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PREVALENCE OF HEPATITIS B VIRUS COINFECTION AMONGST HIV-INFECTED PATIENTS IN CAPITOL HILL HOSPITAL, WARRI, DELTA STATE, NIGERIA

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ABSTRACT: Hepatitis B virus (HBV) is the most prevalent aetiology of viral inflammation of the human liver. This study was conducted to determine the HIV/HBV coinfection rates among HIV patients in Warri, Nigeria. A total of 100 patients attending Capitol Hill hospital in Warri, were recruited for the study and hepatitis B surface antigen (HBsAg) was determined using Enzyme-Linked Immunosorbent Assay (ELISA) technique. The age range of the 100 HIV-positive individuals who participated in the study ranges from 5 to 75 years with an average age of 35.7 years. Thirty-two per cent (32.0%) of the entire population was in the less than 30 years age range. The majority of the population were females (55.0%), singles (56.0%), with primary education (34.0%), students (22.0%) and civil servants (21.0%). Results of the ELISA showed that HIV/HBV coinfection was 1.0%. The results showed that HIV/HBV coinfection occurred only among the female (1.8%), age bracket 31-40 years (3.8%), married (2.3%), those with tertiary education (2.3%) and traders (4.2%). Thus, this study confirms a low HIV/HBV coinfection in HIV patients in Capitol Hill hospital, Warri, Delta State, Nigeria. The observed drop in HIV/HBV coinfection in this study may be due to a steady increase in HBV vaccination in the nooks and crannies of the nation. This study reveals that there is a persistent decline in the prevalence of HBV in HIV-infected persons. The epidemiology of HIV/HBV co-infection in Nigeria requires rigorous surveillance since, despite the overall drop in HBV prevalence, it remains endemic among HIV-positive people.
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1. INTRODUCTION

The most frequent cause of viral inflammation of the human liver is the hepatitis B virus (HBV) (Arababadi et al., 2010). In Nigeria, hepatitis B and AIDS are major killers and disablers that are highly prevalent and endemic, respectively (Innocent-Adiele et al., 2021). HBV infection is a significant global public health issue (Cookey et al., 2022). Since both viruses have a common method of transmission, co-infection between the hepatitis B virus (HBV) and the human immunodeficiency virus (HIV) frequently occurs (Innocent-Adiele et al., 2021). HBV is 10 times more contagious than the hepatitis C virus (HCV) and 50–100 times more contagious than HIV (Elgouhari et al., 2008; Omolola et al., 2019). Because of the low infectious dosage of the virus, common behaviours like using a toothbrush or razor might readily predispose one to HBV infection (Elgouhari et al., 2008; Omolola et al., 2019).

With liver-related mortality occurring in an estimated 25% to 30% of the population of chronic carriers, primarily due to cirrhosis and hepatocellular carcinoma, the infection induced by HBV is one of the major causes of liver disease (Bosch et al., 2004; Akindigh et al., 2019). According to estimates, a fifth of the world's population is HBsAg seropositive (Sharma et al., 2005; Akindigh et al., 2019). According to studies by Zhu et al. (2008) and Li et al. (2010), more than 2 billion people around the world have the hepatitis B virus and 360 million of those are HBV carriers (El-Serag, 2012). The rate of HBV carriers is over 8.0% in just Sub-Saharan Africa (Williams, 2006; UNAIDS, 2015). Nigeria is one of the sub-Saharan African nations having a high prevalence of HBV infection (Zampino et al., 2015). 2010 definitions from the World Health Organization place low prevalence at less than 2.0%, moderate prevalence between 2.0 and 8.0%, and high prevalence at more than 8%. About 13.6% of Nigeria's population

overall are chronic HBV carriers (Zampino et al., 2015).
Research has revealed that there are considerable differences across geographical regions, risk categories, and the type of exposure involved when it comes to hepatitis viruses like HBV and/or HCV co-infection with HIV (Nnakenyi et al., 2020). In sub-Saharan Africa, where HBV is common and is to blame for the majority of viral-related chronic liver disease conditions, more than 70.0% of all HIV cases worldwide are found there (Kharsany & Karim, 2016; WHO, 2017; Tassachew et al., 2022). As a result, approximately 71% of HIV/HBV co-infected people live in sub-Saharan Africa (WHO, 2017; Tassachew et al., 2022). When compared to HIV/HCV co-infection, HIV/HBV co-infection is typically more common in the area (Tassachew et al., 2022).

South Africa, Nigeria, and India, the top three nations with the highest prevalence of people living with HIV, have documented prevalence of HIV/HBV and HIV/HCV co-infection (Saravan et al., 2007; Parboosing et al., 2008; Hamza et al., 2013; USAIDS, 2013; Nnakenyi et al., 2020). According to epidemiological research, the seroprevalence of HBV/HIV co-infection ranges from 5.0 to 10.0% in the USA to 20-30% in several sub-Saharan African and Asian regions (WHO, 2009). The rate of HIV/HBV co-infection in Nigeria is thought to range between 10.0% to 70.0%. (Owolabi et al., 2014).

Regardless of their CD4 T lymphocyte count, the WHO advises starting highly active antiretroviral therapy (HAART) in HIV patients who also have HBV or HCV. However, the choice of regimen depends on which of these viral infections is present as failing to do so could put the patient at higher risk for hepatotoxicity (Nnakenyi et al., 2020). The effective use of antiretroviral medications has greatly decreased AIDS-related morbidities and fatalities; nonetheless, HIV-positive people's mortality from non-AIDS-related end-stage liver illnesses is rising (Tassachew et al., 2022).

Nigeria has one of the highest chronic viral hepatitis disease burdens in the world (Cookey et al., 2022). The epidemiological data on the two viruses in Nigeria will be complemented by research on HIV/HBV co-infection, which will serve to shed light on the variations in the prevalence of HIV/HBV coinfection rates (Williams, 2006). Consequently, the study's objective is to ascertain the prevalence of co-infection with the hepatitis B virus among HIV-positive patients at Capitol Hill Hospital in Warri, Delta State, Nigeria.

2. MATERIALS AND METHOD

2.1 Study Area

This study was conducted in Capitol Hill clinic/Hospital, Delta State, Warri, Nigeria. The city of Warri is an oil hub in South-South Nigeria and houses an annexe of the Delta State Government House. It served as the colonial capital of the then-Warri Province.

2.2 Study Design

This is a cross-sectional study done in Capitol Hill Hospital, Warri, Delta State, Nigeria. All serological pre-analysis of HIV and assay for hepatitis B surface antigen (HBsAg) were conducted at the Virus & Genomics Research unit of the Department of Microbiology, University of Port Harcourt, Nigeria.

2.3 Study Population

The population for the study was consenting HIV-positive patients on Highly Active Anti-Retroviral Therapy (HAART) and HIV naïve patients attending Capitol Hill Hospital, Warri, Delta State, Nigeria.

2.4 Data Collection

A consecutive sampling of the HIV-1 infected individual was done in the healthcare facility mentioned above to a total of 100; ensuring this sampling was representative of the city. A sampling of 100 infected individuals was randomly done irrespective of age, gender and tribe from the register of the hospital. Necessary demographic (age, sex, marital status, education and occupation), and clinical and epidemiological data of each participant were obtained using a well-structured questionnaire. A health officer conducted the interview and enters the data according to the pre-structured questionnaire.

2.5. Sample collection and preparation

The method of sample collection employed was the vein puncture technique using a 2ml sterile syringe. The blood sample was transferred into a plain container and centrifuged at 3000 rpm for 2 minutes. The serum was stored in a vial at -20^0c until ready for use.

2.6 Inclusion and Exclusion criteria

Individuals that were included in the study were consenting attendees (male or female) aged 5 years and above confirmed and documented as an HIV-positive individuals who provided written informed consent were eligible for participation in the study. Individuals selected in the study were either ART-exposed or Naïve. Any attendees (male or female) who refused to provide written informed consent were not eligible for participation in the study

2.7. Detection of Hepatitis B surface antigen (HBsAg)

Serum samples were analyzed in vitro for HBsAg using the Enzyme-Linked Immunosorbent Assay (ELISA) kit manufactured by DIA. PRO Diagnostic Bioprobes, (Milano) Italy. The Elisa test and interpretation of results were done according to the manufacturer's instructions. This test utilizes a combination of monoclonal and polyclonal antibodies to selectively detect elevated levels of HBsAg in serum.

3. RESULTS

3.1 Sociodemographic indices of HIV-infected individuals

As shown in the table below**,** a total of 100 participants were enrolled in the study. The age range of the 100 HIV-positive individuals who participated in the study ranges from 5 to 75 years with an average age of 35.7 years. Thirty-two per cent (32.0%) of the entire population was in the less than 30 years age range. The majority of the individuals were females (55.0%) while the males were 45.0%. The majority of the population were singles (56.0%), with primary education (34.0%), students (22.0%) and civil servants (21.0%). Other socio-demographic characteristics of the participants concerning the seroprevalence of HIV/HBV coinfection are shown in Table 1

3.2 Prevalence of HBsAg/HIV coinfection

Results of the ELISA showed that HIV/HBV coinfection was 1.0%. The prevalence rate was also observed with some socio-demographic variables such as age, sex, educational background and occupational status. The results also showed that HIV/HBV coinfection occurred only among the females (1.8%), age bracket 31-40 years (3.8%), married (2.3%), those with tertiary education (2.3%) and traders (4.2%) as shown in Table 1. However, none was substantially correlated with the risk of HBV/HIV coinfection ($P > 0.05$).

Table 1: Distribution of sociodemographic indices of respondents'

variable	No. tested	No. Positive for HBV (%)	Chi-square Analysis
Sex			
Males	45	0 (0.0)	P = 0.36
Females	55	1 (1.8)	
Age group (years)			
≤ 30	32	0 (0.0)	P = 0.41
31 - 40	26	1 (3.8)	
41 - 50	11	0 (0.0)	
51 and above	31	0 (0.0)	
Marital Status			
Singles	56	0 (0.0)	P = 0.23
Married	44	1 (2.3)	
Educational status			
Primary School	34	0 (0.0)	P = 0.36
Secondary School	32	0 (0.0)	
Tertiary	24	1 (2.3)	
Non-formal	10	0 (0.0)	
Occupations			
Teaching	8	0 (0.0)	P = 0.23
Trading	11	1 (4.2)	
Civil servants	21	0 (0.0)	
Artisans	16	0 (0.0)	
Farming	16	0 (0.0)	
Students	22	0 (0.0)	
Others	6	0 (0.0)	
Total	**100**	**1 (1.0)**	

4. DISCUSSION

After the success noted in many countries (in sub-Saharan Africa, and especially Nigeria), where highly active antiretroviral therapy (HART) has been used to reduce the incidence of HIV progression to AIDS, there has been an increase in concern about the impact of hepatitis B and its related liver disease as the leading cause of morbidity and mortality among HIV-infected individuals. The claims that new information on people who were co-infected with HIV and viral

hepatitis in West Africa served as the inspiration for the current investigation (Adewole et al., 2009; Laurent et al., 2010; Noubiap et al., 2015; Boateng et al., 2019). Furthermore, there have been inconsistent studies about the impact of viral hepatitis on HIV patients who are also co-infected with HBV or HCV (Boateng et al., 2019). According to some studies (Diop-Ndiaye et al., 2008; Otegbayo et al., 2008; van Griensven et al., 2014; Boateng et al., 2019), HBV and HCV coinfections were associated with a more severe form of immunosuppression of pre-ART CD4+ T-cell counts than those with HIV mono-infection. However, other studies found no differences (Harania et al., 2008; da Silva et al., 2018; Boateng et al., 2019).

It is not unusual to find a sizable number of HBV and HCV infections among persons living with HIV (PLWH) due to their shared method of transmission and risk factors (Tassachew et al., 2022). To evaluate the HIV and HBV dual positivity, this study looked at 100 HIV-positive patients. In this study, there was a 1.0% overall prevalence of HIV/HBV coinfection, and 99.0% of cases were mono-infections. WHO has categorized the prevalence of HBV infection in HBV-endemic countries as low (2%), moderate (2–8%), and high (>8%). (2010). The results of the current study are consistent with those of Tounkara et al. (2009), who reported a prevalence of HIV/HBV coinfection of 1.13% in Mali. According to studies, there are considerable differences in HBV co-infection with HIV depending on the geography, risk group, and type of exposure (Nnakenyi et al., 2020). The percentage found in this study is consistent with earlier findings from numerous researchers.

In comparison to the 2.0% reported in Port Harcourt, Nigeria (Okonko et al., 2020b; Aaron et al., 2021) and Ethiopia, this study's low prevalence of HIV/HBV co-infection is equivalent to that of both countries (Tassachew et al., 2022). It is lower than previous reports from Ethiopia, which ranged from 3.0% to 11.7% (Wondimeneh et al., 2013; Balew et al., 2014; Belayneh, 2015; Manyazewal et al., 2016; Weldemhret et al., 2016; Deressa et al., 2017; Shimelis et al., 2017; Ayana et al., 2019; Gedefie et al., 2021; Tassachew et al., 2022), and in other African countries, including Nigeria (7.8%), Kenya (5.8%), Uganda (16.9%), and Sudan (11.7%) (Mudawi et al., 2014; Baseke et al., 2015; Maina et al., 2017; Nnakenyi et al., 2020; Tassachew et al., 2022). Additionally, it is significantly lower than the 14.0% prevalence of HIV/HBV coinfection reported in Port Harcourt, Nigeria (Okonko et al., 2022), the 12.5% prevalence reported in Kumasi, Ghana (Boateng et al., 2019), the 12.4% reported in Port Harcourt, Nigeria (Okonko et al., 2020a), the 9.2% seroprevalence of HBsAg among HIV-positive patients attending the HIV treatment clinic at JUTH (Akindigh et al., 2019), the 5.7% prevalence in a 2009 study of HIV-positive individuals in southern Nigeria (Adewole et al., 2009), the 12.5% prevalence reported from north-western Nigeria in 2013 (Hamza et al., 2013), and the 11.5% observed in another health facility in north-central Nigeria in 2012 (Tremeau-Bravard et al., 2012).

Our findings support the findings of a recent meta-analysis by Musa et al. (2015), which demonstrated that the prevalence of hepatitis B infection in Nigeria is continuing to fall. They calculated that the rate of decline has been around 0.8% yearly (Akindigh et al., 2019). According to our findings, a recent meta-analysis study on HBV and HIV coinfection showed that rates ranged from 0.0% to 28.0% in sub-Saharan Africa, with higher rates reported in West African nations (median: 11.5%), and the lowest rates (median: 4.1%) in East African countries (Stabinski et al., 2015). Furthermore, Sagoe et al. (2013) showed that 13.0% of HIV-positive individuals in Ghana had HBV coinfection, which is contradictory to the findings of the current study, as well as those of Hamza et al. (2013) and Muriuki et al. (2013) in Nigeria and Kenya, respectively.

Contrarily, compared to the rest of sub-Saharan Africa, Ethiopia showed a lower seroprevalence of HIV/HBV coinfections (Manyazewal et al., 2014). Earlier studies found lower prevalence rates for HIV-positive patients in Nigeria, Tanzania, Mali, Iran, and New York, respectively, of 2.7%, 1.2%, 1.13%, 1.8%, and 2.6% (Telatela et al., 2007; Toussi et al., 2007; Tounkara et al., 2009; Moradi et al., 2011; Mbaawuaga et al., 2014). In Ibadan, Nigeria, 2.5% of people had both HBV and HIV, according to Okonko et al. (2012). In Anyigba, Kogi State, Nigeria, Omatola et al. (2019) reported a 3.5% HBV/HIV coinfection rate. Also, 3.1% HBV/HIV coinfection was reported in Port Harcourt, Rivers State, Nigeria by Cookey et al. in 2021. Nonetheless, the seroprevalence rate in our study is lower than the previously reported HBV/HIV co-infection prevalence range of 10–70% for Nigeria (Owolabi et al., 2014). As steps to prevent HIV infection also guard against HBV infection, which shares comparable transmission channels with HIV, the country's public health organizations' efforts to prevent HIV/AIDS are likely to be responsible for the lower prevalence rate (Omatola et al., 2019).

Results from the current study, when combined, were either compatible with or in line with several published studies in sub-Saharan Africa (Boateng et al., 2019). A difference in geography, risk factor, mechanism of infection transmission, and age of infection, in addition to the potential causes described above, could account for this variation in the

frequency of HIV co-infection with HBV/HCV (Tassachew et al., 2022). Moreover, this is probably the reason why there are variations in HIV prevalence (Anbazhagan et al., 2010; Mohammed, 2014; Oluremi et al., 2021; Tassachew et al., 2022).

In this study, socio-demographic factors such as age (31–40 years), female gender, tertiary education level, marital status (being married), and occupation (being a trader) all increased the chance of contracting HIV-HBV coinfection. However, none was substantially correlated with the risk of HBV/HIV coinfection ($P > 0.05$). This goes against the findings of Boateng et al. (2019), who found that factors such as age (18–33 years), male gender, primary and secondary education levels, and marital status (being single) increased the chance of contracting HIV and HBV coinfection in their study in Kumasi, Ghana. According to Kafeero et al. (2020), educational level was not substantially correlated with the risk of HBV-HIV co-infection ($P > 0.05$), while age, marital status, and occupation were independent factors that were.

We noted that only females (1.8%) in this population had HIV/HBV coinfection, in contrast to earlier investigations. This supports data from Okonko et al. (2022) indicating Port Harcourt, Nigeria, had a higher proportion of HIV/HBV dual infection among females. This discovery is consistent with earlier findings from other researchers. According to Okechukwu et al. (2012), female participants (65.5%) had a greater prevalence of HIV/HBV coinfection than male subjects (34.4%). Gyar et al. (2014) also showed that females (53.8%) had a higher prevalence rate of HIV/HBV coinfection than males (46.2%). Although they were comparable, Omatola et al. (2019) revealed that females in Anyigba, Nigeria had higher HBsAg seropositivity than males did. In Port Harcourt, Nigeria, Cookey et al. (2021 & 2022) also noted that females were more likely than males to be coinfected with HIV/HBV.

Contrarily, earlier research revealed that males had higher rates of infection than females (Adewole et al., 2009; Opaleye et al., 2014). According to Sule et al. (2010), who was working in the same environment as Omatola et al. (2019), exposure to HBV was reportedly equivalent for both men and women in Anyigba, Nigeria. According to Okocha et al. (2012), male subjects were more likely to have HIV/HBV coinfection than female subjects. In Port Harcourt, Nigeria, Okonko et al. (2020b) also noted that males were more likely than females to be co-infected with HIV and HBV. This study's larger female-to-male ratio (2.2:1.8) may be explained by the fact that more females than males in Nigeria visit hospitals for medical care, as has been previously noted (Uneke et al., 2005). The variations seen in this study may partly be due to chance, as male subjects tend to play more violent sports that might lead to injuries, which makes them more vulnerable to a more horizontal method of HBV transmission. In addition, men's acceptance of several sexual partners in adulthood may equally contribute to the probability of HIV/HBV coinfection seen in their study.

Also, according to our findings, HIV/HBV coinfection exclusively affects people between the ages of 31 and 40. This supports the findings of Okonko et al. (2022), who noted a greater rate of HIV/HBV dual infection in Port Harcourt, Nigeria, among those aged 31 to 40. This is in contradiction to what several earlier investigations claimed. In Port Harcourt, Nigeria, Cookey et al. (2022) showed a higher rate of HIV/HBV coinfection in the 20–30 age group. In Kumasi, Ghana, Boateng et al. (2019) reported that people between the ages of 18 and 33 had a higher chance of contracting both HIV and HBV. According to Okonko et al. (2020b), HIV/HBV coinfection in Port Harcourt, Nigeria, only affects people between the ages of 16 and 20.

In addition to co-HIV/HBV infections, older age groups (>58 years) revealed a strong link with HCC in their research, according to Kim et al. (2021) and Tassachew et al. (2022). In Port Harcourt, Nigeria, Cookey et al. (2021) showed a higher rate of HIV/HBV coinfection in the age range >59 years. Our observation of an age-specific correlation in patients aged 40–49 years conflicts with the findings of a recent study by Akhtar et al. (2016) in a tertiary hospital in Malaysia and another report from northeast Nigeria (Mustapha et al., 2004) for HBV coinfection in HIV patients. In Ibadan, Nigeria, Okonko and Udeze (2011) also reported HIV/HBV coinfection in people aged 40 to 49. In Nassarawa State and Kogi State, Nigeria, respectively, Ishaku et al. (2013) and Omatola et al. (2019) showed noticeably higher HBsAg seropositivity rates in HIV patients who were older than 50.

Our results are also consistent with earlier research from several researchers, including Lar et al. (2013) and Sarkar et al. (2013), who showed increased rates of HIV/HBV coinfection in the age categories of 36–40 and 31–40, respectively. In Port Harcourt, Nigeria, Okonko et al. (2020a) similarly noted a higher rate of HIV/HBV coinfection among people aged 25 to 45.

The age range of 31 to 40 years has the highest prevalence of HIV/HBV coinfection, which may be a result of chance and the fact that the population in this

age group is made up of active young people who may engage in a variety of activities that may predispose them to HBV infection. Both of these age groups are sexually active. Most HBV infections are spread through sexual contact or during pregnancy (Alter, 2006; Boateng et al., 2019). One further explanation for the age of peak infection in this study could be related to growing parental responsibilities (Omatola et al., 2019). Bello and Olabode (2011) suggested that in northern Nigeria, polygamous men's unsafe sexual conduct may be explained by these factors as well as the men's socioeconomic status, cultural background, and place of employment.

In terms of marital status, our findings likewise revealed that HIV/HBV coinfection only happened among married people (2.3%). This supports the findings of Okonko et al. (2022), who found that married people in Port Harcourt, Nigeria, had a higher risk of HIV/HBV dual infection. This data is consistent with Chen et al. (2011)'s 2013; and Weldemhert et al. (2016)'s reports, which found that in Ethiopia, China, and Punjab, respectively, married people had a greater rate of HIV/HBV coinfection than unmarried respondents. In Port Harcourt, Nigeria, Okonko et al. (2020a) similarly noted a higher rate of HIV/HBV coinfection among married people. In Port Harcourt, Nigeria, Cookey et al. (2022) showed a greater rate of HIV/HBV coinfection among married people. Cookey et al. (2021) showed greater HIV/HBV coinfection among the widowed in Port Harcourt, Nigeria, which was contrary to recent reports in several parts of Nigeria. According to Omatola et al. (2019), widowed patients had considerably greater HBsAg prevalence, which could be explained by the lack of family support that could prevent or limit them from having several sexual partners. This finding might be explained by the differences in sexual behaviour between married and unmarried respondents. While the greater probability of HIV/HBV coinfection seen in this study could also be the result of chance. This strong correlation between marital status and HBV infection is consistent with earlier reports of Omatola et al. (2019) and Sule et al. (2010) in Kogi State, Sirisena et al. (2002) in Plateau State, Ezegbudo et al. (2004) in Anambra State and Mohammed et al. (2015) in Kano State, Nigeria.

Also, according to our findings, only individuals with tertiary education (2.3%) were coinfected with HIV and HBV. This is in line with research conducted in Ethiopia, China, and Punjab by Chen et al. in 2011, 2013, and 2016 as well as Weldemhert et al. This result is consistent with one by Ihongbe et al. (2022), who found that HBV infection was more common among those with secondary and tertiary education. They also found that HBV infection was unrelated to the educational level of the study subjects. This finding concurs with a related study by Innocent-Adiele et al. (2021), which found that in Uyo, Nigeria, persons with prior educational status had a higher prevalence than those with other educational statuses; but disagreeing with a study by Katamba et al. (2020) that claimed the primary school was a correlate of HIV and HBV dual infections (shallow level of education). This finding contradicts that made by Omatola et al. (2020), who claimed that patients with less formal education had a greater frequency of HBV.

Our work, however, runs counter to other research that has been done in Nigeria. In Port Harcourt, Nigeria, Okonko et al. (2022) found that HIV-infected individuals with secondary education had a greater rate of HIV/HBV dual infection. In Anyigba, Nigeria, Omatola et al. (2019) found that persons with only an elementary education or no formal education were more likely to have HIV/HBV coinfection. This runs counter to what we discovered in our investigation. The claim made by Ezegbudo et al. (2004) that the prevalence rates of illnesses including HIV, HBV, and HIV/HBV coinfection were negatively correlated with educational status was refuted by this finding. The results of the current study were also not supported by earlier reports from the Southeastern area of Turkey by Mehmet et al. (2005) and Sule et al. (2010) in Ankpa, Kogi State, Nigeria.

Our findings also indicated that only traders (4.2%) experienced HIV/HBV coinfection. In Port Harcourt, Nigeria, Okonko et al. (2020a) also reported HIV/HBV coinfection in non-students. This supports the findings of Okonko et al. (2022), who noted a greater rate of HIV/HBV dual infection among self-employed individuals in Port Harcourt, Nigeria, including traders. This finding conflicts with that of Omatola et al. (2020), who claimed that patients who were housewives had a greater prevalence of HBV. This finding is consistent with the outcomes of other investigations (Okonko et al., 2020b).

5. CONCLUSION

This study provides proof that HIV patients at the Capitol Hill Clinic/Hospital in Warri, Delta State, Nigeria, have hepatitis B. The prevalence of HIV/HBV coinfection among HIV patients at Capitol Hill Clinic/Hospital in Delta State, Warri, Nigeria, was found to be 1.0%. Fortunately, this study reveals that the prevalence of HBV infection in people who are HIV-positive is steadily declining. The observed drop in HIV/HBV coinfection in this study may be attributed to a gradually rising rate of HBV

vaccination in the country's nooks and crannies. The epidemiology of HIV/HBV co-infection in Nigeria requires rigorous surveillance since, despite the overall drop in HBV prevalence, it remains endemic among HIV-positive people.

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