

Sero-Prevalence of Hepatitis B and Hepatitis C Viruses Co-Infection among Pregnant Women in Nigeria

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Abstract This study was carried out to determine sero-prevalence of hepatitis B and hepatitis C virus co-infection among pregnant women. Viral hepatitis during pregnancy is associated with high risk of maternal complications; infections with Hepatitis B virus (HBV) or the Hepatitis C virus (HCV) are public health problems. Worldwide, there are about 350 million HBV carriers and 130 to 170 million people infected with HCV. The presence of HBV and HCV was determined using third-generation enzyme immunoassay (EIA), reactive samples were further confirmed using enzyme linked immune sorbent assay (ELISA) (Bio-Rad, France). Age group 26-30 and 31-35 had highest frequency of 240 (36.98%) and 206 (31.74%) respectively in HBV and HCV. Sero prevalence of HBV and HCV were 44 (6.78%) and 9 (1.39%) respectively. Prevalence of HBV and HCV co-infection was 1 (0.15%) in age group 31-35. Proper management of maternal hepatitis during the prenatal phase ensures better outcomes in the infant, therefore screening of pregnant women for hepatitis B and C virus are necessary in order to identify those neonates at risk of transmission.

Keywords: Hepatitis B virus, Hepatitis C virus, transmission

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1. Introduction

Viral hepatitis is a life-threatening liver disease, caused by hepatitis B and C virus, and is a major public health problem, particularly in developing countries [31,51]. The prevalence of HBV and HCV in a population can be predicted by risk factors associated with the transmission of infection such as injections, blood products transfusion, surgical procedures, body tattooing, occupational injury, sexual and vertical transmission [1,3,41] many infected individuals deny history of any of these risks so that the likely source remains unidentified in some subjects [61] however, the prevalence varies from area to area and population to population due to variability in ethnicity and socioeconomic conditions [31,51]. Viral hepatitis is the inflammation of the liver caused by infection with the hepatitis viruses; it can also be due to toxins (notably alcohol, certain medications and plants), other infections and autoimmune diseases [4]. Viral hepatitis during pregnancy is associated with high risk of maternal complications. Infections with the Hepatitis B virus (HBV) or the Hepatitis C virus (HCV) are public health problems and are highly endemic in the sub-Saharan Africa [36,37]. Worldwide, there are about 350 million HBV carriers [28] and 130 to 170 million people infected with HCV [74]. HBV and HCV infections are a major cause of morbidity

and mortality. Hepatitis B virus has a circular genome of partially double-stranded DNA. The virus is transmitted through infected blood, sexually and vertically (mother to child) in the perinatal period. Perinatal transmission is the most common mode of HBV transmission worldwide [68]. The Hepatitis B surface antigen (HBsAg) is the serologic hallmark of HBV infection, whilst the soluble extractable protein, the Hepatitis e antigen (HBeAg) is a marker for the highly infectious state. Chronic infection is defined by the presence of HBsAg for more than 6 months. Without immunization, up to 90% of infants born to mothers who are positive for HBsAg and HBeAg, become chronic carriers [17,46,62]. Hepatitis C virus is a single-stranded RNA virus, it is transmitted also through infected blood, sexually and vertically [21,47,73]. HCV has a long lag time between onset of infection and clinical manifestation of liver disease (up to 20 years) [52]. Chronic active hepatitis C infection is associated with increased incidence of preterm delivery and intra-uterine growth retardation [77]. Vertical transmission of HCV from mother to child occurs in 3-10% of pregnancies complicated by HCV infection [14]. Among pregnant women, chronic infection with HBV and HCV are often asymptomatic, and can lead to coagulation defects, postpartum haemorrhage, organ failure and high maternal mortality and poor outcomes of their newborns such as still births, neonatal deaths (NND), jaundice, anorexia (poor appetite), malaise, acute and chronic liver disease (liver cirrhosis) and hepatocellular

carcinoma. Maternal mortality has been shown to increase in pregnant women with liver cirrhosis [48]. Peri-natal transmission of this disease occurs if the mother has had acute Hepatitis B infection during late pregnancy, in the first postpartum or if the mother is a chronic HBsAg carrier [39]. The prevalence of HBV infection in Nigeria was estimated to be 2.4-18.4% of the population [53,58,71]. Also, the sero-prevalence of anti-HCV was 3.6% to 5% in previous studies in Nigeria [22,70]. This study was therefore designed to determine the sero-prevalence of Hepatitis B and C virus infections among apparently healthy pregnant women.

2. Materials and Methods

Apparently 649 healthy pregnant women who attended the antenatal clinic of the Federal Medical Centre Ido-Ekiti, Ekiti State, Nigeria from February 2012 to September 2013 were recruited for the study after obtained their consent. 4 ml of venous blood was collected by venepuncture into a plain bottle and allowed to clot. The presence of Hepatitis B surface antigen (HBsAg) and Presence of antibodies against HCV (anti-HCV) was determined using third-generation enzyme immunoassay (EIA), rapid test ELISA kits (Acon Laboratories, USA); reactive samples were further confirmed using enzyme linked immune sorbent assay (ELISA) (Bio-Rad, France), the procedures were described by the manufacturer of the kit. An ethical clearance for this study was obtained from ethical and research committee.

Table 1. Age distribution and prevalence of HBV among pregnant women

Age group	No of samples screened for HBV	HBV positivity	Sero-positivity
15-20	15 (2.31%)	2 (4.55%)	
21-25	75 (11.56%)	7 (15.91%)	
26-30	240 (36.98%)	11 (25.00%)	
31-35	206 (31.74%)	16 (36.36%)	
36-40	86 (13.25%)	5 (11.36%)	
41-above	27 (4.16%)	3 (6.82%)	
Total	649 (100%)	44 (100%)	

3. Results

Apparently 649 health pregnant women within the age group 15-41 above between February 2012 and September 2013 were recruited for this study from Federal Medical Centre, Ido-Ekiti. Age group 26-30 and 31-35 had highest frequency 240 (36.98%) and 206 (31.74%) respectively in HBV and HCV while age group 15-20 and 41-above had lowest frequency 15 (2.31%) and 27 (4.16%) respectively in HBV and HCV. Sero prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) were 44 (6.78%) and 9 (1.39%) respectively. Age group 26-30 and 31-35 had highest prevalence of HBV and HCV as showed in Table

1 and Table 2. Prevalence of HBV and HCV co-infection was 1 (0.15%) in age group 31-35 as showed in Table 3.

Table 2. Age distribution and prevalence of HBV among pregnant women

Age group	No of samples screened for HCV	HCV Sero-positivity
15-20	15 (2.31%)	-
21-25	75 (11.56%)	-
26-30	240 (36.98%)	2 (22.22%)
31-35	206 (31.74%)	6 (66.67%)
36-40	86 (13.25%)	1 (11.11%)
41-above	27 (4.16%)	-
Total	649 (100%)	9 (100%)

Table 3. Age distribution and prevalence of HBV, HCV CO-Infection among pregnant women

Age group	No of samples screened for HBV and HCV	No of HBV and HCV positivity	No of HBV and HCV co-infection
15-20	15 (2.31%)	2 (3.77%)	-
21-25	75 (11.56%)	7 (13.21%)	-
26-30	240 (36.98%)	13 (24.53%)	-
31-35	206 (31.74%)	22 (41.51%)	1 (0.15%)
36-40	86 (13.25%)	6 (11.32%)	-
41-above	27 (4.16%)	3 (5.66%)	-
Total	649 (100%)	53 (100%)	1

4. Discussion

Infections due to Hepatitis B and Hepatitis C viruses (HBV, HCV) are significant health problems around the globe. Worldwide, viral hepatitis is the commonest cause of hepatic dysfunction in pregnancy. The prevalence of HBV varies between 2% in developed countries where the prevalence is low to about 8% in developing countries where infection is endemic with sex, age and socioeconomic status as important risk factors for infection [5,27,56]. Countries are classified as having low endemic rates (< 2%), intermediate endemic rates (2-8%), or high endemic rates (> 8%) positive for HBV. In our study, the frequency of Hepatitis B and Hepatitis C infections among pregnant woman attending the Federal Medical Centre, Ido-Ekiti were 6.78% and 1.39% respectively while 0.15% was recorded for both HBV and HCV co-infection. Prevalence of 6.78% and 1.39% for HBV and HCV respectively in this present study was supported by WHO's report for Nigeria, with prevalence of HBV and HCV greater than 8% and 1.2% respectively [76]. Previous studies on prevalence of HBV done in Southeast Nigeria reported (2.2%) [51], Obi reported

(2.9%) in the South-South Nigeria, Studies from the Middle East reported 4.3% of HBV in Jordan [10] and 2.4% in Saudi Arabia [34] which were lower compared to this present study. However studies from the Northerneast Nigeria by Olokoba reported (8.2%), Ali reported 8.0% seroprevalence of Hepatitis B in pregnant women; 8.3% to 12.5% was reported by other workers in Nigeria [27,70]. A study conducted in Abidijan, Ivory Coast Africa show 8.5% prevalence of HBV [63], 7.3% prevalence of HBV among pregnant women in Kano as reported by Dawaki, also 5.6% of HBV in Sudan was reported by Elsheikh *et al.*, 2007 among pregnant women which was almost similar to the prevalence in this present study. The seroprevalence of HBV finding in this study is in agreement with the previous studies done among pregnant women in Addis Ababa (5.0%), and Jimma, Ethiopia (1.4%-6.4%) (Tsega *et al.*, 1988; Awole and Gebre-Selassie, 2005). Sierra Leone (6.2%), Zambia (6.5%), USA, only for Asian Americans (5.6%), Jeju Island of Korea (4.9%-6.4%), and Turkey (4.2%) [26,32,38,55,59,60]. In the North Central Mbaawuga reported (11.0%) also 18.2% was reported in Zaria by Luka *et al.*, 2008 which was higher compared to this present study. Africa is considered to be a high prevalent zone for Hepatitis B, higher prevalence rates were reported from Ghana 10.5% [20] and Yemen 13.2% [7]. In United States, the prevalence of Hepatitis B and Hepatitis C is found to be 0.5 to 1.5% and 1% respectively [51]. Prevalence of HBV in this study shows an intermediate endemicity of HBV infection according to WHO criteria [75]. However, there are reports from other parts of the world showed a low prevalence in the same study population, a prevalence of 0.14%-0.97% in USA, except Asian Americans, in Mexico (1.65%), in the northern part of Kerala state in South India (0.21%), Qatar and the United Arab Emirates (1.0-1.5%) were reported [6,26,62,72]. A higher prevalence was found among a similar study population in Mali (15.5%), Hong Kong (10.0%), Papa New Guinea (11.0%), Taiwan (12.0%), Oman (7.1%) and in Brazil (18.5%, ranging from 7.2%-38.5%) [6,12,18,37,40,64]. Comparison of our result with other studies from different countries on pregnant women showed a variable result. The difference in demographic characteristics of the study population such as socio-cultural environment, tribal practices, traditional operation, sexual practices, medical exposure and the difference in hepatitis epidemiology in these countries might explain these discrepancies. Prevalence of HCV in this study was higher than the 0.5% recorded by Buseri *et al.*, 2010 among pregnant women in Yenagoa, Bayelsa state, Nigeria. 1.5% of HCV seropositivity in pregnant women attending the University of Abuja teaching hospital, Gwagwalada, Nigeria [8,15] was similar to prevalence of HCV in this present study, also 1.03% observed by Kumar *et al.*, 2007 in India was similar to prevalence of HCV this present study. 1.39% of HCV obtained in this study was lower than 3.6% recorded by Ugbebor in a study conducted among pregnant women attending the antenatal clinic of the University of Benin teaching hospital. 5% and 14.9% have been recorded in faith me diplex hospital in Benin City and in Enugu, Nigeria [22,65,70] and 2.1% in Gabon (Ndong-Atome *et al.*, 2008). Batool *et al.*, 2008 reported 7.3% for anti HCV which was much higher compared to 1.39% of HCV in this present study he also

reported 2.2% for HBV and 0.08% for HBV and HCV co-infection which was lower compared to prevalence in this present study [24]. Elsheikh reported 5.6% for HBV and 0.6% for Anti-HCV which was lower compared to the prevalence reported in this study; also stated that none of the participants were aware of their condition and age, parity, gestational age, residence, history of blood transfusion, dental manipulations, tattooing and circumcision did not contribute significantly to increased HBV sero-positivity [24]. This difference may be as a result of the type of population studied, different geographical regions, genetic factors and socioeconomic status, also regional differences in risk factors and cultural practices may be responsible for these variations in prevalence rates. Sero-epidemiological studies of different populations show marked variations and differences. The age of acquiring infection is the major determinant of the incidence and prevalence rates [27]. In this study it was found that most of the patients fell within the age group 26–30 and 31–35 because these were the majority age groups attended antenatal clinic of the hospital. Mortada *et al.*, 2013 reported that HBV was detected at a higher rate in pregnant women aged greater than 25 years than in women aged less than 25 years, the difference was not statistically significant. Habiba and Memon 2007 from Pakistan also reported that the majority of those that tested positive to HBV were in the age range 25-35 years which was similar to this present study. Other studies also observed a high prevalence rate of HBV in pregnant women greater than 25 years than those less than 25 years [25,66]. The increased age among HBV positive mothers may be due to increase the chance of exposure to HBV and HCV for each pregnancy. However, Eke *et al.*, 2011 reported a highest prevalence of HBV among pregnant women whose age ranged 20-24 years. The authors attributed that difference to the early marriage and pregnancy of women in South-Eastern Nigeria. Hence, those positive to HBV are likely to be picked when screened during their antenatal care. Pregnant women are considered at a higher risk due to increased exposure to risk factors (such as blood transfusion, intravenous drugs or surgical procedures) [13]. In our study most of the patients were found to be multi gravida patients. Azhar *et al.*, 2012 reported a higher frequency of HBV infection among multigravidae. It might be at increased risk of HBV and HCV infection among multigravidae because of their past pregnancies, hospital admission blood transfusion and/or any surgical procedure in the past [33]. Therefore, with each pregnancy and childbirth chances of exposure to HBV and HCV become greater. Rural residence could also be a risk factor for HBV and HCV infection, socioeconomic conditions among the poor and less educated, and crowded living condition especially in the rural areas, may contribute to HBV and HCV exposure [16,29].

5. Conclusion

Proper management of maternal hepatitis during the prenatal phase ensures better outcomes in the infant, therefore screening of pregnant women for hepatitis B and C virus are highly necessary in order to identify those neonates at risk of transmission, to whom preventive

intervention can be instituted irrespective of maternal hepatitis B and C virus carriage status; this may be the most effective approach to hepatitis B and C virus prevention and control.

Recommendation

Pregnant woman should be mandatorily and routinely screened for hepatitis B and C virus infection as part of antenatal care services in their booking; also infants and new borns must be systematically immunized against hepatitis B and C virus infection. Public awareness, complete immunization against viral hepatitis, better sanitation facilities, safe drinking water, increased availability of antenatal care for early detection and well equipped hospitals for intensive care will go long way in the reduction of viral hepatitis in pregnancy and also its associated maternal and per-natal mortality and morbidity.

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