



# Knowledge and Determinants of Hepatitis B Virus Testing and Vaccination Status among Sickle cell Disease Patients

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Sickle cell anemia patients are a cohort of at-risk individuals for Hepatitis B virus infection due to their life-long dependency on transfusion therapy. The World Health Organization (WHO) recommendations stipulates testing and vaccination for at-risk individuals.

**Objective:** The objectives of the present study are to assess the level of knowledge of sickle cell disease patients to HBV infection, identify their HBV vaccination status and to assess the barrier that prevents patients from being tested and vaccinated for HBV infection.

**Materials and Methods:** This was a cross-sectional study. The subjects comprised of 120 sickle cell disease patients who were recruited through consecutive sampling using pretested, semi-structured, self-administered questionnaires and data was analyzed with statistical package for social sciences (SPSS) for Microsoft Window Version 23.

**Results:** The mean age of the respondents was 24  $\pm$ 6 years. About 57.5% of the respondents are aware of Hepatitis B virus infection but only 15% had good knowledge of the disease. About 80.8% of the respondents have not been tested for Hepatitis B infection while 70% has not been vaccinated. The cost of testing for HBV infection and vaccination was identified as a major factor

that prevented many of the patients from identifying their HBV status as well as getting vaccinated as about 80% of the respondents have not been tested due to high cost of testing while 84.2% have not been vaccinated due to high cost of the vaccine.

**Conclusion:** There should be universal health education to sickle cell anemia patients on the need for Hepatitis B virus infection test and vaccination as well as a health insurance scheme that will cover the cost of Hepatitis B virus testing and vaccination for patients.

**Keywords:** Knowledge; determinants; Hepatitis B virus infection; Hepatitis B test; Hepatitis B vaccine; sickle cell anemia; Enugu.

## 1. INTRODUCTION

Hepatitis B Virus (HBV) infection is a public health problem especially in Sub-Saharan Africa. Despite the World Health Organization (WHO) targets for the eradication of Hepatitis B as a public health problem by 2030, death attributable to Viral Hepatitis has continued to increase over the past decades with sub-Saharan Africa accounting for 20-30% of persons living with Hepatitis B Infection [1]. Hepatitis B virus is a common transfusion transmitted infection and among the most frequent complications in individuals with Sickle Cell Disease (SCD) due to their life-long dependent on transfusion therapy and uncertainties in donor blood testing procedures [2,3]. Efforts to reduce the incidence and prevention of HBV infection in Nigeria are limited even though an effective vaccine has been available in the country since 2004 [4]. This implies that persons who were born before 2004 had no opportunities of being vaccinated with an unquantifiable proportion of such persons who has been living with the infection constituting a reservoir of infection [4].

In other to prevent infection, most transfusion centre's apply the Enzyme Linked Immunosorbent Assay (ELISA) test for HBV detection during donor screening, yet cases of post-transfusion Hepatitis infection has been reported indicating that ELISA test is not entirely effective [5]. The highly recommended and more reliable Nucleic Acid tests such as Polymerase Chain Reaction (PCR) tests are costly and currently not a routine test for donor blood in low-income resource countries such as the Sub-Saharan Africa. The WHO recommendations stipulates testing and vaccination for at-risk individuals such as Sickle Cell Disease patients [6]. Good awareness and positive attitude towards HBV infection, testing and vaccination by the public particularly by at-risk individuals are key to its eradication. The present study was therefore designed to ascertain the level of knowledge of sickle cell disease patients to HBV

infection, identify their HBV infection and vaccination status and to assess the barriers that prevent them from being tested and vaccinated for HBV.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

This was a cross sectional study conducted between February and July 2022 in three general hospitals selected from each of the three senatorial zones in Enugu State namely Udi general hospital in Enugu West senatorial zone, Agbani general hospital in Enugu East senatorial zone and Nsukka general hospital in Enugu North senatorial zone. Subjects were also recruited from some schools in Enugu state including the Institute of Management and technology, the Enugu State College of Education Technical, Enugu State University of Science and Technology, Peace Land College, Bishop Shanahan School of Nursing and Medical Laboratory Technology and Enugu State School of Health Technology, Oji.

### 2.2 Study Setting

Enugu State is located in the Southeastern part of Nigeria. The state derived its name from its capital and largest city Enugu. It has an area of 7,161km<sup>2</sup> with a population of 3,267,837 comprising mainly the Igbo tribe of the Southern Nigeria. It lies between longitudes 6° 30'E and 6° 55'E and latitudes 5° 15'N and 7° 15'N. It consists of three senatorial zones namely Enugu East, Enugu West and Enugu North senatorial zones [7].

### 2.3 Subjects Selection

Subject selection was by a simple random technique. The subjects included consenting sickle cell disease patients who were 18years and above. Those who were severely indisposed and below 18years were excluded from participating in the study.

## 2.4 Sample Size

This was calculated using the formula as proposed by Araoye [8],  $n = Z^2 \times p \times q / d^2$

Where,

N = required sample size

Z = the critical value set at 1.96

P = the estimated prevalence of sickle cell disease in the population (3%) [9]

Q = the probability which is 1-p

D = the absolute sampling error that can be tolerated set at 5% for this study

Thus

$$N = 1.96 \times 1.96 \times 0.03 \times (1 - 0.03) / (0.05 \times 0.05)$$

$$= 0.11179056 / 0.0025$$

$$= 44.716$$

Assuming a 20% non-response rate,  
 $44.716 \times 0.2 = 9$

$$= 44.716 + 9 = 54$$

## 2.5 Data Collection

A self-administered semi-structured questionnaire was used for data collection. The questionnaire collected information on the socio-demographic characteristics of the respondents, their awareness and knowledge of HBV infection and their HBV status. The questionnaires were written in simple English Language and was interpreted to Igbo Language for easy understanding of those who preferred to be interviewed in their local language. Back translation to English Language was done to preserve the original meanings of the questions.

## 2.6 Measured Variables

- Independent Variables: The determinants measured in this study includes the demographic attributes eliciting information on the respondents age, education and employment status. We also measured the levels of knowledge regarding HBV infection, testing and vaccination status as well as some factors militating against HBV vaccination. The knowledge was operationalized as the comprehension of the participants about the characteristics features of HBV infection ranging from the cause, transmission and vaccination. These were measured by 12 questions and all given answers to questions on the disease-specific knowledge was transformed by computation to generate the overall score and the summaries by descriptive statistics.

- Dependent Variables: The main outcomes of the study is the self-reported HBV infection testing and vaccination status measured categorically as thus: (1) "has been tested for HBV infection (yes)" (if respondents had undergone laboratory testing for HBV infection) and "has not been tested for HBV (No)" (if the respondents has not undergone HBV testing in the laboratory). (2) "has been vaccinated (yes)" (if respondents had taken any of the recommended vaccine once, twice or completely) and "has not been vaccinated for HBV (No)" (if the respondents has not taken any of the recommended 3 doses of vaccine). The response "yes is coded" "1" while the response "No" is coded "0".

## 2.7 Data Analysis

Data was analyzed using IBM statistical package for social science (SPSS) for windows version 23 of IBM Corp in Armonk, NY. That was presented with descriptive statistics as frequencies and percentages.

## 3. RESULTS

Table 1 showed the socio-demographic characteristics of the respondents. The mean age of the respondents was  $24 \pm 6$  years. Majority of the respondents were within the age range of 18-25 years, 25.8% were within 26-32 years, 7.5% were within 33-40 years while only 5% were 40 years and above. Females forms 67% while males are 53% of the respondents. Majority of the respondents (45%) had tertiary education, 32.5% had secondary education, 14.2% had elementary education while 8.3% of the respondents were not educated. Majority of the respondents (61.7%) were students, 20% were traders and artisans while 18.3% are civil servants.

### 3.1 Knowledge of Hepatitis B Virus Infection

About 57.5% of the respondents are aware of HBV infection while 42.5% are not aware of the disease. Majority (84.2%) had poor knowledge of the disease while only 14.2% had good knowledge of the disease. The mass media and churches formed the major source of education and awareness about the disease for the respondents with 39.2% and 29.2% respectively while the social media and schools were 18.3% and 13.3% respectively (Table 2).

### 3.2 Determinants of Hepatitis B Virus Testing and Vaccination

Majority 80.8% of the respondents has not been tested to determine their HBV infection status

while 70% has not been vaccinated. About 80% and 84.2% of the respondents were has not been tested nor vaccinated due to high cost of testing and vaccination (Table3).

**Table 1. Socio-demographic characteristics of the respondents (n = 120)**

S/N	Variable	Frequency	Percentage
1	<b>Age group (years)</b>		
	18 – 25	74	61.7
	26 – 32	31	25.8
	33 – 40		
	40 and above	9	7.5
	Mean age (24 ± 6 years)	6	5.0
2	<b>Gender</b>		
	Male	53	44.2
	Female	67	55.8
3	<b>Educational Level</b>		
	Elementary	17	14.2
	Secondary	39	32.5
	Tertiary	54	45.0
	Not educated	10	8.3
4	<b>Occupation</b>		
	Students	74	61.7
	Civil servants	22	18.3
	Traders and artisans	24	20

**Table 2. Awareness and Knowledge of Hepatitis B Virus infection**

S/N	Variable	Frequency	Percentage
1	Do you know about Hepatitis B Infection		
	Yes	51	42.5
	No	69	57.5
	Hepatitis B is a DNA virus		
2	Yes	17	14.2
	No	2	1.7
	Do not know	101	84.2
	Blood transfusion, body fluid contact, sexual intercourse, mother-to-child contact are modes of HBV infection transmission		
3	Yes		
	Do not know	18	15
		102	85
	What is your source of information about HBV infection?		
4	School	16	13.3
	Church	35	29.2
	Mass media	47	39.2
	Social media	22	18.3

**Table 3. Determinants of Hepatitis B Virus testing and Vaccination Status**

S/N	Variable	Frequency	Percentage
1	Have you been tested for HBV infection?		
	Yes	23	19.2
	No	97	80.8
	If no, why?		
2	Cost of testing is high	96	80.0
	Too busy or do not remember	24	20
	Have you been vaccinated against HBV infection?		
3	Yes	36	30
	No	84	70
4	If no, why?		
	Cost of vaccine is high	101	84.2
	Too busy or do not remember	19	15.8

#### **4. DISCUSSION**

Bandura in his social cognitive theory of health promotion stated that knowledge of the nature, transmission and prevention of a particular illness creates a pre-condition for change [10]. Awareness and knowledge assessment in this study showed that a significantly high proportion of the respondents were aware of Hepatitis B infection but only few among them had good knowledge of the disease. This may be due to lack of educational programs on Hepatitis B in the schools as majority of the respondents were students in secondary and tertiary institutions of learning who rather got their information about the virus from either the church or mass media. This finding agrees with the findings of a study carried out among students in a tertiary institution in Northwestern Nigeria [11]. Which reported good awareness of HBV infection with poor knowledge of the disease but at variance with similar study done at Abakaliki, Southeastern Nigeria [6]. Which may be due to the fact that the study done at Abakaliki were carried out on respondents who were medical students in which case studies on infectious disease forms part of their curriculum in school. This implies that there is a low universal coverage on sensitization about Hepatitis B infection with regards to health educational programs in schools. Majority of the respondents had neither not been tested nor vaccinated for Hepatitis B infection which was identified to be due to mainly high cost of testing or high cost of the vaccine. This may be because majority of the respondents are students who are not gainfully employed, artisans, traders or only employed on menial jobs and might not be able to afford the cost of the testing or vaccination. These findings of low level of testing and vaccination due to cost obtained in the present study is similar to a study carried out at Port-Harcourt, South southern Nigeria [12]. In fact, vaccination status among respondents in the present study was lower than 80% as recommended by the WHO [13]. Inadequate knowledge of Hepatitis B infection as well as high cost of testing and vaccination may reflect poor attitude of respondents to testing and vaccination [14,15]. The present study also revealed that the majority of the respondents got their knowledge and awareness of Hepatitis B infection through either the church or mass media. This shows that the church and other religious organizations as well as the mass media are veritable platforms for health education of the populace.

#### **5. STRENGTH AND LIMITATIONS**

The reliability test of the questionnaire which was not performed could be considered as a potential limitation. Also the present study was only descriptive as author did not carry out an analysis to identify a correlation of the risk factors with the disease. The strength of the study lies on the fact that we achieved the desired power by recruiting a number subjects far much higher than the required sample size.

#### **6. CONCLUSION**

Universal health education and subsidization of the cost of testing and vaccine may help reduce the infection rate of Hepatitis B virus among sickle cell disease patients. We recommend routine health education for Hepatitis B infection in the educational institutions and rural communities as well as health insurance schemes for vulnerable cohorts such as sickle cell disease patients. A national health insurance scheme for sickle cell cohorts will help reduce the high cost of testing and vaccination for HBV and enhance a better attitude to testing and vaccination for the disease.

#### **ETHICAL CLEARANCE**

Ethical clearance for the study was obtained from the Enugu State Ministry of Health Research and Ethics Committee.

#### **CONSENT**

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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