

Research Article

Prevalence of Hepatitis B virus Infection Among Cataract Patients in South-East Nigeria

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Abstract

Background

Hepatitis B Virus (HBV) is a public health issue especially in sub-Saharan Africa. This is because attention has not been given to this potentially lethal

viral infection especially in cataract patients which will need extraordinary safety measures. Cataracts remain the commonest cause of blindness in Nigeria and globally. We are yet to know the prevalence of

HBV when co-existing cataract among patients in Nigeria.

Objective

To assess the prevalence of hepatitis B virus infection among cataract patients in southeast Nigeria.

Materials and methods

This single hospital-based, cross-sectional quantitative study was conducted among cataract patients that underwent cataract surgery at City of Refuge Specialist Eye Clinic Onitsha, Nigeria between September 1, 2020 and February 28, 2021. The patients were tested for HBV through rapid testing and confirmed via Enzyme-Linked Immunosorbent Assay. Patients diagnosed with cataract and had HBV infection were included. The primary outcome measure was the number of cataract patients with co-existing HBV infection. The case files of all who had a diagnosis of cataract during the period were retrieved from the Medical Record Department of the hospital to extract relevant information and demographic data. Data was entered into Excel spreadsheet and exported to SPSS version 26 IBM Corporation for analysis. Bivariate analysis was conducted to identify significant variables with a P value < 0.05 considered statistically significant.

Results

In this study, 423 participants who underwent cataract surgery during the study period were included, of which 5 (1.2%) were HBV seropositive. The prevalence of HBV among cataract patients was 1.2%. Majority (53.71%) of patients were between the ages 60 and 74 years, and the female: male ratio was 1:1.

The prevalence of HBV among cataract patients was not affected by rural residence ($p=0.720$), participants' age ($p=0.930$), and participants' months of presentation ($p=0.317$).

Conclusion

There is a high and unpredictable prevalence of HBV among preoperative cataract patients in Nigeria. It is recommended that preoperative screening of all cataract patients should include HBV and other blood borne viral investigations so that asymptomatic carriers might not become a threat for spread of disease.

Keywords: Cataract; Hepatitis B Virus; Ophthalmology; Prevalence; Surgery

1. Introduction

Hepatitis B Virus (HBV) is a viral infection of the liver which causes inflammation and may potentially progress to cirrhosis or cancer [1]. Though HBV is capable of causing acute infection, majority of infected people are chronic asymptomatic carriers that can potentially transmit these infections to others [1, 2].

There is a high worldwide prevalence of HBV [3]. According to the World Health Organization, there are about 350 million people who are asymptomatic chronic carriers of HBV infection globally, with about 2 billion people being infected at some point in their lifetime and about 1 million deaths annually from liver disease and progression to hepatocellular carcinoma [3-5], Africa has the second highest number of newly diagnosed cases of HBV second only to Asia.³ In

Nigeria, the National average of prevalence of HBV in Nigeria is 12% [6, 7].

HBV is transmitted from person to person via contact with blood and other body fluids [3]. In the United States, there are about 500,000 percutaneous blood exposures among hospital-based health care workers, and this places surgeons and other surgical team members at mammoth risk [4, 8].

Cataract is an avertable cause of blindness resulting from opacification of the crystalline lens and cataract surgery usually done to reinstate vision is the most commonly done surgical procedure worldwide [1,5]. Routine screening for HBV is not often done for patients booked for cataract surgery in both private and public hospitals and therefore a high proportion of asymptomatic carriers who undergo cataract surgery pose a risk to health workers and other patients [1, 2]. The risk of exposure to HBV infections to hospital staff can occur during procedures like biometry, tonometry, anesthesia, handling of sharp instruments, cleaning or disposal of instruments, needle stick injuries and injuries from micro-surgical instruments used to perform cataract surgery [5]. Therefore, precautionary measures are the best approach to prevention of HBV infection in addition to vaccination which offers lifelong immunity [8].

Previous studies have revealed that the prevalence of blood-borne viral infections among cataract patients is surprisingly high [1, 2, 9]. There are also no national guidelines on the preoperative screening of patients before cataract surgery. This study is aimed at estimating the prevalence of HBV infection in patients

undergoing cataract surgery. This is on a background that that screening is not routinely done for patients who are billed to have cataract surgery which predisposes the health team to risk of infection.

2. Methods

2.1 Study design

This is a cross-sectional study.

2.2 Study site

This study was conducted at City of Refuge Specialist Eye Clinic, Onitsha, Nigeria. City of Refuge specialist hospital is in the commercial city of Onitsha in Anambra state Nigeria and attends to patients from all the states in the South-Eastern part of Nigeria and beyond. The hospital provides emergency, in-patient, and outpatient eye services. It is also a major referral center for medical and surgical treatment of eye diseases.

2.3 Study period

The study period was between September 1, 2020, and March 31, 2021.

2.4 Study population

Patients diagnosed with cataract and underwent cataract surgery at the City of Refuge Specialist Eye Clinic, Onitsha, Nigeria.

2.5 Inclusion criteria

Patients diagnosed with cataract and had HBV infection were included.

2.6 Exclusion criteria

Patients managed in the hospital without the diagnosis of cataract were excluded.

2.7 Outcome measures

The primary outcome measure was the number of cataract patients with co-existing HBV infection. The secondary outcome included factors affecting the cataract-HBV co-condition.

2.8 Procedures

The study involved all consecutive adult patients aged (≥ 16 years) who consented to testing for hepatitis B surface antigen (HBsAg) using a rapid test device as part of their pre-operative assessment. All available case files from the medical records department were retrieved and all required information was filled in a pretested proforma. The demographic details such as age, gender, residential address whether urban, rural, or semi-urban, and time of presentation within the year were extracted from the case records. During surgery, the operating surgeon and assistant used a special protective kit meant for operating on viral seropositive cases. Disposal of needles and sharp instruments were done as per established institutional policy, which in brief included disposal in puncture-proof containers.

2.9 Laboratory Analysis

Rapid chromatography immunoassay for qualitative detection of surface antigen for HBV was the screening technique used in the study. Results that were found positive on screening tests were confirmed by the Enzyme-Linked Immunosorbent Assay (ELISA) method. Some of the HBV positive patients

who gave their consent were subsequently referred to gastroenterologists for evaluation and treatment.

2.10 Sample size determination

The sample size was obtained using the formula [10], $N = Z^2 \frac{PQ}{d^2}$ where: Z=standard normal deviation at 95% confidence interval =1.96; P= prevalence of the blood-borne viral infection among adult male patients undergoing cataract surgery in a recent study in India by Rewri et al [9], was put at 9.7%; Q=1-p and d=0.05. The ultimate was adjusted to allow a non-inferiority sample size of 135 obtained and rounded up to 162 to cater for 20% attrition or non-response. We decided to recruit 423 participants to ensure an effective response.

2.11 Data Extraction and Analysis

Data was extracted from the medical records registry book in the hospital. Two trained nurses and data clerks extracted the data and were supervised by the principal investigator (PI). Data were initially checked manually for completeness and consistency by the PI during the fieldwork and rechecked before data entry. Data were then coded, entered, and cleaned using Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA) and exported to Statistical Package for the Social Sciences (SPSS) Version 26.0 (IBM Corp., Armonk, NY, USA). The prevalence of the HBV infection was reported in percentage and 95% CI. Chi-square test of independence was used for calculating gender and age-based differences in prevalence. Univariate analysis was conducted to identify significant variables. A p value of < 0.05 was considered statistically significant.

2.12 Ethical consideration

Ethical clearance for this study was obtained from the Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku, Awka, Nigeria, with registration number: COOUTH/CMAC/ETH.C/vol.1/FN: 04/0095 (approval date: April 29, 2021) in accordance with the Helsinki’s code of conduct for biomedical research involving human subjects [11].

3. Results

In this study, 423 participants who underwent cataract surgery between September 2020 and March 2021 were included for analysis of which 5 (1.2%) were HBV positive. The prevalence of HBV among cataract patients was 1.2%. Of the 423 participants, only 391 indicated their ages. The distribution of age and gender of the participants was shown on Table 1. Majority (53.71%) of patients were between the ages 60 and 74 years. The majority of patients were women, though the female: male ratio was 1:1. There was no significant difference between the participants age and

gender (p=0.195). The HBV prevalence per gender shows the female to male ratio of 1:1.5. This is shown in Table 2. Table 3 shows the prevalence of HBV distribution among different age categories. There was no significant difference between the prevalence of HBV and the participants’ age categories (p=0.930). The prevalence of HBV distribution among rural, urban, and semi-urban settlements is shown in Table 4. There was no significant difference between the prevalence of HBV and the participants’ settlements (p=0.720).

Table 5 and figure 1 show the prevalence of HBV across different months of the year (September-March). There was no significant difference between the prevalence of HBV and the different months of the year (p=0.317).

Univariable logistic regression comparing outcomes to identify risk factors for complications were performed. Multivariable logistic regression was not performed due to the small number of outcomes or events.

Age (years)	Total freq (%) (n=391)	Gender (%)	
		Female (n=200)	Male (n=191)
15-29 years	9 (2.30)	2 (1.0)	7 (3.7)
30-44 years	20 (5.10)	13 (6.5)	7 (3.7)
45-59 years	85 (21.68)	47 (23.5)	38 (19.9)
60-74 years	210 (53.71)	102 (51.0)	108 (56.5)
75-89 years	62 (15.82)	32 (16.0)	30 (15.7)
> 90 years	5 (1.28)	4 (2.0)	1 (0.5)
Mean Age (±STD)	63.85±12.75	63.66±12.28	64.05±13.29

Table 1: Distribution of age and gender among the study participants.

χ^2 -value= 7.363, df=5, p-value= 0.195.

Viral disease	Total freq (%)	Gender (%)	
		Female	Male
HBV			
Positive	5 (1.2)	2 (0.9)	3 (1.5)
No disease	417 (98.8)	221 (99.1)	196 (98.5)
<i>Fischer's exact (p)</i>	0.335 (0.670)		

Table 2: Prevalence of HBV distribution in males and females.

Viral disease	Total freq (%)	Age category (years) (%)					
		15-29	30-44	45-59	60-74	75-89	> 90
HBV							
Positive	4 (1.0)	0	0	1 (1.2)	3 (1.4)	0	0
No disease	388 (99.0)	9 (100)	20 (100)	84 (98.8)	208 (98.6)	62 (100)	5 (100)
χ^2 -value (p)	1.346 (0.930)						

Table 3: Prevalence of HBV distribution in among different age categories.

Viral disease	Total freq (%)	Location (%)		
		Rural	Semi-urban	Urban
HBV				
Positive	1 (0.3)	0	0	1 (0.5)
No disease	368 (99.7)	118 (100)	28 (100)	222 (99.5)
χ^2 -value (p)	0.656 (0.720)			

Table 4: Prevalence of HBV distribution among rural, urban, and semi-urban settlements.

Viral disease	Total freq (%)	HBV (%)	
		No disease (n=418)	Positive (n=5)
December	59 (13.9)	58 (13.9)	1 (20.0)
February	68 (16.1)	66 (15.8)	2 (40.0)

January	61 (14.4)	59 (14.1)	2 (40.0)
March	68 (16.1)	68 (16.3)	0
November	59 (13.9)	59 (14.1)	0
October	53 (12.5)	53 (12.7)	0
September	55 (13.0)	55 (13.2)	0
TOAL	423 (100)	418 (100)	5 (100)

Table 5: Prevalence of HBV across different months of the year (September-March).

χ^2 -value=7.041, df=6, p-value= 0.317.

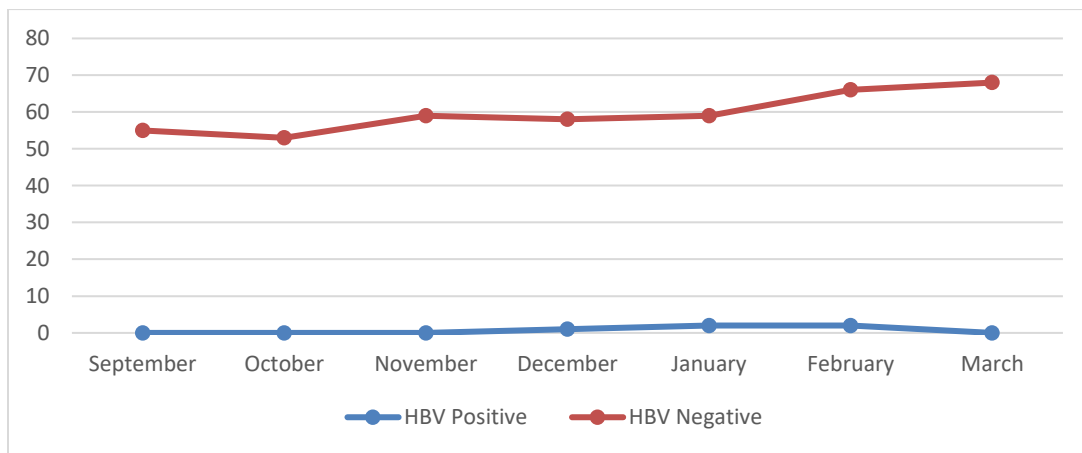


Figure 1: Line graph showing the distribution of HBV across different months of the year (September-March).

4. Discussion

The motivation for this study was that previous report by Tsai et al have documented the potential for detection of HBV surface antigens in tears and aqueous humor of HBV-seropositive individuals, suggesting that ophthalmologists may be at risk of contracting HBV infection by treatment of such HBV positive patients [12]. The present study determined the prevalence and factors associated with the high prevalence of HBV among patients diagnosed with cataracts in a private specialist health facility in Onitsha, Nigeria. Most patients in the present study were between the ages of 60 and 74 years, implying

the concentration of cataract among the elderly group.

In this study, the overall prevalence of HBV infections among cataract patients was 1.2%. This value was higher than 0.2% reported by Dahab et al [2] in Egypt but lower than previous published values of 2.1% by Naeem et al [8] and 2.62% by Tahir et al [1] in Pakistan. Similarly, our finding was lower than 8.0% reported among patients screened for surgery at Felegehiwot referral hospital, Northwest Ethiopia [13] and 24% among patients seen on eye camps in rural Sindh, in India [14] The greater prevalence in eye camps in comparison to ours may be the rural location

of the eye camps and prolonged duration of the study.

In a previous Indian study by Rewri et al [9], the seropositivity was significantly higher ($P < 0.0001$) among men (9.7%), compared to women (3.2%). This is not in keeping with our current study where the male to female ratio was not significantly different ($p=0.195$). So, there was no significant gender variation in the reported cases.

In this study, the prevalence of HBV among cataract patients was not affected by rural residence. This is in contrast with a previous Ethiopian study by Asemahagn et al which reported that the seroprevalence of HBsAg among patients screened for surgery at Northwest Ethiopia was influenced by rural residence (AOR = 2.68, 95%CI = 1.28-5.61) [13]. Additionally, as revealed in this study, the prevalence of HBV among cataract patients was not significantly influenced by the participants' age categories ($p=0.930$), and participants presentation at different months of the year ($p=0.317$).

The clinical implications of the present study were that HBV is one of the main causes of cirrhosis, liver cancer, and death. HBV is present in body fluids, such as blood, saliva, semen, vaginal secretions, and menstrual blood of infected individuals [12]. As HBV is resistant to breakdown outside the body, it is readily transmitted from person to person via contact with infected bodily fluids [12]. The risk of exposure during eye surgeries in may be encountered during syringing, tonometry, anesthesia, handling of sharp appliances such as blade, side-port, and needles and during cleaning and exchange of instruments, disposal of

biomedical waste. This is because HBV seropositive patients pose risk of transmission to persons involved in medical care by accidental prick injuries or through contact of body fluids [9]. In a previous study in Italy by Mele et al, the chances of prick injuries among ophthalmologists were third highest among surgical procedures in the study [15]. Surgeons and paramedical staff and other staff are at increased risk to get infected, especially in a surgical setup where unknown carriers of the virus are undergoing various procedures. This buttresses the importance of the serology tests for these patients undergoing cataract operation.

To the best of our knowledge, this study is the first Nigerian study on the prevalence of HBV among the cataract population. Additionally, our current study put effort into comprehensively assessing the HBV related factors among cataract patients in Nigeria. However, there are some limitations. First, there was data incompleteness (with incomplete information, loss of patient cards, and illegible handwriting on patients' cards) given the non-electronic record-based nature of the source of data. We were, therefore, unable to assess the details of sociodemographic variables and some important variables. Second, we have not been able to describe and discuss the details of the risk factors for HBV in the patients studied. Third, this is a single-center study and included patients from limited geographical area. Thus, the seroprevalence may not be representative.

5. Conclusion

There is a high and unpredictable prevalence of HBV among preoperative cataract patients in Nigeria. It is

recommended that preoperative screening of all cataract patients should include HBV and other blood borne viral investigations so that asymptomatic carriers might not become a threat for spread of this disease. Ophthalmologists and other eye care providers should take all essential precautions when treating persons who have or are at high risk of being infected with HBV.

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Disclosure statement for publication

All authors have made substantial contributions to conception and design of the study, or acquisition of data, or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and final approval of the version submitted. This manuscript has not been submitted for publication in another journal.

Ethics approval and consent to participate

Ethical approval was obtained from Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku, Awka, Nigeria, with registration number: COOUTH/CMAC/ETH.C/vol.1/FN: 04/0095 (approval date: April 29, 2021).

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing

interests.

Data availability

The data used to support the findings of this study are available from the site publicly.

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Authors' contributions

AA Onwuegbuna, EA Chianakwalam, and GU Eleje were involved in the overall conceptual design and implementation of the project, and overall revision of the manuscript. MC Amobi, AI Apakama, CM Okosa, and CG Chigbo were involved in the writing of this manuscript and overall revision. The authors read, approved the final manuscript, and agreed to be accountable for all aspects of the work.

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