Research Article

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Prevalence and Risk Factors in HBV/HIV co-infection among Pregnant Women attending Antenatal care in a Tertiary Institution in North Central Nigeria

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Introduction

Global statistics showed that approximately 37 million persons are infected with HIV and 5 to 20% are co-infected with HBV.[1] The seroprevalence of chronic HBV in HIV infected individuals varies significantly between regions and risk-based groups, reflecting different patterns of transmission.[1] Sub-Saharan African is endemic for Hepatitis B and HIV infections and estimates have it that 70 to 95% of the adult population in this region has been exposed to HBV.[2,3] HBV and HIV co-infection in pregnant women is of public health significance as this cohorts play a key role in vertical and perinatal transmission of both viruses.[2]

The two viruses share the same characteristics in terms of mode of transmission, use of reverse transcriptase enzyme, potential to progress to chronic infections, emergence of genomic mutation, and ease of formation of resistance to commonly available antiviral agents.[4] HBV/HIV co-infection significantly impacts the natural history, progression, and mortality related to both viruses with HIV infection accelerating HBV-related liver impairment.[5] Individuals co-infected with chronic HBV and HIV have worse adverse outcomes than mono-infected and have higher levels of HBV viraemia, increased likelihood of progression to cirrhosis and hepatocellular carcinoma.[6]

Pregnant women with acute hepatitis have an increase incidence of premature labour, prematurity, neonates with low Apgar scores and an increased risk of intraventricular haemorrhage, which is linked to preterm delivery.[7] It is also noted that in pregnant women with fulminant hepatic failure, there is an increased incidence of intrapartum and postpartum haemorrhage, probably due to deranged hepatic function.[7]

Knowledge of the prevalence of HBV in HIV positive pregnant women is crucial in understanding the epidemiology of both viruses. An understanding of the risk factors associated with HBV/HIV co-infection would be beneficial in mapping out strategies in prevention programmes aimed at curbing the menace and spread of both viruses.

This study aimed at determining the prevalence of HBV in HIV positive pregnant women attending antenatal care at Federal Medical Centre, Keffi and to ascertain the risk factors associated with HBV/HIV co-infection.

Materials and Methods

Study Population and Design

This prospective longitudinal and analytical study was carried out between November 2019 and May 2020 at the Antenatal Clinic of the Department of Obstetrics and Gynaecology, Federal Medical Centre, Keffi. The health facility is a tertiary centre that provides specialist services

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and receives referrals from other government and private hospitals in Nasarawa and adjoining states in the North central Nigeria.

The study population consisted of HIV-positive pregnant women attending antenatal care during the period of the study. The estimated sample size was determined using the Fisher et al Formula [8]:

$N = pqZ^2 / d^2$

Where N=required sample size; Z=1.96, which is the standard normal distribution at 95% confidence interval

P = local prevalence rate of previous study on HBV and HIV co-infection among pregnant women = 11.8% = 0.118[9]

Q = 1-p = 1-0.118 = 0.882

D = degree of accuracy or precision expected at 5% which is equal to 0.05

$N = 0.118x (1-0.118)x1.96^2 / 0.05^2 = 159.927$

159.927plus 10% attrition

= 176

HIV positive pregnant women who met the inclusion criteria were recruited for the study after signing the informed consent form. The sample size of 176 was obtained using the Systematic sampling technique. The antenatal clinic in FMC, Keffi runs from Monday to Thursdays, excluding public holidays. An average of HIV-positive clients at the booking clinic per week was 12, from the previous year's record. The study lasted for 6 months (24 weeks). The study population (N) was equal to 12 multiply by 24, which was equal to 286. The sample size (n) was 176 as calculated using Fisher's formula for sample size determination. The sampling interval is equal to N/n, which was equal to 286/176=1.625 approximately 2

Using the antenatal booking register as the sampling frame, the 1st client on the list who is HIV positive was selected as the starting point, while subsequent clients that met the inclusion criteria were recruited using a sampling interval of 2, and this continued until the required sample size of 176 clients was obtained.

Data Collection

Structured questionnaires were used to collect data from participants on age, parity, marital status, gestational age, educational level, occupation, history of blood transfusion, history of multiple sexual partners, history of previous surgery, history of tattoo/tribal marks, sharing of sharp objects, female circumcision and previous deliveries conducted by a traditional birth attendant.

Collection of Blood sample and HBsAg screening

Each consented participant was made comfortable in a chair in the sample collection room. A tourniquet was applied just above the wrist and the dorsum of the hand was cleaned with methylated spirit. Using 5 mL syringe, 4 mL of venous blood was obtained from each participant. The blood sample was emptied into a standard ethylene di-amine tetra acetic acid (EDTA) sample bottle. The collected samples were centrifuged at 4000 rpm for 5minutes to separate the plasma from blood cells. The one-step HBV rapid test using LabAcon strips, sensitivity 99.1% (95% CI 94.9–100.0%), specificity 99.4% (95% CI 98.6–99.9%),(HangzhouBiotest Biotech Co. Ltd, China) was done following the manufacturer's instructions. The rapid test strip was a qualitative membrane-based immunoassay for the detection of antibody to HBV in serum or plasma. The membrane was preloaded with recombinant HBV antigen in the test line region of the strip. During testing, the plasma specimen reacted with recombinant HBV antigen conjugated to colloid gold. The mixture migrated upward on the membrane chromatographically by capillary action to react with recombinant HBV antigen on the membrane and generate a coloured line. The presence of this coloured line indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a coloured line always appeared at the control line region, indicating that a proper volume of specimen was added.

Data Analysis

The data obtained from questionnaires and the laboratory tests were imputed into the statistical package for social sciences (SPSS) version 25.0(Chicago, USA) and tests of associations were done using Chi-square and Fisher's exact test. Results were presented in tables and figures.

Ethical Considerations

Ethical approval was sought and obtained from the Federal Medical Centre, Keffi Ethics Committee. Interview-based data collection and venous blood samples were taken from participants who signed an informed consent form.

Results

A total of one hundred and seventy-six(176) HIV positive pregnant women were recruited for the study.

Socio-demographic characteristics of the study participants

The mean age of the participants was 32.42 years (SD ± 4.99, range 16–42 years). About 70% of the study participants had a secondary level of education. Most were married 175 (99.4%) and of these, 39 (22.2%) were in a polygamous setting. The majority were housewives, 48

Table 1: Socio-demographic characteristics of HIV positive pregnant women

Variables	*Frequency*	*Percentage age (in years)*
15–19	1	0-6
20–24	7	4.0
25–29	41	23.3
30–34	61	34.6
35 and above	66	37.5
Mean ± SD; min, max	32.42 ± 4.99	16, 42
Educational Level		
No formal	37	21.0
Primary	21	11.9
Secondary	70	39.8
Tertiary	48	27.3
Occupation		
Civil servant	27	15.3
Trading	44	25.0
Farming	18	10.2
Artisan	25	14.2
Unemployed	9	5.1
Student	5	2.8
Housewife	48	27.3
Marital status		
Single	1	0.6
Married	175	9.4
Parity		
Nulliparous	20	11.4
Multiparous	128	72.7

(27.3%). One hundred and 28 (72.7%) of the participants were multiparous with a mean parity of 2.53 (SD±1.71)

Seroprevalence of Hepatitis B virus in HIV positive pregnant women

Overall, ten of the study participants tested positive for HBV, giving an HBV/HIV co-infection prevalence of 5.7%

HBV/HIV co-infection occurred more in the age range 30 years and above (80%). All co-infected participants were married (100%). The majority of the women were educated up to the tertiary level, 4(40%). Civil servants and housewives were in the majority. None of the socio-demographic variables showed a significant association with HBV/HIV co-infection (Table 3)

Half (50%) of HBV/HIV co-infected women had previous history of surgery, delivery by traditional birth attendant and prior history of multiple sexual partners, but none of the risk factors considered had significant statistical relationship with HBV/HIV co-infection (Table 4)

Table 2: Seroprevalence of HBV in HIV positive pregnant women

Infection	*Frequency*	*Percentage*
HIV Positive alone	166	94.3
HIV/HBV Positive	10	5.7
Total	176	100

DISCUSSION

The study found a seroprevalence of 5.7% HBV/HIV co-infection among pregnant women attending antenatal care at Federal Medical Centre, Keffi, Nigeria. This is still an infection rather high prevalence, with grave public health concerns. The seroprevalence obtained was higher than the prevalence of 4.2% found by Eke and colleagues in Nnewi, Southeast, Nigeria,[10] 4.2% in Lagos, Southwest, Nigeria by Ezechi and co-workers11; 4.7% by Oga and colleagues in Jos[12] but lower when compared to prevalence obtained by Olokoba et al in Yola, North East, Nigeria[13] 8.9% prevalence rate reported in Ibadan by Adesina et al [14] and 11.8% reported by Lar and co-workers[9]. The likely explanation for the observed variations in seroprevalence may be due to differences in socio-cultural practices, sample size and test kits' sensitivity and specificity.

Studies across Africa have shown variation in the prevalence of HBV/HIV co-infection in pregnancy. When compared with these other African studies, the HBV/HIV co-infection from this study are consistent with the HBV/HIV co-infection prevalence among pregnant women in Sudan (5.6%) and relatively comparable with the 5.3% prevalence registered in South Africa by Hoffmann et al.[15] The similarity in the prevalence of HBV/HIV co-infection may be due to shared mode of transmission of both viruses as well as regions with the same HBV and HIV endemicity. The obtained prevalence is lower than 14.9% reported by Frempong in Ghana[16],12.2% prevalence found in Burkina Faso by Ilooudo et al[17] , 19% reported by Zenebe and colleagues in Northwest Ethiopia[18] , and 9.0% co-infection prevalence observed in Abidjan by Askari et al.[19] The observed prevalence is higher than 3.1% registered by Thumbiran et al in a South African study[2], 4.9% in Ugandan by Ochola et al [20], 4.7% in Kinshasa, Congo by Mpody et al[21], 4.1% in Rwanda by Mutagoma and co-workers [3], and 3.2% in Zambia by Sichone and colleague.[22] These variations may be connected to differences in sampling methods, sample sizes, socio-cultural practices, and sexual behaviours.

Table 3: Socio-demographic characteristics of HBV/HIV co-infected participants:

Variables	*HIV alone*	*Co-infection*	*Total*	*X2*	*p-value*
Age (years)				1.52	1
15–19	1 (0.6)	0 (0.0)	1 (0.6)		
20–24	7 (4.2)	0 (0.0)	7 (4.0)		
25–29	39 (23.5)	2 (20.0)	41 (23.3)		
30–34	57 (34.3)	4 (40.0)	61 (34.7)		
35 & above	62 (37.3)	4 (40.0)	66 (37.5)		
Marital status				0.061	0.806
Married	165 (99.4)	10 (100)	175 (99.4)		
Single	1 (0.6)	0 (0.0)	1 (0.6)		
Educational status				4.876	0.148
None	34 (20.5)	3 (30.0)	37 (21.0)		
Primary	19 (11.4)	2 (20.0)	21 (11.9)		
Secondary	69 (41.6)	1 (10.0)	70 (39.8)		
Tertiary	44 (26.5)	4 (40.0)	48 (27.3)		
Occupation				3.964	0.643
Civil servant	24 (14.5)	3 (30.0)	27 (15.3)		
Trading	43 (25.8)	1 (10.0)	44 (25.0)		
Unemployed	9 (5.4)	0 (0.0)	9 (5.1)		
Farming	16 (9.6)	2 (20.0)	18 (10.2)		
Student	5 (3.0)	0 (0.0)	5 (2.8)		
Artisan	24 (14.5)	1 (10.0)	25 (14.1)		
House wife	45 (27.1)	3 (30.0)	48 (27.5)		

These socio-cultural practices, which include female genital mutilation, polygamy, widowhood inheritance, sexual cleansing, wife sharing, virginity testing and dry sex, are associated with increased transmission of HBV/HIV and the noted variations are related to the extent of these practices in different study locations.

Outside Africa, Mave et al reported 4.6%in India[23] and Santiago-Munoz et al obtained a lower prevalence of 1.5% in a North American study.[24] This may be due to socio-cultural factors and low endemicity to the Hepatitis B virus, as well as the large sample size used in the North American study. The possible explanations for the low prevalence noted in North America when compared to this study may be due to the practice of monogamy, reduction in other harmful socio-cultural practices such as female genital mutilation, improved blood transfusion services, better awareness of infection prevention strategies due to high literacy level and again, documented evidence of low Hepatitis B endemicity.

There was no association between maternal educational level, occupation, and marital status with HBV/HIV co-infections noted in this study. This agrees with the findings of Oga and co-workers in Jos and Zenebe in Ethiopian studies.[12,18] This study noticed a non-statistically significant increase in co-infection with maternal age of 30 years and above. This support findings from earlier study by Landes and colleagues that co-infection prevalence is related to maternal age.[25]It is possible that this age group were exposed to the risk factors due to prolonged exposure period as most were multiparous women, again more than two- thirds of the recruited sample population in this study were women of age group 30 years and above Another consideration may be delay marital age as most had secondary and tertiary levels of education. The noted observation was in contrast to findings by Mutagoma and co-workers that the prevalence of HBV/HIV co-infection was higher in age group 15 to 24 years.[3]The possible reasons for this observation may be differences in sample size, age distribution of the recruited participants and also, the younger population are known to be more experimental, sexually more active and as such prone to risky behaviours that predisposes them to HBV/HIV infections The prevalence of HBV/HIV was not independently

Table 4: Medical and obstetrics risk factors profile in HBV/HIV co-infected pregnant Women

Variables	*HIV alone*	*Co-infection*	*Total*	*X2*	*p-value*
Previous surgery				2.131	0.163
No	119 (71.7)	5 (50)	124 (70.5)		
yes	47 (28.3)	5 (50)	52 (29.5)		
Previous Dental manipulation				2.092	0.148
No	137 (82.5)	10 (100)	147 (83.5)		
Yes	29 (17.5)	0 (0.0)	29 (16.5)		
Previous abortion				0.028	0.866
No	104 (62.7	6 (60.0)	110 (62.5)		
Yes	62 (37.3)	4 (40.0)	66 (37.5)		
Sharing of sharps/needles				2.092	0.148
No	137 (82.5)	10 (100)	147 (83.5)		
Yes	29 (17.5)	0 (0.0)	29 (16.5)		
Female circumcision				1.359	0.244
No	146 (88.0)	10)100)	156 (88.6)		
Yes	20 (12.0)	0 (0.0)	20 (11.4)		
Intravenous drug use				2.437	0.118
No	154 (92.8)	8 (80)	162 (92.6)		
Yes	12 (7.2)	2 (20)	14 (7.4)		
Polygamous marriage				0.378	0.539
No	130 (78.3	7 (70.0)	137 (77.8)		
Yes	36 (21.7)	3 (30.0)	39 (22.2)		
Delivery by Traditional birth attendance				2.94	0.086
No	124 (74.7)	5 (50.0)	129 (73.3)		
Yes	42 (25.3)	5 (50.0)	47 (26.7)		
Previous blood transfusion				0.598	0.46
No	123 (74.1)	6 (60.0)	129 (73.3)		
Yes	43 (25.9)	4 (40.0)	47 (26.7)		
Previous Multi sexual partner				0.554	0.457
No	102 (61.4)	5 (50.0)	107 (60.8)		
Yes	64 (38.6)	5 (50.0)	69 (39.2)		
Tattoos/tribal marks				2.847	0.083
No	106 (63.9)	9 (90.0)	115 (65.3)		
Yes	60 (36.1)	1 (10.0)	61 (34.7)		

associated with history of intravenous drug use, previous surgery, previous dental manipulation, previous abortions, sharing of sharp needles, female circumcision, blood transfusion, multiple sexual partners and delivery by traditional birth attendant. A French study also could not find any significant association between HBV/HIV co-infection and intravenous drug use.[26]

Conclusion

HBV/HIV co-infection is a significant public health problem in North Central Nigeria. Knowledge of its prevalence in HIV pregnant women will help in fashioning out prevention and treatment strategies aimed at reduction of horizontal and perinatal transmission of both viruses. The prevention of transmission to the next generation should be of utmost priority to healthcare policy makers.

Recommendation

In view of the relatively high prevalence of HBV in HIV positive pregnant women, a case is made for routine assessment of HBV viral load in this cohort as part of antenatal care to help in optimizing maternal health.

Conflict of Interest

There is no conflict of interest with any of the authors.

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Ethical Approval

Ethical approval was sought and obtained from Federal Medical Centre, Keffi Ethics Committee. Interview-based data collection and venous blood sample was taken from participants who signed informed consent form.

References

1. Singh K, Crane M, Audsley J, and Lewin S.HIV-Hepatitis B Virus co-infection: Epidemiology, pathogenesis and treatment. AIDS.2017 Sep 24;31[15]:2035-52.
2. Thumbiran NV, Moodley D, Parboosing R, Moodley P. Hepatitis B and HIV co-infection in pregnant women: indication for routine antenatal hepatitis B virus screening in a high HIV prevalence setting. S. Afr. Med. J, 104 [2014],pp.307-309
3. Mutagoma M ,Balisanga H, Malamba S, Dieudonne S. Hepatitis B Virus and HIV co-infection among pregnant women in Rwanda. BMC Infect Dis.2017:618
4. Lacombe K, Boyd A, Gozlan J, Lavocat F, Girard PM, Zoulim F: Drug resistance and immune escape HBV mutants in HIV-infected hosts. Antivir Ther 2010: 15:49-7
5. Flor CDL, Cutrell JB, Jain MK. Management of Patients with HIV and Hepatitis B Co-infection. Journal of clinical outcomes Management.2017 October:24[10]
6. Prussing C, Chan C, Pinchoff J, Kersanske L, Bornsschlegel K, Balter S, et al. HIV and Viral Hepatitis co-infection in New York city,2000-2010: Prevalence and case characteristics. Epidemiol infect. 2015 May: 143[7]:1408-16
7. Ahizechukwu CN, Uzoamaka AE, Charles IO, Ifeanyichukwu UE, Chukwuanugo O. Prevalence and Correlates and Pattern of Hepatitis B Surface antigen In Low Resource Setting Virology Journal 2011:8:12
8. Rouser B. Fundamentals of Biostatics. International students Edition 3rd Ed. Boston: PWS-Kent: 1990.p.348-52
9. Lar PM, Pam VR, Christopher PB, Gwamzhi I, Mawak JD. Prevalence and Immune Status of HIV/HBV co-infected Pregnant Women. Afr J Clin. Exper Microbiol. 2013, 14[3]:120-126
10. Eke AC, Eke AU, Okafor CL, Ezebialu IU, Ogbuagu C. Prevalence, Correlates and Pattern of Hepatitis B Surface antigen in a low resource setting. Virol J.2011 Jan 12 8:12
11. Ezechi OC, Kalejaiye OO, Gab- Okafor CV, Oladele DA, Oke BO, Musa ZA, et al. sero-prevalence and factors associated with Hepatitis B and C co-infection in pregnant Nigerian Women living with HIV Infection. Pan Afr Med J. 2014: 17:197
12. Oga EO, Egbodo CO, Oyebode T. Hepatitis B and C co-infection among HIV Pregnant Women and Fetal Outcome in Jos University Teaching Hospital, Jos, Plateau State. Research in Obstetrics and Gynaecology. 2018: 6[3]:52-58
13. Olokoba AB, Salawu FK, Danburam A, Olokoba JK, Midala JK, Badung LH, et al. Hepatitis B virus infection amongst pregnant women in North-eastern Nigeria-a call for action. Niger J Clin Pract. 2011:14[1]:10:3
14. Adesina O, Oladokun A, Akinyemi O, Adedokun B, Awolde O, et al. Human Immuno deficiency virus and Hepatitis B Virus co-infection in pregnancy at the University College Hospital Ibadan. Afr J Med Sci. 39:305-10
15. Hoffmann C, Mashabela F, Cohn S, Hoffman J, Lala S, Martinson N. Maternal Hepatitis B and infant infection among pregnant women living with HIV in South Africa. J Int AIDS Soc. 2014:17[1]:18871
16. Frempong MT, Ntiamoah P, Annani-Akollor ME, Owiredu WKBA, Addai-Mensah O, Owiredu EW, et al. Hepatitis B and C Infections in HIV-1 and non-HIV infected pregnant women in the Brong-Ahafo Region, Ghana. PLoS ONE.2019:14[7]:e0219922.
17. liboudo D, Simpore J, Ouermi D, Bisseye C, Sagna T, Odolini S, et al. Towards the complete eradication of mother-to-child HIV/HBV co-infection at Saint Camille Medical Centre in Burkina Faso. Africa. Braz J Infect Dis. 14(3):219-224
18. Zenebe Y, Mulu W, Abera B. Sero-prevalence and risk factors of hepatitis B virus and human immunodeficiency virus infection among pregnant women in Bahir Dar city, Northwest Ethiopia: a cross sectional study. BMC Infect Dis 2014, 14.118. https://doi.org/10.1186/1471-2334-14-118
19. Askari A, Hakimi H, Ahmadabadi B, Hassanshahi G, Arababadi MK. Prevalence of hepatitis B co-infection among HIV Positive Patients: Narrative Review Article. Iran J Public Health. 2014 Jun; 43(6):705-12
20. Ochola E, Ocama P, Orach CG, Nankinga ZK, Kalyango JN, McFarland W. High burden of hepatitis B infection in Northern Uganda: results of a population-based survey. BMC Public Health, 2013; 13:727
21. Mpody C, Thompson P, Tabala M, Lantoniaina N,Ravelomanana R, Malongo F, et al. Hepatitis B infection among pregnant and postpartum women living with HIV and on antiretroviral therapy in Kinshasa, DR Congo: A cross-sectional study. PLoS One. 2019, 14(5):e0216293
22. Sichone V, Vwalika B. Prevalence of Hepatitis B Virus, HIV and HBV Co-infection and Associated Factors in Pregnant Women Attending Antenatal Care at the University Teaching Hospital, Lusaka, Zambia. Medical Journal of Zambia. 2019, 46(1):10-18
23. Mave V, Kadam D, Kinikar A, Gupte N, Bhattacharya D, Bharadwai R, et al. Impact of Maternal Hepatitis B virus co-infection on Mother-to-Child Transmission of Human Immunodeficiency Virus. HIV Med. 2014 Jul, 15(6): 347-54
24. Santiago-Munoz P, Roberts S, Sheffield J, McElwee Band Wendel GD. Prevalence of Hepatitis Band C in Pregnant Women who are infected with HIV. American Journal of Obstetrics and Gynaecology .2005;19(3):1270-3
25. Landes M, Newell ML, Barlow P, Fiore S, Malyuta R, Martinelli P et al. Hepatitis B or Hepatitis C co-infection in HIV infected pregnant women in Europe. HIV Med. 2008; 9(7):526-34
26. Benhammou V, Tubiana R,Matheron S, Sellier P, Mandelbrot L, Chenadec J, et al. HBV or HCV Co-infection in HIV-1 Infected Pregnant Women in France: Prevalence and Pregnancy Outcomes. J Acquired Immune Deficiency Syndromes. 2018, 77(5):439-450