

Screening Response to Hepatitis C Virus Antibodies among Diabetic Patients Attending UITH Nigeria

¹J.A. Ndako, ²O.O. Nwankiti, ³C.O. Okeke, ³A.M. Adekeye, ⁴T.P. Choji,
⁴M.U. Alesa and ⁵A.J. Alarape

¹Department of Virology, Federal College of Veterinary and Medical laboratory
Technology, Vom, Nigeria

²Viral Vaccine production Department, National Veterinary
Research Institute, Vom Nigeria

³Department of Haematology and Blood Group Serology, Federal College of Veterinary and
Medical laboratory Technology, Vom, Nigeria

⁴Central Diagnostic Laboratory, National Veterinary Research Institute, Vom Nigeria

⁵Department of Medical Laboratory Sciences., University of Ilorin Teaching Hospital

Abstract: Epidemiological studies have suggested that hepatitis C virus (HCV) infection is a risk factor for the development of diabetes mellitus (DM) type 2; hence this study was carried out to investigate the prevalence of hepatitis C Virus (HCV) among diabetic patients attending University of Ilorin Teaching Hospital (UITH). A total number of one hundred and eighty diabetic patients made up of seventy five males (41.7%) and one hundred and five females (58.3%) were recruited for the study. Structured questionnaire on demographic data and risk factors for HCV was administered to the participants. The sera of all the subjects were assayed for antibodies to HCV using a fourth generation enzyme linked immunosorbent Assay [Forte Diagnostic Limited], All the sera were tested for antibodies to Hepatitis C virus by ELISA method. The overall prevalence of HCV infection among diabetic patients was 5.0%. Of the nine participants' positive for anti-HCV antibodies, three were males (1.7%) while six were females (3.3%). Although more female attended the diabetic clinic, there was no significant difference between HCV infection and sex ($p = 0.603$; $p > 0.05$). The prevalence of HCV infection was highest in the 40-60 age categories. Two of the seropositive individuals had elevated transaminases, with one of the two being an alcoholic consumer. Type 2 diabetes is a debilitating disease condition especially in individuals above 30 years of age, with these scenario it has become very vital for screening exercise to be carried out so as to determine the prevalence rate of HCV among diabetic patient.

Key words: Antibodies, hepatitis c virus, type 2 diabetics

INTRODUCTION

Hepatitis C is an infectious disease caused by hepatitis C virus (HCV). It is a systemic disease primarily involving the liver (Ryan and Ray, 2004). Although HCV was identified as responsible for almost all cases of post-transfusion, non-A, non-B hepatitis (Busch, 2000), it is now recognized to occur more often from causes other than transfusion (Allain, 2000a, b). Primary exposure to HCV leads to acute infection in which only 20-30% of the infected individuals develop clinically evident acute hepatitis (CDC, 2000). Between 75-85% of acute infection progresses to chronic HCV infection. Cirrhosis develops in 10-20% of persons with chronic hepatitis C and hepatocellular carcinoma in 1-5% (CDC, 1998).

Hepatitis C virus infection appears to be endemic in most parts of the world. An estimated 300 million people worldwide are infected with HCV and 3 to 4 million persons are newly infected each year (WHO, 2000). However, there is a considerable geographical variation ranging from 0.01 to 0.1% in the United Kingdom and Scandinavia to 17-26% in Egypt (Hadzie, 2001). Much of the variability between regions can be explained by the frequency and extent to which different risk factors have contributed to the transmission (Wasley and Alter, 2000).

As at year 2000, at least 171 million people worldwide are said to suffer from diabetes. Its incidence is increasing rapidly, and it is estimated that by the year 2030, this number will almost double. The greatest incidence in prevalence is, however, expected to occur in Asia and Africa, where most patients will likely be

found by year 2030 (Wild *et al.*, 2004). Hepatitis C virus infection is associated with increased risk of developing diabetes, previous studies conducted have shown that HCV infection is a risk factor for developing diabetes mellitus (Mehta *et al.*, 2001).

Diabetes is now recognized as one of the extra hepatic manifestation of HCV infection (Noto and Raskin, 2006). Based on available clinical evidence, routine screening test is recommended for HCV in individuals with diabetes and elevated liver enzymes (Alanine aminotransferase (ALT) and Aspartate aminotransferase (AST) (Simo *et al.*, 1996).

The predisposition of hepatitis C virus infection by people of all ages, occupation and sex makes it a global problem especially in developing countries while information on the prevalence of HCV among diabetic patients in Nigeria is still scanty hence, the need to embark on this research to further ascertain the prevalence Hepatitis C virus among diabetics in our location of study.

MATERIALS AND METHODS

Study area and population: The study was conducted at the University of Ilorin Teaching Hospital (UITH), which is a tertiary health institution. Diabetic patients attending University of Ilorin Teaching Hospital were randomly selected and recruited for this study.

Ethical consent: A proposal of the project was submitted to the Ethical Review Committee of the University of Ilorin Teaching Hospital. Where ethical clearance was sought for and obtained.

Questionnaire and sample size: The sample size used in this research work was obtained from 180 volunteers, while those recruited were informed about the study and their consents obtained. Well structured questionnaires were used to collect demographic data and other pertinent information.

Sample collection and processing: Three-Five (3-5) mL of blood was collected from each diabetic patient aseptically. Blood samples were allowed to clot at room temperature undisturbed, thereafter Sera obtained were dispensed into a clean, dry cryovial and stored at -20°C prior use. The sera were screened for antibodies to HCV using ELISA kits (Fortress Diagnostic Limited).

Data analysis: Filled questionnaires were crosschecked manually for correct data entry. The data was analyzed using the SPSS software package, while the critical level for statistical significance was set at $p = 5\%$ (0.05) using the chi-square analysis.

RESULTS

Out of the One hundred and eighty (180) sera samples obtained from confirmed diabetic patients that were screened for evidence of exposure to Hepatitis C virus, male subjects constitutes 75(41.7%) compared to females representing 105(58.3%). The age of the volunteers ranged from 4 to 80 years. The serum samples for 9(5%) diabetic patients were positive for HCV antibodies while 171 samples were negative. Of the 5% sera positive for antibodies to HCV, 3(1.7%) was obtained from the male diabetic patients screened while 6(3.3%) positive sera were from the female subjects. 8(4.4%) of the diabetic patients were less than 40 years of age, 71(39.4%) were between 40 and 60 years, 92(51.1%) were between 60 to 80 years while 9(5%) were 80 years and above. The marital status of the diabetic patients shows that 4(2.2%) were single, 173(96.1%) were married and 3(1.7%) were widows (Table 3). Of the one hundred and eighty diabetic patients, 45(25.0%) had primary education, while 29(16.1%) had secondary education, 46(25.6%) had tertiary education and 60(33.3%) had no formal education. The occupation of the diabetic patients showed that 122(67.8%) were traders, 52(28.9%) were civil servants while 5(2.8%) were industrial workers and 1(0.8%) a student.

Table 1 shows the distribution of IgG antibody among diabetic patients Screened. of the 180 diabetic patients that participated in the study, 9(5%) were positive for IgG HCV antibody.

The Table 2 represents the sex distribution of diabetic patients who participated in this study. A total of 180

Table 1: Total no of subjects screened

	Total no. of subjects screened	No. of positive subjects	No. of negative subjects
Male	75(41.7%)	3(1.7%)	72(40%)
Female	105(58.3%)	6(3.3%)	99(55%)
Total	180 (100%)	9 (5.0%)	171(95%)

Table 2: Prevalence of HCV among diabetics based on sex of subjects screened

HCV	Sex		Total
	Male	Female	
Negative	72.(40%)	99(55.0%)	171
Positive	3(1.70%)	6(3.3%)	9
Total	75(41.7%)	105(58.3%)	180

df : 1; χ^2 : 0.603; $p < 0.05$

Table. 3: Relationship between the marital status of diabetic patients and HCV antibody production

HCV	Marital status			Total
	Single	Married	Widow	
Negative	13	155	3	171
Positive	0	9	0	9
Total	13	164	3	180

df : 2; χ^2 : 0.630; $p < 0.05$

Table 4: Relationship between occupation of the diabetic patients and HCV antibody production

HCV	Occupation				Total
	Trading	civil servant	Industry	Student	
Negative	116	49	5	1	171
Positive	6	3	0	0	9
Total	122	52	5	1	180

df: 3; χ^2 : 0.944; $p < 0.05$

Table 5: Relationship between educational level of diabetic patients and HCV prevalence

HCV	Educational qualification				Total
	Primary	Secondary	Tertiary	No education	
Negative	44	28	43	56	171
Positive	1	1	3	4	9
Total	45	29	46	60	180

df: 3; χ^2 : 0.693; $p < 0.05$

Table 6: Relationship between age in category of diabetic patients and IgG antibody production

HCV	Age in category				Total
	Less than 40 Years	40 – 60 Years	60 -80 Years	80 Years and above	
Negative	80	65	89	9	171
Positive	0	6	3	0	9
Total	8	71	92	9	180

df: 1; χ^2 : 0.330; $p > 0.0$

diabetic patients participated in the study. 75 (41.7%) of them were males while the remaining 105(58.3%) were females.

Table 3 represents the distribution of the diabetic patients by their marital status. Four (2.2%) of the diabetic patients were single, 173(96.1%) were married, while the remaining 3(1.7%) were widow.

Table 4 shows the occupation of the diabetic patients. 122 (67.8%) were traders, 52(28.9%) were civil servants, 5(2.8%) were industrial workers while the remaining diabetic patient (0.5%) was a student.

Twenty-five (25%) had only primary education, 29(16.1%) stopped at secondary education, 46(25.6%) had tertiary education while the remaining 60(33.3%) had no education (Table 5).

The Table 6 shows the age distribution of diabetic patients. Eight of them were less than 40 years, 71 were between 40-60 years, 92 were between 60-80 years while the remaining 9 were 80 years and above.

DISCUSSION

Hepatitis C Virus remains a large health care burden to the world. The incidence rates across the world fluctuates and difficult to ascertain given the asymptomatic, often latent nature of the disease prior to clinical presentation. This study was carried out primarily to determine the seroprevalence of antibodies to HCV in diabetic subjects. Although HCV infection does not

automatically leads to diabetes, it is a precipitating factor to the disease in individuals with risk factors to develop such. This fact makes this study important.

Overall, 5% of the diabetes patients that participated in this study were positive for anti-HCV antibodies. The result obtained from this study is comparable with the work done in the Niger Delta Region by Ejele *et al.* (2005) in which the prevalence of HCV among the diabetic patients was found to be 3.0%. However, the finding in this study is at variance with the prevalence of 11.0% obtained in Jos (Ndako *et al.*, 2009), 14.0% obtained in Enugu (Nwokediuko and Oli, 2008) and 0.0% reported in Ibadan (Balogun *et al.*, 2006). The different prevalence results obtained from the different parts of the country shows geographical variation. Variability in the regions may be explained by the frequency and extent to which risk factors have contributed to the transmission of HCV.

Results of studies carried out in other parts of the world also show variation in the prevalence of HCV among diabetic patients. A study conducted in Spain reported a prevalence of 11.5% (Simo *et al.*, 1996). In France, Rudoni *et al.* (1999) reported a prevalence of 3%.

Diabetes as a disease affects both the male and female gender. The sex distribution of the diabetic patients in this study showed that more women attend diabetic clinic than men (Table 2). This corroborates an earlier report by Wild *et al.* (2004) that there are more women diabetics than men. Some of the men who are diabetic might have refused to show up at the clinic may be because they consider it as a time wasting exercise.

In this study, there were more female diabetic patients positive for anti-HCV antibodies than their male counterparts. Although the prevalence of hepatitis C virus in the males and females were 3.8 and 5.7%, respectively, there was no significant difference in sex (Table 1). The result obtained in this study agrees with the result of a study carried out in Jos (Ndako *et al.*, 2009) in which males had a prevalence of 4.7% compared to females with 6.3%.

The demographic data collected from the subjects enrolled for this study showed that subjects positive for antibodies to HCV belong to the 40-60 years and 60-80 years age category. 6(66.7%) out of the nine subjects with positive result belong to the 40-60 years age categories while the remaining 3(33.3%) belong to the 60-80years group. This is in agreement with the result of study conducted by Ndako *et al.* (2009) in which the age group 47-57 years recorded highest prevalence for HCV. The demographic data of the participants in this study showed that all had type-2diabetes except one participant who is a 4 years old had type-1 diabetes. It was observed that older patients were more likely to have HCV infection as compared to those in the younger age groups Mehta *et al.* (2001). The high seropositivity recorded among older age

group subjects may be largely due to parenteral exposures as compared to younger subjects hence greater chances of transmission of infection.

The result of the liver function tests carried out on the diabetic patients showed that fifty eight of them had elevated alanine transaminase and aspartate Transaminase, out of these two of the participants seropositive for anti-HCV antibodies recorded an elevated alanine transaminase and aspartate Transaminase. It has been suggested that individuals with diabetes and elevated ALT and AST be tested for HCV infection (Simo *et al.*, 1996). The two diabetic patients who were seropositive and had elevated ALT and AST both belong to the 40-60 year age category.

Considering the age of these diabetic patients with hepatitis C infection, there is the tendency for them to develop either liver cirrhosis or hepatocellular carcinoma. It was observed that one of these two individuals with elevated aminotransferases was a long time alcohol consumer. This may increase his chance of developing either cirrhosis of the liver or hepatocellular carcinoma as factors influencing the rate of progression of chronic hepatitis C to cirrhosis and liver cancer include alcohol abuse (Lavanchy, 1999).

The fact that some of the diabetic patients who had hepatitis infection had no elevated ALT and AST may suggest that some were in the acute phase of the infection (Cox *et al.*, 2005).

Although religion appears not to have a direct link with HCV infection, it has influence on the type of lifestyle and cultural practices people take to. In this study, those who practice Islam were more than those that practice Christianity, this maybe the reason why the number of subject who practices polygamy was high. There was no significant difference between religion and Hepatitis C virus infection ($p = 0.584$; $p > 0.05$).

The result obtained in this study showed that sexual intercourse does not serve as a major route for the transmission of hepatitis C virus. Both marital status and marital practice gave no significant difference with hepatitis C. However, it was observed that the prevalence of HCV was higher among those sero-positive subjects who practice polygamy (55.6%) than in sero-positive subjects that practice monogamy (44.4%). This agrees with the finding that the risk of infection with HCV increases noticeably with an HCV-infected individual with multiple sex partners (Lavanchy, 1999). Although the reason behind this discrepancy are not known, but the frequency of sexual contacts is likely to be one factor.

Since HCV is a blood-borne virus, the transfusion of blood and blood products are potential source of transmission, however transfusion was not a main possible cause of infection for the diabetic patient who were seropositive for HCV in this study. Only one of the participants had a history of previous transfusion with only a pint of blood, while none of the spouse had been

transfused before the study, observation made from this study was that no significant difference exists between blood transfusion and HCV infection this agrees with the work done by Simo *et al.* (1996). Although none of the seropositive individuals in this study had donated blood before, it is to be noted that they remain a potential source of HCV transmission through blood donation.

There is a significant association between hepatitis C virus and type 2 diabetes from the findings of this research; this might be attributed to transfusion of unscreened blood in hospitals, parenteral exposures of diabetes patients as a result of self medication and other possible unidentified routes of transmission which can only be explored through further studies. There is also the need to educate the populace on the dangers of the co-infection of HCV and diabetes while Medical/health practitioners carryout proper enlightenment on this co infectious agent, in conclusion therefore our studies showed that there exists a positive relationship between HCV infection and type II diabetes mellitus and the facts that most of the seropositive subjects had diabetes for 5 years or of lesser duration yet showed evidence of chronic liver disease is probably an indication that diabetes might be one of the many extra hepatic manifestations of HCV infection. The presence of raised serum Alanine Amino Transaminase (ALT) levels in diabetic subjects should also be considered as an indication for further investigations of chronic liver disease especially in HCV infection.

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