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Hepatitis C Virus (HCV) Prevalence in Special Populations and Associated Risk Factors: A Report From a Tertiary Hospital

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Abstract

Background: With the advent of highly effective anti-hepatitis C virus (HCV) drugs, efforts to identify infected cases, high-risk groups, and associated risk factors have become the focus of current control measures.
Objectives: To determine the prevalence of the HCV antibody among diabetics and patients with lymphoproliferative disorders (LPD) who presented to the outpatient clinics of a university hospital and its associated risk factors
Patients and Methods: Consecutively consenting patients who had been previously diagnosed with diabetes mellitus and LPD at the outpatient department of the Lagos State University teaching hospital were recruited. A case record form was used to extract their demographics and physical examination findings as well as any risk factors for HCV infection; blood was also drawn to run a serological assay for the HCV antibody. All data were collated and analyzed using the Statistical Package for the Social Sciences version 20. Student T-test, Chi square, and logistic regression were some of the inferential statistics used in addition to descriptive statistics.
Results: In all, 438 patients (405 diabetics and 33 patients with LPD) were recruited. Their ages ranged from 17 - 87 years with a mean + Standard deviation of 59.61 + 11.859 years. The prevalence of hepatitis C among the diabetic subgroup was 0.7%, while the antibody was present in 9.1% of the LPD patients. The occurrence of the HCV antibody was, however, not significantly associated with age, sex, educational level, or marital status ($P > 0.05$). Having multiple sexual partners was identified as the only significant risk factor for hepatitis C (OR = 9.148; P = 0.017).
Conclusions: This survey suggested that a higher HCV prevalence exists in this population than is currently reported in the general population, and having sex with multiple partners was a risk factor for HCV infection.

Keywords: Hepatitis C Prevalence, Diabetes Mellitus, Lymphoproliferative Disorders

1. Background

The hepatitis C virus (HCV) is an RNA virus that belongs to the family of flaviviruses; it is an important cause of liver disease worldwide and is estimated to affect over 150 million people. HCV is a leading cause of chronic liver disease, including liver cirrhosis, primary liver cell carcinoma (PLCC), and liver failure, and is an indication for liver transplantation, especially in the Western world (1, 2). In Nigeria, 18.7% - 38% of liver cancer patients carry markers of HCV (3).

The virus is parenterally transmitted; risk factors include blood transfusion, previous surgical and dental procedures, sharing of sharps (including tattooing/scarification and intravenous drug use (IDU) and, to a lesser extent, perinatal and sexual contact. Iatrogenic factors have also been blamed in some communities with a very high prevalence of HCV, like Egypt and Cameroon (2, 4).

The results of seroprevalence studies of HCV in Nigeria vary depending on the study population and also the geographical setting, with higher rates along the Eastern border and in some northern regions (5). The overall prevalence of HCV in a population survey of 4862 respondents in the Lagos state was 0.1% in 2014 (6) while the overall prevalence was 0.9% in an industry-sponsored nationwide survey involving 5,558 working-class adults conducted from 2010 - 2012 (7).

However in an earlier institution-based study in Nigeria, the HCV antibody prevalence was 4.7% among 360 outpatients in a university hospital, and no risk factors were significantly associated with it (8). The center for disease control (CDC) had previously recommended risk-based testing for HCV infection (9).

Patients with liver disease are known to have a higher prevalence of glucose intolerance, and preliminary studies suggest that HCV infection may be an additional risk factor for the development of diabetes mellitus because diabetics have an increased frequency of HCV infection (10, 11). A significant association has been reported to exist between hepatitis C and lymphoproliferative disorders (12) as well. Chronic hepatitis C virus infection has been linked with the development of lymphoproliferative disorders (LPDs); the prevalence of LPDs in individuals with HCV-induced chronic liver disease is greater than that of the normal healthy population (13).

Currently, newer drugs have shown great promise in eradicating this viral infection; efforts to identify infected cases as well as high-risk groups and their associated risk factors have become the focus of recent control measures. It is hoped that this study may help to document the burden of hepatitis C and its associated risk factors in these special populations, which may make them a priority group in current control measures.

2. Objectives

The purpose of this study was to determine the prevalence of the HCV antibody among diabetic and LPD patients attending the outpatient clinics of the Lagos State University hospital and associated risk factors in patients who test positive for the antibody.

3. Patients and Methods

This study was conducted in the Outpatient department of the Lagos state University teaching hospital from January to December 2014; consecutive consenting patients who had been previously diagnosed with diabetes mellitus (DM) or LPDs were recruited into the study until the desired sample size of 438 was achieved. The diagnosis of DM was based on the IIDF/WHO criteria (14), while that of LPDs was based on histological findings and/or immunohistochemistry (15). Patients who were too ill to comply with the study protocol or who refused to consent were excluded from the study.

A case record form was used to extract information, including demographics, risk factors for HCV acquisition (4), and diabetic and lymphoma history; blood was then collected from each subject for the HCV antibody testing. The latter was done using a Rapid Enzyme-linked Immunosorbent Assay (ELISA) kit, (Diaspot, Immune Assay Kit; DIA Source ImmunoAssays S.A., Louvain-la-Neuve, Belgium). The Diaspot kit for hepatitis C has a specificity of 98.6% and a sensitivity of 99%.

All data were collated and analyzed using the statistical package for the social sciences (SPSS) version 20. Student T-test, Chi Square, and logistic regression were some of the inferential statistics that were included in addition to descriptive statistics.

4. Results

The study included 438 participants: 405 diabetics and 33 patients with lymphoproliferative disorders (20 had non-Hodgkin's lymphoma (NHL), and the others were Hodgkin's lymphoma (HL), chronic lymphocytic leukemia (CLL), multiple myeloma (MM), and B-cell lymphoma). Their ages ranged from 17 - 87 years with a mean + standard deviation (SD) of 59.61 + 11.859 years. The subjects consisted of 66% females, and more than 60% of them had at least a secondary school education. Most participants (70%) were married.

The prevalence of hepatitis C among the diabetic subgroup was 0.7%, while the rate in the lymphoma patients was 9.1%. (All LPD patients with HCV had NHL.) The occurrence of the HCV antibody was, however, not significantly associated with the age, sex, educational level, or marital status of the participants ($P > 0.05$; Tables 1 - 4).

Having multiple sexual partners was identified as the only significant risk factor for hepatitis C acquisition (odds ratio (OR): 9.148; $P = 0.017$; see Tables 5 and 6).

5. Discussion

The observed prevalence of an antibody to hepatitis C in diabetic subjects (0.7%) was similar to that reported (0.1%, 0.6%, and 0.9%) in recent population-based surveys (5-7) conducted in the same locality during the same period, while that of LPD (9.1%) was much higher. One explanation for this finding may be that despite previous reports, diabetics are actually not more predisposed to contracting hepatitis C infection, while HCV infection may be associated with an increased risk of LPDs. However, we were not able to decipher the time of acquisition of the HCV infection in relation to the onset of the lymphoma, as this was just a cross-sectional study. The sero-prevalence rates (5-7) in these population surveys are much lower that the estimated rates reported recently (2), which could indicate a lower disease burden than was estimated.

In addition to liver-related complications, HCV infection has also been implicated as an independent risk factor for cardiovascular disease (16) and, more recently, cerebral hemorrhage (17), which leaves diabetics or lymphoma patients with an HCV infection more prone to experiencing a severe outcome and would make them a priority population in the efforts to eradicate HCV.

Table 1. HCV Prevalence and Association With Demographics: A Comparison of the Mean Ages of Hepatitis C-Positive and Hepatitis C-Negative Patients

Value	N	Mean	SD	SE	Student T-Test
Hepatitis C-positive	6	55.830	17.509	7.148	t (434) = 0.785
Hepatitis C-negative	430	59.660	11.782	0.568	P Value = 0.433

Table 2. Relationship Between Gender and HCV Antibody Presence

Value	Hepatitis C-Positive	Hepatitis C-Negative	Total	Fisher's Exact Test
Gender				χ^2 (1) = 0.000, P = 1.000
Female, No (%)	2 (1.4)	142 (98.6)	144 (100.0)	
Male, No (%)	4 (1.4)	281 (98.6)	285 (100.0)	
Total, No (%)	6	423		

Table 3. Relationship Between Patients' Educational Level and Hepatitis C

Value	Hepatitis C-Positive	Hepatitis C-Negative	Total	Chi Square Test
Educational level				χ^2 (3) = 4.422, P = 0.219
No formal education, No (%)	2 (4.0)	48 (96.0)	50 (100.0)	
Primary, No (%)	2 (1.8)	109 (98.2)	111 (100.0)	
Secondary, No (%)	0 (0.0)	130 (100.0)	130 (100.0)	
Tertiary, No (%)	2 (1.5)	135 (98.5)	137 (100.0)	
Total, No (%)	6	422	428 (100.0)	

Table 4. HCV Antibody Presence and Marital Status

Value	Hepatitis C-Positive	Hepatitis C-Negative	Total	Chi Square Test
Marital status				χ^2 (3) = 7.104, P = 0.069
Single, No (%)	1 (8.3)	11 (91.7)	12 (100.0)	
Married, No (%)	2 (0.7)	304 (99.3)	306 (100.0)	
Divorced, No (%)	0 (0.0)	10 (100.0)	10 (100.0)	
Widowed, No (%)	2 (2.6)	75 (97.4)	77 (100.0)	
Total, No (%)	5	400	405 (100.0)	

Table 5. Logistic Regression Identifying Risk Factors of Hepatitis C Among Diabetic Patients[a]

Value	Sig	Odds Ratio	95% CI for EXP (B)	
			Lower	Upper
Blood transfusion	0.186	6.188	0.414	92.459
Previous surgery	0.637	1.896	0.133	27.061
Multiple sexual partners (MSP)	0.505	2.335	0.193	28.234
Constant	0	0.002		

[a] None of the variables were identified as a significant risk factor of hepatitis C among the diabetic patients.

Table 6. Logistic Regression to Identify the Risk Factors for Hepatitis C Among Diabetic and Lymphoma Patients[a]

Value	Sig	Odds Ratio	95% CI for EXP (B)	
			Lower	Upper
Previous surgery	0.065	7.832	0.877	69.956
Previous incarceration	0.165	7.145	0.446	114.570
Multiple sexual partners (MSPs)	0.017	9.148	1.490	56.162
Constant	0	0.002		

[a]Having MSPs was identified as the only significant risk factor for hepatitis C among diabetic and lymphoma patients, with an odds ratio of 9.148 (P = 0.017, CI = 1.490 - 56.162).

In this study, sex with multiple partners was identified as the only risk factor for HCV antibody acquisition. This finding was in contrast to an earlier report that suggested that the risk factors for HCV were obscure in Nigeria, although that study was conducted in another geographical zone of Nigeria. However, the sexual route generally has been reported as a less likely route of transmission of HCV due to reports that indicated discordance rates among couples (18), except in cases of high-risk sexual behavior. The latter topic was not investigated in this present study. If this finding is confirmed in future studies, it would imply that those who have multiple sexual partners should be included in the high-risk population that requires HCV screening to stay in line with the recommendation of the CDC that those at risk of acquisition or who are already potentially infected should be screened (9).

This study was, however, limited by our inability to assay RNA in those positive for HCV antibody since earlier reports (19) have indicated that only about 70% of them are viremic. Nonetheless this study suggested that the higher prevalence of HCV infection in the LPD population makes these patients a priority for HCV screening in this era of HCV eradication with the newly available and highly effective anti-HCV therapy.

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Footnote

Authors' Contribution: Drs. Onyekwere, Ogbera, and Hameed conceptualized the study. All authors were involved in data collection. Onyekwere, Adeleye, and Hameed conducted data analysis. The manuscript was drafted by Onyekwere, and the final version was read and approved by all.

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