimester, followed by 9.8% in third trimester and no infection in first trimester.

The report by Mac, Suleiman and Airiohuodion, (2019) was not in agreement with the finding of this work by reporting that women in the third trimester of their gestational period (39.2%) had the highest prevalence of HBsAg compared to those in first trimester (18.2%) and second trimester (15.3%). Kwadzokpui *et al.,* (2020) also reported that participants who were in their third trimester had a prevalence of 4.55% higher than their counterparts in their second trimester (Kwadzokpui *et al.,* 2020). The high prevalence of hepatitis B among the second trimester may be because they were reporting for the first time for the antenatal.

Our result on hepatitis B and gravidity is in agreement with that of Mustapha *et al.* (2020) who reported that the highest prevalence was among the primigravidae (9.7%), followed by the multigravidae (4%). The prevalence of hepatitis B among the primipara was highest (10.6%) while multipara had (4.5%) (Asaye *et al.,* 2021) just as in our findings. Some of the previous report were not in agreement with our result in which they reported the highest prevalence of hepatitis B infection to be among the mutigravidea. Similarly, Kampe *et al.,* (2023) reported a higher prevalence of (7.7%) among multigravida, with primigravida recording (1.1%). Also with regards to gravidity, 78.1% were multigravidae, while 21.9% were primigravidae (Anabire *et al.,* 2019), while, Helegbe *et al.,* (2018) said (24.5%) had two previous pregnancies and (24.4%) had no child. According to Anaedobe *et al*. (2015), most of the HBsAg positive women were multi-gravida (73.34%). Those that had given birth to more than five children (grand multiparous) presented with the highest prevalence of (10.00%) of the disease (Kwadzokpui *et al.,* 2020) which was similar to the highest prevalence in multiparous women of (11.99%) as reported by Shedura, Mchau and Kamori, (2023). This may be due to increased risk of HBV infection through sexual exposure and risky sexual behaviour since most of the primigravida were in the active age group. The high prevalence among the primigravida might also be because they were getting pregnant for the first time and might not have knowledge about the measure of protection and control of the transmission of the disease (Anaedobe *et al.,* 2015).

Our findings of this study in Table 2 of hepatitis B infection in relation to educational level is in agreement with the report of Kwadzokpui *et al.* (2020) who stated that pregnant women who had secondary level of education recorded the highest

prevalence of the disease (5.66%) compared to those who had basic education (2.86%) while the illiterates ones had the second highest prevalence (3.13%). Similarly, considering educational status of the subjects screened, highest prevalence was recorded among those without formal education with (13.2%) (Ndako *et al.,* 2021), while the highest prevalence was among those that did not attend formal school with a prevalence of (6.6%) (Asaye *et al.,* 2021). Also, according to Mustapha *et al.* (2020) said there was no prevalence among those with tertiary education, while the highest prevalence was observed among those with primary level education (6.2%). Most of HBsAg-positive women were of low educational status as reported by Anaedobe *et al.,* (2015).

The results indicated a significantly lower prevalence of HBV in pregnant women who had more education compared to those who had lower or no education. Educated women are more likely to be aware of HBV and to have been vaccinated against HBV (Adeyemi et al., 2013). This may explain the significantly lower prevalence among those who had higher education compared to the less-educated women (Adeyemi *et al.*, 2013).

The result of our study revealed the highest prevalence of those infected with hepatitis B antigen was among business oriented women (7.84%), followed by civil servants (2.48%), while the least was observed among the house wives (1.25) There was no significant correlation between hepatitis B infections in relation to Occupation at P=0.115 and r= 0.708. According to Bittaye *et al.* (2019) the highest prevalence was observed among the traders (20.4%) followed by the civil servants (13.4%), farmer (10.0%) and the least among the unemployed (5.8%), which is in agreement withour findings with highest prevalence among the business oriented women. Mustapha *et al. (*2022) alsoreported the highest prevalence among traders 20.4%, while, those with informal work had the highest prevalence of 5.47 (Kwadzokui *et al* 2020). Other reported result was not in agreement with our findings, for instance, according to Kampe *et al*. (2023) the highest prevalence of hepatitis B infection was among others excluding (employee, housewife, merchant and daily labours) with 11.1%, followed by daily labourers 10%, merchants 7.8%, and the employee with the least among the house wives. Similar result from Asaye *et al.* (2021) showed high prevalence among others (Daily labourer and students) (10%), followed by house wives (9.6%), civil servant (5.4%), merchant (5.3%) with least among the farmers. Mac, Suleiman and Airiohuodion, (2019), reported house wives had the highest prevalence of HVB (22.7%), students (19.3%) and civil servant (14.0%). The high prevalence among the business oriented may be because they mingle with different type of people which might had led them to having sex and contacting the disease.

The result of our findings on hepatitis B and marital status is consistent with that of Olakunde *et al.,* (2021) who reported the highest prevalence among the married 5.45% while the single 1.72%. Workye *et al*., (2022) reported the highest prevalence of 2.3% was among the married, while the single had 2.0% and also said the prevalence of hepatitis B was associated with marital status. There was no HBV infection among the single and the cohabiting pregnant women, but 5.69% of the married had the virus (Kwadzokpui *et al*., 2020). Other worker's report were in disagreement with our findings, `for instance a research conducted in central Nigeria showed the highest prevalence was among the single (25.0%) and the married (19.4%) (Mac, Suleiman and Airiohuodion, 2019), while Shedura *et al*. (2023) reported the highest prevalence was among the divorcee (25%), followed by singles (11.3%), the married (9.0%) and the least among those cohabiting (6.7%). The highest prevalence was reported among the divorcees/widows (10.0%) followed by 5.5% among the married, while the single had the lowest prevalence of 4.3% (Kampe *et al.,* 2023).Bittaye *et al. (*2019) reported the highest prevalence was among the single (11.1%), while among the married it was (9.32%), while Asaye *et al.* (2021) also reported the highest prevalence of HBV among those that are not married (15.0%), while the prevalence among the married was (5.4%).

Married women exhibited a significant risk of HBV infection in our study. This finding suggests that acquisition of HBV infection which may be related to sexual lifestyle, is influenced by education as well as unprotected sexual intercourse that cuts across all categories of participants irrespective of marital status (Yakasai and Rabiu ,2001; Mac, Suleiman and Airiohuodion, 2019). This likewise indicates the less probability of getting the disease is dependent on marital status (Mac, Suleiman and Airiohuodion, 2019). Despite the fact that, this was at variance to the discoveries from comparative works by Adegbsan-omilabu (2015), where a significantly high prevalence of HBsAg was reported among the unmarried, pregnant women compared to their single counterparts.

CONCLUSION

This study recorded a prevalence of 1.51% of Hepatitis B virus infection amongst pregnant women in Gombe, Gombe State, which also indicate a risks of HBV perinatal transmission. It is therefore strongly recommended that pregnant and non-pregnant women be routinely screened for Hepatitis B virus infection as part of antenatal care services.

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