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Socio-Demographic Characteristics and Risk Factors for Hepatitis D Virus Infection among Hepatitis B Virus Infected Individuals in a Nigerian Tertiary Hospital.

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Abstract:
Background*: Globally, about 5% of individuals with hepatitis B virus (HBV) infection are co-infected with hepatitis D virus (HDV). Both viruses have similar routes of transmission but vertical transmission from mother to child is less important while sexual and percutaneous transmission are more effective routes of HDV transmission. There is however, paucity of data on socio-demographic characteristics and risk factors for HDV in our environment. This study thus aimed to assess the association of HDV infection with socio-demographic characteristics and risk factors for infection among HBV infected individuals attending a tertiary health facility in Nigeria.*
Materials and Methods*: In this cross-sectional descriptive study, 180 HBV infected individuals were enrolled. An interviewer administered questionnaire was administered to obtain data on their socio-demographic and risk factors for HBV/HDV infection. Blood samples were obtained from the participants for HDV antibody (anti-HDV) test. Data obtained were analyzed using SPSS software version 17.*
Results*: The study comprised of 116 (64.4%) males and the mean age of the participants was 35.2 ± 10.4 years. Test for anti-HDV was positive in 18.9% of the participants. There was no significant association between HDV status and the socio-demographic characteristics of the participants. However, among the risk factors, history of sharing of sharps was a statistically significant predictor of HDV status (OR = 2.7; 95% CI: 1.047 to 7.068, p = 0.040).*
Conclusion: *Sharing of sharps was the only risk factor with significant association with HDV positive status among the study participants.*
Key Word*: hepatitis D virus; hepatitis B virus; risk factors; socio-demographic; Nigeria*

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I. Introduction

Hepatitis D virus (HDV) is a 35nm single stranded satellite RNA virus that requires the concomitant presence of hepadna viruses for its survival and infectivity.[1] HDV has a worldwide distribution though, with considerable geographic variation. Globally, co-infection of HDV and hepatitis B virus (HBV) occurs in 5% of individuals infected with HBV (approximately 15–20 million people).[2] HBV infection is hyper-endemic (prevalence >8%) in Sub-Saharan African countries including Nigeria where the national prevalence of HBV has been reported to be 12.2%.[3] Reported prevalence rate of HDV among HBV infected individuals in Nigeria ranges from about 2% to 18% in different studies.[4,5] Co-existing HDV infection in individuals with HBV infection has been shown to cause increased disease severity in the acute phase and faster disease progression to cirrhosis and liver cancers in the chronic phase.[1] HDV is transmitted in a fashion similar to HBV but the sexual and percutaneous routes have been reported to be the predominant routes of transmission.[6] Vertical transmission, which is a predominant route of HBV transmission in HBV hyper-endemic regions, has not been found to be an effective route of HDV transmission.[6] There may be other risk factors that may predispose individuals to acquiring HDV infection. There is paucity of data on the epidemiology of HDV in Nigeria, particularly with respect to the socio-demography and risk factors of infection.

This study aimed at assessing the socio-demographic characteristics and risk factors for HDV infection among HBV infected individuals who were attendees of a Gastroenterology clinic in a tertiary hospital in Abuja, Nigeria.

II. Materials And Methods

This was a hospital-based cross-sectional descriptive study conducted at a tertiary health institution in Abuja, Nigeria. The study population comprised of chronic HBV infected individuals attending the Gastroenterology Clinic of the institution.

A minimum sample size of 180 was calculated using the Fisher's formula based on a prevalence rate of HDV infection of 12.5% among HBV infected patients reported in another study in Nigeria.[7]

Approval for the study was obtained from the Health Research and Ethics Committee of the hospital before the study commenced. The study population included all HBV infected individuals who were attendees of the Gastroenterology clinic. Written informed consent was obtained from individuals willing to participate in the study.

Individuals who were taking anti-viral agents, those who consumed significant amount of alcohol as well as those who had hepatitis C virus or human immunodeficiency virus infections were excluded.

Information on the socio-demographic characteristics, risk factors for viral hepatitis as well as clinical symptoms were obtained from the participants and recorded on a semi-structured interviewer-administered questionnaire developed by the researchers.

Venous blood samples were obtained from the antecubital fossa of each participant to test for HDV antibody (Anti-HDV) using test kits based on ELISA method.

Data obtained were analyzed using the Statistical Package for Social Sciences (SPSS) software (SPSS version 17, Chicago, IL).

III. Results

0ne hundred and sixteen (64.4%) of the 180 individuals who participated in the study were males while 64 (35.6%) were females giving a male to female ratio of 1.8:1. The age of the study participants ranged from 16years to 70years (median age 34years). The mean age ($\pm$SD) was 35.2 years ($\pm$10.4 years). Table 1 shows the socio-demographic characteristics of the study participants.

Table 1: Socio-demographic Characteristics of the participants.

Variables	Frequency (N = 180)	Percentage
Gender		
Males	116	64.4
Females	64	35.6
Age (years)		
$\leq$ 25	25	13.9
26 – 35	78	43.3
36 – 45	50	27.8
$\geq$ 46	27	15.0
Marital Status		
Single	64	35.6
Married	111	61.6
Others	5	2.8
Educational Status		
No Formal Education	3	1.7
Quranic Only	5	2.8
Primary	17	9.4
Secondary	42	23.3
Tertiary	113	62.8
Occupation		
Civil / Public Servants	55	30.6
Private Sector	28	15.5
Trading / Business	30	16.7
Healthcare Workers	5	2.8
Students	26	14.4
Unemployed	17	9.4
Others	19	10.6
Tribe		
Igbo	27	15.0
Hausa	19	10.6
Yoruba	16	8.9
Igala	11	6.1
Tiv	11	6.1
Nupe	10	5.5
Ebira	10	5.5
Gbagyi	10	5.5
Others	66	36.8

Thirty-four (18.9%) of the participants tested positive for HDV antibodies (anti-HDV+ve). The mean age (±SD) was 37.1 ± 10.1years and 34.8 ± 10.4years among those who were anti-HDV+ve and anti-HDV-ve respectively (p = 0.251). There was no significant difference in the socio-demographic characteristics of those who were anti-HDV+ve compared to those who were anti-HDV-ve (table 2).

Table 2: Association between HDV status and socio-demographic variables.

Variable	Anti-HDV+ve	Anti-HDV-ve	$\chi 2$	p-value
Gender				
Male (n = 116)	19 (16.4%)	97(83.6%)	1.341	0.247
Female (n = 64)	15 (23.4%)	49 (76.6%)		
Age group (years)				
≤ 25	4 (16.0%)	21(84.0%)		
26 – 35	11 (14.1%)	67 (85.9%)	3.149	0.369
36 – 45	13 (26.0%)	37 (74.0%)		
≥ 46	6 (22.2%)	21 (77.8%)		
Marital status				
Single	9 (14.1%)	55 (85.9%)		
Married	23 (20.7%)	88 (79.3%)	2.671	0.263
Others	2 (40.0%)	3 (60.0%)		
Occupation				
Civil/Public Servant	9 (16.4%)	46 (83.6%)		
Private sector	1 (3.6%)	27 (96.4%)		
Traders	7 (23.3%)	23 (76.7%)	11.708	0.069
Healthcare workers	3 (60.0%)	2 (40.0%)		
Unemployed	5 (29.4%)	12 (70.6%)		
Students	5 (19.2%)	21 (80.8%)		
Others	4 (21.1%)	15 (78.9%)		
Education status				
None	2 (66.7%)	1 (33.3%)		
Primary	4(23.5%)	13 (76.5%)		
Secondary	5 (11.9%)	37 (88.1%)	6.075	0.194
Tertiary	22 (19.5%)	91 (80.5%)		
Quranic	1 (20.0%)	4 (80.0%)		
Tribe				
Yoruba	2 (12.5%)	14 (87.5%)		
Hausa	3 (15.8%)	16 (84.2%)		
Ibo	3(11.1%)	24 (88.9%)		
Nupe	1 (10.0%)	9 (90.0%)		
Igala	2 (18.2%)	9 (81.8%)	5.192	0.737
Ebira	2 (20.0%)	8 (80.0%)		
Tiv	3 (27.3%)	8 (72.7%)		
Gbagyi	1 (10.0%)	9(90.0%)		
Others	17 (25.8%)	49 (74.2%)		

Among the risk factors assessed, a statistically significant proportion of the anti-HDV+ve individuals had history of sharing of sharps compared to the anti-HDV-ve individuals. There was no significant difference in the distribution of the other risk factors for viral hepatitis among the anti-HDV+ve and anti-HDV-ve individuals as shown in table 3.

Table 3: Association between HDV status and risk factors.

Risk factors	Anti-HDV+ve (n = 34)	Anti-HDV-ve (n = 146)	$\chi 2$	p-value
Blood transfusion	4(11.8%)	17 (11.6%)	0.001	>0.05
Scarification marks	10 (29.4)	35 (24.0)	0.435	0.509
Tattoos	0 (0.0%)	1 (0.7%)	0.234	>0.05
Sharing of sharps	10 (29.4%)	19 (13.0%)	5.487	0.019
Surgical procedures	8 (23.5%)	31 (21.2%)	0.086	0.770
Tooth extraction	8(23.5%)	23 (15.8%)	1.170	0.279
IVDU*	0 (0.0%)	3 (2.1%)	0.710	>0.05
Injections with quacks	11 (32.4)	37 (25.3%)	0.693	0.405
Contact with someone with jaundice	5 (14.7)	11 (7.5%)	1.751	0.190
Multiple sexual partners	4 (11.8%)	28 (19.2%)	1.037	0.309
Homosexual men	0 (0.0%)	0 (0.0%)	-	-

*IVDU: Intravenous drug users

All the predictor variables entered accounted for 10% (Nagelkerke R-square = 0.100) of the variation in the anti-HDV status, but with the use of stepwise regression technique (backward regression method), history

of sharing of sharps alone accounted for 4.3% of the variation in anti-HDV status. The only statistically significant predictor of anti-HDV status was history of sharing of sharps (OR = 2.7; 95% CI: 1.047 to 7.068, p = 0.040). History of previous contact with someone with jaundice was also a strong predictor of anti HDV status, though not statistically significant (OR = 3.0; 95% CI: 0.842 to 10.648, p = 0.090). The odds ratios of the risk factors are shown on table 4.

Table 4: Logistic regression analysis: Predictors of anti-HDV antibody status

Risk factor	Odds Ratio	95% Confidence Interval for odds ratio	p-value
Blood transfusion	1.2	0.354 – 4.213	0.752
Scarification marks	0.9	0.355 – 2.338	0.847
Tattoos	0.0	-	>0.05
Sharing of sharps	2.7	1.047 – 7.068	0.040
Surgical procedures	1.5	0.568 – 3.724	0.435
Tooth extraction	1.6	0.592 – 4.126	0.367
IVDU*	0.0	-	>0.05
Injections with quacks	1.3	0.537 – 3.332	0.532
Contact with someone with jaundice	3.0	0.842 – 10.648	0.090
Multiple sexual partners	0.6	0.181 – 1.888	0.370
Homosexual men	0.0	-	-

Hosmer and Lemeshow test: p = 0.545. Nagelkerke R-square = 0.100
*IVDU: Intravenous drug users

IV. Discussion

Globally, the endemicity of HBV in different regions have been categorized as low, medium or high endemicity based on prevalence rates of <2%, 2-8% and >8% among the general population respectively.[8] There is considerable geographic variation in the prevalence of HDV. Relative to HBV endemicity in the population, the global prevalence of HDV infection have been broadly categorized into four broad classifications as follows: very low endemicity, low endemicity, moderate endemicity and high endemicity, characterized by HDV prevalence rates of 0-2%, 3-9%, 10-19% and >20% in asymptomatic HBV carriers respectively.[9] HDV/HBV co-infection was found in 18.9% of our study participants. This falls into the category of moderate endemicity for HDV infection. The socio-demographic characteristics showed a higher prevalence of anti-HDV among females compared to males (23.4% vs 16.4%). Similar higher prevalence rates have been reported in a study conducted in Benue, north central Nigeria, where only females were found to be anti-HDV+ve.[10] Likewise, a study in Iran reported a higher prevalence rate among females compared to males (9.9% vs 1.5%). [11] However, our finding is in contrast to reports from north eastern and south western Nigeria where higher prevalence rates were reported amongst males compared to females.[7, 12] Similarly, a significantly higher prevalence rate was reported among males compared to females in studies done in Brazil and Egypt.[13, 14]

The mean age of those who were anti-HDV+ve was higher than the mean age of those who were anti-HDV-ve (37.1 ± 10.1years vs 34.8 ± 10.4years), though difference was not statistically significant. Likewise, the prevalence rate was higher among the age groups that were > 35years compared those who were ≤35years. Similar reports of higher prevalence in the older age group have been reported in other parts of Nigeria and the United States.[12, 15] However, in contrast to our findings, a study in Pakistan reported a significantly lower prevalence of anti-HDV among older individuals (>40years of age) compared to younger individuals who were <40years old.[16]

Considering the occupation of our study participants, the highest prevalence rate of anti-HDV was found among healthcare worker (60%), though there were only 5 healthcare workers that participated in the study. This finding corroborates the occupational risk healthcare workers are exposed to; likewise, they may pose a risk to other individuals utilizing the healthcare system. Thus, the need for observing universal precautions, screening and immunization against hepatitis B virus among healthcare workers should be emphasized.

In regions of high HBV endemicity, which include sub-Saharan Africa and Far East Asia, transmission is usually perinatal and horizontal among children who are at a greater risk of having a chronic infection. In these regions the lifetime risk of HBV infection is >45%.[8] Sexual and percutaneous routes of transmission also abound globally. HDV is transmitted in a fashion similar to HBV, but vertical transmission is uncommon while sexual and percutaneous routes are the predominant routes of transmission. In HDV endemic regions, transmission in children through broken skin and familial clustering of infection in households have been documented.[17] Several risk factors may thus be associated with HDV infection. Our study showed a significant association between HDV/HBV infection and sharing of sharps while the association with other risk factors was not significant. Sharps shared by the study participants included razor blades, shaving sticks, hair fixing needles as well as manicure and pedicure sets among others. Logistic regression analysis showed that history of sharing of sharps and history of contact with someone with jaundice were the important predictors of anti-HDV positive

status in this study population, though only the former was statistically significant. This is contrary to the findings of a study in southwest Nigeria that reported history jaundice to be significantly associated with anti-HDV positivity.[18]

There is need for public awareness on the risk factors for HDV/HBV transmission to stem the tide of infection. Primary prevention with HBV immunization is an equally important strategy to prevent HDV/HBV infection as evidence by the decline in infection rates in countries with effective HBV immunization programmes. Population based studies will however, be required to further evaluate the socio-demographic characteristics and possible associated risk factors for HDV/HBV infection.

V. Conclusion

This study found no significant association between HDV positive status and the socio-demographic characteristics of the study participants. However, among the risk factors assessed, sharing of sharps was the only risk factor with significant association with HDV positive status among the study participants.

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