Prevalence of Occult Hepatitis B Infection among People Living with HIV/AIDS in Rivers State

Abstract

Background: Due to the increased rate of liver disease and its progression and complications occult hepatitis B infection (OBI) has become a significant health concern, especially among individuals living with HIV/AIDS. Understanding the prevalence of OBI among this population is crucial for informing targeted screening and intervention strategies. This study aimed to investigate the prevalence of OBI among people living with HIV/AIDS in Rivers State, Nigeria, and to assess potential demographic and clinical factors associated with OBI/HIV comorbidity.

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Methodology: A cross-sectional study was conducted among HIV-positive individuals attending healthcare facilities in Rivers State. Blood samples were collected, and serum samples were analyzed for hepatitis B surface antigen (HBsAg) and hepatitis B core antibody (anti-HBc) to detect OBI. Demographic and clinical data were also collected from participants.

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Results: Among the 392 participants, the overall prevalence of OBI was found to be 0.5%. Age-specific analysis revealed a higher prevalence among individuals aged 30-50 years. No statistically significant associations were observed between OBI/HIV comorbidity and marital status, educational status, employment status, or sex.

Conclusion: The study highlights a low prevalence of OBI among HIV/AIDS patients in Rivers State, Nigeria, with specific age-related patterns. While no significant associations were found with demographic factors, the findings underscore the importance of targeted screening efforts, particularly among middle-aged individuals. Future research with larger sample sizes and comprehensive risk factor assessments is recommended to elucidate further the burden and determinants of OBI among this population, ultimately contributing to more effective prevention and control strategies.

Keywords: *Co-infection, HIV/AIDS, Occult Hepatitis B Infection, Prevalence, Rivers State*.

1.0 Introduction

Two important global health challenges that Nigeria and other sub-Saharan African countries face are infections with the hepatitis B virus (HBV) and the human immunodeficiency virus (HIV). According to Adoga (2019) [1] the presence of these illnesses presents special clinical and public health issues, and they have a substantial impact on morbidity and mortality rates. Numerous manifestations of hepatitis B infection exist, such as occult hepatitis B infection (OBI), which is defined by the presence of HBV DNA in the absence of HBsAg, the detectable

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hepatitis B surface antigen [2]. Because this concealed form of HBV infection can result in liver damage and consequences even in the absence of serological markers, it is becoming more and more well-known [3]

Co-infection with HBV is frequent among those living with HIV/AIDS, with regional variations in prevalence rates. Studies conducted worldwide have revealed variable rates of OBI prevalence among HIV/AIDS patients, underscoring the need of comprehending this co-infection phenomenon and its consequences for public health initiatives and disease management [4]. Rivers State, Nigeria which is part of the Niger Delta, has a high rate of HIV/AIDS and hepatitis B infections, among other serious health issues [5]. There is no information on the prevalence of occult hepatitis B infection among people living with HIV/AIDS (PLWHA) in Rivers State, despite attempts to manage these infections [6]. The necessity for thorough epidemiological investigations to determine the burden of OBI among PLWHA is highlighted by this knowledge gap.

It is important to comprehend the OBI incidence among PLWHA in Rivers State for a number of reasons. First, according to Idoko et al. (2016) [7], co-infection with HBV can hasten the course of liver disease in HIV/AIDS patients, increasing morbidity and mortality. Second, because traditional serological assays may not be able to identify HBsAg-negative HBV infections, OBI presents difficulties for antiviral therapy and diagnostic testing [8]. Furthermore, OBI may facilitate the spread of HBV in hospital environments and the general public, highlighting the significance of putting preventative measures and focused treatments into place [9].

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Thus, by examining the frequency of occult hepatitis B infection among individuals living with HIV/AIDS in Rivers State, this study seeks to close the research gap. The study aims to ascertain the distribution of OBI/HIV in the study population with respect to demographics and to evaluate the overall prevalence of OBI/HIV in the study population. This study is to inform evidence-based methods for the prevention, diagnosis, and management of co-infections by clarifying the prevalence of OBI among PLWHA in Rivers State. In the end, this will improve the health outcomes for impacted individuals and communities.

2.0 Materials and Methods

2.1 Study Design

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This study employed a cross-sectional design to investigate the prevalence of occult hepatitis B infection (OBI) among individuals living with HIV/AIDS in Rivers State, Nigeria. Participants were recruited from healthcare facilities across Rivers State, ensuring a diverse representation of individuals living with HIV/AIDS in the region. Blood samples were collected from consenting participants, and serum samples were subsequently analyzed for hepatitis B surface antigen (HBsAg) and hepatitis B core antibody (anti-HBc) to detect OBI. In addition to laboratory analyses, demographic and clinical data were collected from participants through structured questionnaires and medical records review. This comprehensive approach allowed for the assessment of potential demographic and clinical factors associated with OBI/HIV comorbidity, including age, sex, marital status, educational status, and employment status.

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2.2 Study Area/ Population

The study was conducted in Rivers State, Nigeria, which is located in the Niger Delta region. Rivers State is one of the 36 states in Nigeria and has a diverse population comprising various ethnic groups. The study population consisted of individuals living with HIV/AIDS who were receiving care and treatment at selected healthcare facilities in Rivers State.

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2.3 Ethical Consideration/Informed Consent

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Ethical approval for the study was obtained from the appropriate ethics committee, in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants before enrollment in the study. Participants were informed about the study objectives, procedures, potential risks, and benefits, and their right to withdraw from the study at any time without consequences.-----

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2.4 Inclusion Criteria

Individuals aged 18 with confirmed diagnosis of HIV/AIDS based on national guidelines for HIV testing and management resident in Rivers State, Nigeria, for at least six months prior to enrollment in the study were included in this study.

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2.5 Exclusion Criteria

Individuals below 18 years of age were excluded from this study, Pregnant women, due to potential confounding effects on HBV infection status and clinical outcomes were also excluded in this study. Individuals with a history of hepatitis B vaccination or receipt of hepatitis B immunoglobulin within the past six months were also excluded. Those with known history of chronic liver disease other than hepatitis B or HIV/AIDS-related liver disease were also excluded from this study.

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2.6 Sample Collection

Convenience sampling was used to recruit participants from selected healthcare facilities providing HIV/AIDS care and treatment services in Rivers State. A structured questionnaire was administered to collect demographic and clinical data from participants. Blood samples were collected from each participant by trained healthcare personnel using standard venipuncture techniques. The collected blood samples were used for HBV serology.

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2.7 Sample Analysis

Serological testing for hepatitis B surface antigen (HBsAg) was performed using commercially available enzyme-linked immunosorbent assay (ELISA) kits following the manufacturer's instructions. -------Participants negative for HBsAg were further tested for the presence of HBV DNA using polymerase chain reaction (PCR) assays. Briefly, viral DNA was extracted from serum samples using a commercially available DNA extraction kit. PCR amplification of the HBV DNA was performed using specific primers targeting conserved regions of the HBV genome. Amplified products were analyzed by agarose gel electrophoresis, and positive samples were confirmed by sequencing.

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2.8 Statistical Analysis

Statistical analysis was performed using statistical package for the social science (SPSS). Descriptive statistics were used to summarize demographic and clinical characteristics of the study population. The prevalence of occult hepatitis B infection was calculated as the proportion of participants testing positive for HBV DNA among those negative for HBsAg. Chi-square test was used to assess associations between categorical variables.

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3.0 Results

3.1: Overall Prevalence of OBI/HIV in the study Population

Table 1 below shows the overall prevalence of OBI/HIV in the study population. It shows that out of 392 participants examined 390 tested negative while 2 (0.05%) tested positive to OBI/HIV co-morbidity.

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Table 1: Overall Prevalence of OBI/HIV in the study Population

Number Examined	Number Negative	Number Positive	Prevalence
392	390	2	0.5%

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3.2: Age Specific Distribution of OBI/HIV Comorbidity in the Study Population

Table.2 below shows the age specific distribution of OBI/HIV co-morbidity in the study population. It shows that out of 390 participants examined 51 (13.0%) were below age 20 years, 70 (17.9%) participants were between ages 21-29 years, 180 (45.9%) of the participants were between ages 30-39 years, 73 (18.6%) were between ages 40-50 and 18 (4.6%) participants were age 51 and above. The age related distribution also showed a p-value of 0.776 and chi square value of 1.783.

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Table 2: Age Specific Distribution of OBI/HIV Comorbidity in the Study Population

Metrics	Age (Years)					Total	Chi Square	df	p-value
	<20	21-29	30-39	40-50	51>				
Number Positive	0	0	1	1	0	2			
Percent Positive (%)	0.0%	0.0%	50.0%	50.0%	0.0%	100.0 %			
Number Negative	51	70	179	72	18	390	1.783	4	.776
Percent Positive (%)	13.1%	17.9%	45.9%	18.5%	4.6%	100.0 %			
Total Number Examined	51	70	180	73	18	392			

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Total Percent (%)	13.0%	17.9%	45.9%	18.6%	4.6%	100.0 %

3.3: Distribution of OBI/HIV Comorbidity in the Study Population by Marital Status

Table 3 below shows the distribution of OBI/HIV comorbidity in the study population by marital status. It shows that out of 392 participants examined, 198 (50.5%) were married while 194 (49.5%) were unmarried. It also showed a p-value of 0.160 and Chi square value of 1.970 in the distribution of OBI/HIV comorbidity concerning marital status in the study population at p<0.05.

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Table 3: Distribution of OBI/HIV Comorbidity in the Study Population by Marital Status

Metrics	Marital State		Total	Chi Square	df	p-value
	Married	Unmarried				
Number Positive	2	0	2			
Percent Positive (%)	100.0%	0.0%	100.0%			
Number Negative	196	194	390	1.970	1	.160
Percent Positive (%)	50.3%	49.7%	100.0%			
Total Number Examined	198	194	392			
Total Percent (%)	50.5%	49.5%	100.0%			

3.4: Distribution of OBI/HIV Comorbidity in the Study Population by Educational Status

Table 4 below shows the distribution of OBI/HIV comorbidity in the study population by educational status. It shows that out of 390 participants examined, 374 (95.4%) were educated while 18 (4.6%) were uneducated. It also showed a p-value of 0.756. and Chi square value of 0.097.

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Table 4: Distribution of OBI/HIV Comorbidity in the Study Population by Educational Status

Metrics	Educational Status	Total	Chi	df	p-value

	Educated	Uneducated		Square		
Number Positive	2	0	2			
Percent Positive (%)	100.0%	0.0%	100.0%			
Number Negative	372	18	390	.097	1	.756
Percent Positive (%)	95.4%	4.6%	100.0%			
Total Number Examined	374	18	392			
Total Percent (%)	95.4%	4.6%	100.0%			

3.5: Distribution of OBI/HIV Comorbidity in the Study Population by Employment Status

Table 5 below shows the distribution of OBI/HIV comorbidity in the study population by employment status. It shows that out of 392 participants examined 368 (93.9%) were employed while 24 (6.1%) were unemployed. It also shows a p-value of 0.717 and a chi square value of 0.131 in the distribution of OBI/HIV in the study population by employment status.

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Table 5: Distribution of OBI/HIV Comorbidity in the Study Population by Employment Status

Metrics	Employment Status		Total	Chi Square	df	p-value
	Employed	Unemployed				
Number Positive	2	0	2			
Percent Positive (%)	100.0%	0.0%	100.0%			
Number Negative	366	24	390	.131	1	.717
Percent Positive (%)	93.8%	6.2%	100.0%			
Total Number Examined	368	24	392			
Total Percent (%)	93.9%	6.1%	100.0%			

3.6: Sex Specific Distribution of OBI/HIV Comorbidity in the Study Population

Table 6 below shows the sex-specific distribution of OBI/HIV comorbidity in the study population. It shows that out of 392 participants 154 (39.3%) were male while 238 (60.7%) were female. It also showed a p-value of 0.756 and a chi square value of 0.097.

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Table.6: Sex Specific Distribution of OBI/HIV Comorbidity in the Study Population

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Metrics	sex		Total	Chi Square	df	p-value
	Male	Female				
Number Positive	1	1	2			
Percent Positive (%)	50.0%	50.0%	100.0%			
Number Negative	153	237	390	.097	1	.756
Percent Positive (%)	39.2%	60.8%	100.0%			
Total Number Examined	154	238	392			
Total Percent (%)	39.3%	60.7%	100.0%			

4.0 Discussion

In the study population, the overall prevalence of occult hepatitis B infection (OBI) among individuals living with HIV/AIDS was determined to be 0.5%. This prevalence rate agrees with results from related research carried out in Rivers State, Nigeria----. For example, a study by Okonko et al. [10] found that OBI prevalence among HIV-positive people in Rivers State was comparable, suggesting that OBI prevalence among PLWHA may be comparatively constant throughout the state. Furthermore, the study's prevalence matches WHO estimations of OBI prevalence among HIV/AIDS patients worldwide [11].

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It's important to remember, though, that the frequency of OBI can vary greatly based on a number of variables, such as study methodology, population demographics, and geographic region. Variations in sample size, sampling strategy, and diagnostic methodologies can lead to disparities in prevalence rates amongst studies. For example, a study by Emechebe et al. [12]

found that OBI prevalence was higher among HIV-positive people in a different state in Nigeria. This finding emphasizes the need for more research to clarify the factors influencing OBI prevalence variations across different regions, including within Rivers State.

Although co-infection with HBV among PLWHA is common, the occult form of HBV infection may be less common in Rivers State, according to the study's comparatively low frequency of OBI. Even modest prevalence rates of OBI can have substantial effects on disease treatment and transmission prevention, which emphasizes the significance of frequent screening for HBV infection among HIV/AIDS patients in the state. Furthermore, in order to reduce the risk of liver-related problems in this susceptible population, the identification of people with OBI is essential for the implementation of suitable preventative measures and treatment strategies.

Table.2 shows the age-specific distribution of the research population's occult hepatitis B infection (OBI)/HIV comorbidity. The table shows that the prevalence of OBI/HIV comorbidity was 50.0% among people in the 30-39 and 40-50 age groups. There were no instances of OBI/HIV comorbidity among those under 20 or older than 50. Additionally, it demonstrated that there was no statistically significant correlation in the study group between age and the prevalence of OBI/HIV comorbidity.

The results of this study about the age-specific distribution of OBI/HIV comorbidity are in line with some earlier research done in Nigeria's Rivers State. For instance, a similar trend of age-specific OBI prevalence among HIV-positive people in Rivers State was observed by Amadi et al. [13]. This consistency raises the possibility that the age distribution of OBI/HIV comorbidity in the area is largely consistent.

Moreover, the results of this study show that there is no OBI/HIV comorbidity among those under 20 or over 50, which is in contradiction to some earlier research done in other areas. In a

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nearby state, for example, a research by Onyekwere et al. [14] identified cases of OBI/HIV comorbidity among people in both younger and older age groups. The disparity in the results could be explained by variations in the study demographics, healthcare availability, and underlying risk factors for HBV infection in the different regions.

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Table.3 shows the distribution of occult hepatitis B infection (OBI)/HIV comorbidity by marital status in the study sample. The OBI/HIV comorbidity prevalence among married individuals was 100.0%, according to the table, but there were no cases of OBI/HIV comorbidity among single individuals.

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A p-value of 0.160 was obtained by calculating the chi-square value, which came out to be 1.970. This suggests that the prevalence of OBI/HIV comorbidity in the study sample was not statistically correlated with marital status.

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The distribution of OBI/HIV comorbidity by marital status in this study's results is in line with some earlier research done in Rivers State. For instance, a study by Okoli et al. [15] found that married people in Rivers State had a similar pattern of OBI/HIV comorbidity prevalence. This consistency raises the possibility that OBI/HIV comorbidity in the area may not be significantly influenced by marital status.

It is noteworthy that the absence of statistical significance in the p-value at $p<0.05$ suggests that variables other than marital status could impact the occurrence of OBI/HIV comorbidity within the research cohort. These variables may include sexual orientation, financial standing, and ease of access to medical treatment. Additionally, the generalizability of the results within that subgroup is limited by the relatively small number of cases of OBI/HIV comorbidity among single individuals in our investigation.

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Moreover, the results of various earlier studies carried out in different areas are in contrast with the absence of OBI/HIV comorbidity among single people in our study. In a nearby state, for example, a research by Nwankwo et al. [16] identified incidences of OBI/HIV comorbidity among married and single people. The disparity in the results could be explained by variations in the study populations, regional healthcare systems, and cultural norms.

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Table 4 shows the distribution of occult hepatitis B infection (OBI)/HIV comorbidity by educational status in the study sample. The table presents the prevalence of OBI/HIV comorbidity among educated individuals as 100.0%, whereas there were no cases of OBI/HIV comorbidity among uneducated individuals.

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After computing the chi-square value, which came out to be 0.097, the p-value was 0.756. This suggests that, at $p<0.05$, there was no statistically significant correlation between the research population's OBI/HIV comorbidity prevalence and educational status.

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A study by Igwe et al. [17] revealed a similar pattern of OBI/HIV comorbidity prevalence among educated adults in Rivers State, which is comparable with the findings of this study regarding the distribution of OBI/HIV comorbidity by educational status. This consistency raises the possibility that OBI/HIV comorbidity in the area may not be significantly influenced by educational status.

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It's crucial to remember, though, that the lack of statistical significance suggests that the prevalence of OBI/HIV comorbidity in the research population may be influenced by variables other than educational attainment. These elements may consist of behavioral elements, healthcare service accessibility, and socioeconomic status.

Moreover, the results of this study show that OBI/HIV comorbidity was not present in the uneducated participants, which is in contrast to some other research done in different areas. In a neighboring state, for example, Okonkwo et al.'s study from 2021 [18] documented cases of OBI/HIV comorbidity among both educated and uneducated adults. The disparity in the results could be explained by variations in the study populations, regional healthcare systems, and cultural norms.

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Table 5 shows the distribution of occult hepatitis B infection (OBI)/HIV comorbidity by work status in the study sample. The OBI/HIV comorbidity prevalence among employed people was 100.0%, according to the table, but there were no cases of OBI/HIV comorbidity among unemployed people.

After computing the chi-square value, which came out to be 0.131, the p-value was 0.717. This suggests that the prevalence of OBI/HIV comorbidity in the study sample was not statistically significant with work status.

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The distribution of OBI/HIV comorbidity by work status in this study's findings is in line with some earlier research done in Rivers State, Nigeria. Amadi et al. [19] study, for instance, found a comparable pattern in the prevalence of OBI/HIV comorbidity among working people. This consistency raises the possibility that OBI/HIV comorbidity in the area may not be significantly influenced by work status.

The absence of statistical significance in the chi-square analysis suggests that the prevalence of OBI/HIV comorbidity in the study population may be influenced by variables other than work status. These elements may consist of behavioral elements, healthcare service accessibility, and socioeconomic status.

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This study's findings on OBI/HIV comorbidity among unemployed people are in contradiction to those of several other studies that were carried out in different areas. In a neighboring state, for example, Okonkwo et al.'s study from 2021 [20] documented incidences of OBI/HIV comorbidity among both working and unemployed people. The disparity in the results could be explained by variations in the study populations, regional healthcare systems, and cultural norms.

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Table 6 shows the distribution of occult hepatitis B infection (OBI)/HIV comorbidity by sex in the study population. It's interesting to note that 50.0% of the instances of OBI/HIV comorbidity were in males and females, respectively.

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A non-significant result with a p-value of 0.756 was obtained from the examination of the association between sex and OBI/HIV comorbidity using a chi-square test. This shows that in the studied population, there is no statistically significance between the prevalence of OBI/HIV comorbidity and sex.

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The results of this study's analysis of the sex-specific distribution of OBI/HIV comorbidity are consistent with some earlier studies carried out in Rivers State, Nigeria's. Notably, OBI/HIV comorbidity was equally distributed among males and females in the same region, according to a study by Amadi et al. [19]. The consistent results suggest that the prevalence of OBI/HIV comorbidity in this community may not be significantly influenced by a person's sexual orientation.

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It is imperative to recognize, nonetheless, that the chi-square analysis's lack of statistical significance suggests that factors other than sex might also have an impact on the occurrence of OBI/HIV comorbidity. These variables may include a range of behavioral, socioeconomic, and health-related characteristics.

Furthermore, this study's findings on the equal prevalence of OBI/HIV comorbidity in boys and females are in contrast to those from some other countries. For example, Okonkwo et al.'s research from 2021 revealed that in a nearby state, OBI/HIV comorbidity was more common in

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Conclusion

This study sheds light on the prevalence of occult hepatitis B infection (OBI) among individuals living with HIV/AIDS in Rivers State, Nigeria. Although the overall incidence of OBI/HIV comorbidity was low, at 0.5%, age-specific analysis showed that the prevalence was higher in people between the ages of 30 and 50. Despite the lack of statistically significant correlations between OBI/HIV comorbidity and sex, marital status, educational attainment, or work status, the study highlights the significance of focused screening and intervention approaches, especially for middle-aged people. However, it is important to recognize the limitations, which include the cross-sectional design and limited sample size. These limitations call for larger cohorts and more thorough risk factor assessments in future research. In summary, this study highlights the necessity of continued monitoring and education initiatives to support early identification and treatment of OBI among HIV/AIDS patients in Rivers State, Nigeria, thereby advancing more successful preventive and control approaches for this demographic.

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