Original Article

PRESENCE OF HEPATITIS C VIRUS INFECTION AMONG DIABATIC PATIENTS IN FAISALABAD, PAKISTAN

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ABSTRACT

Introduction:

Patients with chronic hepatitis C virus (HCV) infection have a significantly increased prevalence of Type 2 Diabetes Mellitus (DM) compared to controls or HBV patients, independent of the presence of cirrhosis. Moreover, antecedent HCV infection markedly increases the risk of developing DM in susceptible subjects. Even non-diabetic patients have insulin resistance and specific defects in the insulin signaling pathways.

Subjects and Methods:

It was cross-sectional study carried out in different hospitals of Faisalabad. Blood from 154 patients with Diabetes Mellitus attending Out Patients clinic was tested for anti HCV antibodies using a commercial second generation enzyme linked immunosorbent assay (ELISA).

Results:

Out of 154 diabetic patients, 18.83% (n=29) were positive for anti HCV antibody. The highest prevalence of anti HCV antibody was seen in the age group 41-50 years (29.26)%. The prevalence of HCV was 22.47% among female diabetic patients as compared to 13.84% in male patients.

Conclusion:

The prevalence of HCV infection among diabetic population of Faisalabad is very high, 2-3 times of normal healthy population as reported by Pakistan Medical Research Council (PMRC).

Keywords: HCV antibodies, diabetes mellitus

INTRODUCTION

Infection with hepatitis C virus (HCV) is a common problem worldwide, affecting millions of people. Acutely infected patients develop chronic hepatitis and become a potential source of virus transmission as many as 1 in 5 will develop cirrhosis and its complications[1,2]. In addition, HCV is increasingly recognized as an important cause of extra hepatic manifestations. Mixed cryoglobulinemia, has been reported in up to half of patients with chronic hepatitis C[3], although clinically important disease is for less common. Recent data shows that HCV infection is also a significant risk factor for the development of diabetes (T2DM)[4-10]. The association may be second in prevalence only to cryoglobulinemia, with intrigoing pathogenesis and implications, but it is poorly recognized. Glucose intolerance is very common in liver cirrhosis of whatever etiology, and ~20% of patients have overt diabetes[11]. When cirrhosis is HCV related, the risk of diabetes is higher[4,5] and post transplantation diabetes is also significantly more common in patients whose liver failure was secondary to HCV[6,7].

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MATERIALS AND METHODS

Diabetic patients attending the out patient clinics were screened for the presence or absence of Anti HCV antibodies. A second generation enzyme-linked immunosorbent assay was used.

After written consent, blood from 154 patients was taken. Before taking blood, patients were enquired about history of previous jaundice, or liver disease. Hence patients with known liver disease were excluded from the study. After screening results were explained to patients. All findings were recorded in a questionnaire form.

RESULTS

Of the 154 patients tested, 89 (57.8%) were females and 65 (42.2%) were males. Age ranged from 20-80 years. 29.26% of the patients had age range of 41-50 years, 22.22% were in age range of 51-60 years while 19.14% were in the age group of 31-40 years. Nearly all the patients had body mass indexes of more than 26.

The overall prevalence of HCV antibody was 18.83% (n=29/154). As is evident from Table 1, the peak age for the prevalence of HIV infection was found in the age range of 41-50 years (24-26%), followed by age group 51-60 years (22.22%). Highest prevalence ranged (76%) between the group 31-60, the most common age group for T2DM.

Table 1. Prevalence of HCV antibody in various age groups of diabetes

Age group (years)	No. screened	No. positive	*%age positive*
11–20	5	0	*0.00*
21–30	25	1	*04.00*
31–40	47	9	*19.14*
41–50	41	12	*29.26*
51–60	27	6	*22.26*
61–80	9	1	*11.11*
Total	*154*	*29*	*18.83*

When the results were analyzed on the basis of gender, statistically significant differences were found, as shown in Table 2.

Table 2

Gender	No. of patients	No. of positive	%age positive
Male	65	9	13.84
Female	89	20	22.47
Total	154	29	18.83

The prevalence of HCV was 22.47% in female diabetics as compared to 13.84% of male diabetics. The mean age for female patients was 42 years. The mean age of male HCV negative patients was 43, while HCV positive diabetic male had a mean age of 45 years.

DISCUSSION

The result of this study have highlighted that HCV infection is more common in diabetics as compared to the healthy general population. The prevalence rate of HCV infection among diabetic patients appeared to be 18.83% in this study. Though we did not check the prevalence of HCV infection in healthy general population during this study, but we can compare the results of this study with many other studies that have been reported in the past to estimate the prevalence of HCV infection among the healthy general population of the area. Pakistan Medical Research Council (PMRC) conducted a major survey in 2009 to estimate the prevalence of HCV infection[12]. The prevalence of anti HCV antibody in healthy general population was found to be 4.9% in Pakistan and 6.7% in Punjab, while many other studies have estimated it to be between 5 to 10%.

So if we compare the results of this study, with previous studies, we can see statistically significant difference in the prevalence of HCV infection in diabetic patients (18.83%) as compared to healthy general population (5-10%), although we consider that the sample size of this study was small and we need further large scale studies to confirm the results of this study.

Since the hepatitis C virus was identified, numerous epidemiological studies have reported a higher prevalence of type 2 diabetes mellitus in subjects infected by HCV[13-15]. Although the initial associations of diabetes and liver disease were made in subjects with advanced liver disease[6,13-15], more recent reports have described an increase in type 2 diabetes mellitus before the development of liver cirrhosis[7]. Furthermore, the epidemiological link has been established between type 2 diabetes and HCV infection, rather than other causes of liver diseases, such as hepatitis B viral infection and alcohol

abuse[16]. The increase in the number of cases of type 2 diabetes mellitus among people infected by HCV has been reported to be as much as four times higher than in the general population in some studies[7]. Other factors, such as obesity, which is characterized by a high body mass index, advanced age and family history of diabetes, are also associated with the higher incidence of diabetes in the HCV infected patients[18-20]. However, it is tempting to speculate that the HCV infection is able to trigger autoimmune mechanisms against the insulin producing pancreatic beta cells in susceptible individual.

The mechanism through which HCV infection increases the risk of diabetes are not very clear, but considerable evidence suggests that effects of viral proteins on cellular processes involved in hepatic lipid steatosis, insulin, resistance, and impaired insulin secretion might be associated with the development of diabetes[21-24]. Insulin resistance was recently confirmed in an experiment using a transgenic mouse model with a HCV core gene[25]. The experiment showed elevated insulin levels, a loss of glucose tolerance, and the development of over diabetes after a high fat challenge. In the current study, participants were over weight or obese. These subjects of individuals with an additional risk factor are liable to become more easily diabetic. It implies that anti-HCV positive persons who are over weight or obese will exacerbate their insulin resistance and enhance the progression to diabetes. Moreover, defective insulin inhibition of hepatic glucose production, a high level of elevated tumor necrosis factor (TNF), which is known to inhibit insulin receptor substrates-I phosphorylation; and insulin sensitivity restored by administration of anti-tumor necrosis factor-antibody were also confirmed[25] An other study[26] showed that HCV is present in human pancreatic cells and has a direct cytopathic effect at the islet cell, accompanied by morphologic changes and functional defect in insulin secretion. Whether the hepatic inflammatory status, hepatic histological stage, genotype of HCV, response to antiviral treatment of other factors influence anti HCV positive person to develop diabetes is not clear and require further study.

Limitation

This study has some limitations. First, HCV RNA was not tested to evaluate the relation between actual viral status and past infection, second, prevalence of HCV in non diabetic Faisalabad population was not checked, and thirdly, other risk factors for diabetes, such as family history and physical activity etc. were not studied.

CONCLUSIONS

The HCV-diabetes association represents a major public health problem. Hundreds of thousands of patients are affected globally, and many more have impaired glucose tolerance. Diabetes related micro and macro vascular complications are likely, and the ongoing hepatic inflammatory response may contribute to other genesis. Furthermore, a putative bidirect anal relationship between HCV-induced liver disease and diabetes may occur.

On the basis of this study, we strongly recommend screening of all diabetics for HCV and their hepatic status, and treatment.

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