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Prevalence of Anti-Hepatitis C Virus Antibodies in Patients Attending Federal Medical Centre (FMC), Lokoja, Kogi State, Nigeria

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Abstract: Hepatitis C virus (HCV) is one of the causes of viral hepatitis reported as major public health problem worldwide. In order to determine the prevalence of HCV antibodies among attendees of FMC, Lokoja; and to study whether or not the patients' variables considered risk factors for contracting HCV infection are associated with HCV antibody positivity, we consecutively selected and screened 200 apparently healthy patients (twenty five of whom were intending blood donors) visiting the Health Centre. Following obtainment of verbal consents, participants' demographic variables and blood samples were collected. Each sample was tested for the presence of antibody to HCV using a rapid membrane-based immunoassay kit (*DiaSpot* ™ HCV). The anti-HCV antibody prevalence observed was 3.60%. Statistical analysis revealed that none of the studied risk factors (age, gender, occupation, histories of blood transfusion and sexually transmitted infections) appeared associated ($p > 0.05$) with HCV antibody prevalence. However, odds ratio showed that all these factors, except history of blood transfusion, increased the risk of testing positive to HCV antibodies among the patients. Routine screening of general population and all blood donors for HCV antibody should be continued; and practice of behavioral attitudes that will lessen the risk of HCV infection are recommended for the general population.

Key words: HCV antibody, Prevalence rate, Risk factors, Blood donors, Kogi State

INTRODUCTION

Hepatitis is inflammation of the liver. Viral hepatitis on the other hand is the infection/inflammation of the liver caused by one of the hepatotropic viruses namely hepatitis viruses A, B, C, D, E, G and recently the TT and SEN hepatitis viruses [1-3]. Viral hepatitis has been described as major public health, occurring endemically, in all areas of the world [4]. While viral hepatitis may be a mild sub-clinical infection with nonspecific symptoms to an overwhelming multisystem fulminant disease [2-4], chronic carrier state may occur resulting in chronic viral hepatitis following either overt or inapparent acute infection.

Hepatitis C virus (HCV), like the hepatitis B virus (HBV), has been implicated in acute and persistent infections, as well as, chronic liver disease [5-7] that may progress to cirrhosis and hepatocellular carcinoma (HCC). Commonly, 55% to 85% of people with acute hepatitis C do not get rid of the virus within 6 months and therefore progress to chronic (long-term) hepatitis C. About 70% of the chronically infected persons will develop chronic liver disease, 1% to 5 % of which may die from chronic liver disease [8]. HCV, together with HBV and aflatoxin B1 (AFB) are the three main agents responsible for about 80% of HCC in humans [9], but in many instances they leave "molecular marks" on hepatocytes which allow accurate determination of the cause(s) of individual HCC

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[10]. In addition, Stefanova-Petrova *et al.* [11] reported that chronic HCV infection affected tissues other than the liver; and that age, female gender, duration of the infection, infection by transfusion of blood and blood products and extensive liver fibrosis were linked with extra-hepatic manifestations.

HCV is an enveloped virus and the sole member of the genus *Hepacivirus* within the family *Flaviviridae* [12]. It is worldwide in distribution [13] and its isolates have been classified into six major genotypes with several subtypes [14] with genotypes 4 and 5 apparently predominant in Africa [15]. The virus has a linear, single stranded, positive sense RNA of about 9.6 Kb as its genome which is flanked at the 5' and 3' ends by noncoding regions [16, 17]. This virus initiates infection by interacting with certain receptors on surfaces of susceptible cells [18, 19]; it infects the liver and replicate in the organ for many years. It is transmitted from infected to uninfected by percutaneous or permucosal exposure to infectious blood or blood-derived body fluids. The risk factors associated with having HCV infection are transfusion of blood and blood products and transplantation of solid organs from infected donors, injecting drug use, occupational exposure to blood (primarily contaminated needle sticks), birth to an infected mother, sexual contact with an infected partner and multiple heterosexual partners. While clinical patients rarely contract HCV from health care workers, nosocomial and iatrogenic transmission of the virus has been recognized but only in the context of outbreaks and primarily due to unsafe injection practices [20, 21].

As regards seroepidemiological study of HCV, detection of antibodies specific for the virus in human blood is the usual method of laboratory diagnosis. This is made possible by the enzyme immunoassay screening of human blood for anti-HCV antibodies introduced during the early 1990s; this in turn has reduced transfusion of blood and blood products as a major mode of acquiring HCV [22, 23]. Schreiber *et al.* [24] reported that, in spite of improvements in the generations of serodiagnostic kits to detect HCV antibodies, the window period for the infection was generally more than 40 days. Through screening, prevalence rates of anti-HCV antibodies have been determined for various nations of the world. One hundred and seventy million people (3%) of the world population are reportedly infected by HCV, 20% and 70% of which respectively represent acute and chronic cases [25]. This virus was reportedly endemic in West Africa [26]; and it was the major cause of the disease formerly known as non-A non-B post transfusion hepatitis [27].

Various prevalence rates of anti-HCV antibodies have been documented in African countries: Karuru *et al.* [28] reported 4.4% in Kenya; in 2004, Lassey *et al.* [29] recorded 2.5% in Ghana and 3.3% in Burkina Faso [30]. In Nigeria, the nation reported by Inyama *et al.* [31] as one of the countries highly endemic for viral hepatitis, the prevalence rate of HCV infection wAs earlier said to vary between 5.8% and 12.3% [32]. In tune with this, different states in Nigeria, such as Lagos, Osun and Plateau States have recorded anti-HCV antibody prevalence rates of 8.4% [33], 9.2% [34] and 5.7% [35] among blood donors, pregnant women and HIV patients respectively. However, Imoru *et al.* [36] reported HCV virus antibody prevalence of as low as 0.4% (n =2,288) among male blood donors in Kano State.

In Kogi State, Nigeria, there is dearth of literature on prevalence of anti-HCV antibodies and associated risk factors to the best of our knowledge. The objectives of this study therefore were to determine the prevalence of HCV specific antibodies in blood of patients attending one of the most utilized health facilities in Lokoja, the capital of Kogi State; and to study the association of some of the patients' variables with the prevalence of HCV antibodies.

MATERIALS AND METHODS

Study Area and Population: This study was carried out in September/October, 2007 in Lokoja, the administrative capital of Kogi State, Nigeria. Lokoja town has heterogeneous population made up of the Igala, Ebira, Yoruba, Nupe, Oworo, Bassa-Nge, Kakanda, Egbura and the Hausa. The population as estimated in late 2006 was 60,579 people, 45% of which comprises civil servants and business people, while 30% is made up of students and vocational workers; the remaining 25% comprises farmers. Lokoja town lies on latitude 7° 49' North of the equator and on longitude 6° 44' East of the Greenwich meridian. The town is the most centrally located in Nigeria, located at the confluence of the rivers Niger and Benue. The climate of the town is the continental type characterized by adequate rainfall, high humidity (about 80% and 65% respectively in wet season and harmattan period) and high temperature (daily average is 29.6°C); the rainy season is from April to October and reaches its peak in September with average annual rainfall of about 100mm.

Study Design: One of the most utilized health facilities-Federal Medical Centre, Lokoja was used for this study in order to have sample representative of the town.

Approval to carry out the study was obtained from the Management of the hospital, following which objectives of the study were explained to consecutively select apparently healthy patients. Two hundred patients, some of which visited the hospital as intending blood donors, eventually gave verbal consent to participate in the study after explaining the objectives and procedures of the study to them. Questionnaire forms were used to collect participants' demographic variables considered as risk factors for contracting HCV. Subsequently, blood sample was collected from each patient. The collected patients' variables are age, gender, occupation, histories of blood transfusion and sexually transmitted infections (STIs). The test and interpretation of the results were done according to the guidelines of the kit's manufacturer.

Serological Test: Briefly, about 5 ml Blood sample was aseptically collected by venepuncture from each subject into anticoagulant-free blood sample bottles. The blood samples were left to clot, after which sera were separated from the clot by centrifuging at 2000 rpm for 10 minutes. Sera were then separated from the clots and stored at room temperature in labeled bottles until assayed the same day. Each serum sample was tested for the presence of antibody to HCV using test strips of a rapid, one step test kit (*DiaSpot* ™ HCV, Jakarta) for the qualitative detection of antibodies to HCV in serum/plasma. This kit has relative sensitivity and specificity of > 99.0% and 98.6% respectively, with accuracy of 99.3%. The test strip uses the principle of membrane based immunoassay. The membrane is coated with recombinant HCV antigen on the test line region of each test strip.

Data Analysis: The data generated from this study were presented using descriptive statistics. With SPSS version 13.0 for Windows, CHI square statistical analysis, at 5% level of signiFicance, was used to evaluate whether or not there were associations between the anti-HCV antibody prevalence and the patients' variables. Odds ratio was calculated at 95% confidence interval (CI) for data that satisfy 2 by 2 contingency tables.

RESULTS AND DISCUSSION

Of the 200 apparently healthy patients screened for antibodies to HCV, test results for three of them were invalid. Table 1 shows the studied variables for the 197 patients with valid test results. The ages of these patients range from 1-89 years with 45.9 and 89 years as the mean and modal ages respectively. Approximately, 52% (102 persons) of the screened participants were aged 50 years and above. Female gender accounted for 55.3%

Table 1: Risk factors for anti-HCV antibodies among the tested patients at Federal Medical Centre, Lokoja, 2007

Risk factor	No. tested (%)	No. positive	Percentage positive (%)	p-value/ (OR)
Age (years)				
</= 29	41(20.81)	1	2.40	0.56
30-49	54(27.41)	1	1.90	
>/=50	102(51.78)	5	4.90	
Gender				
female	109(55.33)	5	4.60	0.38/2.60
male	88(44.67)	2	2.30	
Occupation				
health care work	15(7.61)	1	6.70	0.50/2.10
non-health care work	182(92.39)	6	3.30	
History of blood transfusion				
yes	25(12.69)	1	4.00	0.90/1.15
no	172(87.31)	6	3.50	
History of STIs				
yes	22(11.17)	2	9.10	0.14/3.40
no	175(88.83)	5	2.90	
Total	197(100)	7	3.60	

Keys:

STI = sexually transmitted infection

OR = Odds ratio, for only data that satisfied 2 x 2 contingency table

Level of statistical significance is set at $p < 0.05$

(109 females), while 7.6% (15 individuals) of the patients were health care workers. Proportions of the studied patients with histories of having received blood transfusion and having had STIs are 12.7% (25 persons) and 11.2% (22 persons).

Overall, 7 (3.6%) patients tested positive to HCV antibodies; 71.4% (5 seropositive patients) of which were females. The results of the risk factors and seropositivity for anti-HCV antibodies are as shown in Table 1. None of the 5 demographic variables analyzed showed statistical association with anti-HCV antibody prevalence, however, the odds ratio (OR) revealed that female gender, health care work, previous STI and having being transfused with blood put the patients in these categories at higher risk of testing seropositive to HCV antibodies, Table 1. It was gathered during data collection that 25 of the 197 patients visited the health centre to donate blood.

The seroprevalence of 3.6% for HCV observed in this study is below the lower range of 5.8%-12.3% prevalence reported by Halim and Ajayi [37]. It is however, slightly higher than 3.0% (n=366) reported by Ejele *et al.* [38] in Niger Delta, Nigeria and less than 8.4% (n=167) seropositivity documented for blood donors in Lagos [39]. In this study, patients aged 50 years and above had the highest anti-HCV antibody prevalence. This was contrary to observations of Ejele *et al.* [38] and Ayolabi *et al.* [39] who reported highest prevalence of HCV antibodies in the age group 30-39 years, the supposedly sexually active group. In this study age bracket 30-49 years of which age range 30-39 years is a subset had the lowest anti-HCV antibody seropositivity. The reason for this was not immediately apparent, but this was suggestive of the probability of transmission routes other than sexual as mode of acquisition of the HCV among the seropositive patients. There was, however, no statistical association ($p = 0.56$) between age of the patients and prevalence of HCV antibodies.

Contrary to observation of Inyama *et al.* [40], females (4.6%) in this study had higher HCV antibody prevalence than the males (2.3%). This might be due, in part, to higher number of females that enrolled in the study. This observation is consistent with that of Ejele *et al.* [38] that females had higher HCV antibody prevalence than males in Niger Delta, Nigeria. Statistical analysis, however, showed no significant difference ($p = 0.38$) between the prevalence rates of the female and male individuals. Inyama *et al.* [40] and Mustapha *et al.* [41] made similar observations between male and female genders in Nigeria populations. In addition, though among sickle-cell anemic patients, Torres *et al.* [42] also observed no significant gender difference in HCV antibody prevalence in Brazilian population. The odds ratio (OR=2.06, 95% CI: 0.39-10.87), however, revealed that females in this study appeared to have two times likelihood of testing seropositive to HCV antibodies than the males.

Health care work has been identified as a rare risk factor for transmission and acquisition of HCV [43]. In this study, we observed that patients engaged in health care work had higher (6.7%) HCV antibody prevalence compare to those engaged in other occupations combined. While there was no statistical difference ($p = 0.50$) between the HCV antibody prevalence rates in the two groups (Table 1), those patients engaged in health care work were apparently twice (OR=2.10, 95% CI: 0.24-18.52) as likely to test positive to HCV antibody compared to those engaged in non-health care work.

Having sexually transmitted infection is more often than not a risk factor in spread of HCV [44]. Though the prevalence of 9.1% recorded in this study for patients with history of having had STI was higher than that of their counterpart (Table 1), the risk factor was not statistically associated ($p = 0.14$) with prevalence of anti-HCV antibodies. But those individuals with history of STI appeared to be at more than 3 times (OR = 3.40, 95% CI: 0.62-18.69) greater risk of being seropositive for HCV antibodies compared to those without such history.

Blood transfusion is a chief risk factor for contracting HCV [45]. But this study observed that of the twenty five (12.7%) tested patients with history of having received blood transfusion, only 1 (4.0%) tested positive to anti-HCV antibodies. The prevalence of HCV antibodies was however, not statistically associated ($p = 0.90$) with history of blood transfusion in this study. In addition, those with and without this history appeared equally likely (OR = 1.15, 95% CI: 0.13-9.10) to test positive to HCV antibodies. We observed that of the 25 intending blood donors that participated in this study, 1 tested seropositive for HCV antibody. The patient was consequently advised not to donate blood and referred for further test.

The observations that age, gender, history of blood transfusion and history of having previously suffered STI were apparently not statistically associated with HCV antibody prevalence in this study correspond with those made by Tess *et al.* [45] in Northwestern Tanzania. In addition, we observed here that the variable-occupation also appeared not associated with HCV antibody prevalence among the studied group.

One shortcoming observed in this study is the somewhat smaller sample size; future study with larger sample size might reveal different observations. Conclusively, this study has been able to add to the knowledge of HCV antibodies prevalence in Lokoja, Kogi State, Nigeria. It also revealed that the studied risk factors were apparently not statistically associated with the prevalence rate. The screening of all intending blood donors for HCV antibodies should be scaled up to detect anyone with such viral infection prior to blood donation. Though HCV infection can be treated using a combination of polyethylene glycol-conjugated alpha interferon and ribavirin, the success rates are limited and the outcome of therapy is very dependent on the genotype of the infecting virus [46, 47]. Therefore, until prophylaxis i.e. vaccine is hopefully developed following successful *in vitro* culture of infectious HCV [48] behavioral attitudes that will lessen the risk of contracting HCV are recommended for the general population.

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