

Original Article

Parallel and overlapping Human Immunodeficiency Virus, Hepatitis B and C virus Infections among pregnant women in the Federal Capital Territory, Abuja, Nigeria

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Abstract:

Background: Risk factors that are associated with HIV infection are also associated with HBV and HCV infections in sub-Saharan Africa. The HIV-infected pregnant cohort represents a unique population and infection with the hepatitis virus is considered a public health problem worldwide. **Objective:** The purpose of this study was to evaluate the prevalence of Human Immunodeficiency Virus, Hepatitis B and C virus parallel and overlapping infections among pregnant women attending antenatal clinics in Federal Capital Territory (FCT), Abuja. **Method:** Five hundred (500) blood samples were collected from three district hospitals in the FCT and tested at Wuse General Hospital, Abuja for the presence of antibodies to HIV and Hepatitis C virus, and HBsAg by ELISA technique in accordance with the manufacturer's instructions. HIV seropositive sera were confirmed by Western blot. **Result:** Of the 500 pregnant women, those detected with HIV antibodies, HBsAg and anti-HCV antibodies were 42 (8.4%), 19 (3.8%) and 8 (1.6%) respectively. The overall seroprevalence of HIV and HBV or HCV co-infection was 9.5% while 7.1% and 2.4% HIV positive pregnant women were specifically co-infected with HBV and HCV respectively. Those within the age bracket of 15-20 years had the highest prevalence of HIV (13.4%), HBV (5.1%) and HCV (1.9%) infections. Among the occupation characteristics of the women, those of them involved in trading recorded the highest prevalence of HIV (60.6%), HBV (30.3) and HCV (6.1%). HIV was higher among the married women than the singles ((8.6% vs 6.5%); with HBV infection the reverse was the case (3.0% vs 9.8%) while HCV was same for both groups. History of blood transfusion did not reflect a higher rate of HIV and HBV (1.4% vs 9.6%; 2.8% vs 4.0% respectively) unlike HCV infection with 0.5% recorded only among those that had transfusion experience. **Conclusion:** When monitoring the risk of hepatotoxicity to antiretroviral drugs among these group of patients caution should be maintained. Moreover, evidence of parallel and overlapping HIV, HBsAg and HCV infections among this cohort should motivate inclusion of HBV and HCV among the diseases of surveillance in the national sentinel survey in order to ascertain the bigger picture of these infections in Nigeria.

Key Words: Human Immunodeficiency Virus, Hepatitis B Virus, Hepatitis C Virus, Abuja, Nigeria

Introduction:

Risk factors that are associated with HIV infection are also associated with HBV and HCV infections in sub-Saharan Africa.(1) These include sexual behaviour, presence of other sexually transmitted diseases, female and male circumcision status, percutaneous and perinatal exposures, and poverty.

Hepatitis B and C virus co-infections have been reported to be common among HIV infected persons in various countries. In Slovenia, the overall prevalence of HCV infection in HIV-positive persons was reported to be 16.9%. In recent studies carried out in Northern Nigeria, the prevalence of HIV and HCV co-infection was reported as 6.2% in Kano, Abuja 12.5% (2) and Keffi, a neighbouring city to Abuja, 11.1%.(3) On the other hand, a higher prevalence of 20.6% was reported among persons with HIV/HBV co-infection in Keffi, North-Central Nigeria.(3)

Pregnant women infected with hepatitis are very likely to transmit the infection on to her newborn infant due to exposure to maternal blood, fluids and faeces. About 10-20% of infants born to hepatitis B infected mothers have been reported to be at risk of developing hepatitis.(4)

The HIV-infected pregnant cohort represents a unique population. In the US, 6.3% was reported as overall prevalence of HIV and hepatitis B or C virus co-infection among pregnant women with 1.5% and 4.9% specifically co-infected with hepatitis B and C respectively.(5) In Rwanda and Uganda, about 6% of HIV-positive pregnant women were co-infected with either HBV or HCV.(6) In this study, we evaluate the prevalence of human immunodeficiency virus (HIV), hepatitis B virus and hepatitis C virus among pregnant women attending antenatal clinics in Federal Capital Territory, Abuja, Nigeria.

Material and Methods:

Study population

This study was conducted at the Wuse General Hospital, Abuja among pregnant women aged between 15 and 50 years during the period of June, 2005 to March 2006

A total of 500 ante-natal attendees were recruited for the study from three district hospitals in Abuja, comprising of Wuse (250), Nyanya (200) and Gwarinpa (50). These hospitals are secondary health facilities that serve the inhabitants of the Federal Capital Territory, Abuja - Nigeria.

Sample collection

Five (5) ml of blood each was collected from subjects into plain sterile bottle following informed consent. Blood samples were centrifuged and sera separated and stored at -20°C until used. Samples were analyzed in batches for antibodies to HIV-1 and 2 by ELISA (Abbot, USA) and

confirmed by Western Blot (Cambridge Biotech, UK), antibodies to Hepatitis C by ELISA (Abbot, USA;) and HBsAg (monoclonal, ELISA; Abbot USA), in accordance with the respective manufacturer's instructions.

Serum samples that were repeatedly reactive for anti-HCV and HBsAg by ELISA were indicated as positive in the study.

Statistical Analysis

Relative risk at 95% Confidence Interval and test of significance at $P = 0.05$ using Fisher Exact 2-tailed values were measured using Epi Info Version 6.04 statistical package

Ethical Issues

Informed consent and ethical approval were obtained from the subjects and authorities of the affected district hospitals respectively.

Results:

Out of a total of five hundred (500) samples analyzed for HIV antibodies, HBsAg and anti-HCV antibodies, 42 (8.4%) were positive for HIV, HBsAg, 19 (3.8%) and anti-HCV, 8 (1.6%). A break down by district hospital shows that of the 250 samples from Wuse District Hospital, 22 (8.8%), 8 (3.2%) and 4 (1.6%) were positive for HIV-1 antibodies, HBsAg and anti-HCV antibodies respectively. Of the 200 samples collected from Nyanya District Hospital, 17 (8.5%), 8 (4%) and 3 (1.5%) were positive for HIV-1, HBsAg and anti-HCV respectively; while out of the fifty (50) samples from Gwarinpa District Hospital, 3 (6.0%) had HIV-1 antibodies, 3 (6.0%) and 1 (2%) were HBsAg and anti-HCV positive respectively (Table 1).

Table 2 shows the association and Relative Risk (95%CI) of HIV/HBV and HIV/HCV co-infections in pregnant women attending the three District Hospitals in the FCT, Abuja. Three (7.1%) HIV positive pregnant women were co-infected with HBV, having relative risk of 1.95 (CI 95% 0.66–5.74) and Fisher Exact 2-tailed $P=0.208$ whereas only one (2.4%) pregnant woman had both HIV and HCV co-infection (RR, 1.95 [CI 95% 0.66 – 5.74]) and Fisher Exact 2-tailed $P=0.507$.

Table 3 indicates age distribution of ante-natal attendees in relation to HIV, HBsAg and anti-HCV positivity. The highest prevalence of HIV (13.4%), HBV (5.1%) and HCV (1.9%) infections occurred in the age bracket of 21-25 years while among the age group 15-20 years only 1.8% prevalence each was recorded for HIV, HBV and HCV respectively. None of the pregnant women in the age bracket 36 years and above that had HCV infection. Generally, the overall prevalence of HBV and HCV prevalence among pregnant women in the FCT, Abuja were 3.8% and 1.6% respectively.

Table 1: Sample distribution of the three district hospitals in the FCT, Abuja

Location	No. Tested	No. Positive (%)		
		HIV	HBV	HCV
Gwarinpa	50	3 (6)	3 (6)	1 (2)
Nyanya	200	17 (8.5)	8 (4)	3 (1.5)
Wuse	250	22 (8.8)	8 (3.2)	4 (1.6)
Total	500	42 (8.4)	19 (3.8)	8 (1.6)

Table 2: Relative Risk (95%CI) of HIV/HBV and HIV/HCV co-infections in pregnant women attending FCT District Hospitals

Infections	No. positive	Percentage	Relative Risk (95% CI)	P value (Fisher Exact)- 2 tailed
HIV and HBV	3	7.1	1.95 (0.66 - 5.74)	0.208
HIV and HCV	1	2.4	1.50 (0.23 - 9.60)	0.507

Majority of the pregnant women tested were housewives, 312 (62.4%) while civil servants, traders and students were 152 (30.4%), 33 (6.6) and 3 (0.6%) respectively (Table 3). Findings in this study show that the highest prevalence of HIV, HBV and HCV were recorded among Traders (60.6%, 30.3% and 6.1% respectively) whereas students and housewives ranked second in the prevalence of HIV (33.3%) and HBV (2.2%) respectively. Apart from HIV where civil servants had prevalence of 5.9%, they were the least infected with HBV (1.3%) and HCV (3.9%) compared to the other groups (Table 3).

Table 3: Age distribution of pregnant women attending Wuse, Nyanya and Gwarinpa District Hospitals in relation to HIV, HBsAg and anti-HCV positivity

Age Range	No. Tested	HIV (%)	HBV (%)	HCV (%)
15-20	55	1(1.8)	1(1.8)	1(1.8)
21-25	157	21 (13.4)	8 (5.1)	3 (1.9)
26-30	161	11 (6.8)	6 (3.7)	3 (1.9)
31-35	104	8 (7.7)	3 (2.9)	1(1.0)
36-40	17	0 (0.0)	0 (0.0)	0 (0.0)
41-45	5	0 (0.0)	1 (20.0)	0 (0.0)
46-50	1	1 (100)	0 (0.0)	0 (0.0)
	500	42(8.4)	19 (3.8)	8 (1.6)

HIV infection among the married were higher than the singles (8.6% vs 6.5%), whereas the reverse was recorded for HBV infection (3.0% vs 9.8%). In the case of HCV infection, the prevalence was the same for both groups (1.6%). The prevalence of HIV, HBsAg and HCV among those transfused and those never transfused is shown in Table 4. Among the pregnant women who claimed to have received blood transfusion at one time or the other, only 1 (1.4%) was positive for HIV, HBsAg 2 (2.8%) and HCV, 6 (8.3%). However, those that never received blood transfusion had higher prevalence of HIV and HBV infections (9.6% and 4.0% respectively) than the transfused except in HCV infection where prevalence was lower (0.5%).

Table 4: Demographic characteristics and transfusion status of pregnant women attending Wuse, Nyanya and Gwarinpa District Hospitals

Characteristics	No. Tested	No. Positive (%)		
		HIV	HBV	HCV
Occupation				
Civil servant	152	9 (5.9)	2(1.3)	6 (3.9)
Students	3	1 (33.3)	0 (0)	0 (0.0)
Housewives	312	12 (3.8)	7 (2.2)	0(0.0)
Traders	33	20 (60.6)	10(30.3)	2 (6.1)
Marital status				
Married	439	38 (8.6)	13 (3.0)	7 (1.6)
Single	61	4 (6.5)	6 (9.8)	1 (1.6)
Blood transfusion status				
Transfused	72	1 (1.4)	2 (2.8)	6 (8.3)
Never transfused	428	41 (9.6)	17 (4.0)	2 (0.5)

Discussion

This study shows the prevalence of HIV, HBV and HCV infections as well as HIV/HBV and HIV/HCV co-infections among pregnant women attending three district hospitals in the FCT, Abuja. The cohort of pregnant women was chosen for this study not only because of their sexuality and vulnerability to sexually transmitted infections but also based on the fact that the three viruses studied share common route of transmissibility through heterosexual intercourse.

Over the years, pregnant women cohort has been used to determine the national prevalence of HIV and syphilis in Nigeria without concurrently surveying for HBV and HCV since both HIV viral hepatitis share similar route of transmission.

In the recent national sentinel survey carried in 2004 (7), HIV prevalence in the FCT, Abuja was reported as 6.3%, whereas findings from this study shows a higher prevalence of 8.4%. Nyanya and Wuse districts recorded HIV prevalence of 6.7% and 2.0% respectively in the 2005 sentinel report compared to 8.5% and 8.8% respectively obtained in this study about 2 years later. Similarly, the high prevalence of viral hepatitis (9.3%) obtained in this study among pregnant women in Awka, Anambra State, Nigeria (8) is comparable to 8.4% reported in this study. Abuja, being an urban city with state of the art infrastructures has in recent times witnessed a fast population growth as a result of increasing drift of people especially civil servants, politicians and businessmen to the city. This mass drift is bound to increase the level of human interactions that may inadvertently affect disease epidemiology.

In this study, the prevalence of HIV and HBV or HCV co-infections is recorded as 9.5% with 7.1% and 2.4% specifically co-infected with HBV and HCV respectively. This report is higher than HIV/HBV and HIV/HCV co-infections reported in other urban cities such as Kampala, Uganda (4.9% and 0.6% respectively) and Kigali, Rwandan (2.4% and 4.9% respectively) (6). In Abidjan,

Cote d'Ivoire, a relatively higher frequency of HIV/HBV infection as against HIV/HCV co-infection was recorded (9.0% and 1% respectively) (9). Apart from incessant conflicts that may compounded the health status of some of these African cities, it is expected that FCT, Abuja-Nigeria better resource standing should address issues that may expose its citizenry to the risk of acquiring HIV and/or hepatitis infections.

This study also revealed that HIV infection possibly contributed to the incidence of HBV and HCV infections in the FCT-Abuja where about 2-fold (7.1% vs 3.8%) and 1.5-fold (2.4% vs 1.6%) increase in HBV and HCV infections respectively were observed among those specifically co-infected with HIV. This observation further implicates heterosexual intercourse in the transmission of these diseases as earlier reported (10, 11). It is clear from this study that there is a relatively high frequency of HIV and HBV or HCV co-infection among this cohort where about 10% of HIV-positive women in FCT, Abuja had a co-infection with one hepatitis virus.

Even though the influence of parallel and overlapping infections with HIV on vertical transmission of HBV and HCV in pregnant women is not clear, other workers have speculated hepatitis virus may act as cofactor for HIV disease progression (2) In this study, infection with the three viruses was one of the highest among those in the age bracket 21-25 years. This age group falls among the sexually active age groups in Nigeria and the result further confirms the fact that the infections are prevalent by sexual contact as earlier reported (10).

Assessing occupational risk in acquiring the infections, this study indicates that women who are traders suffered the highest rates with HIV, HBV and HCV. This could be explained by the fact that some of the market women do travel long distances away from their spouses and may stay many days before return and may have been involved in illicit unprotected sex that may lead to sexual transmitted diseases. It's not uncommon that Abuja situated in North Central Nigeria, market women may

travel down up to the coastal and far northern states to acquire market wares thereby prolonging their period of stay away from home.

Results of this study also revealed a high prevalence of HCV recorded among pregnant women that had recently received blood transfusion. This emphasizes the need to include the routine screening of HCV along with HIV and HBV in the current safe blood practices in all hospitals. It is common knowledge that in Nigeria, screening of blood donors in most hospitals is done for HIV alone and in some cases with HBV.

In conclusion, findings from this study have raised pertinent issues of public health importance particularly the high prevalence of parallel and overlapping HIV, HBV HCV infections found among pregnant women in the FCT-Abuja, Nigeria. Hence, when monitoring the risk of hepatotoxicity to antiretroviral drugs among these group of patients caution should be maintained. Also, there is need to include HBV and HCV among the disease of surveillance in the biannual national sentinel survey.

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