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SELF- REPORTED VIRAL HEPATITIS B AND C TESTING AND RISK FACTORS ASSESSMENT IN A COMMUNITY IN SOUTHERN NIGERIA

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ABSTRACT

Background: Viral hepatitis B and C, is a leading cause of global health challenge and can be acute or chronic. It is highly endemic in Nigeria with a prevalence of rate of 8.1 and 1.1% for Hepatitis B and C respectively. Hepatitis B and C share similar transmission pathways and risk factors though vertical transmission as well as horizontal transmission remains a key route in endemic regions. This study aims to identify the risk factors associated with these viruses in our environment. **Method:** This is a community based cross-sectional study using a pretested validated questionnaire conducted in Port Harcourt, Nigeria. Data from the administered questionnaire was analyzed using Microsoft excel software. **Result:** There were 133 participants in this study in this study with a mean age of 40.34±15.5years and a median age of 38.74years comprising 87 females and 47 males. More females self-reported testing for hepatitis B and C at least once in their lifetime compared to males.25.6% of the 133 participants (n=34) have had contact with viral hepatitis B and/or C patients with a female preponderance. In multiple regression models, the knowledge of hepatitis B vaccine correlated inversely with use of own barbing clipper/needles [p=0.0045, CI: 35.821-61.092], tattoo/piercing [p=0.050, CI: 0.016-3.300]and traditional pedicure [p=0.096, CI:0.097-2.048]. **Conclusion:** Combating viral hepatitis B and C in Nigeria remain an enigma. Improved funding for testing, increased access to care and robust awareness campaigns will be imperative in curbing the spread of this deadly diseases.

KEYWORDS: *self-reported testing Risk factors Viral hepatitis HBV HCV Knowledge.*

INTRODUCTION

Hepatitis is inflammation of the Liver which can be caused by infectious and non-infectious agents such as viruses, chemicals, drugs, alcohol, or genetic disorders. It is a leading cause of global health challenge and can be acute or chronic. According to the World Health organization, "There are five main strains of the hepatitis virus, referred to as types A, B, C, D and E. While they all cause liver disease, they differ in important ways including modes of transmission, severity of the illness, geographical distribution and prevention methods"[1] Hepatitis B and C are the most prevalent forms of the virus because of their ability to cause chronic inflammation of the liver. [2] Hepatitis D also causes chronic infection however it's been described by the CDC in a recent publication as a "satellite virus" because it can only infect people who are also infected by the hepatitis B virus (HBV). [3] Despite is ability to cause severe Liver disease, Hepatitis D is not a notifiable disease thus its prevalence remains unknown. [3]

Hepatitis B and C share similar transmission pathways chronically affecting over 350 million and 170 million people respectively.[4.5] A recent study states that there are approximately 2 billion people infected by HBV and about 400 million carriers worldwide.[6]

Risk factors for Hepatitis B and C include sexual contact such as having multiple sex partners, unprotected sex, blood transfusion and exposure to blood products especially in endemic regions, sharing needles, syringes, and other equipment used to inject drugs, sharing razors, toothbrushes, and other sharp instruments, Organ transplantation, working in a healthcare setting, having a positive dental history, tattoos and body piercings, and intravenous recreational drug abuse.

Vertical transmission remains a key route in endemic regions,[7] as well as horizontal transmission (exposure to infected family members by contact with body fluids, such as saliva, shared toothbrushes and secretory skin lesions).[8-10] blood transfusion is an essential lifesaving

procedure however there is a 1% risk of transmitting blood borne infections.[11] and 12.5% of blood transfusion recipients in Africa are at risk of viral hepatitis infection following transfusion.[12] Exposure to contaminated objects such as poorly sterilized medical, surgical, and dental equipment are a major risk factor for hepatitis B and C infection[13] with 7.3% and 3.2% of patients on medical procedures such hemodialysis reported to have Hepatitis B and C infection respectively.

Viral hepatitis B and C is highly endemic in Nigeria with a prevalence of rate of 8.1 and 1.1% for HBV and HCV among adult aged 15-64 years[14] thus the need to identify the risk factors associated with these viruses in our environment.

METHODOLOGY

Study design

This is a community based cross-sectional study using a pretested validated questionnaire conducted in Port Harcourt, Nigeria.

Study setting/study tool

The study was set in the community around the Rivers State University Teaching Hospital plus the Old GRA/ Township/Borokiri axis as well as the Rivers State University community, Nkporlu, mile 3 Diobu. This study was conducted using a well-structured, reliable, validated questionnaire developed from a literature review and administered by field experts. The questionnaire comprises four sections: (i) Socio-demographic characteristics, including age, sex, marital status, level of education, and occupation (ii) Sexual, behavioral, and history of testing for HBV/HCV iii) Risk characteristics, such as history of sharing sharp equipment such as tattoos, history of dental procedures, history of surgical operations, history of hospitalizations, history of traditional pedicure, sharing or owning of barbing clippers, (iv) history of contact and having HBV/HCV-infected family members.

Inclusion criteria

All participants who gave informed consent were included into the study. However, those with incomplete data and who did not give consent were excluded from the study.

Sample size and Statistical analysis

A standardized formula for cross-sectional studies was utilized to calculate the required sample size. (15) Statistical analysis was performed using Microsoft Excel software. Descriptive statistics were used by presenting frequencies with percentages for all categorical characteristics and means with standard deviations (SD) for continuous variables.

Ethical approval was obtained from the Rivers State University Teaching Hospital ethical committee with number RSUTH/REC/2022213.

RESULTS

There were 133 participants in this study with a mean age of 40.34±15.5years and a median age of 38.74years. The participants were predominantly females (87 females and 47 males).

History of self-reported testing for viral hepatitis B and C among the study population

More females have tested for hepatitis B(HBV) (n=15) and hepatitis C(HCV) (n=13) at least once in their lifetime compared to their male counterparts (HBV n=4, HCV n=2). Notably, more females within the age group of 18-45years have tested for HBV while more females in the age group 46-65years have tested for HCV than any other age groups. (see table 1 and 2)

Table 1: Participants by age and sex who self-reported testing for HBV.

	Participants		Tested for HBV	
Sex / Age	Male	Female	Male	Female
<18	1	1	0	0
18-45	26	58	4	7
46-65	16	22	0	6
>65	4	5	0	2
Total	**47**	**86**	**4**	**15**

Table 2: Participants by age and sex who self-reported testing for HCV.

	Participants		Tested for HCV	
Sex / Age	Male	Female	Male	Female
<18	1	1	0	0
18-45	26	58	2	5
46-65	16	22	0	6
>65	4	5	0	2
Total	**47**	**86**	**2**	**13**

Risk factors for viral hepatitis B and C infection in the study population

1. History of exposure to infected close contacts and family members (horizontal transmission)

Rates of history of exposure of the study participants to HBV infected family members is approximately equal in both sexes (6.4% females vs 6% males) although fewer numbers of participants have had contact with HCV infected family members. Table 3 and 4

Table 3: Participants by age and sex that have a history of contact with HBV positive family member.

	Participants		Family history HBV % (n)	
Sex / Age	Male	Female	Male	Female
<18	1	1	0	0
18-45	26	58	3	4
46-65	16	22	0	1
>65	4	5	0	1
Total	**47**	**86**	**6.4% (3)**	**6.% (6)**

Table 4: Participants by age and sex that have a history of contact with HCV positive family member.

	Participants		Family history of HCV % (n)	
Sex / Age	**Male**	**Female**	**Male**	**Female**
<18	1	1	0	0
18-45	26	58	2	1
46-65	16	22	0	0
>65	4	5	0	1
Total	**47**	**86**	**4.3% (n=2)**	**2.3% (n=2)**

2. History of contact with viral hepatitis B & C patients among the study participants

A quarter of the study population (25.6%, n=34) have had close contact with a patient with viral hepatitis B or C with female participants accounting for more of exposed participants than males. See Table 5.

Table 5: Participants by age and sex that have had contact with viral hepatitis B & C patients.

	Participants		VH Contact % (n)	
Sex / Age	**Male**	**Female**	**Male**	**Female**
<18	1	1	0	0
18-45	26	58	8	16
46-65	16	22	0	8
>65	4	5	0	2
Total	**47**	**86**	**17.0% (n=8)**	**30.2% (n=26)**

Table 6: Other Risk Factors- exposure to possible sources of infection.

RISK FACTORS	Participants		Total
	Male	**Female**	
Hxofhospitalization	18	49	**67**
Hxofsurgery	13	34	**47**
Hxofblood Transfusion	2	10	**12**
Hxof dental procedure	11	14	**25**
Use own clipper/needle	17	10	**27**
Tattoo/piercing	2	8	**10**
Traditional pedicure	5	12	**17**

Hx= History

Knowledge of hepatitis B (HBV) vaccine and avoidance of avertible risk factors.

In Multiple Regression model which introduced all categories in our conceptual framework demonstrated the best overall goodness of fit (Prob > $chi^2 < 0.001$) in the

impact of knowledge of HBV vaccine on the avoidance of avertible risk factors for viral hepatitis B with the given equation: $Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\epsilon Y$

Where:

- Y is the knowledge about the HBV vaccine (dependent variable),
- X1 is the use of own clipper/needle (independent variable),
- X2 is getting a tattoo/piercing (independent variable),
- X3 is getting a traditional pedicure (independent variable).

We are given the following values for one observation:

- Y = 92
- X1 = 14
- X2 = 7
- X3 =10

Table 6: OLS Regression Results for Knowledge of HBV vaccine and avoidance of avertible risk factors.

	coef	std err	t	P>|t|	[0.025	0.975]
const	48.4567	5.736	8.447	0.004	35.821	61.092
X1	2.0215	0.798	2.533	0.045	0.123	3.920
X2	1.6571	0.659	2.514	0.050	0.016	3.300
X3	0.9755	0.544	1.795	0.096	-0.097	2.048

Legend: Y is the knowledge about the HBV vaccine (dependent variable), X1 is the use of own clipper/needle (independent variable), X2 is getting a tattoo/piercing (independent variable), X3 is getting a traditional pedicure (independent variable).

Interpretation of the Coefficients and P-values

- **Intercept (β0) = 48.46**: This represents the expected knowledge about the HBV vaccine (Y) when all predictors (X1, X2, X3) are zero.
- **β1=2.02 for X1**: This means that for every one-unit increase in the use of own clipper/needle, knowledge about the HBV vaccine increases by **2.02 units**, assuming X2 and X3 are held constant.
- **β2=1.66 for X2**: This means that for every one-unit increase in the number of tattoos/piercings, knowledge about the HBV vaccine increases by **1.66 units**, assuming X1 and X3 are held constant.
- **β3=0.98 for X3**: This means that for every one-unit increase in the number of traditional pedicures, knowledge about the HBV vaccine increases by **0.98 units**, assuming X1 and X2 are held constant.

P-values

- **P-value for X1 = 0.045**: This is **statistically significant** at the 0.05 level, indicating that the relationship between the use of own clipper/needle and HBV knowledge is significant.
- **P-value for X2 = 0.050**: This is **marginally significant**, suggesting that the number of tattoos/piercings has a borderline significant impact on knowledge of the HBV vaccine.
- **P-value for X3 = 0.096**: This is **not statistically significant** at the 0.05 level, meaning that the number of traditional pedicures does not significantly influence knowledge of the HBV vaccine.

Making Predictions

For the given values X1=14, X2=7, and X3=10, we can predict YYY (knowledge of the HBV vaccine).

$Y=48.46+(2.02\times14)+(1.66\times7)+(0.98\times10)$

$Y=48.46+28.28+11.62+9.80=98.16$

Thus, the predicted knowledge of the HBV vaccine for X1=14, X2=7, and X3=10 is **98.16**.

Thus, from the observed knowledge of the HBV vaccine (Y), which is close to the predicted value of **98.16**, we can conclude the following: The individual has a relatively high level of knowledge about the HBV vaccine, This knowledge likely influences their behaviours, leading them to avoid risk factors such as using unclean clippers/needles, getting tattoos or piercings in unsafe environments, and getting traditional pedicures that might increase the risk of HBV transmission. The regression coefficients therefore suggest that the higher the awareness about HBV, the more likely individuals are to avoid these risky behaviour.

There is a significant inverse relationship between the use of own clipper/needle and HBV vaccine knowledge and participants with knowledge of HBV vaccine are twice most likely to use their own barbing clipper and hair making needles.

DISCUSSIONS

The CDC recommends universal screening among adults 18 years of age and above for viral hepatitis B[16] and C.[17] However, most countries are yet to implement these recommendations and a proportion of their populace became aware of chronic viral hepatitis status by self-reported testing. In this community study, females were documented to most likely self-report testing for both viral hepatitis B and C than males. (see table 1) This finding is however contrary to the results obtained by Yendawa et al (2024) that noted in their nationwide population-based study that "being male, ages between 30-60 years and individual receipt of HBV vaccination were key factors associated with self -reported testing for viral hepatitis B."[16] Our outcome of self-reported testing

being higher in females than males is however in keeping with health-seeking behaviors observed among females in our environment.[18]

In this investigation, 25% of the study participants have had contact with viral B and /C infected persons. There was nonetheless sexual dimorphism among those who admitted to have had contact with either a viral hepatitis B or/and C infected person as more females were observed to have had contact with infected individuals. (see table 2 &4) This maybe due to a higher female population in the study as multiple studies have shown that males are more likely to be exposed to and be infected by viral hepatitis B and C.[19-20] Remarkably, at least 6% of the participants of both genders have been exposed to hepatitis B infected family members.

Despite the absence of an effective vaccine for viral hepatitis C, risk factor modulations such as avoiding contact with infected blood, use of new sterile needles and sterilized medical appliances, practicing safe sex by use of barrier methods and testing donated blood for hepatitis C before transfusion help in mitigating the spread of the infection. In addition to the aforementioned risk factor preventions, viral hepatitis B is a vaccine preventable disease, the knowledge of which has been reported to depend gender, age and occupation.[22]
From table 7 the regression coefficients suggest that the higher the awareness about hepatitis B, the more likely individuals are to avoid these risky behaviors. By fitting the regression model and interpreting the coefficients and p-values, we understand that the different factors (use of own clipper/needle, tattoo/piercing, and traditional pedicure) influence knowledge about the hepatitis B vaccine. Thus, the knowledge of viral hepatitis B vaccine likely drives the avoidance of risk factors, contributing to better health outcomes and lower risk of hepatitis B transmission.

Recommendations
There is a need for improved funding for screening, awareness campaigns, detection and treatment of viral hepatitis B and C in Nigeria. it is pertinent that the federal government of Nigeria in partnership with the WHO and other relevant organizations create hepatitis elimination programs that are similar to HIV control programs emphasizing on more people being aware of their hepatitis B and C(HBV/HCV) status.

Furthermore, patients with viral hepatitis pay out of pocket for their routine tests and medications which deter adherence. We advise that HBV and HCV care be mainstreamed into health insurance schemes and basic healthcare provision funds.

Finally, while testing is being encouraged, vaccination and avoidance of risky behavior for those that are negative should be emphasized to mitigate the spread of this deadly viruses.

CONCLUSION
The prevention, diagnosis and treatment of viral hepatitis B and C remain a challenging enigma in Nigeria and Sub-Saharan Africa as a whole. Improved funding for testing, increased access to care and robust awareness campaigns will be imperative in curbing the spread of this deadly diseases.

Competing interests
Authors have declared that no competing interests exist.

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