

## Frequency of Hepatitis C in Patients with Diabetes Mellitus

SARA SHAMSHAD ALI<sup>1</sup>, MUHAMMAD RAMIZ<sup>2</sup>, ALMAS SARWAR<sup>3</sup>, RUBAB MUNAWAR<sup>4</sup>, ADNAN ALI<sup>5</sup>, MADIHA AKRAM<sup>6</sup>

<sup>1</sup>WMO, Mumtaz Bakhtawar Hospital, Raiwind Road Lahore

<sup>2</sup>Medical Officer, Holy Family Hospital, Rawalpindi

<sup>3</sup>WMO, DHQ hospital, Narowal

<sup>4</sup>House Officer, Saidu Group of Teaching Hospitals, Swat

<sup>5</sup>Assistant Professor of Medicine, Central Park Medical College & Teaching Hospital, Lahore

<sup>6</sup>Senior Demonstrator, Physiology Department, Pak Red Crescent Medical College, Lahore

Corresponding author: Muhammad Ramiz, Email: [muhammadramiz12455@gmail.com](mailto:muhammadramiz12455@gmail.com)

### ABSTRACT

**Objective:** The purpose of this study is to determine the prevalence of hepatitis C infection among patients of diabetes mellitus.

**Study Design:** Cross-sectional/descriptive study

**Place and Duration:** The study was conducted at Medicine department of Benazir Bhutto Hospital, Rawalpindi and Avicenna Teaching Hospital, Lahore during the period from July 2021 to December 2021.

**Methods:** There were 130 patients of both genders had diabetes mellitus were presented in this study. Patients were aged between 25-70 years. Data on the recruited patients' age, gender, BMI, residence, and educational attainment were collected after informed written permission was obtained. Prevalence of hepatitis infection C was recorded by using ELISA (Enzyme Linked Immuno-Sorbent Assay) method. SPSS 24.0 was used to analyze complete data.

**Results:** Among 130 patients of diabetes, 70 (53.8%) were females and 60 (46.2%) were males. Mean age of the patients was 39.45±15.74 years and had mean BMI 25.8±7.41 kg/m<sup>2</sup>. We found that majority of the cases were from rural areas 80 (61.5%) and 50 (38.5%) had urban residency. 58 (44.6%) patients were educated and 72 (55.4%) patients were uneducated. Frequency of hepatitis C was found among 40 (30.8%) patients. All patients of HCV had diabetes mellitus II and most the patients were females 25 (62.5%). Most of the patients 22 (55%) had glycemic value 180 mg/dl range. Among 40 cases of HCV 10 (25%) were aged between 25-35 years, 22 (55%) were aged between 36-45 years and 8 (20%) had ages >45 years. Increased level of Serum Glutamic -Pyruvic Transaminase (SGPT) was found in 32 (80%) patients.

**Conclusion:** We concluded in this study that the frequency of HCV infection was found among 30.8% patients most probably found among cases of diabetes mellitus II.

**Keywords:** Diabetes Mellitus, Hepatitis C, SGPT

### INTRODUCTION

Infection with the Hepatitis C virus (HCV) is one of the leading causes of chronic liver disease and a severe danger to one's health. After being discovered as a distinct illness for the first time in 1975, HCV infection was categorised as a kind of non-A or non-B hepatitis. In 1989, after the development of molecular biology, the virus was confirmed to be deadly. There are seven primary genotypes of the hepatitis C virus, all of which belong to the Hepacivirus genus (in Greek, hepato means liver) (i.e., 1, 2, 3, 4, 5, 6, and 7).[2] There was a 12-percent prevalence of Hepatitis C in the general population in Egypt, which was the highest in the world.[3] Patients aged 40 and above were also found to have a significant frequency of the condition. This disease has been projected to affect 2.2–3 percent of the world's population.[4,5]

In both industrialised and developing countries, diabetes mellitus (DM) is a major health problem. Because diabetes mellitus is a metabolic problem, it may result in a variety of life-threatening side effects, including retinal damage, kidney damage, nerve damage, and heart disease [6, 7].

There is currently no vaccine or post-exposure prophylaxis for hepatitis C, which is a major public health problem [8]. As a consequence of the long-term infections it causes, cirrhosis and hepatocellular cancer may develop in the liver [9]. DM may be caused mostly by HCV infections progressing slowly; in particular, the virus may influence glucose metabolism by altering the host's innate immune response [10-11] Some ideas propose that alterations in carbohydrate and lipid metabolism, as well as the action of liver tumour necrosis factor-, contribute to insulin resistance through altering insulin receptor substrate signalling. DM/insulin resistance has been proven to be strongly related with HCV infection in a recent review by Desbois et al. Abnormalities in blood glucose levels have been shown to be closely linked to liver disease in those who have had HCV infection. HCV infection is linked to an elevated risk of type 2 diabetes mellitus (T2DM) regardless of the severity of the underlying liver disease, according to a systematic review and meta-analysis from 33 studies. HCV-infected patients had a higher risk of developing diabetes than non-infected patients in both retrospective (OR adjusted = 1.68, 95

percent CI 1.15–2.20) and prospective studies (HR adjusted = 1.67, 95 percent CI 1.28–2.06) [13]. The frequency of T2DM among HCV patients has been shown to vary from 7.4 to 43.2% in several studies [14, 15].

HCV's global spread might exacerbate the diabetes pandemic, and vice versa. This theory merits additional investigation. Anti-HCV positive in diabetic individuals was the focus of this investigation.

### MATERIAL AND METHODS

This study was conducted at the department of medicine, Benazir Bhutto Hospital (BBH), Rawalpindi and Avicenna Teaching Hospital, Lahore during the period from July 2021 to December 2021. The study was comprised of 130 patients. Data on the recruited patients including age, gender, BMI, residence, and educational attainment were collected after informed written permission was obtained. Intravenous drug addicted patients and those did not give written consent were excluded from this study.

To gather the information, a questionnaire was used that included a medical history, a clinical examination, and a laboratory investigation. For the purpose of gathering information about the patient's hepatitis C infection risks (such as injecting, operating on him/her or piercing his/her ears/nose, being in close contact with an HCV positive patient, etc. ), duration and type of diabetes, as well as the occurrence of its complications, the history was framed in this manner. Peripheral symptoms of chronic liver disease and long-term effects of diabetes mellitus were assessed during a thorough clinical examination. The Hospital's laboratory performed the random blood glucose levels, urine regular screening, and complete blood count. By using ELISA, local labs were able to identify the presence of anti-HCV antibodies.

As a result of the revised diagnostic criteria, the diabetes condition was verified based on two fasting or two random plasma glucose levels of more than 126 mg/dL and 200 mg/dL, respectively, and patients were categorized as either hypoglycemic, normal, or hyperglycemic based on their blood glucose levels. In order to determine the underlying liver condition,

liver function tests were performed. SPSS 24.0 was used to analyze complete data.

## RESULTS

Among 130 patients of diabetes, 70 (53.8%) were females and 60 (46.2%) were males. Mean age of the patients was  $39.45 \pm 15.74$  years and had mean BMI  $25.8 \pm 7.41$  kg/m<sup>2</sup>. We found that majority of the cases were from rural areas 80 (61.5%) and 50 (38.5%) had urban residency. 58 (44.6%) patients were educated and 72 (55.4%) patients were uneducated.(table 1)

Table-1: Demographic details of enrolled cases

Variables	Frequency	Percentage
Mean Age (years)	39.45±15.74	
Mean BMI (kg/m <sup>2</sup> )	25.8±7.41	
Gender		
Male	70	53.8
Female	60	46.2
Residency		
Urban	50	38.5
Rural	80	61.5
Education status		
Educated	58	44.6
Non-educated	72	55.4

Frequency of hepatitis C was found among 40 (30.8%) patients. All patients of HCV had diabetes mellitus II.(fig 1)

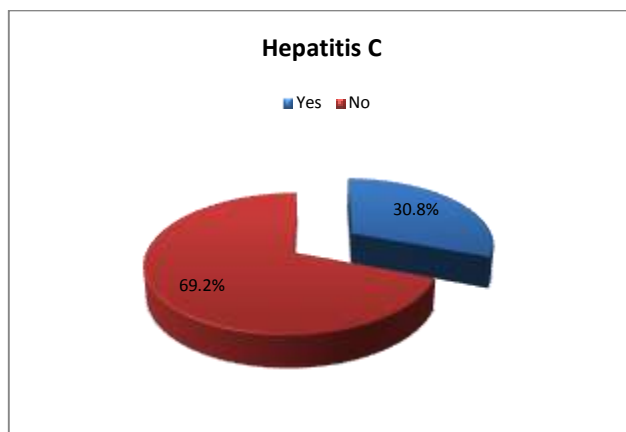


Figure-1: Association of HCV among cases

Among HCV cases, majority were females 25 (62.5%). 10 (25%) were aged between 25-35 years, 22 (55%) were aged between 36-45 years and 8 (20%) had ages >45 years.(table 2)

Table-2: HCV patients with respect to gender and age

Variables	Frequency (n=40)	Percentage
Gender		
Male	15	37.5
Female	25	62.5
Age Group		
25-35 years	10	25
36-45 years	22	55
>45 years	8	20

Table-3: Glycemic value and SGPT level among HCV patients

Variables	Frequency	Percentage
Increased SGPT		
Yes	32	80
No	8	20
Glycemic Value		
60-120 mg/dl	7	17.5
121-180 mg/dl	11	27.5
180 mg/dl	22	55
Total	40	100

Increased level of Serum Glutamic -Pyruvic Transaminase (SGPT) was found in 32 (80%) patients. Most of the patients 22 (55%) had glycemic value 180 mg/dl range, 7 (17.5%) had 60-120 mg/dl range and 11 (27.5%) HCV patients had glycemic value 121-180 mg/dl range.(table 3)

## DISCUSSION

Many studies have shown a correlation between HCV infection and T2DM [16,17]. HCV-infected patients had a 21% to 50% likelihood of developing diabetic mellitus, according to prior case studies. Diabetes and HCV infection have been determined to have a high correlation by a number of studies. The prevalence of diabetes in HCV-infected patients was found to be 4.39 times greater than in the control group [18]. Patients with Type 2 Diabetes Mellitus (T2DM) at Karachi's Sir Ganga Ram Hospital are at a significant risk of contracting HCV infection [19]. Another 42.3 percent of individuals with impaired glucose tolerance were found to have HCV infection, according to the research [20]. It is now obvious that HCV patients in a community need to do frequent blood glucose testing. In our study we found similar findings that patients of diabetes mellitus had HCV in 40 (30.8%) cases.

All of the diabetics who were seropositive in the research were type II diabetics, which is another interesting result. The lack of selection criteria may be a contributing factor here. Despite this bias, several studies have shown a substantial link between type II diabetes and a higher risk of cardiovascular disease. Similar results were made by Mehta et al. [21], for example. Hepatitis C virus antibody positive with the development of diabetes, primarily type II, has also been indicated by Gray H. et al., notably in Afro-Caribbean [22]. The link between type II diabetes and HCV infection has also been shown by Caronia et al. [23].

Additionally, we found that the vast majority of the patients with diabetes were less than 5 years of age. Chronic diabetes mellitus is not a risk factor for hepatitis C infection, according to this study. Researchers aren't sure what triggers diabetes development, but they suspect it might be the hepatitis C infection itself. Hepatitis C infection may present itself in diabetes in addition to the liver in this scenario.[24,25] Those in their fourth or fifth decade of life had the highest percentage of anti-HCV positive diabetes.

Among HCV cases, majority were females 25 (62.5%). 10 (25%) were aged between 25-35 years, 22 (55%) were aged between 36-45 years and 8 (20%) had ages >45 years. Similar findings were presented in previous research in 2017.[26] Increased level of Serum Glutamic -Pyruvic Transaminase (SGPT) was found in 32 (80%) patients.[18-20] Most of the patients 22 (55%) had glycemic value 180 mg/dl range, 7 (17.5%) had 60-120 mg/dl range and 11 (27.5%) HCV patients had glycemic value 121-180 mg/dl range. Chronic hyperglycemia in patients with cirrhosis is prevalent and may be a direct outcome of liver disease or an unrelated condition, such as the use of corticosteroids, interferon, or another medicine that may cause hyperglycemia, in another study.[27]

It was shown that higher alkaline phosphatase, indirect bilirubin, and combined total bilirubin readings were related with higher levels of anti-HCV seropositivity. In DM2 patients undergoing haemodialysis, Ocak et al.[28] found an association between age and HCV seropositivity. Because bilirubin and alkaline phosphatase increases were identified in this group and related with anti-HCV positive, this group may have some liver dysfunction, such as cirrhosis. This group has no information on cirrhosis, which is unfortunate. Hepatitis C virus (HCV) viremia has been shown to be common in people with diabetes mellitus type 2, which raises the possibility of the development of liver diseases such steatosis, fibrosis, and cancer. It has been shown that both cardiovascular and cerebrovascular illness, as well as death from these conditions, are linked to the metabolic syndrome.[29] It was revealed that a larger majority of seropositive individuals had peripheral signs of chronic liver disease without any of the diabetes consequences. Diabetes may be one of the numerous extra-

hepatic symptoms of HCV infection, rather than a risk factor for infection itself. As a result, persistent HCV infection may lead to diabetes later in the disease's progression. Individuals with advanced hepatic fibrosis had a greater frequency of diabetes than patients with early fibrosis, according to another research.

### CONCLUSION

We concluded in this study that the frequency of HCV infection was found among 30.8% patients most probably found among cases of diabetes mellitus II.

### REFERENCES

- 1 M. G. Ghany, D. B. Strader, D. L. Thomas, and L. B. Seeff, "Diagnosis, management, and treatment of hepatitis C: an update," *Hepatology*, vol. 49, no. 4, pp. 1335–1374, 2009.
- 2 A. Medhat, M. Shehata, L. S. Magder et al., "Hepatitis C in a community in Upper Egypt: risk factors for infection," *American Journal of Tropical Medicine and Hygiene*, vol. 66, no. 5, pp. 633–638, 2002.
- 3 C. D. Williams, J. Stengel, M. I. Asike et al., "Prevalence of nonalcoholic fatty liver disease and nonalcoholic steatohepatitis among a largely middle-aged population utilizing ultrasound and liver biopsy: a prospective study," *Gastroenterology*, vol. 140, no. 1, pp. 124–131, 2011.
- 4 D. Lavanchy, "The global burden of hepatitis C," *Liver International*, vol. 29, no. 1, pp. 74–81, 2009.
- 5 C. E. Gordon, E. M. Balk, B. N. Becker et al., "KDOQI US commentary on the KDIGO clinical practice guideline for the prevention, diagnosis, evaluation, and treatment of hepatitis C in CKD," *American Journal of Kidney Diseases*, vol. 52, no. 5, pp. 811–825, 2008.
- 6 American Diabetes Association, "Diagnosis and classification of diabetes mellitus," *Diabetes Care*, vol. 36, supplement 1, pp. S67–S74, 2012.
- 7 American Diabetes Association, "Diagnosis and classification of diabetes mellitus," *Diabetes Care*, vol. 37, supplement 1, pp. S81–S90, 2014.
- 8 Shepard CW, Finelli L, Alter MJ. Global epidemiology of hepatitis C virus infection. *Lancet Infect Dis*. 2005;5(9):558–67.
- 9 Thrift AP, El-Serag HB, Kanwal F. Global epidemiology and burden of HCV infection and HCV-related disease. *Nat Rev Gastroenterol Hepatol*. 2017;14(2):122–32.
- 10 Negro F, Alaei M. Hepatitis C virus and type 2 diabetes. *World J Gastroenterol*. 2009;15(13):1537.
- 11 Everhart J. A confluence of epidemics: does hepatitis C cause type 2 diabetes? *Hepatology*. 2001;33(3):762–3.
- 12 Fabiani S, Fallahi P, Ferrari SM, Miccoli M, Antonelli A. Hepatitis C virus infection and development of type 2 diabetes mellitus: systematic review and meta-analysis of the literature. *Reviews in Endocrine and Metabolic Disorders*. 2018;19(4):1–16.
- 13 White DL, Ratzu V, El-Serag HB. Hepatitis C infection and risk of diabetes: a systematic review and meta-analysis. *J Hepatol*. 2008;49(5):831–44.

- 14 Rao H, Wei L, Li H, Yang R, Zhang H, Shang J, et al. Prevalence of abnormal glycometabolism in treatment-naive patients with hepatitis C virus infection in a Chinese Han population. *J Gastroenterol Hepatol*. 2015;30(6):1049–56.
- 15 Kwon S, Kim S, Kwon O, Kwon K, Chung M, Park D, et al. Prognostic significance of glycaemic control in patients with HBV and HCV-related cirrhosis and diabetes mellitus. *Diabet Med*. 2005;22(11):1530–5.
- 16 A. Antonelli, C. Ferri, S. M. Ferrari, M. Colaci, D. Sansonno, and P. Fallahi, "Endocrine manifestations of hepatitis C virus infection," *Nature Clinical Practice Endocrinology and Metabolism*, vol. 5, no. 1, pp. 26–34, 2009.
- 17 D. L. White, V. Ratzu, and H. B. El-Serag, "Hepatitis C infection and risk of diabetes: a systematic review and meta-analysis," *Journal of Hepatology*, vol. 49, no. 5, pp. 831–844, 2008.
- 18 P. Zhao, J.-B. Wang, and J. Jiao, "Investigation on the incidence of diabetes in chronic hepatitis C patients and their HCV genotypes," *Zhonghua Gan Zang Bing Za Zhi*, vol. 14, no. 2, pp. 86–88, 2006.
- 19 B. Younas, G. M. Khan, and M. A. Chaudhary, "Prevalence of diabetes mellitus among patients suffering from chronic liver disease," *Mother and Child*, vol. 38, no. 1, pp. 37–40, 2000.
- 20 I. A. Shah, S. Shah, Z. Hayat, M. Noor, and M. Arshad, "Impaired glucose tolerance in HCV/HBV cirrhosis," *Journal of Postgraduate Medical Institute*, vol. 14, no. 1, pp. 68–72, 2011.
- 21 Mehta SH, Brancati FL, Sulkowski MS, Strathdee SA, Szklo M, Thomas DL. Prevalence of type 2 diabetes mellitus among persons with hepatitis C virus infection in the United States. *Ann Intern Med*. 2000;133(8):592-9.
- 22 Gray H, Wreghitt T, Stratton IM, Alexander GJ, Turner RC, O'Rahilly S. High prevalence of hepatitis C infection in Afro-Caribbean patients with type 2 diabetes and abnormal liver function tests. *Diabet Med*. 1995;12(3):244-9
- 23 Caronia S, Taylor K, Pagliaro L, Carr C, Palazzo U, Petrik J et al. Further evidence for an association between noninsulin-dependant diabetes mellitus and chronic hepatitis C virus infection. *Hepatology* 1999;30(4):1059-63.
- 24 Ambachew, S., Eshetie, S., Geremew, D. et al. Prevalence of type 2 diabetes mellitus among hepatitis C virus-infected patients: a protocol for systematic review and meta-analysis. *Syst Rev* 8, 60 (2019).
- 25 Ghani Ur Rehman, Mohammad Ali, Farooq Shah, Amjad Iqbal, Ayaz Ahmad, Zafar Hayat, Badshah Islam, Farman Ali, Ikramullah, Yousaf Jamal, Sartaj Alam, Muhammad Sajjad, Muhammad Zeeshan Bhatti, "Prevalence of Diabetes Type 2 in Hepatitis C Infected Patients in Kpk, Pakistan", *BioMed Research International*, vol. 2017
- 26 Lu J, Hou X, Tu H, Tang Z, Xiang Y, Bao Y, et al. Hepatitis B Virus Infection Status is more prevalent in patients with type 2 diabetes. *J Diabetes Investig*. 2017; 8 (4): 619–625.
- 27 Arrelias CC, Bellissimo-Rodrigues F, Lima LC, Silva AS, Lima NK, Zanetti ML. Hepatitis B vaccination coverage in patients with diabetes mellitus. *Rev Esc Enferm USP*. 2016; 50:255–262
- 28 Ocak S, Duran N, Kaya H, Emir I. Seroprevalence of hepatitis C in patients with type 2 diabetes mellitus and non-diabetic on haemodialysis. *Int J Clin Pract*. 2006; 60:670–674.
- 29 Shiffman ML, Gunn NT. Impact of hepatitis C virus therapy on metabolism and public health. *Liver Int*. 2017; 37:13–18.