Original

Assessing the Effectiveness of a Structured Education Program on Hepatitis B Awareness among Secondary School Students in Gombe State, Northeastern Nigeria

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Abstract

Background: This study evaluates the effectiveness of a structured education program in improving Hepatitis B knowledge among secondary school students in Gombe State, Nigeria, focusing on causes, prevention, and demographic influences.

Materials and Methods: A quasi-experimental design was employed using a convenience sampling method to select 200 students between November 5–19, 2023. A pre-test and post-test evaluation assessed participants' knowledge of Hepatitis B. The structured teaching program incorporated interactive lectures, visual aids (such as infographics), and a question-and-answer session. Data collection was conducted using a self-administered questionnaire, including sociodemographic details and knowledge-based questions. Analysis was performed using paired descriptive statistics and chi-square tests in SPSS Statistics (version 27.0; IBM Corp.).

Results: The educational intervention significantly improved students' knowledge (mean difference = 0.555, $p < 0.001$). Age and class were significant factors, with students aged 12–14 years and those in junior classes demonstrating higher knowledge scores. There was no significant association between knowledge and sex. The mean knowledge score increased from 1.269 to 1.824 ($p < 0.001$).

Conclusion: The structured teaching program effectively enhanced Hepatitis B knowledge among secondary school students in Gombe State. Tailoring interventions based on age and class can optimize educational outcomes. This study highlights the importance of targeted health education in combating Hepatitis B in schools.

Keywords: Hepatitis B, knowledge, students, teaching, Nigeria

How to cite this article

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Introduction

Hepatitis B is a significant global health issue, affecting millions of people. As of 2022, the World Health Organization reported approximately 257 million individuals living with chronic Hepatitis B infection worldwide.[1] About 2 billion people have been infected at some point, highlighting this virus's widespread nature. [2,3] Structured teaching programs are educational interventions designed to increase knowledge and understanding of health-related topics. Previous literature highlighted that approximately 15-40% of patients infected with Hepatitis B Virus will develop life-threatening liver complications such as cirrhosis, liver failure, and hepatocellular carcinoma, resulting in 600,000 to 1.2 million deaths per year due to Hepatitis B Virus.[4] Nigeria has a high burden of hepatitis B infection. According to research in Nigeria, the prevalence of hepatitis B surface antigen (HBsAg), an indicator of chronic hepatitis B infection, is estimated to be around 8-12% in Nigeria.[5,6] The mode of transmission of the hepatitis B virus is through blood. It is present in high concentrations in blood and various body fluids such as serum, serous exudates, saliva, semen, and vaginal fluid. The most important mode of transmission in intermediate and high-endemic areas is believed to be perinatal transmission, i.e., mother-to-fetus transmission. In contrast, sexual transmission is the predominant route in low-endemic areas[7] A great number of the Nigerian population was reported to have been infected with Hepatitis B Virus, and the disease was documented to be the highest cause of chronic liver disease in Nigeria [5,8]

Structured education learning programs typically involve a series of planned lessons or activities that are delivered over a specific period; examples are lecture-based programs, information delivery, problem-based learning (PBL) programs, project-based learning (PjBL) programs, online learning programs, and multimedia-based programs [9]. The goal of structured teaching programs is to provide individuals with the information and skills they need to make informed decisions about their health. Several studies have been conducted to assess secondary school students' knowledge of hepatitis B prevention. A study conducted in Nigeria among secondary school students found that more than 50% of the students in secondary school lacked knowledge about the clinical features and complications of hepatitis B infection. The majority of students (72.7%) were aware of HBV vaccination. However, many students did not know their vaccination status, whereas only 23.5% of the students were fully immunized.[4,10] In addition, only 35.7% of the students knew that vaccination was an effective method of preventing Hepatitis B. Another study conducted in Iran found that while the majority of secondary school students were aware of Hepatitis B, their knowledge of its transmission and prevention was inadequate. Only 27.7% of the students knew that Hepatitis B could be transmitted through sexual intercourse, and only 42.8% knew that vaccination was an effective method of preventing Hepatitis B.[11]

The results of a study in Jordan show that although the students had a moderate overall knowledge level of hepatitis B, there were significant gaps in their understanding of specific prevention measures such as vaccination, and avoiding sharing personal items. [12] A previous study in China investigated the impact of a structured teaching program on the academic performance of medical students. The program consisted of a series of workshops and hands-on activities designed to enhance students' knowledge and understanding of anatomy and physiology. A study in the United States of America found that students who participated in the structured teaching program performed significantly better on exams and had a higher overall Grade Point Average. (GPA) than those who did not participate.[13]

Effective prevention and control of hepatitis B require a comprehensive approach that includes raising awareness about the disease and its transmission, providing vaccination, and promoting safe injection practices and blood transfusion. Education is a crucial component of this approach, and structured teaching programs have been demonstrated to be an effective way of increasing knowledge of diseases and their prevention. Structured teaching programs have shown promising results in improving health-related knowledge among various populations. By adopting a structured teaching approach, students can receive organized and systematic information, enabling them to grasp key concepts effectively. Such programs often incorporate interactive methods, such as group discussions, role-playing, and audiovisual aids, which facilitate active participation and engagement among students.[7,14]

However, there is a lack of research on the effectiveness of structured teaching programs in increasing knowledge about Hepatitis B among secondary school students in

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Nigeria, especially in Gombe State. This study aims to fill this gap by evaluating the effectiveness of a structured teaching program in increasing knowledge about the causes and prevention of hepatitis B among secondary school students in Gombe State.

Methods

Study Design

A one-group pre-test post-test research design, a type of quasi-experimental design, was employed to evaluate the effectiveness of the structured education program in Baptist high school gombe state.

Study settings

This study was conducted at Baptist Academy in Gombe State, Northeastern Nigeria, which was purposively selected due to its accessibility and the diversity of its student body. The school comprises both junior and senior secondary school students of both sexes, providing a representative sample of the target population.

Study Population

The study population consisted of 1,063 secondary school students in Baptist secondary school, Gombe state Nigeria. The sample size and determination of participants were achieved using non-probability convenience sampling. The inclusion criteria consisted of secondary school students aged 12 years or older. The exclusion criteria included students younger than 12 years and those who could not read or write. To determine the sample size, the Taro Yamane formula was applied as follows:

$n = N / (1 + N(e^2))$

Where:

- n = Sample size
- N = 1063 (Total population)
- e = 0.0637 (Margin of error of 6.37%)

Substituting the values:

$n = 1063 / (1 + 1063(0.0637^2))$
$n = 1063 / (1 + 1063(0.00406))$
$n = 1063 / (1 + 4.315)$
$n = 1063 / 5.315$
$n \approx 200.06$

Instrument of Data Collection

Data were collected between January 4 and January 18, 2024, using a self-administered questionnaire with two sections: demographic information and a structured knowledge assessment. The questionnaire, adapted from a previous study [15], categorized knowledge levels into three groups: inadequate (0-5), moderate (6-7), and adequate.[8-10]

The instructional method used in this study was a structured teaching program, which included interactive lectures, visual aids (such as infographics, and a question-and-answer session. The teaching session lasted 45 minutes and was delivered in small groups to enhance engagement and understanding.

The study aimed to answer two key questions: (1) what is the knowledge level about the causes and prevention of hepatitis B before and after the teaching program? (2) Is the program effective in increasing knowledge? A pilot study in Gombe Metropolis showed the tool's reliability with a Cronbach's alpha of 0.82.

Data Analysis

Data were entered and cleaned using Microsoft Excel and analyzed with SPSS version 29.0. Sociodemographic parameters, including categorical and discrete variables, were presented in frequency tables. Pre- and post-test knowledge levels were compared using percentages and frequencies. A Pearson's chi-square test of independence was performed to assess the relationship between knowledge levels and selected sociodemographic variables, such as age, sex, and class.

Ethical Clearance

Ethical clearance was granted by the Gombe State IRB Board, with reference number MOH/ADH/ADM621/V.I/431 on 03/09/2023. Each student was provided with a consent and assent form to read and sign, following a thorough explanation and assurance of confidentiality regarding the information they provided.

Result

We conducted a descriptive analysis of the socio-demographic characteristics of secondary school students in Gombe State, Nigeria. The gender distribution in (Table 1) indicated that 61% (122) were male and 39% (78) were female. Most respondents were between the ages of 12 and 14, making up 57% (114) of the sample. Participants aged 15 to 16 years accounted for 28% (56), while 15% (30) were 17 years or older. In terms of class level and age 56% (110) of participants

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were in the senior class, with notable majority between the age 17-20 years and 45% (90) were in the junior class 14 -17 years

Table 1. Sociodemographic characteristics of study participants

Variables	Categories	Frequency	Percentage (%)
Gender	Male	122	61
	Female	78	39
Age	12-14	114	57
	15-17	56	28
	≥ 18	30	15
Class	Senior	110	55
	Junior	90	45

The study results in (figure 1) further highlight the categorization of respondent's knowledge scores based on their responses. A grade with a scale score of 0-5 indicates inadequate knowledge, 6-7 reflects moderate knowledge, and 8-10 demonstrates adequate knowledge. Before the intervention, there was insufficient knowledge about hepatitis cure and prevention among the students, with a score of 100. However, after the intervention, knowledge significantly improved, with a notable increase to a score of 160. In terms of moderate knowledge, the post-test score of 30 shows a slight improvement compared to the pre-test score of 20

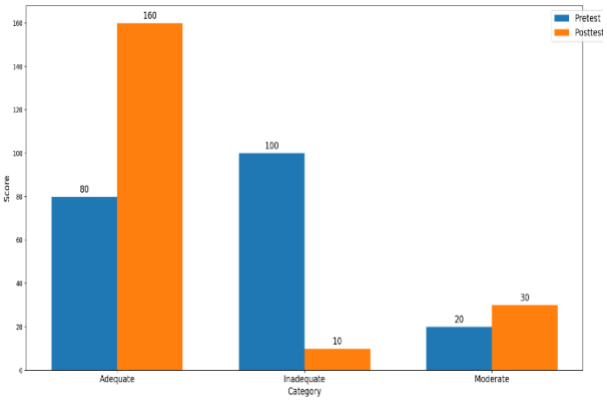

Figure1: Knowledge Test Score of Participants

The study further examined the pre-and post-test knowledge of structured education programs and how they affect the increase (table 2) of knowledge among a sample of secondary school students in Gombe State, Nigeria. The result shows that the knowledge of participants that hepatitis is caused by a virus was notably low, with 10 participants (5%) correctly identifying it as such. Post-intervention, this understanding dramatically increased to 192 participants (96%). Similarly, the result shows that participant's knowledge of whether all infected individuals exhibit hepatitis-related symptoms increased from 50 participants (25%) in the pre-test to 160 participants (80%) in the post-test.

Notably, knowledge of the transmission routes for hepatitis B improved significantly. In the pre-test, only 20 participants (10%) acknowledged that the virus can be transmitted through contact with contaminated blood, while this figure increased to 180 participants (90%) post-intervention. Awareness of unsafe sexual practices as a transmission route also rose from 80 participants (40%) to 175 participants (87.5%). Participants having the knowledge that hepatitis B can be passed from mother to child at birth improved from 30 participants (15%) in the pre-test to 185 participants (92.5%) in the post-intervention.

The result shows the comprehension of how unsterilized surgical instruments can facilitate transmission also saw a marked improvement, with awareness increasing from 40 participants (20%) preintervention to 170 participants (85%) postintervention. Notably, participants exhibited a strong understanding that hepatitis B can lead to serious liver damage, with responses rising from 5 participants (3%) pre-intervention to 195 participants (97.5%) post-intervention.

In addition, knowledge regarding the effectiveness of vaccination as a preventive measure increased from 15 participants (7.5%) in the pre-test to 185 participants (92.5%) in the post-test. Willingness to undergo hepatitis B screening showed a notable increase, with only 25 participants (12.5%) indicating readiness in the pre-test, compared to 150 participants (75%) after the intervention. Furthermore, many participants expressed a commitment to informing their peers about hepatitis B, with a willingness to share this knowledge remaining high at 180 participants (90%) in the post-test compared to 20 participants (10%) in the pre-test.

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Table 2: Pre and Post Test Knowledge of Students on Hepatitis B

Questions	Pre-Test Knowledge (%)		Post Test Knowledge (%)	
	Yes	No	Yes	No
Is Hepatitis caused by a virus?	10 (5)	190 (95)	192 (96)	8 (4)
Do all infected persons have symptoms?	50 (25)	150 (75)	160 (80)	40 (20)
Can hepatitis B be transmitted by coming in contact with contaminated blood	20 (10)	180 (90)	180 (90)	20 (10)
One of the ways hepatitis B is spread is through unsafe sexual practices.	80 (40)	120 (60)	175 (87.5)	25 (12.5)
Can hepatitis B be passed from mother to child at birth?	30 (15)	170 (85)	185 (92.5)	15 (7.5)
Transmission can also be by the use of unsterilized surgical instruments.	40 (20)	160 (80)	170 (85)	30 (15)
Hepatitis B infection can lead to liver damage.	5 (3)	195 (97)	195 (97.5)	5 (2.5)
Vaccination remains the safe and effective way to prevent hepatitis B infection.	15 (7.5)	185 (92)	185 (92.5)	15 (2.5)
Are you willing to go for Hepatitis B screening?	25 (12.5)	175 (87.5)	150 (75)	50 (25)
Will you inform your peers about hepatitis B?	20 (10)	180 (90)	180 (90)	20 (10)

Furthermore, the study analyzes the pre-test and post-test knowledge scores of respondents (Table 3) using mean scores, standard deviations, mean differences, paired t-tests, and p-values. The mean score for the pre-test knowledge was 1.269 ± 0.479, while the post-test mean score was 1.824 ± 0.377. The mean difference between the pre-test and post-test scores was 0.555. A paired t-test revealed a statistically significant difference in knowledge scores, with $t = 16.20$ and $p < 0.001$, indicating that the educational intervention significantly improved participants' knowledge. Chi-square tests were conducted to examine factors influencing the effectiveness of the structured teaching program. The analysis included variables such as age, sex, and class, and the distribution of knowledge scores categorized as inadequate, moderate, or adequate before and after the intervention. Statistically significant differences in knowledge scores were observed across age groups ($\chi^2 = 20.653$, $df = 4$, $p < 0.001$) and class levels ($\chi^2 = 27.23$, $df = 2$, $p < 0.001$). Statistical analysis confirmed students aged 12-14 years and those in junior classes demonstrated higher frequencies of adequate knowledge scores after the intervention. However, sex did not significantly influence the effectiveness of the educational intervention, as indicated by a chi-square value of $\chi^2 = 0.476$ ($df = 1$, $p = 0.78$), suggesting that male and female students benefitted equally from the program.

Table 3: Relationship between demographic factors (age, sex, and class) and hepatitis B knowledge levels among study

Variable	Category	Inadequate	Moderate	Adequate	χ^2	df	P-value
Age	12-14 years	1	24	89	20.653	4	<0.001
	15-17 years	4	6	46	-	-	-
	18 and above	5	0	25	-	-	-
Sex	Male	61	14	47	0.476	2	0.78
	Female	39	6	33	-	-	-
Class	Senior	10	5	95	27.23	2	<0.001
	Junior	0	25	65	-	-	-

χ^2 =Chi-square, df =degrees of freedom

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Discussion

This study investigates the impact of a structured education program on hepatitis B awareness among secondary school students in Gombe State, North-Eastern Nigeria. Respondents included students from both junior and senior classes. Previous research has emphasized the potential impact of class-related studies, revealing significant differences in academic performance and health outcomes between junior and senior students.[16,17]

However, this study indicates that age and school class significantly influence knowledge enhancement. Younger students aged 14–15 and 15–17, who received instructional interventions through info graphics and videos, as well as those in junior classes, demonstrated greater improvements. This may be attributed to differences in instructional methods, peer interaction, and class dynamics among participants. This aligns with a previous study in Russia, which found that age significantly affects learning [18]. A study among college students in China also revealed a significant association between age and knowledge of hepatitis B, showing that younger students had higher knowledge levels than their older peers.[19]

This study shows that gender did not significantly impact knowledge gain; This stands in contrast to previous studies, which suggest female students exhibit greater motivation for learning and higher academic ability [20]. Our study reveals that there was low pre-knowledge of hepatitis among selected students, indicating a lack of awareness and possibly a low understanding of how viral hepatitis can affect both the social and physical activities of adolescents and youth. Although the lack of awareness may be caused by a lack of access to basic information, including underlying factors like inaccessibility to a proper diagnosis of hepatitis B and a lack of access to experienced healthcare workers, some participants were not aware of hepatitis B's mode of transmission, like contact with contaminated blood or blood products, mother-to-child during birth, or unsterilized medical equipment. Variably, this corresponds with a previous study among youth and adolescents carried out in south-eastern Nigeria that showed that about 98.1% of youth are not aware of hepatitis infection.[21]

Although, after the educational training, notable participants correctly identified vertical transmission from mother to child during birth, indicating a high level of knowledge in this aspect, few participants were aware of this mode of transmission. The post-test evaluation of this study shows an increase in knowledge and awareness of the hepatitis B virus among the students; this may be due to a high level of educational retention, increased awareness, and effective educational interventions. A minority of the participants were not aware of the link between hepatitis B infection and liver damage, while a notable majority correctly recognized that hepatitis B infection can lead to liver damage and also acknowledged that vaccination is a safe and effective preventive measure. The recognition of the notable majority of respondents in this study corresponds to previous studies in the United States of America that show that the majority of the study population is aware that hepatitis is one of the major causes of various liver diseases and damage. [22,23]

Interestingly, while a few respondents expressed reluctance towards hepatitis B screening, several participants showed a positive attitude and willingness to undergo the screening. This aligns with previous research, emphasizing the importance of raising awareness and promoting hepatitis B prevention and control measures among youth and adolescents to curb the spread of the virus. [24]

In addition, the study result shows a reduction in the number of participants who are not willing to tell their peers about viral hepatitis. This may be triggered by peer learning influence and first-hand sensitization. A considerable number of respondents understand that some individuals can be asymptomatic carriers of the virus. Although proper training and sensitization among young adults and adolescents could help in propagating the health implications of the hepatitis B virus among parents, guidance, and peer groups, as suggested by a previous study carried out in Ekiti State, Nigeria, and Catalonia, Spain.[25,26]

Our findings show that sex did not significantly influence the effectiveness of the educational intervention in increasing knowledge about hepatitis B. This is consistent with previous studies that have found no significant differences in knowledge levels between male and female students.[27] the chi-square test showed that the differences in knowledge scores between the age groups were statistically significant. Respondents aged 12-14 years and those in the junior class had higher frequencies. Although our study is in agreement that educational interventions among youth and adolescents should be tailored towards a specific group for effective impact.[28,29]

Limitation: Although improvements in knowledge were observed post-intervention, the relatively small sample size may limit the generalizability of the findings.

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External factors such as access to healthcare and information could have impacted participants' understanding and attitudes toward hepatitis B.

Conclusion: This study evaluated the effectiveness of an educational intervention in improving hepatitis B awareness among secondary school students in Gombe State, Nigeria. The findings revealed a significant increase in knowledge post-intervention, with younger students (aged 12–14) and those in junior classes showing the most knowledge improvement. Gender had no significant impact on knowledge gains. These results highlight the importance of interactive and targeted educational strategies in enhancing hepatitis B awareness and prevention among adolescents.

Declarations

Authors' Contribution: Olajide Olasunkanmi Modupeokluwa (Conceptualization, methodology, data analysis, manuscript writing, and manuscript formation, original draft), Olaposi j. Olatoregun (Data collection, literature review, statistical analysis, manuscript formation, and revision), Adenekan y. Tolulope (Conceptualisation, validation, data analysis, manuscript writing, and manuscript formation), Amina Ibrahim (Conceptualization, data analysis, manuscript review, and manuscript formation), Adnan Umar Musa Conceptualisation, data analysis, manuscript formation, and visualization. Supervision).
Conflict of interest: No conflict of interest

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