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QUALITATIVE DETECTION OF HBV AND HCV INFECTION IN HIV POSITIVE PATIENTS IN SOUTH-SOUTH, NIGERIA

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ABSTRACT

Hepatitis B (HBV) and hepatitis C (HCV) co-infections in HIV pose significant health risks, particularly in regions with limited healthcare access. This study aimed to determine the prevalence of HBV and HCV co-infections among HIV-positive individuals in Benin city, Nigeria, and to identify associated risk factors. This cross-sectional study included 250 HIV-positive participants and 100 healthy controls. Serum samples were screened using rapid immunoassay kits for HBsAg and anti-HCV antibodies, and clinical and demographic data were collected through structured questionnaires. No cases of HIV/HBV/HCV triple co-infection were detected while the prevalence of HBV and HCV among HIV-positive participants was 4.8% and 2.4%, respectively. There was no significant relationship between age, gender, educational level, or marital status and HBV positivity. However, occupationally, Skilled workers were 4.3 times more likely to be HBV-positive than non-skilled workers. Fatigue and abdominal pain were significant indicators of HBV infection. HCV prevalence remained low, and no statistically significant correlation existed between HCV positivity and any demographic factor. Thus, this study emphasizes the importance of routine screening and integrated healthcare strategies in managing viral hepatitis infections in HIV-positive populations. Public health initiatives should focus on HBV vaccination, early detection, and improved treatment access., alongside targeted occupational health programs. The absence of triple co-infection highlights the need for sustained preventive efforts in this high-risk group. These findings provide valuable insights for future research and evidence-based policy development.

Keywords: Antibodies, Detection, HBV, HCV, HIV,

INTRODUCTION

Globally, hepatitis B and hepatitis C viruses pose serious threats to public health, especially in areas where HIV is common like Sub-Saharan Africa. Percutaneous exposure, blood transfusion, sexual contact, and perinatal transmission are among the common ways that HIV, HBV, and HCV are spread Thio *et al.* (2021). Co-infection of HIV with HBV and/or HCV increases morbidity rates and makes managing the disease significantly more challenging as infection also raises mortality rates, especially in environments with limited resources. Globally, an estimated 38 million people live with HIV, with Sub-Saharan Africa bearing approximately two-thirds of this burden WHO (2021). HIV alone

significantly weakens the immune system by targeting and destroying CD_4^+ T cells, which are crucial for immune function. This immune suppression renders individuals more susceptible to opportunistic infections, including viral hepatitis.

Meanwhile, over 296 million people are infected with HBV and approximately 58 million are infected with HCV worldwide, with a significant proportion of these cases occurring in Sub-Saharan Africa and Asia WHO (2022). These viruses also attack the liver, causing a range of liver-related complications, from acute hepatitis to chronic liver disease, cirrhosis, and hepatocellular carcinoma (HCC). HIV-positive individuals who are co-infected with HBV and/or HCV face more severe clinical outcomes than individuals with single infections. HIV accelerates the progression of liver disease caused by HBV and HCV, leading to a higher risk of liver fibrosis and cirrhosis Thio *et al.* (2021). This is particularly concerning in resource-limited settings like Nigeria, where access to comprehensive healthcare services, diagnostic tools, and treatment options can be limited. The co-infection further complicates the management of HIV due to potential drug interactions between antiretroviral therapy (ART) and antiviral treatments for HBV and HCV, as well as the risk of developing drug resistance Omede *et al.* (2019).

The transmission of HIV, HBV, and HCV is facilitated by various number of high-risk behaviors and exposures. Intravenous drug use (IDU), unprotected sexual activity, and unsafe blood transfusions are common risk factors for these infections. In regions like Nigeria, the lack of widespread access to safe blood products, comprehensive harm reduction programs, and preventive healthcare exacerbates the risk of co-infection, Ibrahim *et al.* (2020). Moreover, vertical transmission, or mother-to-child transmission of these viruses, is another critical concern, particularly in areas with high HIV prevalence. Pregnant women living with HIV who are co-infected with HBV or HCV are more likely to transmit these viruses to their offspring, posing additional public health challenges WHO (2022).

HIV-positive patients may face a higher risk of co-infection with hepatitis B and C due to shared transmission mechanisms, particularly in contexts where access to preventative healthcare measures, such as safe blood transfusion practices and widespread vaccination, may be limited. Despite the known complications arising from HBV and HCV co-infection, including accelerated liver disease progression and higher mortality rates, the prevalence and clinical implications of this co-infection among HIV patients remain under-researched.

A lack of data on co-infection rates, risk factors, and disease outcomes limits the development of effective interventions for screening, treatment, and prevention. It is therefore crucial to investigate the epidemiology, clinical consequences, and outcomes of HIV, HBV, and HCV co-infection to improve patient care, especially in regions with high prevalence. This study aimed to determine the prevalence of hepatitis B and C co-infection among HIV-positive patients in Benin City, Nigeria.

Study Area

The study was conducted in Benin City, the capital of Edo State, Nigeria. Benin City is a major urban center in Southern Nigeria with a diverse population. The city has several healthcare facilities providing care to HIV-positive individuals, which served as the primary recruitment sites for this research.

Sample Population

The sample population for this study consisted of HIV-positive individuals receiving care at healthcare facilities located within the Benin metropolis. Participants were selected from clinics providing antiretroviral therapy (ART) services and managing HIV-related conditions. 250 individuals used as tests included both male and female individuals of any age who consented to participate in the study and were undergoing ART. And, 100

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individuals were used as control subjects and they consisted of apparently healthy male and female individuals that do not have HIV.

Ethical Approval

Ethical approval for the study was obtained from the Health Research Ethics Committee (HREC) of the Edo State Ministry of Health. The study adhered to Helsinki's Declaration.

Data Collection

During the ART clinic days, the patients' data were checked by the doctor in charge and those who had started Antiretroviral treatment (ART) were recruited for the study. The objectives of the study were explained to each patient and written informed consent was signed by each participant before sample collection. For those whose language posed a barrier, the information was translated into their local dialect by the researcher with the aid of a Google translator. A questionnaire with a unique Participant Identification Number was given to each participant to obtain clinical information, socio-demographic characteristics as well as other information relevant to the research.

Sample's Collection and Processing

Following standard operating procedure, five (5) milliliters of venous blood were collected and transferred to a serum separator tube. The blood was allowed to clot and the serum was separated by centrifugation at 3,000 revs per minute (rpm) for 5 minutes, the serum was extracted and stored at -20°C before sample analysis.

Serological Detection of Viral Hepatitis

The serum was analyzed for HBsAg using Micropoint HBsAg Test Strip (Micropoint Biotechnologies Co., Ltd, Shenzhen, China) and anti-HCV antibodies using Micropoint HCV Rapid Test Strip (Micropoint Biotechnologies Co., Ltd, Shenzhen, China). The kits were used according to the manufacturer's instructions.

Qualitative Detection of Viral Hepatitis

The serum was analyzed for HBsAg using Micropoint HBsAg Test Strip (Micropoint Biotechnologies Co., Ltd, Shenzhen, China) and anti-HCV antibodies using Micropoint HCV Rapid Test Strip Micropoint Biotechnologies Co., Ltd, Shenzhen, China). The kits were used according to the manufacturer's instructions.

Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics were used to summarize demographic and clinical characteristics. Categorical variables were presented as frequencies and percentages. The primary variables of interest were categorical, chi-square (χ^2) tests were used to determine associations between demographic characteristics and hepatitis B virus (HBV) or hepatitis C virus (HCV) status. Fisher's exact test was applied where cell counts were below five. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Characteristics of the Study Participants. The demographic characteristics of the study participants reveal significant differences between the subject and control groups. The age distribution shows that a higher proportion of subjects were aged over 50 years (26.4%) compared to the control group (5%). Statistically significant differences in age distribution were observed ($\chi^2 = 248.425$, $p = 0.001$), with the subject group having more participants in older age categories, particularly those aged 46-50 years and over 50 years.

Regarding gender, there was no significant difference between the groups ($\chi^2 = 1.448$, $p = 0.229$), as the proportion of females was higher in both groups. The occupational status of participants differed markedly, with a greater number of subjects engaged in business (42.4%) compared to controls (5%) ($\chi^2 = 258.068^{\dagger}$, $p = 0.001$). A significant difference

was also observed in educational levels, with the subject group showing a higher proportion of individuals with no formal education (12.8%) and fewer participants with tertiary education compared to the control group (χ^2 = 199.974†, p = 0.001). In terms of marital status, there were more single individuals in the control group (86%) compared to the subject group, where a larger proportion were married (46%) (χ^2 = 120.936†, p = 0.001).

Table 2: Prevalence of HBV and HCV antibodies and HIV Status of the Study Participants. Hepatitis B virus (HBV) status among the study participants indicated that a very small percentage of individuals were HBV positive (4.8%), while the majority were negative (95.2%). Similarly, for hepatitis C virus (HCV), only 2.4% of participants tested positive, with the remaining 97.6% being negative. In terms of HIV status, the majority of participants had been living with HIV for more than 5 years (58.0%), followed by those who had been living with HIV for 1–5 years (27.6%), while a smaller proportion (14.4%) had been living with HIV for less than a year.

Table 1: Demographic Characteristics of the Study Participants:

Variables	Subject (n)	Control (n)	χ^2	P
Age				
<20	22(8.8)	0(0.0)	248.425†	<0.001
20–25	12(4.8)	81(81.0)		
26–30	15(6.0)	9(9.0)		
31–35	27(10.8)	0(0.0)		
36–40	43(17.2)	0(0.0)		
41–45	27(10.8)	0(0.0)		
46–50	38(15.2)	5(5.0)		
?50	66(26.4)	5(5.0)		
Gender				
Female	182 (72.8)	79 (79.0)	1.448	0.229
Male	68 (27.2)	21 (21.0)		
Occupation				
Business	106 (42.4)	5 (5.0)	258.068†	<0.001
Civil Servant	0 (0.0)	5 (5.0)		
Employed	40 (16.0)	0 (0.0)		
None	22 (8.8)	0 (0.0)		
Skill-based	65 (26.0)	0 (0.0)		
Student	17 (6.8)	85 (85.0)		
Education				
None	32 (12.8)	0 (0.0)	199.974†	<0.001
Primary	46 (18.4)	0 (0.0)		
Secondary	131 (52.4)	5 (5.0)		
Tertiary	41 (16.4)	95 (95.0)		
Marital Status				
Divorced	19 (7.6)	0 (0.0)	120.936†	<0.001
Married	115 (46.0)	14 (14.0)		
Single	62 (24.8)	86 (86.0)		
Widowed	54 (21.6)	0 (0.0)		

†Fisher's Exact

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Table 2: Prevalence of HBV, HCV and HIV Antibody Status of the Study Participants

Variables	Frequency (%age)
HBV Status	
Yes	12 (4.8)
No	238 (95.2)
HCV Status	
Yes	6 (2.4)
No	244 (97.6)
HIV Status	
<1 Year	36 (14.4)
1–5 Years	69 (27.6)
>5 Years	145 (58.0)

Table 3: Association between Demographic Characteristics and HBV Prevalence among the Study Participants. The association between demographic characteristics and HBV status showed that there was no significant relationship between age, gender, marital status and HBV positivity (p=0.385, p=0.972, and p=0.751 respectively). However, occupation showed a significant association with HBV status of the study participants (p=0.004). A higher proportion of individuals with HBV were skilled workers (9.2%) compared to other occupations, particularly those in business, where only 2.7% were HBV positive (χ^2 = 19.106, p = 0.004). Furthermore, individuals with tertiary education had a significantly lower prevalence of HBV compared to those with lower levels of education, although the p-value for education was not significant (χ^2 = 3.310, p = 0.346).

Table 3: Association between Demographic Characteristics and HBV Prevalence among the Study Participants

		HBV Status			
Variable	**Category**	**Negative**	**Positive**	χ^2	**P**
Age	<20	21 (95.5)	1 (4.5)	8.511	0.385
	>50	70 (98.6)	1 (1.4)		
	20-25	6 (100.0)	0 (0.0)		
	26-30	23 (95.8)	1 (4.2)		
	31-35	25 (92.6)	2 (7.4)		
	36-40	39 (90.7)	4 (9.3)		
	41-45	26 (96.3)	1 (3.7)		
	46-50	42 (97.7)	1 (2.3)		
Gender	Female	252 (96.6)	9 (3.4)	0.001	0.972
	Male	86 (96.6)	3 (3.4)		
Occupation	Business	108 (97.3)	3 (2.7)	19.106	0.004
	Civil Servant	5 (100.0)	0 (0.0)		
	Employed	40 (100.0)	0 (0.0)		
	None	19 (86.4)	3 (13.6)		
	Skilled Worker	59 (90.8)	6 (9.2)		
	Student	102 (100.0)	0 (0.0)		
Education	None	31 (96.9)	1 (3.1)	3.310	0.346
	Primary	43 (93.5)	3 (6.5)		
	Secondary	130 (95.6)	6 (4.4)		
	Tertiary	134 (98.5)	2 (1.5)		
Marital Status	Divorced	18 (94.7)	1 (5.3)	1.208	0.751
	Married	125 (96.9)	4 (3.1)		
	Single	144 (97.3)	4 (2.7)		
	Widowed	51 (94.4)	3 (5.6)		

Table 4: Association between Demographic Characteristics and HCV Prevalence of the Study Participants. Data on hepatitis C virus (HCV) prevalence presented a different narrative compared to HBV. According to the study, there was no statistically significant relationship between HCV positivity and any demographic factor. That is, due to consistently low positivity rates, there was no discernible pattern in the distribution of HCV antibodies across age groups. Notably, participants in the 26–30 years and 46–50 years age groups displayed slightly higher positivity rates (6.7% and 5.3%, respectively)., but these differences were not statistically significant (p = 0.668).

Gender was similarly found to be unrelated to HCV status, as both males and females showed comparable positivity rates of 2.7% and 1.5%, respectively (p = 0.557). Occupational classification yielded no significant insights either, with all job categories exhibiting low positivity rates and no significant variance (p = 0.662). Interestingly, the highest positivity rate (5.0%) was recorded among employed participants, while none of the students or those without formal employment tested positive. Educational attainment showed no meaningful association with HCV positivity (p = 0.793), though participants with secondary education had a slightly higher infection rate (3.1%). Marital status, while not significantly associated (p = 0.070), displayed a somewhat higher positivity rate among divorced individuals (10.5%).

Overall, the analysis indicates that no specific demographic group exhibited a significantly higher risk of HCV infection, although divorced participants and those in certain age categories appeared slightly more vulnerable. This highlights the need for broad-based preventive strategies rather than demographic-specific interventions for HCV control.

Table 4: Association between Demographic Characteristics and HCV Prevalence of the Study Participants

Variable	No examined (%age)	Positive (%age)	Chi-square	P-value
Age			5.810	0.668
<20	22 (100.0)	0 (0.0)		
21-25	12 (100.0)	0 (0.0)		
26-30	14 (93.3)	1 (6.7)		
31-35	27 (100.0)	0 (0.0)		
36-40	41 (95.3)	2 (4.7)		
41-45	27 (100.0)	0 (0.0)		
46-50	36 (94.7)	2 (5.3)		
>50	65 (98.5)	1 (1.5)		
Gender			0.344	0.557
Female	177 (97.3)	5 (2.7)		
Male	67 (98.5)	1 (1.5)		
Occupation			2.403	0.662
Business	103 (97.2)	3 (2.8)		
Civil servant	0 (0.0)	0 (0.0)		
Employed	38 (95.0)	2 (5.0)		
None	22 (100.0)	0 (0.0)		
Skill	64 (98.5)	1 (1.5)		
Student	17 (100.0)	0 (0.0)		
Education			1.036	0.793
None	32 (100.0)	0 (0.0)		
Primary	45 (97.8)	1 (2.2)		
Secondary	127 (96.9)	4 (3.1)		
Tertiary	40 (97.6)	1 (2.4)		
Marital Status			7.062	0.070

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Divorced	17 (89.5)	2 (10.5)
Married	114 (99.1)	1 (0.9)
Single	61 (98.4)	1 (1.6)
Widowed	52 (96.3)	2 (3.7)

Table 5: Clinical and Health Characteristics of Study Participants. Clinical and health characteristics of the study participants show a high prevalence of individuals with no significant illnesses (88%). Among those who reported health conditions, hypertension, diabetes, and stomach ulcers were the most common, each affecting 2.8% of participants. A substantial proportion (14.4%) of participants had received blood transfusions, while 1.2% had experienced needle stick injuries. The occurrence of jaundice was reported in 4.0% of the participants. Notably, fatigue was reported by 35.2% of participants, which is an important indicator of potential underlying health issues. Regarding symptoms, 17.6% reported abdominal pain, 3.6% had appetite loss, 2.8% experienced nausea, and 2.0% had vomiting. A very small proportion of participants (6.8%) had been vaccinated, and only 1.6% had received treatment.

Table 6: Association between Clinical Characteristics and HBV Status of Study Participants. The results show that 3.8% of the participants with no illness tested positive for HBV. Other variables such as blood transfusion, needle use, and sexual activity did not show significant associations with HBV status. Although, those that previously had blood transfusion had higher HBV prevalence 5.5%, than those without (3.1%) (χ^2 =0.809, p=0.368). The participants without needle use had higher HBV prevalence (3.5%) than those with needle use (χ^2 =0.107, p=0.743). Those with sexual activity had higher preponderance of HBV (4.3%) than those without (2.4%) (χ^2 = 0.951, p=0.329). Individuals with jaundice had a significantly higher likelihood of being HBV positive (40.0%) compared to those without jaundice (2.4%) (χ^2 = 41.583, p = 0.000). Fatigue was also associated with HBV positivity, as 7.5% of individuals with fatigue tested positive for HBV, compared to only 1.9% among those without fatigue (χ^2 = 6.425, p = 0.011). Similarly, abdominal pain and appetite loss were found to be significant factors associated with HBV positivity. Those with abdominal pain were more likely to test positive for HBV (9.1%) compared to those without abdominal pain (2.6%) (χ^2 = 4.873, p = 0.027). The presence of appetite loss was also associated with a higher likelihood of HBV positivity (33.3%) (χ^2 = 24.950, p = 0.000). The population of participants that had not been vaccinated, had higher HBV prevalence, though not statistically significant (χ^2 =2.273, p=0.132). The population of participants not on treatment was statistically significant (χ^2 =26.505, p=0.000)

Table 5: Clinical and Health Characteristics of Study Participants

Variables	Frequency (%)
Illness	
Arthritis	1 (0.4)
Hypertension (B.P.)	7 (2.8)
Depression	1 (0.4)
Diabetes	7 (2.8)
Fibroid	1 (0.4)
Malaria	1 (0.4)
None	220 (88.0)
Pain	1 (0.4)
Pregnancy	4 (1.6)
Ulcer	7 (2.8)
Blood Transfusion	

Yes	36 (14.4)
No	214 (85.6)
Needle Injury	
Yes	3 (1.2)
No	247 (98.8)
Jaundice	
Yes	10 (4.0)
No	240 (96.0)
Fatigue	
Yes	88 (35.2)
No	162 (64.8)
Abdominal Pain	
Yes	44 (17.6)
No	206 (82.4)
Appetite Loss	
Yes	9 (3.6)
No	241 (96.4)
Nausea	
Yes	7 (2.8)
No	243 (97.2)
Vomiting	
Yes	5 (2.0)
No	245 (98.0)
Vaccination	
Yes	17 (6.8)
No	233 (93.2)
Treatment	
Yes	4 (1.6)
No	246 (98.4)

Table 6: Association between Clinical Characteristics and HBV Status of Study Sarticipants

		HBV Status			
Variable	**Category**	**Negative**	**Positive**	χ^2	**P**
Illness	No	308 (96.3)	12 (3.8)	1.165	0.999
	Arthritis	1 (100.0)	0 (0.0)		
	Diabetes	7 (100.0)	0 (0.0)		
	Malaria	1 (100.0)	0 (0.0)		
	Pregnancy	4 (100.0)	0 (0.0)		
Blood Transfusion	No	286 (96.9)	9 (3.1)	0.809	0.368
	Yes	52 (94.5)	3 (5.5)		
Needle injury	No	335 (96.5)	12 (3.5)	0.107	0.743
	Yes	3 (100.0)	0 (0.0)		
Sexual Activity	No	161 (97.6)	4 (2.4)	0.951	0.329
	Yes	177 (95.7)	8 (4.3)		
Jaundice	No	332 (97.6)	8 (2.4)	41.583	0.000
	Yes	6 (60.0)	4 (40.0)		
Fatigue	No	252 (98.1)	5 (1.9)	6.425	0.011
	Yes	86 (92.5)	7 (7.5)		
Abdominal Pain	No	298 (97.4)	8 (2.6)	4.873	0.027
	Yes	40 (90.9)	4 (9.1)		
Appetite Loss	No	332 (97.4)	9 (2.6)	24.950	0.000

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	Yes	6 (66.7)	3 (33.3)		
Nausea	No	331 (96.5)	12 (3.5)	0.254	0.615
	Yes	7 (100.0)	0 (0.0)		
Vaccination	No	318 (97.0)	10 (3.0)	2.273	0.132
	Yes	20 (90.9)	2 (9.1)		
Treatment	No	336 (97.1)	10 (2.9)	26.505	0.000
	Yes	2 (50.0)	2 (50.0)		

Table 7: Association between Clinical Characteristics and HCV Status of Study Participants. Among the reported illnesses, diabetes was significantly associated with HCV positivity, with 14.3% of participants with diabetes testing positive for the virus (χ^2 = 45.747, p = 0.000). Despite these associations, other clinical variables such as blood transfusion history, needle use, jaundice, and treatment status did not show significant correlations with HCV positivity (p=0.309 p=0.785, p=0.613 and 0.752 respectively). While blood transfusions and needle use are commonly known risk factors for HCV transmission, their lack of significance in this study may reflect a lower prevalence of these practices among participants or effective preventive measures. Fatigue was another significant factor, as 6.8% of those reporting fatigue were HCV positives (p = 0.001). Abdominal pain was also found to be significantly linked to HCV status, with 6.8% of participants reporting this symptom testing positive (p = 0.035). However, appetite loss, nausea, vomiting, and vaccination did not significantly influence the prevalence of HCV among the study population (p=0.082, p=0.674, p=0.723, and p= 0.919 respectively).

Table 7: Association between Clinical Characteristics and HCV Status of Study Participants

Variables	No (n%)	Yes (n%)	Chi- square	p-value
Illness			45.747	0.000*
Arthritis	0 (0.0)	1 (100.0)		
BP	7 (100.0)	0 (0.0)		
Depression	1 (100.0)	0 (0.0)		
Diabetes	6 (85.7)	1 (14.3)		
Fibroid	1 (100.0)	0 (0.0)		
Malaria	1 (100.0)	0 (0.0)		
No	216 (98.2)	4 (1.8)		
Pain	1 (100.0)	0 (0.0)		
Pregnancy	4 (100.0)	0 (0.0)		
Ulcer	7 (100.0)	0 (0.0)		
Blood transfusion			1.034	0.309
No	208 (97.2)	6 (2.8)		
Yes	36 (100.0)	0 (0.0)		
Needle Injury			0.075	0.785
No	241 (97.6)	6 (2.4)		
Yes	3 (100.0)	0 (0.0)		
Sexual Activity			2.840	0.092
No	79 (100.0)	0 (0.0)		
Yes	165 (96.5)	6 (3.5)		
Jaundice			0.256	0.613
No	234 (97.5)	6 (2.5)		
Yes	10 (100.0)	0 (0.0)		
Fatigue			11.317	0.001*
No	162 (100.0)	0 (0.0)		
Yes	82 (93.2)	6 (6.8)		
Abdominal pain			4.450	0.035*

No	203 (98.5)	3 (1.5)		
Yes	41 (93.2)	3 (6.8)		
Appetite loss			3.024	0.082
No	236 (97.9)	5 (2.1)		
Yes	8 (88.9)	1 (11.1)		
Nausea			0.177	0.674
No	237 (97.5)	6 (2.5)		
Yes	7 (100.0)	0 (0.0)		
Vomit			0.125	0.723
No	239 (97.6)	6 (2.4)		
Yes	5 (100.0)	0 (0.0)		
Vaccination			0.010	0.919
No	207 (97.6)	5 (2.4)		
Yes	37 (97.4)	1 (2.6)		
Treatment			0.100	0.752
No	240 (97.6)	6 (2.4)		
Yes	4 (100.0)	0 (0.0)		

DISCUSSION

Nigeria has a high endemicity of HBV and HIV infection. This study included 350 participants, comprising 250 HIV-positive patients receiving antiretroviral therapy (ART) and 100 HIV-negative individuals, with no known health conditions, serving as controls. Significant differences existed in the age distribution and occupational status of the participants, and the higher proportion of participants were over 50 years old (26.4%); the higher representation of business people (42.4%) in the subject group contradicts findings from previous research. Previous research in the same region had younger populations with higher rates of students and civil servants with higher study populations Ojide *et al.* (2015). These differences may reflect broader socioeconomic changes in the region, including a shift toward entrepreneurship and an aging HIV-positive population, possibly due to improved ART access and the long-term survival rate of the HIV-positive population.

This study's HBV prevalence of 4.8% and HCV prevalence of 2.4% are significantly lower than those found by Ojide *et al.* (2015), who found that among HIV-positive patients in Benin City, the prevalence of HBV and HCV was 15.5% and 7.0%, respectively. The improvement in blood safety procedures and the benefits of HBV vaccination campaigns over the last ten years is probably responsible for this decline. The high percentage of participants (58%) who have had HIV for more than five years points to long-term survival and efficient antiretroviral therapy (ART) management of HIV (Meriki *et al.*, 2022) in the study participants, as well as this region.

This study did not find a significant age, gender, and marital status difference in HIV and HBV prevalence, whereas previous studies carried out by Lawal *et al.* (2020) found a significant difference between gender and HIV and HBV prevalence. Occupation was a significant predictor of HBV positivity ($p = 0.004$) in the study participants, with the highest prevalence observed among skilled workers. Education has been known as a stronger predictor of HBV infection, but there was no significant correlation between education level and HBV status in this study ($p = 0.346$). According to WHO (2021), the lower prevalence among those with tertiary education may be a result of improved health-seeking practices and vaccination uptake in this subgroup.

In contrast to Lawal *et al.* (2020), who found age and marital status to be significant predictors of HCV prevalence, no demographic factors were significantly

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associated with HCV positivity ($p > 0.05$) in this study. The lower overall prevalence of HCV in the current study may be the cause of this difference, as it lowers the statistical power to identify associations.

In contrast to previous studies where comorbidities like hypertension and tuberculosis were more common among the HIV-positive population, Sadoh *et al.* (2011), it is noteworthy that 88% of participants in this study reported no significant illness. This might be the outcome of enhanced general health monitoring and better treatment of HIV-related illnesses. Notably, this study found no significant correlation between HBV and blood transfusions or needle stick injuries, which were previously recognized as important risk factors Guidotti and Chisari, (2006). This probably indicates advancements in healthcare safety procedures. Jaundice ($p < 0.001$), fatigue ($p = 0.011$), and abdominal pain ($p = 0.027$) were significant clinical predictors of HBV positivity. In-line with earlier findings that connect fatigue to persistent viral infections, fatigue (35.2%) in this study is still a significant concern among people living with HIV Saidu *et al.* (2020). These results also align with previous research showing that jaundice and fatigue are indicators of liver dysfunction in chronic HBV infection Chen *et al.* (2009).

Similar to Sulkowski's (2008) findings, which highlighted fatigue as a common symptom in chronic HCV infection, fatigue ($p = 0.001$) and abdominal pain ($p = 0.035$) were significant predictors of HCV infection in this study. Contrary to earlier studies, there were no significant correlations found with, blood transfusions or jaundice and HCV prevalence, indicating a lower rate of healthcare-related transmission in this population. Despite estimates of HCV infection prevalence being lower than those for HBV, HCV infection remains a global health concern. Patients with HCV do not have access to therapy through the national program or an HCV treatment program, as the situation is with hepatitis B. Factors like fatigue and abdominal pain were significant in univariate analyses. These findings indicate that while, fatigue, abdominal pain, and diabetes may serve as important clinical indicators for HCV infection. Further investigation is needed to understand the underlying factors contributing to HCV transmission in this population. The results suggest that routine health assessments should include specific symptom screening to facilitate early diagnosis and intervention.

CONCLUSION AND RECOMMENDATION

This study recorded that 4.8% of the participants tested positive for HBV while 2.4% tested positive for HCV and. there was no significant correlation between age or gender and HBV/HCV status. Our findings contribute to the evidence showing endemicity of these illnesses among HIV-positive patients in Benin City. This research also highlights the significance of regular viral hepatitis screening in HIV-positive populations and promotes integrated health care to treat infected people. This result will be helpful in the further development of public health initiatives for the control of HBV and HCV infections. Public health policies that focus on improving diagnostic capabilities, expanding vaccination coverage, and addressing socioeconomic barriers to healthcare access are strongly advocated**.**

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