

# Seroprevalence of hepatitis C infection in type 2 diabetes mellitus

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### ABSTRACT

**Introduction:** Hepatitis C is an emerging disease with different studies showing varying prevalence rates across India. In several studies, prevalence of hepatitis C infection was found to be higher in diabetics than nondiabetics. However, none has been reported from India. **Objectives:** The aim was to determine the sero-prevalence of hepatitis C infection in type 2 diabetes mellitus (T2DM). **Settings and Design:** Cross-sectional study of all T2DM patients attending endocrine clinic in Regional Institute of Medical Sciences, Imphal from October 2011 to September 2013. **Subjects and Methods:** All T2DM patients included and exclusion criteria are patients with other forms of diabetes, liver failure, renal failure, malignancy or other chronic illness. Patient's age, sex, height, weight, body mass index, history of risk factors, etc., collected and investigated for blood glucose fasting and prandial levels, transaminases levels, hepatitis C virus (HCV) screening, etc., **Statistical Analysis:** Statistical analysis was performed using Statistical Package for the Social Sciences version 20; appropriate test used where applicable. **Results:** Out of the 192 T2DM patients screened, prevalence rate of HCV sero-positivity is found to be 5.7% (11/192), higher in males. History of jaundice in the past was the only significant history among sero-positive patients. Transaminases levels are significantly higher in sero-positive cases. They had higher fasting and postprandial blood glucose, fasting glucose levels being significantly higher. **Conclusion:** Our study shows a slightly higher prevalence of hepatitis C infection in type 2 diabetics.

**Key words:** Alanine transaminases, aspartate transaminases, hepatitis C virus, type 2 diabetes mellitus

## INTRODUCTION

Hepatitis C virus (HCV) infection is one of the leading causes of chronic liver disease with a global prevalence rate of around 3%.<sup>[1]</sup> Many studies have shown that HCV-infected patients tend to develop diabetes,<sup>[2,3]</sup> reason attributed to insulin resistance.<sup>[4]</sup> Interestingly, some studies have also shown that the prevalence of HCV infection in diabetics is much higher compared with the normal population.<sup>[5-7]</sup> There is no report from India. Hence, the aim of this study was to find out the sero-prevalence rate of HCV infection among type 2 diabetes mellitus (T2DM) patients with a

secondary goal to compare the biochemical changes among diabetics with HCV sero-positive and negative.

## SUBJECTS AND METHODS

This cross-sectional study was carried out at a medical institute. All T2DM patients with no history of previous HCV infection attending the Endocrine clinic were included. Anthropometric parameters, duration of diabetes, history of risk factors to HCV infection (jaundice, blood transfusion, high risk sexual behavior, intravenous drug abuse, and surgical procedures) were recorded. Plasma glucose was estimated by the glucose oxidase phenol 4-aminoantipyrine peroxidase kit (enzymatic colorimetric test) with RANDOX auto analyzer manufactured by Randox Laboratories, London, U.K. Alanine transaminases (ALT) and aspartate transaminases (AST) levels were estimated by ultraviolet kinetic inverse spectrophotometric single step method using RANDOX auto analyzer. Glycosylated hemoglobin (HbA1c) was estimated by high-performance

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liquid chromatography using G8 Analyzer, manufactured by Tosoh Bioscience, Tessenderlo, Belgium. HCV antibody screening was done by rapid immunochromatographic test using Bioline HCV kit manufactured by Bio Standard Diagnostics private Limited, Gurgaon, India. HCV RNA and HCV Genotyping was advised for patients with positive anti-HCV antibody and advised to attend Gastroenterology Clinic, RIMS for further assessment. The data was analyzed using Statistical Package for the Social Sciences software v20 and descriptive statistic such as percentage and proportion and appropriate significance test such as Fisher's exact test, Chi-square test was used for analysis wherever applicable.

## RESULTS

A total of 192 T2DM patients were screened, and their characteristics are given in Table 1. The prevalence rate of HCV positivity among T2DM patients in the study is found to be 5.7% (11/192). Maximum positivity rate was seen among male patients and all were in the age group of 40–59 years. Among the risk factors for HCV infection, only history of jaundice in the past was significant, however the cause could not be ascertained. Higher number of sero-positives had elevated transaminases compared with sero-negatives [Table 2].

Sero-positive patients had higher fasting and postprandial blood glucose (fasting blood glucose [FBG] and postprandial glucose [PPBG]) means, of which the FBG levels was significantly higher but the PPBG level was not significantly different. Among the 122 patients who had their HbA1c estimated, no significant difference was found between the sero-positive and sero-negatives. Transaminases levels, were however more significantly elevated in the sero-positive group ( $P = 0.000$ ) [Table 3].

## DISCUSSION

The present study found a slightly higher prevalence rate of 5.7% among T2DM when compared to the global prevalence rate of around three percent in the general population.<sup>[1]</sup> The sero-prevalence in this study is much higher compared to the prevalence of 1.52% among 39,395 apparently healthy blood donors from Manipur.<sup>[8]</sup>

Simó *et al.*,<sup>[5]</sup> study was one of the earliest to demonstrate that prevalence of HCV infection was higher in diabetics than control subjects (11.5% vs. 2.5%;  $P < 0.001$ ) who are matched for main risk factors. Even though Gray *et al.*,<sup>[6]</sup> was the first to show a higher prevalence of HCV infection in T2DM patients (8% in Asian patients), the study was only done on patients with persistently elevated ALT over a period

**Table 1: Characteristics of the patients in the study (total number (n)=192)**

	(%)
Age	52.11±11.04
Sex	
Male	118 (61.5)
Female	74 (38.5)
Duration of diabetes	67.40±68.04
BMI	24.80±3.79
Treatment history	
Diet	4 (2.1)
OHA	118 (61.5)
Insulin	56 (29.2)
Dual (insulin+OHA)	13 (6.8)
History of risk factors	
Surgery	
Yes	74 (38.5)
No	118 (61.5)
Blood transfusion	
Yes	18 (9.4)
No	174 (90.6)
Jaundice	
Yes	18 (9.4)
No	174 (90.6)
Intra-venous drug usage	
Yes	3 (1.6)
No	189 (98.4)
Multiple sexual partners	
Yes	2 (1.0)
No	190 (99)
History of alcohol consumption	
Yes	36 (18.8)
No	120 (62.5)
Stopped	36 (18.8)
FBG (mg/dl)	159.17±75.31
PBG (mg/dl)	267.14±114.53
HbA1c	8.32±2.42

BMI: Body mass index, FBG: Fasting blood glucose, PBG: Postprandial blood glucose, OHA: Oral hypoglycemic agents, HbA1c: Glycated hemoglobin

of 3 years. Studies done by Mason *et al.*,<sup>[7]</sup> showed a prevalence rate of 4.3% among diabetics. There are also studies much lower low prevalence of HCV infection in diabetics.<sup>[9,10]</sup>

The reason for this high prevalence rate is not known, though factors like intravenous drug abuse, multiple sex partners was associated with HCV infection, inference could not be drawn due to low number of patients with these risk factors. History pertaining to risk factors such as intravenous drug usage and multiple sex partners might have been under-reported. History of jaundice in the past was significant for HCV infection but we cannot conclude whether the patient had HCV infection first, before the onset of DM, or after, as these patients have never been screened for HCV infection before. History of surgical procedures and blood transfusions was not significant in our study that goes against other studies that have hypothesized these risks factors as one of the possible cause of acquiring HCV patients in diabetics.<sup>[5,6,10]</sup> Cadranel *et al.*, suggested a nosocomial cause for the increased

**Table 2: Comparisons of hepatitis C positive and negative type 2 DM patients**

	Number (%)		P
	HCV Ab-ve	HCV Ab+ve	
Sex			
Female	73 (38.0)	1 (0.5)	0.053*
Male	108 (56.2)	10 (5.2)	
Total	181 (94.3)	11 (5.7)	
Age groups (years)			
<40	24	0	
40-59	108	11	
≥60	49	0	
BMI			
Low	9	2	0.190*
Normal	87	5	
High	85	4	
History of risk factor			
Surgery			
Yes	71	3	0.535*
No	110	8	
Blood transfusion			
Yes	15	3	0.071*
No	166	8	
Jaundice			
Yes	13	5	0.001*
No	168	6	
Intravenous drug usage			
Yes	0	3	
No	181	8	
Multiple sex partners			
Yes	0	2	
No	181	9	
Transaminases			
AST levels			
Normal	127	1	0.000*
Elevated	54	10	
ALT levels			
Normal	119	1	0.000*
Elevated	62	10	

\*Fisher's exact test. DM: Diabetes mellitus, HCV Ab: Hepatitis C virus antibody, AST: Aspartate transaminases, ALT: Alanine transaminases, BMI: Body mass index

**Table 3: Comparison of the biochemical profiles of HCV serology negative and positive type 2 DM patients**

	HCV Ab-ve		HCV Ab+ve		P
	Number	Mean	Number	Mean	
FBG	181	157.22±73.10	11	191.36±104.57	0.004
PPBG	181	263.85±112.97	11	321.36±132	0.682
HbA1c (n=122)	115	8.36±2.38	7	7.7±3.08	0.741
AST level	181	40.04±26.99	11	115.64±66.38	0.000
ALT level	181	49.75±38.67	11	139.09±63.40	0.000

DM: Diabetes mellitus, FBG: Fasting blood glucose, PPBG: Postprandial blood glucose, AST: Aspartate transaminases, ALT: Alanine transaminases, HbA1c: Glycated hemoglobin, HCV: Hepatitis C virus, HCV Ab: Hepatitis C virus antibody

prevalence of HCV infection in diabetics, with a history of blood transfusion before 1991 and frequent hospital admissions >2 as significant risk factors.<sup>[11]</sup>

The mean FBG among the diabetics who were sero-positive positive was significantly higher when compared to

sero-negatives. Caronia *et al.*,<sup>[12]</sup> showed that the fasting insulin levels in patients with HCV-related cirrhosis and diabetes was high and pointed to insulin resistance. As we did not assess the severity of liver damage in these patients who tested positive, conclusion could not be made.

The transaminases level among sero-positives was three times higher than sero-negatives. Though transaminase elevation can be seen among type 2 diabetics, elevation of transaminases by around ≥3 times in diabetics warrants a screening for HCV infection.

Limitation of the study is that Viral RNA was assessed in only five patients; all were positive for HCV RNA; three had genotype 1 and two had genotype 3. Liver histology was also not assessed.

## CONCLUSION

There is a higher prevalence of HCV sero-positivity among patients with type 2 diabetes compared to the general population. It is not certain from this study whether type 2 diabetes predisposes to HCV infection, or the sero-positive cases were already infected and develop diabetes later on. However, it is seen that type 2 diabetics who have more than three times elevation in transaminases have a higher prevalence of HCV sero-positivity.

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