

# Association of Hepatitis C with Diabetes Mellitus in DHQ Hospital Gujranawala

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## ABSTRACT

**Background:** Chronic hepatitis C virus (HCV) is becoming a very common problem worldwide with millions of people being reported as infected. At the same time diabetes is also a major health problem spreading like jungle fire. It is being estimated that it will become a pandemic by 2030.

**Aim:** To estimate the prevalence of HCV infection in patients with type II diabetes.

**Methodology:** A case control study was conducted at DHQ hospital Gujranawala from January to June 2015. A total of 510 study subjects were enrolled. Biodata and other information was collected by questionnaire. HCV antibody test was done by ELISA.

**Results:** The prevalence of HCV in type II diabetes and nondiabetic controls was 10.5% and 4.3%, respectively indicating that diabetics are more likely to be seropositive for hepatitis C (CI: 95%).

**Conclusion:** In this study, we found evidence of association between HCV and type II diabetes. As we did not perform HCV RNA test, we could not assess the association with HCV viremia.

**Keywords:** HCV, antibodies, diabetes mellitus

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## INTRODUCTION

It has long been speculated that hepatitis C virus can lead to deranged glucose metabolism and to insulin resistance. Therefore such individuals are prone to develop diabetes mellitus<sup>1,2</sup>. Although mechanism that how hepatitis C causes deranged glucose metabolism is not clear, it may involve autoimmune pancreatic beta cell destruction<sup>3,6</sup>. Prevalence for diabetes is 12.4% in US while hepatitis C is effecting 3% of the population worldwide<sup>8,9,10</sup>. There are many studies that suggest that two diseases are co related<sup>11,12,13</sup> and hepatitis C can predispose to the development of type 2 diabetes mellitus. However effects of diabetes on the severity of hepatitis C are unknown<sup>14,15</sup>. Diabetes could cause liver disease because it can lead to accumulation of glycogen and fat droplets in liver and can also lead to peri-sinusoidal fibrosis causing ultimately liver cirrhosis (16). In 25 to 75% cases diabetes is also cause of nonalcoholic steatohepatitis (NASH), leading to the cirrhosis of liver<sup>7,18</sup>. Likewise hepatitis C infection co existing with diabetes is a precursor to the cirrhosis of liver in its own right. As already described that there are many studies showing association between diabetes and hepatitis infection however the results are conflicting<sup>19,20</sup>.

This study is designed to determine and evaluate the prevalence of anti-HCV antibody among diabetic patients visiting DHQ hospital Gujranawala to see the burden and association of both diseases in the patient population.

## MATERIALS AND METHODS

A case control study was conducted in DHQ hospital Gujranawala. Cases were known diabetic patients and newly diagnosed diabetic patients in the outpatient department. Controls were non diabetic volunteers with fasting blood sugar < 100 mg/dl or random blood sugar < 126 mg/dl, non-hypertensive, and with no liver disease. 260 diabetic and 250 controls were enrolled after taking consent from the patients. Both cases and controls were subjected to similar tests including detection of anti HCV antibody by ELISA, LFTS and cholesterol levels. Results were analyzed by SPSS version 17. For quantitative data unpaired t-test was employed to compute the mean values of AST, ALT, and cholesterol from cases and controls. P value < 0.05 were taken as statistically significant.

## RESULTS

In this study, there were a total of 510 participants (260 subjects with diabetics and 250 non diabetic controls). Of the diabetic subjects, 166 (63.8%) were males and the rest 94 (36.2%) were females. On the other hand, 180 (72%) males and 70 (28%) females were included from non-diabetic controls. There was no significant difference in sex distribution among

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diabetic patients and their non-diabetic controls. If we see study participant's nature of the work, 54.3% of diabetics and 75% of non-diabetic controls had non sedentary nature of work. This non sedentary nature of work is protective for diabetes.

The prevalence of HCV in diabetes and non-diabetic controls was found out to be 10.8% and 2.3%, respectively. There was statistically significant difference in distribution of HCV among diabetic and non-diabetic controls. In LFTs, the mean difference in AST levels between diabetic and non-diabetic controls was 1.58U/L which is statistically significant (95% CI:(0.092-3.03). However the mean difference in ALT levels between diabetics and non-diabetics was 0.50U/L which was statistically not significant (95% CI: (-1.783-2.83). The difference in mean cholesterol levels between diabetics and non-diabetics was 66.44mg/dl which was significant statistically (95% CI:( 49.33-81.34).

## DISCUSSION

In this study, we set detection of anti HCV antibody as the criterion for the diagnosis of hepatitis C infection.

In this study we found high prevalence of HCV antibodies in diabetics. Results were in agreement with many study reports from various quarters of the world. In 2008, a meta-analysis of observational studies showed the risk of type 2 diabetes mellitus in patients infected with hepatitis C. This indicated significant DM risk in HCV-infected cases compared with non-infected controls in both retrospective (adjusted OR=1.68, 95% CI 1.15–2.20) and prospective (adjusted HR=1.67, 95% CI 1.28–2.06) studies<sup>21</sup>. In another study, Simo, R. and his coworkers observed that type 2 diabetic patients were almost five times more vulnerable to have hepatitis C antibodies than controls<sup>22</sup>. In addition Hua-Fen et al 2006 and Chong-Shan et al 2003, Mehta et al 2000, and Andrea et al 2003 in USA also found out a significant association between HCV and diabetes<sup>20,21,22,23,24,25,26</sup>. However it is not possible to find out the exact cause of this increased prevalence of HCV in diabetic patients. But there are various theories presently proposed to explain this association. In first, because of increased usage of insulin injections, there are more chances of transmission of hepatitis C virus through finger pricks whose chances also increase proportionately. Depressed immune system in diabetes mellitus may be the other reason, which does increase the vulnerability of diabetics for hepatitis C infection. In type 2 diabetes mellitus there is insulin resistance as well, leading to increased hepatic production of glucose. Type 2 DM also leads to decreased insulin

secretion. All these reasons contribute to the development of hyperglycemia<sup>27,28</sup>. It has also been suggested by few studies, that HCV replication may be favored by increased levels of insulin and/or the increased serum levels of free fatty acids, which are there in patients with increased insulin resistance and type 2 diabetes mellitus<sup>29,20</sup>. Other possibilities may include the direct and/or indirect effect of HCV infection on glucose metabolism. In humans with chronic hepatitis C (CHC) infection, it has been shown that insulin signaling in the liver is altered by defects in IRS-1 tyrosine phosphorylation and phosphatidylinositol 3 kinase activation, thus possibly contributing to the insulin resistance<sup>31</sup>. It is also suggested that the proinflammatory cytokine TNF- $\alpha$  may mediate this process. TNF- $\alpha$  is upregulated in patients with chronic hepatitis C (CHC) and this cytokine has been shown to interrupt insulin signaling protein. When treated with anti-TNF- $\alpha$ , insulin sensitivity significantly improves<sup>32,22</sup>. There are however some studies whose results are not in agreement with our conclusions. Naoufel et al., 2009 in Tunisia and Luce Marina et al., 2008 from Brazil in their studies showed no statistically significant association between HCV and diabetes. Gulcan et al., 2008, Williams et al., 2006 and Sotiropoulos et al., 2001 also could not provide any convincing evidence of this association ( $P > 0.05$ )<sup>17,34-37</sup>. The reason for these different results may be 1) small sample size in these studies and 2) different genotypes of HCV with different predilections for diabetes<sup>38</sup>.

## CONCLUSION

In this study, it is indicated that there is a positive association between HCV infection and diabetes mellitus. Since we did not use HCV RNA, we could not say that HCV infection is a risk for development of diabetes. We further recommend use of HCV RNA test for a study designed with prospective cohort to be conducted for better understanding about the role of HCV as being a risk factor for diabetes type II.

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