



TO STUDY PREVALENCE OF T2DM IN HCV RELATED CLD AND NON HCV RELATED CLD

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ABSTRACT Patients with liver disease are known to have a higher prevalence of glucose intolerance. Preliminary studies suggest that hepatitis C virus (HCV) infection may be an additional risk factor for the occurrence of type 2 diabetes mellitus. The study was aimed to investigate type 2 diabetes mellitus in hepatitis C virus related Chronic Liver Disease.

MATERIAL AND METHODS: This cross sectional study was conducted at K.P.S. Post Graduate Institute of medicine, GSVM medical college, Kanpur from January 2019 to October 2020. Chronic liver disease patients who were older than 18 years were included. Basic demographic data collected by questionnaire and laboratory investigations including fasting and post prandial blood glucose levels, ultrasound whole abdomen, liver function tests were done. Multiple statistical tests were applied to analyze data.

RESULT: A total of 99 patients with chronic liver disease patients were taken; Mean HbA1c (%) of HCV population and non HCV population were (6.37±1.34) and (4.69±0.70) respectively with significant p value (<0.001). Mean blood sugar fasting in HCV population and non HCV population were (108.02±25.80) and (87.12±13.58) respectively with significant p value (<0.001) Mean blood sugar post prandial in HCV population and non HCV population were (154.49±43.22) and (125.25±18.72) respectively with significant p value (<0.001).

CONCLUSION: The study concludes that type 2 diabetes mellitus was found more in HCV related CLD with HbA1c in diabetic range.

KEYWORDS :**1. INTRODUCTION**

Hepatitis C virus (HCV) has been identified as one of the important cause of chronic liver disease[1]. Chronic hepatitis C infection though affects liver mainly but also cause extrahepatic manifestations including sialadenitis, cryoglobulinemia, porphyria cutanea tarda and glomerulonephritis [2,3]. Also type 2 diabetes mellitus has been observed to occur in HCV related CLD. Diabetes mellitus is a chronic metabolic disease causing abnormal glucose homeostasis [4]. HCV infection is a contributing factor to the development of diabetes, and higher prevalence of type 2 diabetes mellitus has been observed with HCV infection than in HCV negative patients [5–8]. Allison et al. (1994) first time observed association between HCV infection and diabetes mellitus[9].

There are multiple mechanisms proposed for the development of diabetes in HCV related CLD patient like interference with insulin signaling pathway in hepatocytes, production of cytokines such as TNF alpha and IL-6 with increasing oxidative stress [10,11]. Here we conducted a cross sectional study to find the outcome of diabetes mellitus in HCV positive CLD patient using parameters like HbA1c, BSF and PPBS as per the criteria set by American diabetes association for diagnosis of diabetes mellitus.

- Blood sugar fasting ≥ 126 mg/dL
- Post prandial blood glucose ≥ 200 mg/dL
- Hemoglobin A1c (HbA1c) level of $\geq 6.5\%$

2. AIMS AND OBJECTIVES

To study association of diabetes mellitus with HCV related CLD

3. MATERIAL AND METHODS

The study was approved by Ethics Committee of the institute ETHICS APPROVAL NUMBER (EC/BMHR/2020/66, dated 03/10/2020).

Source of Data

Patients of chronic liver disease and willing to give consent, reaching medicine department of LLR and associated hospital GSVM Medical college, Kanpur from January 2019 to October 2020.

Methods of collection of data

Study design: Cross sectional study

Place of study: The present analysis was conducted at K.P.S. Post graduate institute of medicine, GSVM medical college, Kanpur, Uttar

Pradesh, India.

Study period: Between January 2019 and October 2020.

Inclusion criteria: Patients age >18 years of age of either gender who are diagnosed with Chronic liver disease.

Exclusion Criteria: Patients with no history of hepatocellular carcinoma. Family history of diabetes mellitus, signs and symptoms suggestive of metabolic syndrome, no evidence of pancreatic disease.

Procedure methodology: We conducted a cross sectional study where patients were recruited from medicine emergency and wards. All the required details about cases such as demographic data (age, gender, address etc), clinical presentations (signs and symptoms), general examination, systemic examination were carried out. All patients underwent Ultrasonography to see liver morphology. Blood sample was taken for rapid antigen testing to detect any viral cause along with other biochemical investigations to confirm our diagnosis as per the standard procedure. Blood sample was also sent for HbA1c, fasting blood sugar and 2 hr post prandial blood sugar estimation. Patients were followed up with these reports and were evaluated during hospitalisation.

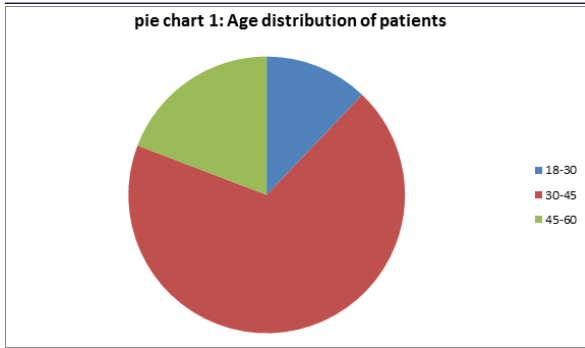
Statistical analysis: The data was collected and entered in MS excel and a master chart was made. The data was analysed using appropriate statistical tools, statistical package of social sciences (SPSS, version 23.0) software and expressed as mean \pm standard deviation. Continuous data was analysed using Student's t-test and level of significance was set at p value.

4. OBSERVATION AND RESULTS

In our study, a total of 99 patients were included, out of which 20 patients were more than 45 years of age followed by 67 patients who were in 30-45 years of age and 12 patients were in 18-30 years age group described in pie chart 1. Mean age of all patients who were HCV positive was 37.19 \pm 7.85 and 43.97 \pm 4.96 who were HCV negative as given in table 1

Table 1: Descriptive statistics for age

	HCV	Non HCV
Mean	37.19	43.97
Standard deviation	7.85	4.96



Student t test was applied on age of CLD patients, the p value was statistically not significant indicating there is no significant difference in age.

Table 2: Distribution of Gender

Gender	HCV		Non HCV	
	Number	Percentage	Number	Percentage
Male	54	66.66	27	33.33
Female	9	50	9	50

This study consists of total 81 males and 18 females. Out of 81 males, 66.66% were HCV positive and 33.33% were HCV negative. Out of 18 females, 50% were HCV positive and 50% were HCV negative as shown in table 2 and pie chart 2. P value was not significant with chi square value 1.768.

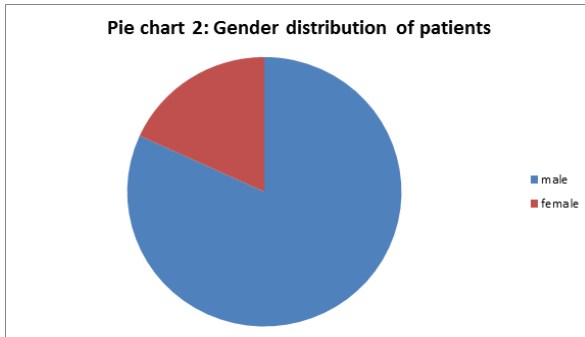


Table 3: Correlation of HbA1c with HCV positivity and negativity in Chronic liver disease patient.

	HCV positive	HCV negative
HbA1c >6.5 %	21	1
HbA1c <6.5%	23	54

A chi square test of independence was performed to examine the relation between HbA1c and HCV positive chronic liver disease patients as shown in table 3. The relation between these variables was significant.

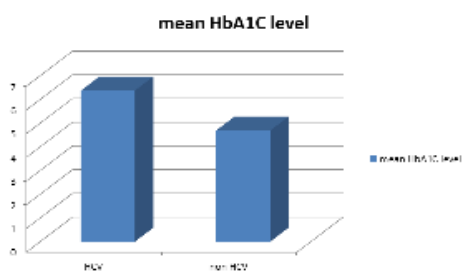
$X^2(1, N=99) = 29.8, p < 0.05$

(p value is <0.00001)

This signifies that HCV positive patients are more likely to have higher HbA1c level than HCV negative.

Table 4: Mean HbA1c level in HCV related CLD and non HCV related CLD

	HCV	Non HCV
HbA1c	6.37±1.34	4.69±0.70



In HCV related CLD, mean value of HbA1c (percentage) was 6.37±1.34 given in table 4. Student t test was applied. P value is <0.001 indicating that HbA1c is significantly higher in HCV related CLD patient.

Table 5: Correlation of blood sugar fasting with HCV positivity in chronic liver disease patient

	HCV positive	HCV negative
BSF ≥126	10	1
BSF <126	34	54

We studied correlation between blood sugar fasting with HCV positivity in chronic liver disease. A chi square test of independence was performed.

$X^2(1, N=99) = 10.82, p < .05$
(p value is significant = <0.00301)

Thus HCV positive CLD patients are more likely to have blood sugar fasting in diabetic range.

Table 6: Mean blood sugar fasting in HCV related CLD and non HCV related CLD

	HCV	Non HCV
Mean	108.02±25.80	87.12±13.58

In HCV positive patient, mean value of blood sugar fasting is 108.02±25.80 while in HCV negative CLD, it was obtained as 87.12±13.58 with significant p value demonstrated in table 6.

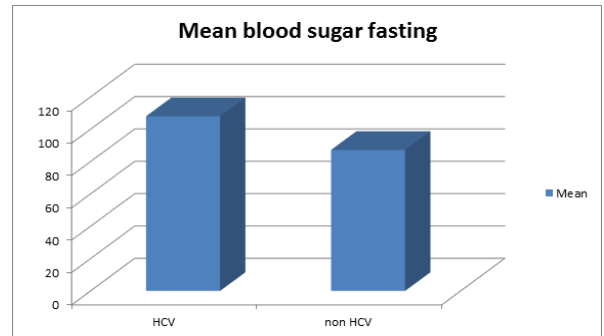


Table 7: Correlation of post prandial blood glucose level with HCV positivity in CLD patients

	HCV positive	HCV negative
BSPP ≥180	8	2
BSPP <180	37	52

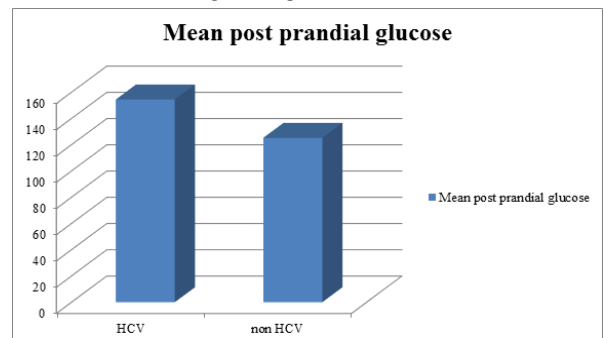
When we studied correlation between post prandial blood glucose and HCV positive CLD patient given in table 7, by performing chi square test, significant relationship was found between them.

$X^2(1, N=99) = 5.35, p = 0.02$

Table 8: Mean blood sugar post prandial in HCV related CLD and non HCV related CLD

	HCV	Non HCV
Mean	154.49±43.22	125.25±18.72

Mean blood sugar post prandial in HCV positive CLD patient was 154.49±43.22 and in non HCV related CLD was 125.25±18.72 as shown in table 8, with significant p value.



5. DISCUSSION

We set out to study the prevalence of T2DM in HCV patients, as per the study done by **Muhammad Sadik Memon et al (2013) [12]**, total number of 361 patients of hepatitis C related CLD were analyzed; after analysis, 31.5% patients who were HCV positive found to have type 2 diabetes mellitus. **Deepak N Amarapurkar et al (2008)[13]** analyzed 200 patients who were HCV positive and suffering from CLD, when diabetes prevalence was seen in these 200 HCV positive patients, type 2 diabetes mellitus was found in 44 (22%) patients. In our study, we found a significant correlation between HCV infection and hyperglycemia which correlates with studies done earlier.

In our observation, all three components of glucose metabolism viz. BSF, BSPP and HbA1c were significantly affected by the HCV status of the patients. As per the study done by **Showkat A Kadla et al (2020) [14]**, HCV causes 2.1-fold increase in the prevalence of type 2 diabetes. In their study, impaired blood sugar as per blood sugar fasting levels were seen more in controls. But when postprandial sugar was seen both impaired as well as the diabetic range of sugar levels were more in patients with hepatitis C. The differences were not statistically significant. HbA1c in the range of >6.5 was seen in 11 cases and 2 controls showing that dysglycemia was more in patients with hepatitis C. Our study revealed all aspects of glucose metabolisms to be affected to a smaller or larger degree by a statistically significant margin.

We found correlation between HCV positive and HbA1c level and significant p value (<0.001) was found with mean value 6.37 ± 1.34 in HCV positive patient and 4.69 ± 0.70 in HCV negative patient. When chi square test was conducted to see correlation between blood sugar fasting and post prandial blood sugar level with HCV positive patients, a significant p value <0.001 was obtained which shows that HCV positive patients are more likely to have raised blood sugar than HCV negative. As per study done by **Gastaldi G et al (2017) [15]**, it was seen that upto 30% of patients who were HCV positive found to have type 2 diabetes mellitus. It was found that HCV patients are 1.5 to 3.8 times as likely to have T2DM as HCV negative patients.

All these studies supported the evidence of prevalence of type 2 diabetes mellitus in HCV related CLD with multiple pathogenic mechanism involved for the occurrence of T2DM.

6. CONCLUSION

In this study we concluded that type 2 diabetes mellitus is significantly higher in HCV related CLD patients with higher HbA1c level, blood sugar fasting and blood sugar post prandial.

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