

Original Research Article

Prevalence of hepatitis B and C among HIV infected pregnant women attending care and treatment at National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria.

ABSTRACT

Introduction: Viral Hepatitis and Human Immunodeficiency Virus (HIV) are most common top ranking leading causes of infectious diseases and deaths worldwide. If these infections, remain unidentified and untreated among HIV infected pregnant women, children born to these pregnant women are at high risk of these viral hepatitis infections.

Aims: The aim of the study was to determine the sero-prevalence of HBV and HCV among HIV infected pregnant women in Abuja, Nigeria.

Methodology: A cross sectional study among 330 HIV infected pregnant women commencing antiretroviral therapy (ART) at National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria were studied. The women were screened for the presence of HBV and HCV antibodies. A pre-tested questionnaire was used to obtain socio-demographic data prior to recruitment/enrollment. Data were analyzed using statistical product and service solutions (SPSS) (version 20.0).

Results: Out of the 330 HIV infected pregnant women, 90 (27.3%) were HBV positive, while 5 (1.5%) were HCV positive ($p = 0.42$). The highest prevalence was observed among the age group of 20 – 29. However, none of the patients tested positive for both HBV and HCV.

Conclusion: The findings of this study indicated that infection with viral hepatitis is common and of public health concern. Therefore, concerted efforts should be put in place to mitigate the epidemics.

Keywords: Hepatitis B Virus, Hepatitis C Virus, Human Immune Deficiency Virus, sero-Prevalence, cross sectional, NIPRD

1. INTRODUCTION

Viral Hepatitis and Human Immunodeficiency Virus (HIV) are among most common top ranking leading causes of infectious disease deaths worldwide [1,2]. Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections are regular causes of chronic hepatitis globally and they create highest burden to healthcare systems because of its high rate of morbidity and mortality, and also high costs of management and treatment [3,4,5,6].

Viral hepatitis can also be referred to as inflammation of the liver. The HBV and HCV infections primarily affect the liver and usually show no symptoms for a long time. Although,

28 [If the infections remain untreated, the virus can cause greater damage to the liver and death.](#)
29 HIV help in [modifying](#) the natural history of HBV and HCV infection among co-infected
30 persons and therefore are more likely to develop chronic viral hepatitis; have an increased
31 risk of liver-related mortality and morbidity and suffer from life-threatening complication
32 beyond those caused by either infection alone [7,8,9,41]. World Health Organization (WHO)
33 in 2018 reported an estimated 257million people are living with HBV infection (as defined by
34 hepatitis B surface antigen reactive) [10]. It was also estimates by WHO that 3% of the
35 world's populations are chronically infected with infection cause by HCV and most of these
36 cases are found in Africa region [11,42].
37 The sero-prevalence of HBV infection is very high in the developing countries of sub-
38 Saharan Africa and South East Asia where about 8 - 10% are chronic infectious carriers; and
39 these same geographic regions have over two-thirds of the worldwide HIV burden [12,13]. In
40 the developed countries, chronic HBV and HCV co-infection are found among estimated
41 30% and 10% of HIV-positive persons respectively, with only non or approximately 1% being
42 triply infected with HIV, HBV and HCV [14].
43 Some studies carried out across Nigeria have shown difference prevalence frequencies of
44 HIV/HBV co-infection from 9.2% to as high as 70.5% and that of HIV/HCV co-infection
45 ranged from 0.5% to 14.7% [15,16,17,18]. HBV and HCV infections occur more frequently
46 among HIV infected patients due to the shared modes of transmission and further worsens
47 the outcome for the mother and the infant with a more rapid clinical and immunological
48 progression [19,20]. Although, most perinatal and horizontal transmission of HBV occur in
49 areas of greater endemicity as most infections are acquired in the first 5 years of life around
50 Asia and Africa geographic regions and estimated 25% of infected children will die of HBV
51 related chronic liver disease in adulthood [21,22].
52 There are several reported consequences of an acute viral hepatitis in pregnancy, this may
53 include premature labor with the resultant sequelae of prematurity [23,24]. An increase in the
54 incidence of prematurity over that [are](#) seen in the general population has being
55 demonstrated in some studies [23,24,25]. Other later effect of HBV infection may include a
56 higher risk of intraventricular hemorrhage.
57 Accordingly, except if HBV infected pregnant women are identified and sufficient
58 management, care and treatment are given, their babies would be at high risk of HBV
59 infection and its challenges later in life. For HIV patients co-infected with both/or HBV and
60 HCV are usually associated with accelerated prognosis into cirrhosis and other liver
61 diseases, hence, causing higher mortality rates; despite the impacts of HCV on HIV disease
62 prognosis still remains unclear [26,27]. Additionally, it is reported that individuals co-infected
63 with HBV and HCV are risk of hepatotoxicity associated with the use of antiretroviral drugs
64 (ARDs) [19,20,21,22,26,27].
65 The clinical presentation of non-specificity and the chronic course that makes the early
66 diagnosis of HBV and HCV difficult [19,20]. Thus, there may be a latent or silent epidemic of
67 HBV and HCV among pregnant women living with HIV/AIDS which remain unreported and
68 thereby no intervention plan to scrub such menace. It is of significant to investigate the
69 proportion and frequency of HBV and HCV co-infection among HIV infected [HIV infected](#)
70 pregnant women attending care and [treatment](#) at National Institute for Pharmaceutical
71 Research and Development (NIPRD) Abuja in order to understand and profound
72 interventions aimed at management, prevention, care and treatment in view of its growing
73 public health importance. Thereby, providing a window of opportunity for patient education
74 and behavioral modification by counselling and improved management of our HCV and or
75 HBV co-infection in HIV infected pregnant women to achieve better pregnancy outcome.
76 Therefore, this present study is aim to investigate the sero-prevalence of HBV and HCV
77 among HIV infected pregnant women in NIPRD, Abuja seeking healthcare and
78 management.
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81 **2. MATERIAL AND METHODS**

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83 **2.1 Study Area and Design**

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85 The study was a cross-sectional survey carried out between 5th January, 2015 to 23rd
86 December 2018 among HIV infected pregnant women on their commencement for ART at
87 NIPRD for HIV care and treatment. Abuja is the developing Federal Capital City of Nigeria
88 lying between latitude 8.25°N and 9.20°E of the equator and longitude 6.45°N and 7.39°E of
89 Greenwich Meridian. It is located at the centre of the country with a landmass of
90 approximately 7,315 km², of which the actual city occupies 275.3 km². It is situated within
91 the Savannah region with moderate climatic conditions. The territory is located just north of
92 the confluence of the River Niger and Benue River [28].

93 NIPRD is the apex medical research and referral institution in Nigeria charged with the
94 responsibility to conduct research into disease of public health significant in the country.
95 Although, with the Federal Government of Nigeria programme in 2002 on antiretroviral drug
96 (ARDs) treatment, it was selected among the 25 treatment centres. It was selected
97 principally to provide the research backup and referral centre serving a large population in
98 the heart of Abuja and its environs for the National HIV programme. Presently, the facility
99 provides free comprehensive care, treatment and support for over 6,646 HIV patients.
100 Patients are enrolled into the HIV treatment programme following HIV confirmations or a
101 referral from the HIV Counseling and Testing Centre (HCT), Virology laboratory of NIPRD,
102 Abuja or transfer from other government recognized HIV treatment facility in the country.

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104 **2.2 Study Populations**

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106 As a tradition and requirement, all HIV infected pregnant women to commence ART are
107 screened for pregnancy. A total of 330 HIV infected pregnant women were confirmed for
108 pregnancy in our laboratory (Human Virology unit of Microbiology and Biotechnology
109 Department, NIPRD, Abuja) were recruited for this study.

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111 **2.3 Research Questionnaire**

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113 A well-structured self-administered questionnaire was designed to achieved the desired
114 objective of the study and was used to collect baseline information about the patients. The
115 questionnaire before the study was pretested on 20 HIV infected pregnant woman in our
116 health facility with the necessary modification and corrections made after the pre-test. The
117 baseline information (socio-demographic variants) include age, present place of abode, viral
118 hepatitis status, educational status, occupational status, history of previous blood
transfusion, alcoholism and phone numbers.

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120 2.4 Samples Collection

121 Five millilitres (5mL) of venous blood were carefully drawn from the veins of each patient into
122 a well labeled Ethylene Diethyl Tetracetic Acid (K2 EDTA) tube for CD4+ count and
123 haematological assay as required for ART initiations/commencement baseline parameters.
124 After the assay, the samples were centrifuged at 4,000 revolutions per minutes (rpm) for 10
125 minutes. The plasma was aliquoted into cryovials and stored in the -40°C freezer until ready
126 for serological screenings for HBV and HCV.

127 2.5 Serological Screening

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129 Serological diagnosis was carried out using Rapid diagnostic tests (RDTs), for HBV infection
130 the SD BIOLINE (Standard Diagnostic (SD) Inc., Korea) one step HBV test kit was used for
131 detection of HBV infection and HCV antibodies was carried out using the SD BIOLINE HCV
132 test kit. This is an immunochromatographic rapid test for the qualitative detection of
133 antibodies specific to HCV in blood with a sensitivity of 100% and specificity of 99.4%
134 according to manufacturer's instructions found on the standard operation procedure insert.
135 The seropositive samples to HBsAg and anti-HCV detected by RDTs screening were further
136 confirmed by Western blot (Trinity Biotech, Bray, Ireland) according to manufacturer's
137 specifications.

138 2.6 Data Analysis

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141 The data obtained from the study was analyzed using statistical product and service
142 solutions (SPSS) (version 20.0), descriptive statistics were presented in [Tabular form](#). The
143 student t-test (t^2) test was used to determine the level of association of the prevalence of
144 HBV and HCV among HIV infected pregnant women with respect to age distribution. Values
145 obtained were considered statistically significant at $p \leq 0.05$.

146 147 3. RESULTS

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149 A total number of 330 HIV infected pregnant women were included in this study. The mean
150 age of the patients was 29.5 years with range 10 - 49 years. Of the 330 HIV infected
151 pregnant women studied, 90 (27.3%) tested positive for HBV, 5 (1.5%) tested positive for
152 HCV. However, none of the patients tested positive for both HBV and HCV in this present
153 study. The age distribution and results of screened viral hepatitis (HBV, HCV and HBV/HCV)
154 of the study patients (n = 330) are shown in Table 1.

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156 It was observed that age group 20 – 29 had the highest prevalence 65 (19.7%) of HBV and
157 closely followed by 30 – 39 age group with prevalence of 25 (7.6%) HBV sero-positivity. No
158 HBV sero-positivity observed among other age groups. The HCV sero-positivity observed
159 among HIV infected pregnant women during this study was 5 (1.5%) at age group 20 – 29
160 years (Table 1).

161 162 3.1 Socio-demographic characteristics of the HIV infected pregnant women 163 studied (n = 90).

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165 The socio-demographic characteristics of the studied HIV infected pregnant women:
166 educational attainment, marital status, occupation status and others are presented on Table
167 2. In this present study, majority of the pregnant women were within the age group 20 - 29
168 (42.4%) and least at age group 10 – 19 (14.8%). Most of the women are married (77.3%),

169 follow by those that are not married (10.6%), closely followed was widowers (9.1%) and least
170 women are divorces (3.0%). The educational status, half of women had at least a secondary
171 education (48.5%) and followed by primary pupil (22.7%). About 22.7% are gainfully self-
172 employed. It was observed that 25.8% ever had blood transfusion and 19.7% consumed
173 alcohol. It was observed that 19.7% had ever tested for viral hepatitis. The screening of viral
174 hepatitis B and C was found to be 90 (27.3%) and 5 (1.5%) seropositive respectively among
175 the pregnant HIV infected women.
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178 4. DISCUSSION

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180 Viral hepatitis B and C virus poses as an endemic in countries worldwide. The 27.3%
181 prevalence of HBV observed among the HIV infected pregnant women (n = 330) shows it
182 has high endemicity of HBV infection according to WHO criteria [29] This finding is also in
183 agreement with the WHO (1990) report for Nigeria as highly endemic area for HBV with
184 prevalence greater than 8%. Although, the prevalence (27.3%) of HBV found in HIV infected
185 pregnant women (n = 330) attending ART care and treatment in NIPRD did not falls within
186 the range of reports given in other studies carried out in other parts of Nigeria, Africa and the
187 rest of the world. Our findings, thus, show that NIPRD Abuja, like other areas in Nigeria, is
188 highly endemic for HBV infection.

189 The overall prevalence of HBV among HIV infected pregnant women reported in this study
190 was 27.3%, implying that HBV is prevalent among HIV infected pregnant women. This
191 relatively high prevalence could be attributed to the similar modes of transmission of these
192 viruses (HIV, hepatitis B and C); thus infection with any one of the three viruses is predictive
193 of a likely exposure to the remaining two viruses. People living with HIV/AIDS (PLWHA) are
194 disproportionately affected by viral hepatitis infections and this is quite evident in different
195 prevalence reported in different studies. The prevalence reported here in this study is
196 relatively higher than 10.8% prevalence reported by [30] among HIV infected persons in
197 Abuja, Nigeria.

198 The findings of this study reveal that the prevalence of HBV and HCV infection among this
199 group of patients is 27.3% and 1.5% respectively, this may imply that these patients are at
200 risk of developing life threatening challenges, since viral hepatitis are reported to prognosis
201 faster among HIV patients than non HIV patients, thereby causing liver related health
202 challenges.

203 Interestingly, few studies across Sub-Sharan Africa have shown a variation in the prevalence
204 of HIV/HBV co-infection in pregnancy. The prevalence of HIV/HBV co-infection in pregnant
205 women of 27.3% in this our present study was not in agreement with 4. 2% and 4.1% by [32]
206 and colleagues in Nnewi, South East Nigeria and [31] and colleagues from Rwanda, South
207 Africa respectively [32,31]. A likely explanation for this is that they found that HBV positivity
208 was associated with black African origin of whom accounted for one fifth of their study
209 population [33]. Higher prevalence of 8. 9% and 9. 0% were reported by [34] from Ibadan
210 Nigeria and [35] from Abidjan, Cote d'Ivoire respectively. The variations in social and cultural
211 practices as well as varying sample size, testing kits specificity and sensitivity may have
212 been accounted and responsible for the variation in prevalence rates in the Nigerian studies
213 [36].

214 In this study, one of socio-demographic characteristic considered were age group of the
215 patients. The age group of 20 – 29 years had the highest HBV sero-prevalence rate of
216 19.7% and followed by 30 – 39 years 7.6%. This is in agreement with the highest viral
217 hepatitis sero-prevalence rate observed in the 25 – 29 years' age group in a similar study in
218 Ibadan, Nigeria [37]. This may be so because this age range falls within the sexually active
219 age group and hence are more at high risk of having a sexual contact with an infected
220 person [38].

221 The age group (20 – 29) years had the highest prevalence of 5 (1.5%) of HCV antibody
 222 sero-positivity. The reason for this was not immediately apparent, but this was suggestive of
 223 the probability of transmission routes other than sexual as mode of acquisition of HCV
 224 among the seropositive patients. The HCV co-infection among HIV-infected patients have
 225 been reported infrequently from location to location which is in agreement with variations
 226 observed in other studies carried out in Nigeria. This co-infection prevalence is non-
 227 negligible, and patients co-infected with these two viruses should receive special care, as it
 228 is known that HCV infection causes increased morbidity and mortality in HIV-positive
 229 patients [39,40]. However, there was no statistically significant ($p \leq 0.05$) between age of the
 230 patients and prevalence of HBV and HCV infections.

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Table 1: Age distribution of HIV infected pregnant women with HBV and HCV (n = 330)

Age group	HBV positive women	Percentage (%) HBV positive	HCV positive women	Percentage (%) HCV positive
10 – 19	0	0	0	0
20 – 29	65	19.7	25	1.5
30 – 39	25	7.6	0	0
40 – 49	0	0	0	0
Total	90	27.3	25	1.5

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238 **Table 2: Socio-demographic characteristics, HBV and HCV seropositivity of**
 239 **pregnant HIV infected women (n = 330).**
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Variables	Frequency	Percentage (%)
Age group		
10 – 19	49	14.8
20 – 29	140	42.4
30 – 39	85	25.8
40 – 49	35	17.0
Educational status		
No formal	50	15.2
Primary	75	22.7
Secondary	160	48.5
Tertiary	45	13.6
Marital status		
Single	35	10.6
Married	255	77.3
Widowed	30	9.1
Divorced	10	3.0
Occupational status		
Civil servant	45	13.6
Self employed	75	22.7
Un employed	110	33.4
Trading	65	19.7
Student	35	10.6
Ever tested for Viral hepatitis		
Yes	265	80.3
No		
Blood transfusion		
Yes	85	25.8
No	245	74.2
Alcohol consumption		
Yes	85	19.7
No	365	80.3
HBV screened		
Reactive	90	27.3
Non-reactive	240	72.7
HCV screened		
Reactive	5	1.5
Non-reactive	325	98.5

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5. CONCLUSION

The findings of this study indicated that infections with [HBV](#) and [HCV](#) are common and of public health concern. Therefore, concerted effort should be put in place to mitigate the epidemics. This finding stress the urgent need for more provident HBV immunization programs and screening of the HIV infected pregnant women for HBV and HCV before and

250 even during antiretroviral therapy to prevent children born to these pregnant women the risk
251 of HBV or HCV. Therefore. public enlightenment campaigns against these silent killers
252 **diseases** and symptomless infections should be mounted.
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COMPETING INTERESTS

The author declares that no conflicts of interest regarding this research work exist.

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CONSENT

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The patients were enrolled after they were sufficiently counseled on the objectives, risk and
262 importance of the study. Written consents were obtained and all relevant confidentiality was
263 kept throughout and after the study period.

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ETHICAL APPROVAL

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Ethical approval for the study was sought and obtained from the Institutional Review Board
(IRB) of National Institute for Pharmaceutical Research and Development (NIPRD), Abuja in
274 accordance with the code of ethics for biomedical research involving human subjects.

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UNDER PEER REVIEW