



Research Article

Sero-prevalence of HBsAg and anti-HCV Co-infection among Pregnant Women Accessing Primary Health Care (PHC) Maternity of Lamurde, Mubi-South, Adamawa State, Nigeria

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ABSTRACT

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The epidemiology of viral hepatitis among pregnant women is of paramount significance in policy and decision making and the provision of effective and adequate antenatal care, especially in the grassroots health care facilities like that of our study area. This study is cross-sectional hospital-based research aimed at investigating the seroprevalence of HBsAg and anti-HCV among pregnant women accessing PHC maternity in Lamurde, Mubi for antenatal care. Blood samples from all the 100 consenting pregnant women were screened for HBsAg and anti-HCV antibodies using rapid diagnostic kits. A total of 11(11.0%) of the pregnant women tested were seropositive for HBsAg and none 0.0(0.0%) of the participants tested were seropositive for anti-HCV. Hepatitis B surface antigen (HBsAg) seropositivity was highest in the age group 26-30yrs (17.4%) and least in the age group 16-20yrs (3.4%). However, no single case of HBsAg and or anti-HCV was recorded in the age groups 31-35. Most of the participants (55.0%) in this study were those without formal education. The highest (18.5%) prevalence rate of HBsAg was reported among pregnant women with secondary education, closely followed by pregnant women with primary education (18.2%). The association between educational status and infection with hepatitis B virus (OR =3.75, 95% CI = 0.931-15.08) showed that the odds were 3.75 times higher that pregnant women with formal education will be infected with HBV when compare with pregnant women with no formal education, but with no statistical difference. In view of the above result and the likelihood of mother-to-child transmission of hepatitis viruses, there is a need to institute compulsory routine screening for these viruses for all pregnant women attending antenatal care in Mubi.

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INTRODUCTION

Hepatitis B virus (HBV), a partially double-stranded DNA virus with a circular genome that belongs to the family hepadnaviridae, is responsible for causing hepatitis B infection. (Esan *et al.*, 2014; Onwuliri *et al.*, 2017). There are several antigenic components to HBV which include; Hepatitis B surface antigen (HBsAg), hepatitis B core antigen (HBcAg), and hepatitis B extractable antigen (HBeAg). However, immune response to either HBcAg or HBsAg is responsible for protection against HBV infection (Kwon and Lee, 2011; Gasim *et al.*, 2013), while the infectious state of the virus is portrayed by the soluble extractable protein (HBeAg) (Esan *et al.*, 2014).

Hepatitis is swelling of the liver typified by the presence of inflammatory cells in the tissue of the organ. In addition to certain substances such as toxins (derived from plants, alcohols, certain medications) and several other infections, hepatitis is mostly caused by an assemblage of viruses collectively called hepatitis viruses (Ugbebor *et al.*, 2011). Viral hepatitis is a relentless disease of the liver, instigated majorly by hepatitis B and C virus, and constitutes a public health predicament, especially in underdeveloped countries (Esan *et al.*, 2014).

HBV is more severe than HCV and much more severe than HIV and can remain infectious outside the body for more than 7 days (Apuzzio *et al.*, 2012; Pennap *et al.*, 2015). HBV is often referred to as a 'silent killer' because many people carrying the virus are asymptomatic and unaware of the infection (Samuel *et al.*, 2004; Onwuliri *et al.*, 2017).

Despite the availability of vaccines and other forms of therapy, HBV still constitutes a nuisance to public health (Harkisoen *et al.*, 2012; Chaiba *et al.*, 2012). This was contained in a WHO report which estimated the global burden of HBV infection to be approximately 2 billion with more than 17.5% of this burden developed chronic infection and mortality rate between 0.025-0.035% annually; most of which occur in developing countries (Gasim *et al.*, 2013; Jibrin *et al.*, 2016)

Hepatitis C virus which belongs to the family Flaviviridae is a single-stranded RNA virus reported to have infected about 170 million people globally with a mortality rate of about 0.21% (Hahne *et al.*, 2013; Esan *et al.*, 2014; Onwuliri *et al.*, 2017). Studies have shown that about half of the patients infected with HCV developed chronic carrier states, therefore, stand the chance of developing cirrhosis of the liver and hepatocellular carcinoma (Ugbebor *et al.*, 2011).

Both HBV and HCV are carried from person to person during contact with infected blood either through sexual contact or parenterally and also through haemodialysis and perinatal infection (vertical transmission) (Onwuliri *et al.*, 2017). Among these modes of transmission, sexual contact is the most significant route of transmission of these viruses, especially among pregnant women (Jibrin *et al.*, 2016). This is because pregnant women who tested positive for both viruses can vertically pass on the viruses to their infants particularly when the pregnancy is in the third trimester (Luuse *et al.*, 2017; Pennap *et al.*, 2017; Oti *et al.*, 2018). This may cause hepatitis in the newborn with deleterious effects, which later in life may lead to mental and physical health impairment. Viral hepatitis in pregnant women is also reported to be a common cause of jaundice and a leading cause of maternal mortality (Ugbebor *et al.*, 2011)

Given the background information and the asymptomatic nature of these viruses, the epidemiology of viral hepatitis among pregnant women needs to be established for adequate planning, policymaking, and treatment to forestall the future generation from infections and associated complications later in life. This study, therefore, explores the seroprevalence of HBsAg and anti-HCV which are the hallmark of HBV and HCV respectively among pregnant women in our study area.

MATERIAL AND METHODS

Study Design

This was a cross-sectional study that was conducted between March to June 2018 in which consenting pregnant women, attending Antenatal care at Lamurde Primary Health Care (PHC) maternity clinic in Mubi were recruited for hepatitis B surface antigen (HBsAg) and anti-hepatitis C virus (anti-HCV) screening.

Study area

The study area was Lamurde PHC maternity located in Mubi South Local Government Area of Adamawa State within the coordinates, 10°13'55.4"N 13°15'05.1"E

Ethical Consideration

The concept of the study was made known to each subject in clear understandable language. After which, verbal informed consent was obtained from each participant prior to their inclusion in the study. Also, ethical approval was granted by the management of the PHC maternity before the start of the project. The individual laboratory results were kept confidential and given to the participants at the completion of the project. Seropositive subjects were counselled and advised to seek medical attention immediately.

Inclusion Criteria

All pregnant women who gave their consent after a careful explanation of the concept of the research were included in the study.

Exclusion Criteria

All pregnant women who had once been vaccinated with the required doses of the vaccines and those who declined to offer consent were excluded from the study.

Sample collection and processing

After observing the aseptic procedure on each subject, 5ml venous blood was collected by venepuncture into blank EDTA tubes. The serum was separated within 1-2 hrs after

collection by centrifugation of whole blood at 3000 rpm for 10 min. Clear serum separated from the red blood cells was kept at refrigerating temperature for further use.

Laboratory Assay for detection of HBsAg and HCV

Each serum sample was examined for the presence of HBsAg and anti-HCV using an adsorption qualitative technique based on the principle of antigen-antibody reaction. HBsAg test strips (DiaSpot® Diagnostics, USA) were employed for this purpose. The test for HCV antibodies was conducted using an Anti-HCV antibody third-generation enzyme immunoassay kit (Skytec™). The test and interpretation of the results were done as specified by the manufacturers.

Data Analyses

The prevalence of HBsAg, anti-HCV, and co-infection was determined from the proportion of seropositive participants in the total population under study and expressed as a percentage. An odd ratio at a 95% confidence interval was used to determine the relationship between educational status and infection with hepatitis B virus using Statistical Package for Social Sciences version 17

RESULTS

The result of the prevalence study is presented in Table 1. From the 100 participants screened for HBsAg and anti-HCV, only 11.0 (11.0%) were positive for HBsAg. None 0.0(0.0%) of the participants tested were seropositive for anti-HCV, as such none was positive for HBsAg/anti-HCV co-infection.

The results in Table 2 show the frequency of pregnant women with HBsAg and anti-HCV seropositivity based on their age group. The HBsAg seropositive blood was detected more in the age group 26-30yrs (17.4%) and least in the age group 16-20yrs (3.4%). However, no single case of HBsAg and or anti-HCV was recorded among the age group 31-35.

The prevalence rate based on educational status is presented in Table 3. From the table, 55.0 (55.0%) of the subjects under study were those with no formal education. The highest prevalence rate (18.5%) of HBsAg was reported among pregnant women with secondary education, closely followed by pregnant women with primary education (18.2%). Surprisingly, the least prevalence rate (3.5%) of HBsAg was reported among pregnant women with non-formal education.

The association between educational status and infection with hepatitis B virus (OR =3.75, 95% CI = 0.931-15.08) showed that the odds were 3.75 times higher that pregnant women with formal education will be infected with HBV when compare with pregnant women with no formal education, but with no statistical difference.

Table 1: Frequency of HBsAg and anti-HCV among pregnant women

Hepatitis type	No. tested (%)	No. Positive (%)	No. Negative (%)
HBsAg	100	11(11.0)	89(89.0)
Anti-HCV	100	0(0)	100(100)
HBsAg/HCV Co-infection	100	0(0)	100(100)

Table 2: Frequency of HBsAg and anti-HCV among pregnant women based on age group

Age group (Yr)	No. tested	HBsAg positive (%)	Anti-HCV positive (%)	Co-infection
16-20	29	1(3.4)	0	0
21-25	45	6(13.3)	0	0
26-30	23	4(17.4)	0	0
31-35	3	0	0	0
Total	100	11(11.0)	0	0

Table 3: Frequency of HBsAg and anti-HCV among pregnant women based on educational status

Educational status	No. tested	HBsAg positive (%)	Anti-HCV positive (%)	Co-infection
Non-formal education	55.0	3(3.5)	0.0	0.0
Primary grade	11.0	2(18.2)	0.0	0.0
Secondary grade	27.0	5(18.5)	0.0	0.0
Tertiary grade	7.0	1(14.3)	0.0	0.0
Total	100.0	11(11.0)	0.0	0.0

DISCUSSION

The 11.0 % prevalence rate for HBsAg among pregnant women in our study area was quite the same as the report of previous studies in Makurdi, Benue State (Mbaawuaga *et al.*, 2008) and in Sudan (Kirbak *et al.*, 2017) and can be comparable to 11.4%, 10.8% and 10.5% prevalence rates reported in Abuja (Osazuwa, 2012), Yemen (Murad *et al.*, 2013) and Ghana (Batayneh and Bdour, 2002) respectively. A relatively higher prevalence rate of HBsAg in our study area could be associated with higher exposure to risk factors associated with the transmission of the Hepatitis B virus. Such as early marriage and sexual exposure, multiple sexual partners occasion by multiple marriages, early exposure to medical devices and or blood products during childbirth, and history of sexually transmitted infections, among others.

The 11.0% prevalence rate for HBsAg (a sero-marker for HBV) among pregnant women in our study area falls within the range of hyper endemicity (WHO, 1999; Ugbebor *et al.*, 2011). This has established and supports the report of the World Health Organization (WHO) for Nigeria as a highly endemic area for hepatitis B virus (HBV) infection. The endemicity of HBV is classified; thus, Low (when the prevalence rate is less than 2%), intermediate (when the prevalence rate is between 2-8%), and high (when the prevalence rate is greater than 8%) (WHO, 1999; Esan *et al.*, 2014; Pennap *et al.*, 2015).

Contrary to the finding of our study, a higher prevalence rate of 18.2% was reported in Zaria (Luka *et al.*, 2008), 16.5% in Osogbo (Kolawole *et al.*, 2012), and 15.8% in Maiduguri (Baba *et al.*, 1999). There were also reports of 14.6%, 12.8%, and 12.5% prevalence rates among pregnant women in Bauchi (Jibrin *et al.*, 2016), Minna (Ndams *et al.*, 2008), and Benin City (Ugbebor *et al.*, 2011) respectively.

The lower prevalence rate of HBsAg among pregnant women compared to that of our study was variously reported in Nigeria. These include among others 10.0% prevalence rate

reported in Jos (Onwuliri *et al.*, 2017), 8.3% in Zaria (Luka *et al.*, 2008), 7.3% in Kano (Dawaki and Kawo, 2006), 6.8% in Ado-Ekiti (Esan *et al.*, 2014), 5.7% in Ilorin (Onwuliri *et al.*, 2017), 2.9% in South-south (Obi *et al.*, 2006) and 2.19% in Benin City (Onakewhor and Okonofua, 2008). The lower prevalence rate of HBsAg as reported in other studies could be attributed to minimal exposure of the participants to risk factors associated with the sources of transmission of hepatitis B virus.

Studies from some African countries and Middle-east reported variable higher and lower HBsAg prevalence rates among pregnant women. These include among others 17.3% prevalence rate in Burkina Faso (Collenberg *et al.*, 2006), 15.5% in Mali (Sidibe *et al.*, 2001), 13.2% in Yemen (Al-Shamahy, 2000), 8.5% in Cote d'Ivoire (Rouet *et al.*, 2004), 7.1% in Oman (Al Awaidy *et al.*, 2006), 6.3% in Tanzania (Onwuliri *et al.*, 2017), 4.3% in Jordan (Batayneh and Bdour, 2002), 2.4% and 4.1% in Saudi Arabia (Khalil *et al.*, 2005; Bani *et al.*, 2012), 1.75 in Egypt (El-Shabrawi *et al.*, 2013). Also, 2.4%, 4.7%, and 4.9% prevalence rates were all reported in Ethiopia (Regea and Eyasu, 2018). The disparity in the prevalence rate between the present study and the previous studies could be due to the differences in sample size, socio-cultural environment, geographical area, socioeconomic status, sexual practices, and medical exposure among others.

The prevalence of HBsAg was highest in the age group 26-30yrs (17.4%). This was quite similar to a previous report from a rural community in Nasarawa State (Pennap *et al.*, 2015) and other parts of northern Nigeria (Oti *et al.*, 2018). Many other studies in other parts of the world had shown that HBV was detected at a higher rate in pregnant women aged greater than 25 years than in women aged less than 25 years (El-Magrahe *et al.*, 2010; Taseer *et al.*, 2010; Mortada *et al.*, 2013). This shows that these subjects must have been infected before now. Since HBV is easily transmitted sexually, the high prevalence of HBsAg among this age group corresponds with the age bracket in

which sexual activities are high (Olokoba *et al.*, 2011; Pennap *et al.*, 2015).

The result of the study also showed that most of the subjects tested were those with no formal education. This can be explained by the geographical location of the study area; a rural area in which the majority of the inhabitants are indifferent to western education. However, the finding of this study showed a higher likelihood for pregnant women with formal education to be infected with hepatitis B virus (HBV). This can be explained by the fact that women with formal education are well exposed and meticulous in seeking medical attention at the slightest provocation of health challenges. These attributes likely expose them to important risk factors such as medical devices and or blood products before or during childbirth. However, women with no formal education are usually carefree when it comes to seeking medical attention. As such are less likely to be exposed to hospital-related risk factors for infection with HBV. Contrary to the finding of this study, reports from previous studies had associated lower educational status with a high risk of HBV infection (Esan *et al.*, 2014; Onwuliri *et al.*, 2017). The lack of significant difference as observed in this study showed that educational status may constitute a potential risk factor, but not enough to warrant a significant risk factor for infection with HBV.

The anti-HCV zero prevalence rates in the studied population were unique considering reports from previous studies in Nigeria. However, this can be comparable to very low anti-HCV endemicity reported in some parts of Nigeria and other African countries which includes 0.4% in Calabar (Mbotto *et al.*, 2010), 0.5% in Niger Delta (Buseri *et al.*, 2010), Benin City (Ugbebor *et al.*, 2011), and Gwagwalada (Agarry *et al.*, 2010), 0.6% in Sudan (Elsheikh *et al.*, 2007) and 0.8% also in Benin City (Oladeinde *et al.*, 2013). The lack of detection of anti-HCV among pregnant women in the

study area may imply that HCV exhibits low endemicity or is not endemic in the studied population and the study area, especially among women folks.

However, the non-detection of anti-HCV among pregnant women in the study population was contrary to the 2.1% prevalence rate quoted for Nigeria in the Hepatitis C global prevalence data, published in 2010 (Anaedobe *et al.*, 2016; Lavanchy, 2011). In the same vein, higher anti-HCV prevalence rates were variously reported among similar study groups in Nigeria which include among others; 1.7% in Ibadan (Anaedobe *et al.*, 2016), 1.86% in Benin City (Onakewhor and Okonofua, 2009), 2.5% in Maiduguri (Baba *et al.*, 1999). Higher prevalence rates of anti-HCV were also reported in Nnewi, Ekiti, Keffi, and Lagos with 1.0% (Oluboyo *et al.*, 2014), 1.39% (Esan *et al.*, 2014), 6.0% (Oti *et al.*, 2018), and 1.5% (Ezechi *et al.*, 2014) respectively. The differences observed in the reported prevalence of anti-HCV in this study and the comparative may be connected with differences in the endemicity of each geographical area, regional differences in risk factors, sample size employed during the study, genetic factors, among others (Onwuliri *et al.*, 2017; Regea and Eyasu, 2018; Oti *et al.*, 2018).

There is variability in the prevalence of hepatitis B and C as reported from different countries, regions, and populations. This variability cut across gender, age group, socioeconomic and educational status (Oluboyo *et al.*, 2014; Onwuliri *et al.*, 2017). Also, the differences in prevalence rate across countries may be a pointer to the level of essential health care services available to these countries (Jibrin *et al.*, 2016). Since this study mainly reflects prevalence among women with immunocompromised immunity due to pregnancy; infections with these viruses among this group may constitute public and clinical health significance. This is because viral hepatitis is the most common cause of liver failure among pregnant women (Esan *et al.*, 2014). Also, infection with hepatitis viruses during pregnancy may be associated with a high risk of transmission to unborn babies

which consequently leads to neonatal hepatitis. Infants with neonatal hepatitis stand the chance of developing chronic viral hepatitis which subsequently leads to liver cirrhosis and liver cancer later in life due to an undeveloped immune system during infancy (Jibrin *et al.*, 2016).

CONCLUSION

A total of 11(11.0%) of the pregnant women tested were seropositive for HBsAg and none 0.0(0.0%) of the participants tested were seropositive for anti-HCV. In view of the likelihood of vertical transmission of hepatitis viruses, there is a need to institute compulsory routine screening for these viruses for all pregnant women attending antenatal care in Mubi.

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