PREVALENCE OF HEPATITIS C VIRUS ANTIBODIES IN HIV-INFECTED INDIVIDUALS ATTENDING NEW ERA HOSPITAL, ABA, ABIA STATE, NIGERIA

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ABSTRACT: Background: Hepatitis C virus (HCV) and HIV co-infection significantly accelerates liver disease progression due to shared parenteral transmission routes. This study determined the seroprevalence and sociodemographic correlates of anti-HCV antibodies among HIV-positive individuals at New Era Hospital in Aba, Abia State, Nigeria. **Methods:** A cross-sectional epidemiological design was utilized with a cohort of 100 participants. Serum samples were analyzed using a third-generation Enzyme-Linked Immunosorbent Assay (ELISA) protocol (DIA.PRO, Italy) engineered to detect host total antibodies (IgG and IgM) against viral antigens. Demographic variables and clinical viral load profiles were structured and statistically analyzed using Chi-square (χ^2) and Fisher's exact tests via SPSS version 25.0. **Results:** Out of the 100 participants evaluated, 7 tested positives for anti-HCV antibodies, establishing an overall study seroprevalence of 7.0%. Descriptive within-group frequencies indicated higher exposure rates among males (10.5%), cohorts aged greater than 50 years (15.8%), widowed individuals (14.3%), and civil servants (50.0%, n=2). Positive cases were primarily distributed within the lower viral replication bands (less than 20 copies/mL) and the 100–999 copies/mL strata. Inferential analysis demonstrated that no demographic variables or clinical strata were statistically associated with anti-HCV antibody seroprevalence ($p > 0.05$). **Conclusion:** The recorded 7.0% seroprevalence underscores a notable burden of exposure within the study area. The absence of statistically significant demographic associations implies that transmission risks are likely driven by localized environmental exposure vectors or shared behavioral routines rather than fixed demographic characteristics. These findings emphasize the critical need for integrated routine diagnostic screening and targeted public health prevention campaigns.

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1. INTRODUCTION

Hepatitis C virus (HCV) infection ranks as one of the major global public health problems, affecting approximately 58 million persons worldwide and resulting in an estimated 1.5 million new cases per annum **[1]**. As a blood-borne pathogen that primarily targets hepatic tissue, HCV leads to acute and chronic hepatitis. Chronic infection can trigger severe sequelae, including liver cirrhosis, hepatocellular carcinoma, and liver failure, driving high rates of global morbidity and mortality **[2]**. The burden of HCV is disproportionately elevated in low- and middle-income nations where systematic screening, early diagnosis, and therapeutic interventions remain restricted due to infrastructural limitations.

This burden is heavily compounded in sub-Saharan Africa, which bears the world's greatest disease velocity for Human Immunodeficiency Virus (HIV). Within this region, HIV-HCV co-infection is increasingly recognized as a critical clinical priority due to shared parenteral transmission routes, including unsafe blood transfusions, unsterile medical interventions, sexual practices, and the sharing of sharp objects **[3]**. Epidemiologically, HIV/HCV co-infection accelerates liver disease progression, yields higher circulating viral loads, lowers antiviral treatment responses, and increases all-cause mortality compared to HCV monoinfection **[4]**. In resource-constrained environments like Nigeria, this co-infection places a double burden on already strained public health infrastructure handling concurrent viral epidemics.

Nigeria faces an intersecting crisis with an HIV prevalence estimated at 1.3%, while local HCV prevalence ranges between 1.1% and 8.0%, widely depending on geographical location and the sub-population evaluated **[5]**. Prior

Nigerian studies among people living with HIV have documented highly variable HCV co-infection rates ranging from 1.0% to over 10.0% **[6]**. These variations are frequently tied to differences in study designs, localised institutional settings, and the sensitivity of laboratory diagnostic metrics. Because immune compromise puts HIV-infected patients at heightened risk of establishing a chronic HCV carrier state, liver disease has emerged as a leading cause of non-AIDS mortality during the antiretroviral therapy (ART) era **[2]**. Furthermore, undiagnosed co-infection complicates clinical management by increasing the risk of ART-induced hepatotoxicity and severe drug-drug interactions.

Managing this clinical challenge in Nigeria is severely hampered by low public awareness, a deficit of diagnostic centres, and the high cost of confirmatory molecular tools like HCV RNA assays. Consequently, routine screening capacity is lacking in most healthcare facilities, resulting in underdiagnosis and missed windows for early intervention **[4]**. To optimise patient outcomes and support the World Health Organization's goal of eliminating viral hepatitis as a public health threat **[1]**, establishing localised, high-quality empirical evidence is vital. This study aims to determine the seroprevalence and sociodemographic correlates of anti-HCV total antibodies within an HIV-positive context using a sensitive Enzyme-Linked Immunosorbent Assay (ELISA) framework, providing meaningful insights to guide integrated care strategies.

2. MATERIALS AND METHODS

2.1 Study Design and Population

This hospital-based study utilized a cross-sectional epidemiological design. The target population comprised a cohort of 100 eligible participants who provided explicit, informed consent at the designated healthcare facility in Aba, Nigeria. Demographic and clinical profiles were obtained through the administration of standardized, structured questionnaires. Individuals with incomplete data profiles or those who declined to grant informed consent were excluded from the study pool.

2.2 Laboratory Analysis

Whole blood samples were collected via venipuncture, and plasma was separated by centrifugation. Plasma samples were safely transported under optimal cold-chain conditions and analyzed for the presence of anti-HCV antibodies at the Virus and Genomics Research Unit, Department of Microbiology, University of Port Harcourt.

2.3 HCV Serological Analysis

The presence of anti-HCV antibodies in plasma samples was measured using a third-generation Enzyme-Linked Immunosorbent Assay (ELISA) kit (DIA.PRO, Milano, Italy) following the manufacturer's operational protocols. This assay utilizes immobilized specific HCV core and non-structural antigens to capture host total antibodies (incorporating both IgG and IgM immunoglobulins) present in the specimen. Spectrophotometric validation was executed by measuring sample Optical Density (OD) at 450 nm to calculate the Sample-to-Cutoff (S/Co) ratio. Test outcomes were strictly interpreted according to the manufacturer's diagnostic thresholds.

2.4 Statistical Data Analysis

Socio-demographic and clinical data were compiled and managed using Microsoft Excel version 2021 (Microsoft Corp., USA). Inferential statistical analysis was performed using SPSS version 25.0 (IBM Corp., USA). Descriptive statistics were summarized as frequencies and percentages. The statistical significance of variations across demographic variables was evaluated using Chi-square (χ^2) tests or Fisher's exact tests where appropriate, utilizing a 95% confidence interval with a significance threshold set at $p < 0.05$.

2.5 Ethical Considerations

The study was conducted in strict accordance with ethical declarations. Formal ethical clearance and institutional approval were obtained from the University of Port Harcourt Research Ethics Committee in conjunction with local clinical administrative approvals from the Abia State institutional oversight framework.

3. RESULTS AND ANALYSIS

3.1 Analysis of Study Participants' Characteristics

The socio-demographic and clinical description of the participants of the study is revealed in Table 1. The sample involved a total of 100 participants, of whom 81.0% were females, and 19.0% were males. Concerning age distribution, 11.0% of the participants were within the age range of 11–30 years, the majority of the participants, 38.0%, were in the age range of 31–40 years, 32.0% of the participants were in the age range of 41–50 years, and 19.0% of the participants were greater than 50 years of age.

Concerning marital status, 6.0% of the participants were single; an overwhelming majority, 78.0%, were married; 7.0% were widowed; and 9.0% were divorced. Concerning educational attainment, 4.0% of the respondents had attained

nursery education, 46.0% had attained primary education, 45.0% had attained secondary education, and 5.0% had attained tertiary education.

Concerning their occupational distribution, the vast majority of the respondents, 72 (72.0%), were engaged in business/trading, while 5 (5.0%) were farmers, 4 (4.0%) were students, 3 (3.0%) were teachers, and 4 (4.0%) were civil servants. The remaining fraction of the cohort were artisans (10.0%), which comprised drivers, hairdressers, a nurse, a cook, an engineer, a job man, a herbalist, and a retiree.

Furthermore, concerning clinical status based on viral load (VL) measurements, 79.0% of the participants had a viral load of less than 20 copies/mL as target not detected (TND), and 11.0% of the participants fell within the range of 20–99 copies/mL. Higher viral replication profiles were less frequent, with 5.0% of the participants presenting a viral load within the 100–999 copies/mL range, and 5.0% presenting with a viral load greater than or equal to 1,000 copies/mL.

3.2 Relationship between Socio-demographic Characteristics and Anti-HCV Antibody Seroprevalence

The relationship between the socio-demographic characteristics and the seroprevalence of anti-HCV antibodies among the study participants is revealed in Table 1. The sample involved a total of 100 participants, of whom 7 (7.0%) were positive, and 93 (93.0%) were negative. About sex distribution, seroprevalence was recorded as 5 (6.2%) positive among female participants and 2 (10.5%) positive among male participants. Sex was not significantly associated with the seroprevalence of anti-HCV antibodies ($\chi^2 = 0.449$, df = 1, p = 0.503). With regards to age distribution, 1 (9.1%) of the participants within the age range of 11–30 years tested positive, 2 (5.3%) within 31–40 years, 1 (3.13%) within 41–50 years, and 3 (15.8%) greater than 50 years of age. Age range was not significantly associated with the seroprevalence of anti-HCV antibodies ($\chi^2 = 1.838$, df = 3, p = 0.607).

Concerning the participants' marital status, the seroprevalence of anti-HCV antibodies was highest among widowed participants, 1 (14.3%), followed by married participants, 6 (7.7%), while single and divorced participants both recorded 0 (0.0%) positivity. However, marital status was not associated with the seroprevalence of anti-HCV antibodies ($\chi^2 = 1.155$, df = 3, p = 0.764). The educational attainment of the respondents showed that 1 (25.0%) with nursery education, 3 (6.52%) with primary education, and 3 (6.7%) with secondary education tested positive, while tertiary education recorded 0 (0.0%) positivity. Educational qualification was not associated with the seroprevalence of anti-HCV antibodies ($\chi^2 = 1.045$, df = 3, p = 0.790).

About occupational status, positivity rates were 2 (50.0%) among civil servants, 1 (20.0%) among farmers, and 4 (5.6%) among those engaged in business/trading. The remaining occupational categories, which included students, teachers, and artisans, all uniformly recorded 0 (0.0%) positivity. Occupational status was not significantly associated with the seroprevalence of anti-HCV antibodies ($\chi^2 = 8.871$, df = 12, p = 0.714), as indicated in Table 1. With regards to baseline clinical characteristics evaluated by viral load (VL), positivity was recorded at 3 (3.8%) among participants with a viral load of <20 copies/mL (TND) and 1 (20.0%) among participants with a viral load of 100–999 copies/mL, while the 20–99 copies/mL and ≥1,000 copies/mL categories recorded 0 (0.0%) positivity. Viral load category was not significantly associated with the seroprevalence of anti-HCV antibodies ($\chi^2 = 1.488$, df = 5, p = 0.914), as indicated in Table 1.

Table 1: Socio-demographic characteristics and Seroprevalence of Hepatitis C Virus (HCV) among HIV-infected Individuals in a Health Facility in Aba

Socio-demographic Characteristics	Categories	Frequency (n)	Positive (%)	Negative (%)	χ2	df	p-value
Sex	Female	81	5 (6.2)	76 (93.8)	0.449	1	0.503
	Male	19	2 (10.5)	17 (89.5)			
Age Ranges (years)	11–30	11	1 (9.1)	10 (90.9)	1.838	3	0.607
	31–40	38	2 (5.3)	36 (94.7)			
	41–50	32	1 (3.13)	31 (96.9)			
	> 50	19	3 (15.8)	16 (84.2)			
Marital Status	Single	6	0 (0.0)	6 (6.5)	1.155	3	0.764
	Married	78	6 (7.7)	72 (92.3)			
	Widowed	7	1 (14.3)	6 (85.7)			

	Divorced	9	0 (0.0)	9 (100)			
Educational Qualification	Primary	46	3 (6.52)	43 (93.5)	1.045	3	0.790
	Secondary	45	3 (6.7)	42 (93.3)			
	Nursery	4	1 (25.0)	3 (75.0)			
	Tertiary	5	0 (0.0)	5 (100)			
Occupation	Business / Trading	72	4 (5.6)	70 (94.4)	8.871	12	0.714
	Civil Servant	4	2 (50.0)	2 (50.0)			
	Student	4	0 (0.0)	4 (100)			
	Farmer	5	1 (20.0)	4 (80.0)			
	Teacher	3	0 (0.0)	3 (100)			
	Artisans	10	0 (0.0)	10 (100.0)			
Viral Load (VL)	<20 (TND)	79	3 (3.8)	38 (96.2)	1.488	5	0.914
	20–99	11	0 (0.0)	11 (100)			
	100–999	5	1 (20.0)	4 (80.0)			
	≥ 1,000	5	0 (0.0)	5 (100)			
	Total	**100**	**7 (7.0)**	**93 (93.0)**			

4. DISCUSSION

Hepatitis C virus remains an important blood-borne pathogen across the African continent. It is a major cause of chronic liver disease, liver cirrhosis, and hepatocellular carcinoma worldwide. Transmission occurs primarily through exposure to contaminated blood, unsafe injections, unsterilized instruments, and inadequate infection-control practices **[7–9]**. In sub-Saharan Africa, unsafe blood transfusion and non-sterile injection practices remain important routes of HCV transmission **[8,10]**. This study evaluated the seroprevalence of anti-HCV antibodies among a cohort of 100 individuals in Nigeria, providing insights into the occurrence of HCV infection and its distribution across selected sociodemographic and clinical characteristics.

The sociodemographic baseline of this cohort showed that 81.0% were females and 19.0% were males. This profile differs from findings reported in some previous Nigerian studies. For instance, **[11]** reported a predominantly male study population among prison inmates in Calabar, with males accounting for 90.8% compared with 9.2% females. In contrast, **[12]** reported a female-predominant cohort among HIV-positive patients in Ibadan. These contrasts indicate that gender distribution within research cohorts may be sample- and location-specific, reflecting differences in study populations, institutional settings, and health-seeking patterns rather than a uniform nationwide pattern.

The overall findings of this study revealed that 7 out of 100 evaluated individuals were positive for anti-HCV antibodies, establishing a seroprevalence rate of 7.0%. Anti-HCV antibodies indicate previous or current exposure to HCV but do not by themselves establish active viral replication **[12,13]**. The 7.0% seroprevalence rate observed in this study falls within the range reported in other Nigerian populations. **[14]** reported a prevalence of 2.6% among HIV-positive patients in Lagos, while **[15]** reported a prevalence of 5.0% among apparently healthy individuals in Jos North. Conversely, **[16]** reported a higher prevalence of 10.4% among healthcare seekers at a tertiary facility in Jos. The prevalence observed in the present study therefore falls between some of the lower and higher estimates reported in Nigerian populations, demonstrating variation in HCV seroprevalence across different study settings and populations.

When broken down by sex, the within-group seroprevalence was descriptively higher among males (10.5%) than females (6.2%). However, inferential statistical analysis demonstrated that sex was not significantly associated with anti-HCV antibody status ($p = 0.503$). The descriptive trend towards higher male prevalence is consistent with findings reported by **[11,12]**, in which males recorded higher HCV prevalence than females, although statistically significant associations were not established. Similarly, **[17]** reported comparable HCV seroprevalence among males (4.31%) and females (4.03%) in a sub-Saharan African analysis. The lack of statistical significance observed in the present study therefore agrees with previous findings indicating that sex may not independently determine HCV seropositivity.

Stratification by age ranges showed that anti-HCV antibody seroprevalence was descriptively highest among participants over 50 years of age (15.8%), followed by the 11–30 years group (9.1%), while the 31–40 and 41–50 years cohorts demonstrated lower rates at 5.3% and 3.13%, respectively. However, age group was not a statistically significant predictor of infection ($p = 0.607$). The descriptive concentration in the older age group is consistent with **[15]**, who observed the highest HCV prevalence among participants aged 51–65 years in Jos North, although the association with age was not statistically significant ($p = 0.731$). Similarly, **[17]** reported higher HCV seroprevalence among older adults in their sub-Saharan African analysis. The relatively higher prevalence observed among older participants in the present study may reflect cumulative exposure over the course of life; however, the absence of statistical significance indicates that age was not a significant predictor of HCV seropositivity in this study.

With respect to marital status, seroprevalence was descriptively highest among widowed individuals (14.3%), followed by married participants (7.7%), while single and divorced cohorts recorded 0.0% positivity. Despite these variations, marital status was not statistically associated with HCV exposure ($p = 0.764$). This finding is comparable with **[11]**, who reported no statistically significant association between marital status and HCV seroprevalence among prison inmates in Calabar. Although variations in prevalence may occur across marital categories, the absence of statistical significance in the present study suggests that marital status was not a significant predictor of anti-HCV positivity among the participants.

Educational qualification similarly failed to yield a statistically significant association with seroprevalence ($p = 0.790$), despite a descriptive distribution across nursery (25.0%), secondary (6.7%), and primary (6.52%) tiers. This finding differs from **[13]**, who reported a statistically significant association between educational level and HCV seroprevalence in a rural screening population in Nasarawa State. The difference may be related to variations in the study populations, geographical settings, and distribution of potential exposure factors. In the present study, however, the non-significant result indicates that educational qualification was not statistically associated with anti-HCV antibody status.

This pattern was further reflected in the occupational analysis, which was not statistically significant ($p = 0.714$), despite civil servants recording a high within-group descriptive prevalence (50.0%, $n = 2$), followed by farmers (20.0%, $n = 1$) and business traders (5.6%, $n = 4$). These descriptive differences should be interpreted cautiously because some occupational categories contained relatively few participants. The finding of no significant association is consistent with **[11]**, who also found no statistically significant association between occupation and HCV seroprevalence. This suggests that broad occupational categories may not adequately capture the specific exposures associated with HCV transmission.

Finally, evaluating baseline clinical viral loads revealed that participants with lower viral levels yielded positive cases occurring in the <20 copies/mL cohort (3.8%, $n = 3$) and a single positive case in the 100–999 copies/mL tier (20.0%, $n = 1$), while the 20–99 copies/mL and ≥1,000 copies/mL categories recorded 0.0% positivity. This distribution was not statistically significant ($p = 0.914$). There was no reviewed Nigerian or sub-Saharan African study that reported the same viral-load category structure and directly tested the association between anti-HCV antibody status and these specific HCV viral-load categories. Therefore, an exact similar-study comparison is not made for this finding. However, the result can be interpreted in relation to the distinction between anti-HCV antibody positivity and active HCV infection. Anti-HCV antibodies indicate previous or current exposure to HCV but cannot independently confirm active viral replication; detection of HCV RNA is required to establish current viraemic infection **[12,13]**. Evidence from other African populations supports this distinction. **[18]** reported detectable HCV RNA among 55.66% of anti-HCV-positive participants with available RNA results in Rwanda, while **[19]** reported that 59.5% of anti-HCV-seropositive participants tested in Ghana were HCV RNA positive and 40.5% were RNA negative. These findings demonstrate that anti-HCV positivity does not necessarily correspond to detectable HCV RNA in every individual, although they do not reproduce the specific viral-load categories or the non-significant association observed in the present study.

Ultimately, the consistent absence of statistical significance across all the variables examined ($p > 0.05$) indicates that the descriptive subgroup differences observed in this study should not be interpreted as statistically established associations. The findings are consistent with previous Nigerian studies that also reported non-significant associations between selected sociodemographic characteristics and HCV seroprevalence **[11,12,15]**. The observed differences may reflect variations within the study population, but larger studies may be required to determine whether these descriptive patterns represent meaningful epidemiological relationships.

5. CONCLUSION

The seroprevalence of anti-HCV antibodies (7.0%) among the evaluated cohort is an indication of baseline historical exposure to Hepatitis C virus (HCV) within this population. This could be attributed to shared community environmental vectors, exposure to contaminated sharp objects, or historical parenteral risk channels rather than individual traits. None of the socio-demographic characteristics (sex, age, marital status, level of education, and occupational status) or baseline clinical profiles was statistically associated with the seroprevalence of anti-HCV antibodies ($p > 0.05$). Consequently, this uniform distribution highlights the critical public health need for universal, routine ELISA screening embedded directly within established chronic care programs to prevent silent hepatic disease progression.

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