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ORIGINAL ARTICLE

Seroprevalence of Hepatitis B and C Viruses, and HIV Infections among Antenatal Women in a Secondary Health Facility in Lagos, Nigeria

Seroprevalence des Virus de L'hepatite B et C et des Infections par le VIH chez les Femmes Enceintes dans un Etablissement de Sante Secondaire a Lagos, au Nigere

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ABSTRACT

BACKGROUND: Hepatitis B and C viruses and HIV infections contribute a significant proportion to maternal and perinatal morbidity and mortality in low and middle-income countries. While the burden of hepatitis B and C viruses is higher in low and middle-income countries, Nigeria also has the second-largest burden of HIV.

OBJECTIVES: To determine the seroprevalence of hepatitis B and C viruses and HIV infections among antenatal women who sought care at a secondary health facility in Lagos.

METHODS: This was a retrospective review of patients managed in the antenatal clinic of 68 Nigerian Army Reference Hospital over one year. A study proforma was used to collect relevant data which were entered and analyzed using the IBM Statistical Package for Social Sciences (SPSS Statistics) Version 23.

RESULTS: A total of 347 women attended prenatal care during the study period, however, only 329 cases with complete data were included in the final statistical analysis. The prevalence of HIV in our study was 6.4%, while HBV and HCV accounted for 6.2% and 1.8% respectively. Hepatitis B, and hepatitis C viruses and HIV Infections occurred in 3 (0.9%) of our patients, 6 (1.8%) of the women had HIV-HBV co-infection while 1 (0.3%) was infected with HIV-HCV.

CONCLUSION: Our study re-emphasizes the public health importance of HBV, HCV and HIV screening in our antenatal clinics. This knowledge is very important for the implementation of effective prevention and control measures that will further decrease the mother-to-child transmission of these viruses. **WAJM 2022; 39(10): 1084–1088.**

Keywords: Hepatitis B, HIV, Hepatitis C, Seroprevalence, Co-infection, Lagos.

RÉSUMÉ

CONTEXTE: Les virus de l'hépatite B et C et les infections par le VIH contribuent pour une part importante à la morbidité et à la mortalité maternelles et périnatales dans les pays à revenu faible et intermédiaire. Alors que le fardeau des virus de l'hépatite B et C est plus élevé dans les pays à revenu faible et moyen, le Nigeria a également le deuxième plus grand fardeau du VIH.

OBJECTIFS: Déterminer la séroprévalence des virus de l'hépatite B et C et des infections par le VIH chez les femmes en période prénatale qui ont consulté dans un établissement de santé secondaire de Lagos.

MÉTHODES: Il s'agit d'une étude rétrospective des patientes prises en charge dans la clinique prénatale de 68 références de l'armée nigériane sur une période d'un an. Un formulaire d'étude a été utilisé pour recueillir les données pertinentes qui ont été saisies et analysées à l'aide du progiciel statistique pour les sciences sociales IBM (SPSS Statistics) version 23.

RÉSULTATS: Un total de 347 femmes ont suivi des soins prénataux pendant la période d'étude, cependant, seuls 329 cas avec des données complètes ont été inclus dans l'analyse statistique finale. La prévalence du VIH dans notre étude était de 6,4%, tandis que le VHB et le VHC représentaient respectivement 6,2% et 1,8%. Les virus de l'hépatite B et de l'hépatite C ainsi que le VIH étaient présents chez 3 (0,9%) de nos patientes, 6 (1,8%) des femmes avaient une co-infection VIH-VHB tandis qu'une (0,3%) était infectée par le VIH-VHC.

CONCLUSION: Notre étude souligne à nouveau l'importance pour la santé publique du dépistage du VHB, du VHC et du VIH dans nos cliniques prénatales. Ces connaissances sont très importantes pour la mise en œuvre de mesures de prévention et de contrôle efficaces qui permettront de diminuer davantage la transmission mère-enfant de ces virus. **WAJM 2022; 39(10): 1084–1088.**

Mots clés: Hépatite B, VIH, Hépatite C, Séroprévalence, Co-infection, Lagos.

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INTRODUCTION

Hepatitis B and C viruses and HIV infections contribute significantly to maternal and perinatal morbidity and mortality in low and middle-income countries.[1] These infections may occur singly, dual, or all together possibly because of the shared mode of transmission.[1] The effect of these highly contagious viruses is not only limited to the consequences it may pose to the pregnant woman but, also the increased risk of maternal to child transmission (vertical transmission) and transmission from the infected mother to the healthcare provider (horizontal transmission) even in asymptomatic patients.[1]

The burden of hepatitis B and C viruses is higher in low-and middle-income countries.[1,2] Nigeria is among the countries with the highest global prevalence of viral hepatitis with hepatitis B virus (HBV) and hepatitis C virus (HCV) contributing about 11% and 2.2%, respectively.[2] Worldwide, chronic HBV infection is estimated to affect 3.6% of the population.[2] Approximately 60 million people live with chronic HBV infection in Africa with an estimated prevalence of 6.2%.[2] Nigeria is ranked as one of the countries that are hyper-endemic for chronic HBV infection (>8%).[2] Acquisition of this infection is most common during pregnancy, delivery, and breastfeeding.[2] Other risk factors for transmission include high-risk behaviours such as seen in commercial sex workers and intravenous drug abusers, others include unscreened blood products, female genital mutilation, tribal marks, scarification, needle stick injury, unsterile surgical environments, home deliveries or delivery at traditional birth attendant facilities, organ transplant, unprotected penetrative sex, in particular anal and vaginal sex, haemodialysis, body piercing, tattooing, exposure to infected body fluids, such as sweat, saliva and menstrual, vaginal and seminal fluids.[1–3] The resultant effect may be chronic carriers, liver cirrhosis and hepatocellular carcinoma.[1,2] Its even more worrisome that the hepatitis B virus can survive in inanimate objects for about 7 days during which it may still be infective.[1,2] Approximately 1% of people have a dual infection with HIV and hepatitis B virus infection (2.7 million people) globally.[3] On the other hand, screening for hepatitis C is not routine in some secondary health care facilities in Nigeria which may contribute to its low prevalence as reported in a study by Eleje, *et al* which found an estimated Hepatitis C virus seroprevalence of 1.3%.[4] In Nigeria, because of the endemic nature of HIV, HBV infections and increasing prevalence of HCV infection, lack of established screening protocol, and low immunisation coverage, perinatal transmission poses a great challenge to obstetricians and the paediatricians.[4,5]

As regards HIV infection, Nigeria has the second-largest burden of the disease.[6] Adult HIV prevalence rate of 1.4% has been reported in Nigeria.[6,7] Nigeria is one of twenty-three priority countries identified by the World Health Organization (WHO) as accounting for 90% of pregnant women living with HIV worldwide.[6–8] Notwithstanding several efforts made so far by the Nigerian Government in addressing mother-to-child transmission, the country still contributes to 30% of the world's gap in achieving the global target for eradicating mother-to-child transmission of HIV.[6–8]

HBV-HIV co-infection is increasingly seen and associated with increased severity of liver disease in HIV-infected patients. Higher HBV viral load in HIV co-infected individuals tends to cause significant liver fibrosis with the attendant risk of liver cirrhosis and hepatocellular cancer hence increasing the risk of liver-related mortality.[9,10] Severe immunodeficiency in HIV-infected patients tends to increase the risk of reactivation of latent hepatitis B virus infection.[9–11] Furthermore, HIV positive patients on antiretroviral therapy (ART) have an increased risk of drug-related hepatotoxicity when commencing ART, and also increased risk of hepatic flares when active treatment for both HBV and HIV are interrupted, therefore HBV/HIV co-infection may complicate the natural course of either of the diseases or alters it's morbidity.[10–16]

Although HBV/HCV co-infection seems not to be common, interest has been rekindled in highly endemic regions because of its shared mode of transmission and same site of replication-(liver). More insights into the interactions between HCV and HBV may provide suggestions for future discovery of prophylactic or therapeutic interventions.[17]

There are limited studies as regards HCV/HIV co-infection. Evidence in some studies suggests an increased virulence and pathogenesis of hepatic disease in HCV/HIV co-infected individuals.[18,19] Ejeta and co-worker reported a prevalence of HCV/HIV co-infection of 0.23%.[20]

This study, therefore, aims to determine the seroprevalence of triplex viral infection among antenatal women who sought care at a secondary health facility in Lagos.

METHODS

Study Design and Setting

The study was conducted at 68 Nigerian Army Reference Hospital Yaba (68NARHY), Lagos. 68 NARHY is a 500-bed capacity military hospital that serves about 6000 in-and-out patients per month and provides referral services to Nigerian service men and civilians alike. This is located in Yaba Local Council Development Area of Lagos State. It runs daily adult HIV clinic at its Centre for Infectious Disease Clinic (CID) with average daily clinic attendance of 150 clients. It runs two antenatal clinics weekly with average clinic attendance of 110 pregnant women. The hospital offers specialized treatment to all categories of pregnant women, it also has a unit dedicated to the care of HIV-positive pregnant women. Routine screening for triple viral infection is offered routinely as a policy in the hospital. This study was a retrospective review of medical records of pregnant women who sought care over a one-year period, between 1st May 2020 and 30th April 2021. All the antenatal records of pregnant women retrieved and reviewed.

Study Population and Eligibility Criteria

The antenatal and delivery case notes of all pregnant patients seen at 68 NARHY between the 1st of May 2020 and 30th of April 2021 were retrieved from the medical records department. Women with incomplete records were excluded from the study.

Laboratory Methods

A volume of 10 mls venous blood sample was obtained by venepuncture from each participant at booking and collected in a labelled plain universal specimen bottle. At the Central research laboratory of the NARHY, each clotted sample was centrifuged at 3000 rpm for 5 min. The sera collected was tested for HBsAg, and anti HCV using multiplex latex rapid agglutination slide test kits manufactured by Grand Medical Diagnostic Limited, USA. Reactive samples for HBsAg and anti- HCV were further confirmed using the enzyme-linked immunosorbent assay (Bio Rad, France). Following Nigerian National HIV counselling and testing guidelines, the HIV status of the women who screened positive are further confirmed at the Human Virology Laboratory (HVL) of NARHY with Western blot.

Data Collection and Analysis

A proforma was used to collect relevant data such as the patients' socio-demographic data, parity, and gestational age of the pregnancy (calculated from the last menstrual period and/or early ultrasound scan). The information sought included HIV, hepatitis B and C status – Data were entered and analysed using the IBM Statistical Package for Social Sciences (SPSS Statistics) Version 23. Armonk, NY: IBM Corp. Categorical variables were summarized and presented as frequency distribution tables, while continuous variables were presented as mean and standard deviation. Frequency distributions were generated and univariate analysis using relevant statistics was performed to identify factors associated with HBV-HCV-HIV coinfection. Logistic regression was used to identify independent determinants for HBV-HCV-HIV coinfection in pregnancy. P<0. 05 was considered to be statistically significant.

Ethical Considerations

Ethical approval was obtained from the Health Research and Ethics Committees (HREC) of 68 NARHY Hospital. Ethical principles according to Helsinki's declaration were observed throughout the study duration.

Primary Outcome Measures

The outcomes of interest include the prevalence of triple viral infection, HBV-HIV co-infection, HBV-HCV co-infection, and HCV-HIV co-infection in pregnancy at the study center.

RESULTS

A total of 347 women attended prenatal care during the study period, however, only 329 cases with complete data were included in the final statistical analysis, with a response rate of 94.8%.

Women who had at least secondary education constituted 84.5% of the study participants, while 97.3 % are married.

More than half (52.6%) of the study population were in the second trimester of their pregnancy while about a quarter were in the first trimester (25.2%).

Table 1: Socio-Demographic and Obstetrics Characteristics of the Study Participants

Variable	Frequency (n=329)
Age	
≤20	6 (1.8)
21–30	80 (24.3)
31–40	240 (72.9)
> 40	3(0.9)
Mean Age	32 ± 1.23
Parity	
0	64 (19.5)
1–2	127 (38.6)
3–4	101 (30.7)
≥5	37 (11.2)
Marital Status	
Single	9 (2.7)
Married	320 (97.3)
Educational Qualification	
< Secondary	51 (15.5)
≥ Secondary	278 (84.5)
Gestational Age (Weeks)	
1–13	83 (25.2)
14–27	173 (52.6)
≥28	73 (22.2)

The mean age of the participants was 32 ± 1.23 years. Majority of the women were in the age group 31–40 (72.9%). About one-fifth of the patients were primigravida, while 37 (11.2%) were grand multipara, 320 (97.3%) of the women were married while 278 (84.5%) had at least secondary education.

Table 2: Sero-prevalence of HBV, HCV and HIV among the Study Participants (n=329)

Variable	Frequency (n=329)
HIV	
Negative	308 (93.6)
Positive	21 (6.4)
HBsAg	
Negative	309 (93.9)
Positive	20 (6.2)
HCV	
Negative	323 (98.2)
Positive	6 (1.8)

The prevalence of HIV in our study was 21 (6.4%), while HBV and HCV accounted for 20 (6.2%) and 6 (1.8%) respectively.

Table 3: shows the combined Virology Profile of Participants. Three of the 329 (0.9%) women in the cohort tested positive for HBV, HCV and HIV infection; six (1.8) women had HBV-HIV co-infection, one (0.3%) woman had HCV-HIV co-infection.

Table 3: Combined Virology Profile of Participants

Variable	Frequency (n=329)(%)
HIV, HBV	6 (1.8)
HIV, HCV	1(0.3)
HBV, HCV	2(0.6)
HIV, HBV, HCV	3(0.9)

DISCUSSION

Maternal-to-child transmission of HBV, HCV and HIV infection is becoming a significant health problem in low and middle-income countries. This is even more important as the limited number of studies in our sub-region have shown a variation in the prevalence of HBV-HCV-HIV co-infection in pregnancy. A total of 329 women managed in our facility for prenatal care were retrospectively evaluated for the status of these viruses.

The seroprevalence of HIV in our study was 6.4% while that of HBV and HCV were 6.2% and 1.8% respectively. The HBV seroprevalence of 6.2% is close to the seroprevalence of 7.2% reported

Table 4: Association between Patient's Characteristics and HBV-HCV-HIV Co-Infections

Age (Years)	HBV-HCV-HIV Positive	HBV-HCV-HIV Negative	P-value	Crude OR(95% CI)
≤20	0(0.0)	6(1.8)	0.78	0.91 (0.8–1.87)
21–30	2(2.5)	78(97.5)	0.32	0.77 (0.7–2.8)
31–40	1(0.4)	239(99.6)		1.0 (REF)
>40	0(0.0)	3(0.9)	0.41	1.1 (0.62–1.76)
Parity				
0	0 (0)	64(100)	0.9	1.3 (0.68–3.2)
1-2	0 (0)	127(100)		1.00 (REF)
3-4	2 (2.0)	99 (98.0)	0.8	0.5 (0.49–2.33)
>5	1 (2.7)	36 (97.3)	0.6	0.4 (0.40–3.1)
Marital Status				
Single	0 (0.0)	9 (100)	0.7	0.6 (0.60–3.7)
Married	3 (0.9)	317 (99.1)		1.0 (REF)
Educational status				
< secondary	2 (3.9)	49 (96.1)	0.8	1.2 (1.1– 3.2)
> secondary	1 (0.4)	277 (99.6)		1.0 (REF)

by Adegbesan-Omilabu, *et al* at LUTH[21] and 7.9% reported by Yakasai, *et al* in Kano,[22] but, lower than 19.8% reported by Mac et al in Northcentral Nigeria[23] and 8.3% by Anaedobe, *et al* in Southwest Nigeria.[24] This may be because these studies were done in tertiary health facilities with possibly greater number of patients.

Of the 329 study population, 6 women tested positive for HCV with a seroprevalence of 1.8%. This finding of our study is similar to the prevalence of 1.83% found in a systematic review by Birye, *et al* in Ethiopia.[25] However, this is lower than 6% reported by Onwuliri, *et al* in Maiduguri North-East Nigeria.[26] Recently prevalence of hepatitis C virus infection among pregnant women in Nigeria: a national pilot cross-sectional study was conducted by Eleje, *et al,* where a total of 159 pregnant women from antenatal clinics across six geopolitical were tested for HCV, and it was found that HCV Seroprevalence was 1.3%[4] which is relatively comparable to our study. Currently, there is no established guideline for HCV screening in pregnant women in low and middle-income countries, this may be because of the additional cost on the already strained health budget, or because of no vaccination or treatment protocol in pregnant women.[27]

In our study, we found that the seroprevalence of HIV is 6.4%. This is higher than the National prevalence of 1.4% and Lagos state prevalence of 1.3%.[6,7] However, this may be because our facility is a reference centre for the management of retroviral positive patients.

Triplex viral infection occurred in 0.9% of our patients, 1.8% of the women had HIV-HBV co-infection, 0.3% were infected with HIV-HCV and 0.6% had HBV-HCV co-infection.

The HCV/HIV co-infection rate of 0.3% in our study is relatively low when compared to 1.65% reported by Adesina, *et al* in University College Hospital Ibadan[28] and 1.5% and 2.4%, respectively, reported among HIV-positive pregnant women in Lagos by Ezechi and colleagues.[29] and Zeba, *et al* in Ouagadougou.[30]

A very small percentage (0.9%) of our study population was infected with the three (triple) viruses, this is lower than 0.19% reported by Adesina et al in Ibadan, southwest Nigeria.[28] but, higher than 0. 08% found by Ezechi, *et al* in Lagos.[29] These differences in prevalence may have been accounted for by different sample sizes, and test kit sensitivity and specificity. Although there are differences in the prevalence of these studies, the low prevalence reported may suggest that triple viral co-infections in pregnant women are not common in our setting.

Few studies have shown a variation in the prevalence of HIV/HBV co-infection in pregnancy. The finding of HIV/HBV co-infection rate of 1.8% in our study is lower than the 4.2% reported by Ezechi, *et al*[29] in Lagos, and Eke and co-workers in Nnewi south east Nigeria.[31]

We also found that 0.6% of our cohort have mixed infections of hepatitis B and C which favourably compares with 0.57% of mixed infections reported by Ugbebor and colleagues at Benin, South-South Nigeria.[32] We didn't find any relationship between maternal age, parity, educational status and HBV-HCV-HIV co-infection. This is similar to the study by Ezechi, *et al* done in Lagos. This similarity may be because of the similar socio-cultural group of the study participants. We were however limited by being only able to evaluate HBsAg positivity and anti-Hepatitis C antibody as markers for HBV and HCV viral infection in our study population, other serological makers to differentiate active infection from carriers were not done in our study population, making it difficult to differentiate patients that were immunised, from active infections or just carriers.

CONCLUSION

Our study re-emphasizes the public health importance of HBV, HCV and HIV, screening in our antenatal clinics. This knowledge is very important for the implementation of effective prevention and control measures that will further decrease the mother-to-child transmission of these viruses.

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