Magna Scientia Advanced Research and Reviews

eISSN: 2582-9394

Cross Ref DOI: 10.30574/msarr

Journal homepage: https://magnascientiapub.com/journals/msarr/

(RESEARCH ARTICLE)

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Prevalence of blood born viral infections among glaucoma patients in south-east, Nigeria

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Magna Scientia Advanced Research and Reviews, 2022, 05(01), 001–009

Publication history: Received on 10 January 2022; revised on 14 Februay 2022; accepted on 16 Februay 2022

Article DOI: https://doi.org/10.30574/msarr.2022.5.1.0025

Abstract

Background: The hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are blood-borne viral infections. They can predispose to occupational related infections in health care settings, including ophthalmology practice.

Objectives: To determine the prevalence of and risk factors associated with HBV, HCV, and HIV among glaucoma patients.

Methods: A retrospective cross-sectional study was conducted in a private specialist eye hospital on glaucoma patients managed between 1st August, 2020 and 31st July, 2021. A total of 594 patients met inclusion criteria of primary diagnoses of glaucoma. All blood samples were tested for HBsAg, anti-HCV, and anti-HIV. The data was collected, entered and analyzed using STATA version 17.0 (College Station, TX: StataCorp LLC). The descriptive statistics were determined by means of percentages. Chi-square was used for trend analysis and p-value was used to declare the statistical significance between the variables.

Results: The overall prevalence of HBV, HCV and HIV was 2.41% (15/622, 95%CI=1.35-3.98), 1.45% (9/622, 95%CI=0.66-2.75) and 3.22 (20/622, 95%CI=1.96-4.97) respectively. The prevalence of HBV was significantly higher in males compared to female counterparts. The prevalence of HBV was not influenced by age while the prevalence of HCV and HIV were not influenced by gender nor age.

Conclusion: The prevalence of HBV, HCV, and HIV are high among glaucoma patients in south-east Nigeria. These findings have implications for practice on the need to strengthen the health care education and practice of universal safety precautions in ophthalmology practice.

Keywords: Glaucoma; Hepatitis B virus; Hepatitis c virus; Human immunodeficiency virus; Prevalence

1. Introduction

Human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) infections cause serious morbidity and mortality around the world, especially in low and middle income countries .[1,2] These viral infections may

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remain asymptomatic but are capable of causing acute or chronic disease.[1] Hence asymptomatic carriers of these diseases may become potential means of spreading these deadly diseases among the unsuspecting population .[3] While knowledge of HIV infection and modes of its spread is common in Africa, unfortunately, the awareness of HBV and HCV infections in Africa is still poor.[3]

The current global prevalence of HIV is estimated to be 38 million, causing over 600,000 deaths annually and majority of HIV infected people live in sub Saharan Africa.[4] Globally, prevalence of HBV is reported to be 350 million, causing over 700,000 deaths annually,[2] whereas HCV is estimated to cause 58 million chronic illnesses and 290,000 deaths annually.[1] In Nigeria,[5] current HIV prevalence is 1.4 % with about 1.9 million people living with HIV while HBV national prevalence was reported to be 12.2%.[5,6] Eleje et al[7] reported the prevalence of HCV among pregnant women in Nigeria to be 1.3%. However, studies by Onwuegbuna et al among cataract patients in Nigeria indicated that the prevalence of HIV was 3.8% while the prevalence of HBV and HCV among cataract patients were 1.2 % respectively.[8,9,10]

While HIV, HBV and HCV are contracted through direct contact with blood of infected persons, HIV and HBV are also contracted through contact with other body fluids.[11] Glaucoma remains the commonest cause of irreversible blindness globally and also the second commonest cause of blindness worldwide.[12]In Nigeria[13], glaucoma is also the second commonest case of blindness with south East Nigeria carrying the largest burden of glaucoma within the country.[14]

Glaucoma is a chronic and often progressive disease that warrants lifetime treatment.[15] **G**laucoma management involves prosper evaluation, and conducting investigations which help to characterize the type of glaucoma in the affected individual[15]. The treatment options are also influenced by the severity of the disease, family history, age at diagnosis, vision on the affected eye, rural or urban dwelling, economic status, cultural practices, availability of glaucoma services.[14]

Glaucoma clinic services often entail that contact is made between the eyes and ophthalmic instruments. This may occur during tonometry, pachymetry, gonioscopy, A or B scan test, laser procedure etc. The glaucoma patient may also undergo filtration surgery. These procedures carry a risk of transmission of these viral infections to other patients or health workers involved in the management of glaucoma patients.[16]

The risk of these blood borne viral infections are even higher for glaucoma patients, because they undergo these procedures often throughout their lifetime. Moreover, the situation is more grim where routine screening is not done for these lethal blood borne infections like in Nigeria, where the burden of glaucoma, HBV, HCV and HIV is high.[17],[18]. Again, we are yet to know the prevalence of these viral infections among glaucoma patients in Nigeria.

This study was aimed at determining the prevalence of HIV, HBV and HCV infections among glaucoma patients. This study also aimed to determine the need or otherwise for routine screening for blood borne viral infections among glaucoma patients.

2. Methods

2.1. Study design

This was a descriptive cross–sectional study.

2.2. Study population

Glaucoma patients make up the study population.

2.3. Study site

The study site was City of Refuge Specialist Eye Clinic, Onitsha, Anambra State, Nigeria. It has consultant ophthalmologists, optometrists and ophthalmic nurses, laboratory scientists among other health workers. It serves as a referral centre for patients requiring specialist eye care within Anambra State, parts of Imo, Enugu, Abia, Ebonyi and Delta States of Nigeria.

2.4. Inclusion criteria

All consecutive adult patients aged (≥18 years) who had glaucoma and consented to testing for HBsAg, Anti–HCV Ab and HIV antibodies as part of their routine assessment in glaucoma management were included in the study.

2.5. Exclusion criteria

Patients who had glaucoma co-existing with other eye diseases were excluded.

2.6. Study period and duration

All the patients seen at City of Refuge Specialist Eye Clinic, Onitsha, Anambra state, Nigeria between 1st August, 2020 and 31th July, 2021.

2.7. Sample technique

Non- random sampling technique. All available case files from the medical records department were studied.

2.8. Study outcome Measures

The outcome measures include the prevalence of HBV, HCV, and HIV while gender and age of affected glaucoma patients were independent variables.

2.9. Procedures involved

The medical records were reviewed to identify patients who were diagnosed with glaucoma during the study period. The patients' case records were then retrieved from the hospital record department. The patients' socio- demographic data, HBV, HCV and HIV sero status were retrieved and analyzed. Study was done according to the declaration of Helsinki.

Rapid chromatography immunoassay for qualitative detection of surface antigen for HBV and antibodies for HCV and HIV was the screening technique used in the study (Abbott, Illinois, USA). This is a simple screening test in places with limited facilities/resources and where rapid results are required.

Data on patient's demographics and clinical history was retrieved from the clinical notes and recorded in a structured proforma and analyzed through application of statistical tools.

2.10. Ethical approval

The medical records were reviewed to identify patients who were diagnosed with glaucoma during the study period. The patients' case records were then retrieved from the hospital record department. The patients' socio- demographic data, HBV, HCV and HIV sero-status were retrieved and analyzed. Study was done according to the declaration of Helsinki.

2.11. Data 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. Data were initially checked manually for completeness and consistency by the principal investigator 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 STATA Version 17.0 (College Station, TX: StataCorp LLC). The prevalence of the HBV, HCV and HIV infections were 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.

3. Results

The study involved a total of 622 patients (male, 341, 54.8%; female, 281, 45.2%), who were seen in the hospital during the study period. Of these 622, only 594 had complete data and were subsequently used for analysis. The sociodemographic characteristics among the study population is shown in Table 1.

Table 1 Socio-demographic variables among the study population

Variable	Frequency	Percentage (%)
Sex		

Female	341	54.82
Male	281	45.18
Total	622	100
Age (years)		
<=20 years	19	3.20
21-40 years	54	9.09
41-60 years	196	33.00
61-80 years	296	49.83
81 years and above	29	4.88
Total	594	100
Mean age (±SD)	59.16±16.04 years	
Occupation		
Artisan	5	15.15
Civil servant	3	9.09
Dependent	10	30.30
Trading	15	45.45
Total	33	100

Table 2 Distribution of Age and Gender among the study population

Age (years)	Sex (%)		Total (%)
	Female	Male	
<=20 years	12 (3.7)	7 (2.5)	19 (3.2)
21-40 years	27 (8.5)	27 (9.8)	54 (9.1)
41-60 years	99 (31.1)	97 (35.1)	196 (33.0)
61-80 years	160 (50.3)	136 (49.3)	296 (49.8)
81 years and above	20 (6.3)	9 (3.3)	29 (4.9)
Total	318 (100)	276 (100)	594 (100)

Table 2 and figure show the distribution of age and gender among the study population.

Table 3, Table 4 and Table 5 show the prevalence of HBV, HCV and HIV 1 and 2 among the study population, respectively. The overall prevalence of HBV, HCV and HIV was 2.41% (15/622, 95%CI=1.35-3.98), 1.45% (9/622, 95%CI=0.66-2.75) and 3.22 (20/622, 95%CI=1.96-4.97) respectively.

Table 3 Prevalence of HBV among the study population

HBV	Frequency	Prevalence (%)
Positive (+ve)	15	2.41

Negative (-ve)	607	97.59
Total	622	100

Table 4 Prevalence of HCV among the study population

HCV	Frequency	Prevalence (%)
Positive (+ve)	9	1.45
Negative (-ve)	613	98.55
Total	622	100

Table 5 Prevalence of RVS among the study population

RVS	Frequency	Prevalence (%)
Positive (+ve)	20	3.22
Negative (-ve)	602	96.78
Total	622	100

Table 6 Relationship between HBV, sex and age of participants in the study population

Variable	HBV (%)		Total (%)	χ^2-value (p)
	Positive (+ve)	Negative (-ve)		
Sex				
Female	4 (26.7)	337 (55.5)	341 (54.8)	4.920 (0.027*)
Male	11 (73.3)	270 (44.5)	281 (45.2)	
Age (years)				
<=20 years	0	19 (3.3)	19 (3.2)	
21-40 years	4 (26.7)	50 (8.6)	54 (9.1)	
41-60 years	7 (46.7)	189 (32.6)	196 (33.0)	9.001 (0.061)
61-80 years	4 (26.7)	292 (50.4)	296 (49.8)	
81 years and above	0	29 (5.0)	29 (4.9)	

*=significant p-value<0.05

Table 6 shows the relationship between HBV, sex and age of participants in the study population. Table 7 shows the relationship between HCV, sex and age of participants in the study population, while Table 8 shows the relationship between HIV, sex and age of participants in the study population.

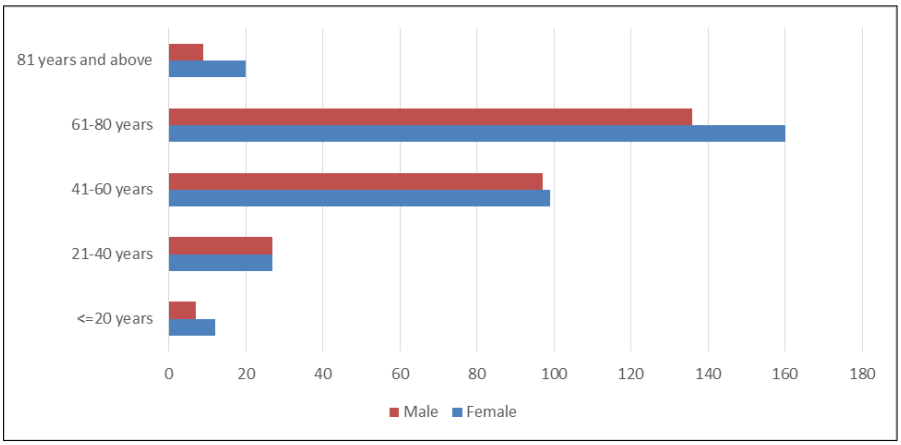

Figure 1 Distribution of Age and Gender among the study population

Table 7 Relationship between HCV, sex and age of participants in the study population

Variable	HCV (%)		Total (%)	χ^2-value (p)
	Positive (+ve)	Negative (-ve)		
Sex				
Female	4 (44.4)	337 (55.0)	341 (54.8)	0.397 (0.529)
Male	5 (55.6)	276 (45.0)	281 (45.2)	
Age (years)				
<=20 years	0	19 (3.2)	19 (3.2)	
21-40 years	0	54 (9.2)	54 (9.1)	
41-60 years	3 (33.3)	193 (33.0)	196 (33.0)	2.089 (0.719)
61-80 years	6 (66.7)	290 (49.6)	296 (49.8)	
81 years and above	0	29 (5.0)	29 (4.9)	

Table 8 Relationship between RVS, sex and age of participants in the study population

Variable	RVS (%)		Total (%)	χ^2-value (p)
	Positive (+ve)	Negative (-ve)		
Sex				
Female	12 (60.0)	329 (54.6)	341 (54.8)	0.223 (0.636)
Male	8 (40.0)	273 (45.4)	281 (45.2)	
Age (years)				
<=20 years	0	19 (3.3)	19 (3.2)	
21-40 years	3 (15.0)	51 (8.9)	54 (9.1)	
41-60 years	8 (40.0)	188 (32.7)	196 (33.0)	2.872 (0.579)
61-80 years	9 (45.0)	287 (50.0)	296 (49.8)	
81 years and above	0	29 (5.0)	29 (4.9)	

4. Discussion

The motivation for this study was that testing for blood-borne viruses among ocular disease patients remains a vital and significant procedure in preventing the transmission of pathogens from patient to health care workers or from patient to patient. Additionally, during this COVID-19 pandemic, there is emerging increase worldwide in the proportion of visits to hospitals that included eye emergencies.[19] Glaucoma remains the leading cause of irreversible blindness worldwide, with primary open angle glaucoma accounting for the greatest number of total glaucoma cases.[20] The principal findings of this study was that the overall prevalence of HBV, HCV and HIV was 2.41%, 1.45% and 3.22 respectively. Additionally, the prevalence of HBV was significantly higher in males compared to female counterparts.

In this study, the prevalence of HBV was 2.41%. This finding was higher than 1.5% reported by Alhassan et al among patients undergoing eye surgery in National Eye Centre, Kaduna, Nigeria[21] but lower than 9.79% reported by a previous study by Duan et al aimed at identifying the prevalence of and risk factors associated with HBV, HCV, and HIV infections among patients with eye diseases at a tertiary eye hospital in Southern China.[22]

In the current study, we identified one factor impacting the prevalence of HBV in glaucoma patients. In this study, the prevalence of HBV was significantly higher in males compared to female counterparts. This finding concurs with the Duan et al study which documented that the age and gender distributions were significantly different between HBV-positive and HBV-negative cases ($p<0.001$).[22]

In this study also, the prevalence of HCV was 1.45%. This finding was higher than a previous study by Duan et al in Southern China. In Duan et al study, the overall prevalence of HCV was 0.99%.[22] Previous study by Onwuegbuna et al among cataract patients in Nigeria indicated that the prevalence of HCV was 1.2 %.[10]

In this study also, the prevalence of HIV was 3.22%. This finding was higher than a previous study by Alhassan et al in Kaduna, Nigeria[21] and by Duan et al in Southern China.[22]In Alhassan et al study, the overall prevalence of HIV was 0.2%. However, in Duan et al study, the overall prevalence of HIV was 0.11%.[22] The higher HIV prevalence in the present study may be due to improved access to antiretroviral therapy across Nigeria. Extra care is often taken with patients who are seropositive to HIV. This however comes at extra cost.

The clinical implications for the present study is that the awareness and knowledge of the prevalence of blood-borne viral infections in ophthalmology practice as well as the frequency of accidental exposure and risk of transmission would help to understand benefits of universal preoperative screening before glaucoma surgery. In one study, there was a high prevalence of occupational-related sharp injuries among ophthalmologists.[23] Additionally it was observed that most of the ophthalmologists were aware of universal precautions, but lacked adherence to post-exposure prophylaxis.

The current study was based on retrospective review of cases seen over 10 months, which limits the independent variables to only gender and age. The generalization to the findings of the absence of confirmatory tests for HCV is also among the limitations. However, high female participation is a recognized strength.

5. Conclusion

In conclusion, the prevalence of HBV, HCV, and HIV are high among glaucoma patients in Nigeria. These findings have implications for practice on the need to strengthen the health care education and practice of universal safety precautions in ophthalmology practice.

Compliance with ethical standards

Acknowledgments

The authors would like to thank all the patients whose data were used in the study. We also thank all the staff of the hospital involved in this study.

Disclosure of conflict of interest

The authors declare that they have no competing interests.

Statement of informed consent

Informed consent was not sought for the present study because it was a retrospective study of cases. The waiver for the consent was taken from the Institutional Review Board/Ethics Committee.

Funding

The authors received no specific funds for this work.

Data Availability

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

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. AI Apakama 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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