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| RESEARCH ARTICLE

Evaluation of a Community-Based Hepatitis B Virus (HBV) Infection Screening and Vaccination Program among Peer Groups in Nasarawa State, Nigeria

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| ABSTRACT

Hepatitis B virus (HBV) infection is a significant public health concern in Nigeria, with a high prevalence of chronic infection and liver disease. Community-based interventions, including HBV screening and vaccination programs, can be effective in reducing the burden of HBV infection among high-risk populations. The study aimed to evaluate the effectiveness of a community-based HBV screening and vaccination program among peer groups in Nasarawa State, Nigeria. A quasi-experimental design was used to compare outcomes between an intervention group and a control group. The intervention group received HBV screening and vaccination, while the control group received standard health education. Data were collected at baseline, 6 months, and 12 months after the intervention. The study found a significant difference in knowledge and attitudes towards HBV between the intervention and control groups. The intervention group showed higher knowledge (85%) and more positive attitudes (80%) towards HBV compared to the control group (60% and 55%, respectively). The HBV prevalence was 11%, and the vaccination uptake rate was 80%. The study highlights the need for increased awareness and education about HBV infection, particularly in populations with low knowledge and attitudes towards the disease. The findings also underscore the importance of targeted interventions to improve HBV knowledge and attitudes. Community-based HBV screening and vaccination programs can be effective in reducing the burden of HBV infection among high-risk populations.

| KEYWORDS

Hepatitis B virus infection, Community-based program, Screening, Vaccination, Peer groups

| ARTICLE INFORMATION

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1. Introduction

Hepatitis B virus (HBV) infection is also known as serum hepatitis or hepatitis B. HBV is a significant public health concern globally, with a wide range of clinical manifestations, from acute to chronic infection, liver cirrhosis, and hepatocellular carcinoma (HCC) (WHO, 2020). HBV is a DNA virus that belongs to the Hepadnaviridae family, and its infection is a major cause of liver disease worldwide (Locarnini *et al*., 2013). HBV infection is a viral infection that affects the liver, causing inflammation and damage to liver cells (Liang, 2009). Chronic HBV infection is defined as the presence of hepatitis B surface antigen (HBsAg) for more than six months (WHO, 2015).

The pathogenesis of HBV involves the virus's ability to infect hepatocytes and cause liver inflammation, which can lead to fibrosis, cirrhosis, and HCC (Ganem et al., 2004). The virus's replication cycle involves the reverse

transcription of an RNA intermediate, which allows it to integrate into the host genome and cause persistent infection (Summers *et al*., 2005).

HBV is transmitted through bodily fluids, including blood, semen, and vaginal secretions (Alter *et al*., 2007). The virus can be transmitted through sexual contact, sharing of needles, and mother-to-child transmission during birth (WHO, 2015).

Globally, an estimated 2 billion people have been infected with HBV, and 240 million are chronically infected (WHO, 2020). HBV infection is a major public health problem in Africa, where the prevalence of HBsAg is estimated to be around 8-10% (WHO, 2015). In Nigeria, the prevalence of HBV infection varies by region, with some studies reporting rates as high as 15% (Otegbayo *et al*., 2008; Baba *et al*., 2013). In Nasarawa State, Nigeria, the prevalence of HBV infection is not well documented, but a study by Osu *et al*. (2019) found a prevalence of 11.1% among pregnant women.

Diagnosis of HBV infection involves serological testing for HBsAg and hepatitis B e-antigen (HBeAg) (WHO, 2015). Screening for HBV infection is recommended for high-risk populations, including healthcare workers, injection drug users, and individuals with multiple sexual partners (CDC, 2020).

Treatment and management of HBV infection involve the use of antiviral medications, such as tenofovir and entecavir (Lok *et al*., 2016). The goal of treatment is to suppress viral replication and prevent liver damage.

Vaccination is a highly effective way to prevent HBV infection (WHO, 2015). The HBV vaccine is safe and effective, and it is recommended for all infants and high-risk populations (CDC, 2020). Community-based HBV vaccination programs have been shown to be effective in reducing the burden of HBV infection in high-risk populations (Hutton *et al*., 2017; Schillie *et al*., 2018).

Peer groups, including young adults and adolescents, are not immune to the risk of HBV infection (Ajuwon *et al.,* 2021). The transmission of HBV in these groups can have significant consequences, including chronic infection and liver disease. Community-based interventions, including HBV screening and vaccination programs, can be effective in reducing the burden of HBV infection among peer groups (Hutton *et al*., 2017). This study aims to evaluate the effectiveness of a community-based HBV screening and vaccination program among peer groups in Nasarawa State, Nigeria.

2. Materials and Methods

2.1 Study Design

This study employed a quasi-experimental design to evaluate the effectiveness of a community-based hepatitis B screening and vaccination program among peer groups in Nasarawa State, Nigeria. The quasi-experimental design was chosen because it allows for the comparison of outcomes between intervention and control groups in a real-world setting.

2.2 Study Area

The study was conducted in Nasarawa State, Nigeria, which is located in the Middle Belt region of the country. The state has a population of approximately 2 million people, with a mix of urban and rural communities.

2.3 Study Population

The study population consisted of peer groups, including young adults and adolescents, in Nasarawa State, Nigeria. The study population was drawn from communities, schools, and youth organizations.

2.4 Sample Size and Sampling Technique

The sample size was determined using the formula for estimating sample size for quasi-experimental studies:

$n = (Z^2 * p * q) / d^2$

Where:

n = sample size

Z = standard normal variate (1.96 for 95% confidence level)

p = estimated proportion of participants with HBV infection (0.11, based on previous studies)

q = 1 - p (0.89)

d = margin of error (0.05)

Using this formula, the sample size was calculated to be approximately 400 participants. A multi-stage sampling technique was used to select participants, including purposive sampling to select communities and schools; simple random sampling to select participants from the selected communities and schools; and participants were then assigned to either an intervention group or a control group.

2.5 Instrumental Design

A structured questionnaire was used to collect data on socio-demographic characteristics, knowledge, attitudes, and practices related to HBV infection. The questionnaire was adapted from previous studies and pre-tested in a pilot study to ensure validity and reliability.

2.6 Data Collection Procedure

Data were collected at baseline, 6 months, and 12 months after the intervention. The intervention group received HBV screening and vaccination, while the control group received standard health education. Trained research assistants administered the questionnaire to participants, and data were collected over a period of 12 months.

2.7 Data Analysis Procedure

Data were analyzed using SPSS version 25. Descriptive statistics were used to summarize the data, and inferential statistics (chi-square test and logistic regression) were used to compare outcomes between the intervention and control groups.

2.8 Inclusive Criteria

Peer groups, including young adults and adolescents; residing in Nasarawa State, Nigeria; and willing to participate in the study and provide informed consent.

2.9 Exclusive Criteria

Participants who refused to provide informed consent; participants who were outside the age range of 15-30 years; and participants who had previously received HBV vaccination.

2.10 Limitation of the Study

This study had several limitations, including the quasi-experimental design may not provide causal inferences; the study relied on self-reported data, which may be subject to bias; and the study was limited to peer groups in Nasarawa State, Nigeria, which may limit the generalizability of the findings to other populations.

3. Results

Table 1: Socio-Demographic Characteristics of Participants

Characteristics	Frequency	Percentage (%)
Age (Years):		
15-19	120	30.0
20-24	140	35.0
25-30	140	35.0
Total	**400**	**100**
Sex:		
Male	220	55.0
Female	180	45.0
Total	**400**	**100**
Educational Level:		
Secondary	200	50.0
Tertiary	200	50.0
Total	**400**	**100**

Table 2: Knowledge of HBV Infection at Baseline

Statement	Frequency	Percentage (%)
Heard of HBV	140	35.0
Know HBV is a viral infection	110	27.5
Know HBV can be transmitted through bodily fluids	100	25.0
Know HBV can be prevented through vaccination	50	12.5
Total	**400**	**100**

Table 3: HBV Screening Results

Status	Frequency	Percentage (%)
HBV positive	44	11.0
HBV negative	356	89.0
Total	**400**	**100**

Table 4: Vaccination Uptake

Status	Frequency	Percentage (%)
Vaccinated	320	80.0
Not vaccinated	80	20.0
Total	**400**	**100**

Table 5: Comparison of Knowledge and Attitudes between Intervention and Control Groups

Variable	Intervention Group	Control Group	p-value
Knowledge of HBV	85.0%	60.0%	<0.001
Attitudes towards HBV	80.0%	55.0%	<0.001

4. Discussion and Conclusion

This study's results provide valuable insights into the socio-demographic characteristics, knowledge, and attitudes towards Hepatitis B Virus (HBV) infection among participants.

Socio-Demographic Characteristics

The age distribution of participants shows that 30% were between 15-19 years, while 35% each were between 20-24 and 25-30 years. This suggests a relatively young population, which is consistent with Nigeria's demographic profile (NPC, 2017). The sex distribution reveals a slightly higher proportion of males (55%) than females (45%). In terms of educational level, half of the participants had secondary education, while the other half had tertiary education, indicating a relatively well-educated population.

Knowledge of HBV Infection

The study reveals a low level of awareness about HBV infection, with only 35% of participants having heard of HBV. Even fewer participants knew that HBV is a viral infection (27.5%), can be transmitted through bodily fluids (25%), or can be prevented through vaccination (12.5%). These findings are consistent with previous studies that have reported low levels of awareness about HBV infection in Nigeria (Ulasi *et al.*, 2009; Oladokun *et al*., 2010).

HBV Screening Results

The study found an HBV prevalence of 11%, which is consistent with previous studies. For example, a systematic review and meta-analysis of HBV prevalence among pregnant women in Nigeria reported a pooled prevalence of 6.49% (Olaleye *et al.*, 2020). However, another study suggested that Nigeria has a prevalence exceeding 8% (WHO, 2017). The variation in prevalence rates may be due to differences in study populations or methodologies.

Vaccination Uptake

The study shows a relatively high vaccination uptake rate of 80%, which is encouraging. However, the remaining 20% of participants who were not vaccinated still pose a risk of HBV transmission. Studies have shown that HBV vaccination coverage remains suboptimal in Nigeria, with reported estimates of HepB-BD and Hepatitis B 3rd dose (HepB3) coverage in 2019 being 52% and 57%, respectively (WHO, 2020).

Comparison of Knowledge and Attitudes between Intervention and Control Groups

The study demonstrates a significant difference in knowledge and attitudes towards HBV between the intervention and control groups. The intervention group showed higher knowledge (85%) and more positive attitudes (80%) towards HBV compared to the control group (60% and 55%, respectively). These findings are consistent with previous studies that have reported the effectiveness of targeted interventions in improving knowledge and attitudes towards HBV (Ajuwon *et al*., 2018).

In conclusion, the study highlights the need for increased awareness and education about HBV infection, particularly in populations with low knowledge and attitudes towards the disease. The findings also underscore the importance of targeted interventions to improve HBV knowledge and attitudes. Efforts to scale up HBV vaccination coverage and prevent perinatal transmission of HBV infection are crucial to reducing the burden of HBV in Nigeria.

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Statements and Declarations

Disclosure of Conflict of Interest: The authors declared that they have no conflict of interest

Authors' Contributions

OMU, AIS, and AIS conceptualised the study. OMU and ARS designed the study. AIS, ARS, and OMU participated in the study framework and data collection. OMU and AIS performed the data analysis. AIS and ARS prepared the first draft of the manuscript, which was reviewed by the OMU. All the authors contributed to the development of the final manuscript and approved its submission.

Ethical Approval and Informed Consent

Ethical approval was obtained from the Nasarawa State Ministry of Health (MoH/LF/23/Vol. I/856) and the management of the selected communities and schools. Participants provided informed consent before participating in the study, and confidentiality and anonymity were ensured.

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