Original Research Article

FREQUENCY OF HEPATITIS C SEROPOSITIVITY AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS

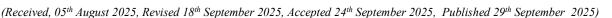TAJ T[1], ELAHI SH[2], ESSA A[3], JUNAID SM[4]

[1]Department of General Medicine, Lady Reading Hospital, Peshawar, Pakistan
[2]Department of General Medicine, Swat Medical Complex, Pakistan
[3]Department of General Medicine, MTI Dera Ismail Khan, Pakistan
[4]Private Clinic, Skin Sense Laser Clinic, Peshawar, Pakistan
Corresponding author email address: Doctor.tayyaba@gmail.com

ABSTRACT

Background: *Hepatitis C virus (HCV) infection remains a global health burden, with an increased risk of chronic complications in patients with comorbidities. Type 2 diabetes mellitus (T2DM) has been associated with higher HCV prevalence, potentially due to shared risk factors and the impact of chronic HCV on glucose metabolism.* **Objective:** *To determine the frequency of hepatitis C seropositivity among patients with type 2 diabetes mellitus.* **Study Design:** *Cross-sectional study.* **Setting:** *Department of Medicine, Tertiary Care Hospital, Peshawar.* **Duration of Study:** *January 2025 to July 2025.* **Methods:** *A total of 178 patients, aged 21–70 years and of either gender, with a diagnosed type 2 diabetes mellitus, were enrolled. Patients with other liver diseases, renal disease, or cardiac disease were excluded from the study. Blood samples were collected and tested for HCV seropositivity using standard serological assays. Data were analyzed using SPSS version 23.* **Results:** *The mean age of the study population was 55.63 ± 9.46 years. Among the patients, 103 (57.9%) were female and 75 (42.1%) were male. The overall frequency of HCV seropositivity in type 2 diabetic patients was 27 (15.2%).* **Conclusion:** *The frequency of hepatitis C seropositivity in patients with type 2 diabetes mellitus was found to be 15.2%. This highlights the importance of routine HCV screening in diabetic populations to facilitate early diagnosis and management.*

Keywords: Hepatitis C Virus, Type 2 diabetes mellitus (T2DM), Patients, Seropositive

INTRODUCTION

Hepatitis C virus infection (HCV), as well as Diabetes Mellitus (DM), have been identified as contributors to sickness and mortality globally. Studies indicate that over 170 million individuals have been diagnosed with HCV around the world (1, 2). Each year, approximately 3-4 million instances arise, carrying a considerable risk of developing into chronic liver disease and hepatocellular carcinoma (3, 4). Diabetes impacts individuals of all ages and continents. HCV infection, often described as a silent disease, is caused by the HCV, a positive-sense, single-stranded RNA virus that belongs to the family Flaviviridae and the genus Hepacivirus (5). There are seven genotypes as well as 86 subtypes involved. HCV is mainly spread through contact with infected blood.22 Unsafe injection practices are the primary mode of transmission, contributing to 40% of reported HCV infections around the world (6). There is increasing evidence concerning the connection between HCV and type 2 DM. In controlled studies, patients infected with HCV demonstrated an increased likelihood of developing type 2 DM. HCV infection might result in cirrhosis, which may eventually lead to glucose intolerance as well as DM (7, 8). HCV has been demonstrated to cause hepatic steatosis and impaired insulin signaling (9). A comprehensive study conducted indicated that patients with DM who also have chronic hepatitis C virus infection encounter a 2-3-fold increased risk of liver decompensation as well as cirrhosis.30 DM increases the likelihood of developing hepatocellular carcinoma in individuals with chronic HCV (10, 11). A study indicated that the prevalence of HCV infection was higher in type 2 diabetic patients (84%) compared to type 1 diabetic patients (16%). Furthermore, another study showed that type-2 diabetes had been more prevalent in patients with HCV as opposed to those who had an HBV infection (12, 13). The coexistence of HCV infection and type 2 DM has been increasingly recognized, with evidence suggesting that HCV may contribute to the development of insulin resistance and impaired glucose metabolism. Understanding the frequency of HCV seropositivity among patients with T2DM is therefore clinically significant as it not only highlights the burden of dual pathology but also helps in early identification and timely management to prevent long-term morbidity.

METHODOLOGY

This cross-sectional study was conducted in Tertiary Care Hospital, Peshawar, from January 2025 to July 2025, after securing the ethical approval from the hospital's IRB. We enrolled 178 patients of both genders, aged 35 years or older, presenting with type 2 diabetes mellitus (HbA1c > 7). Patients with other types of liver disease, renal disease, and heart disease were omitted. Consecutive non-probability sampling was employed for participant selection. Data collection began after taking consent from all participants. Demographic details, including age, gender, BMI, and socioeconomic status, were recorded. Hepatitis C seropositivity was determined using the HCV Ab test. The results of the test were considered positive if a viral load was below 15 IU/mL, which means that the virus is detected; between 15 and 800,000 IU/mL indicated low viral load, above 800,000 IU/mL indicated high viral load, and levels exceeding 100,000,000 IU/mL were classified as indicative of advancing active infection. An experienced consultant supervised all laboratory procedures and assessments with at least five years of post-fellowship experience. Statistical analysis was performed using SPSS 23. Age, BMI, and duration of diabetes were calculated using mean and SD; other categorical demographics were evaluated using frequency and percentages. The chi-square test was used to assess the associations, with a P-value considered statistically significant at ≤ 0.05.

RESULTS

The mean age of our 178 patients with T2DM was 55.63 ± 9.456 years. Mean body mass index was 27.78 ± 2.67 kg/m², and the mean duration of diabetes was 6.67 ± 2.01 years.

The majority of patients were over the age of sixty, at 69 (38.8%). Females were in the majority, comprising 103 (57.9%), while there were 75 (42.1%) male patients. The distribution of BMI showed that most of the patients (145, 81.5%) had a BMI greater than 24.9 kg/m². In terms of diabetes duration, 117 (65.7%) patients had been diagnosed for more than five years (Table 1).

The frequency of patients who were seropositive for the hepatitis C virus was 27 (15.2%). The analysis of the association between HCV seropositivity and baseline characteristics is presented in Table 3. We observed that older patients had a higher frequency of HCV, and patients having a BMI higher than 24.9 kg/m2 had a higher rate of HCV. Those with a duration of diabetes of more than five years had a higher prevalence of HCV, but these associations were not statistically significant.

Table 1: Baseline characteristics

Baseline characteristics		Frequency	Percentage
Age distribution	35 to 50	50	28.1%
	51 to 60	59	33.1%
	> 60	69	38.8%
Gender	Male	75	42.1%
	Female	103	57.9%
Socioeconomic status	Lower	48	27.0%
	Middle	105	59.0%
	Higher	25	14.0%
BMI distribution	18 to 24.9	33	18.5%
	> 24.9	145	81.5%
Duration of diabetes (Years)	1 to 5	61	34.3%
	> 5	117	65.7%

Table 2: Frequency of HCV seropositivity

HCV seropositivity	Frequency	Percentage
Yes	27	15.2%
No	151	84.8%

Table 3: Association of HCV seropositivity with baseline characteristics

Baseline characteristics		HCV seropositivity				P value
		Yes		No		
		n	%	n	%	
Age distribution	35 to 50	3	11.1%	47	31.1%	0.06
	51 to 60	9	33.3%	50	33.1%	
	> 60	15	55.6%	54	35.8%	
Gender	Male	13	48.1%	62	41.1%	0.49
	Female	14	51.9%	89	58.9%	
Socioeconomic status	Lower	9	33.3%	39	25.8%	0.45
	Middle	13	48.1%	92	60.9%	
	Higher	5	18.5%	20	13.2%	
BMI distribution	18 to 24.9	5	18.5%	28	18.5%	0.99
	> 24.9	22	81.5%	123	81.5%	
Duration of diabetes (Years)	1 to 5	7	25.9%	54	35.8%	0.32
	> 5	20	74.1%	97	64.2%	

DISCUSSION

The findings from our study revealed a hepatitis C virus (HCV) seropositivity of 15.2% among a cohort of 178 patients with T2DM. The observed prevalence in our study is substantially lower than the 27.38% reported by Khan et al. in DI Khan, Pakistan, and the 49.33% frequency found by Yousaf et al. in Lahore, Pakistan (14, 15). Our prevalence of HCV is higher than the rates documented in international studies. In Iran, Farshadpour et al. found that 1.98% patients had HCV. In comparison, another study from Brazil by Villar et al. found a 2.42% prevalence of HCV In India, Laloo et al. found a 5.7% prevalence, and in Northern Tanzania, Eilah et al. found a 0.5% prevalence of HCV in diabetic patients (16-19). This significant disparity highlights the impact of geographic and regional factors on HCV epidemiology. Pakistan, across multiple studies, consistently showed a higher burden of HCV within its diabetic population, suggesting a pressing need for targeted interventions. Our study found no statistically significant associations with age, gender, socioeconomic status, BMI, or duration of diabetes. Although we found that a higher frequency of HCV was observed in patients aged greater than 60 years, Khan et al. reported that 56.52% of their HCV-positive patients were over 50 years of age, which was also not a notable finding (14). Laloo et al. observed that all their HCV-positive diabetic patients were in the 40-59-year age bracket (18). This suggests that age might be a contributing factor to the development of HCV in diabetic patients. The distribution of HCV between genders in our study was nearly equal, a finding that aligns with the results from Farshadpour et al. in Iran, who also did not find a significant difference in seroprevalence between males and females.[16] This stands in contrast to other studies that reported a male predominance. Khan et al. and Laloo et al. both reported a higher prevalence of HCV infection among male diabetics; however, the former did not find this difference to be statistically significant, while the latter reported marginal significance (P = 0.05) (14, 18). This inconsistency across studies indicates that gender may not be an independent risk factor for HCV in T2DM patients.

We did not find a link between HCV seropositivity and the duration of diabetes. This aligns with the results reported by Khan et al., who found that a diabetes duration of greater than 10 years was not significantly associated with HCV infection (14). This challenges the hypothesis that longer disease duration inherently leads to more frequent medical interventions. It suggests that the risk of acquiring HCV may not be associated with the prolonged duration of diabetes. Furthermore, we also found no association between BMI and HCV status.

The most consistent finding across studies is the significant elevation of liver transaminases (ALT and AST) in diabetic patients who are co-infected with HCV. Laloo et al. reported potentially higher AST and ALT levels in their seropositive group (18). Similarly, Farshadpour et al. identified an AST level of 41–80 IU/L as a significant predictor of HCV seropositivity.[16] This biochemical correlation is mechanistically plausible, as HCV is a hepatotropic virus that causes liver inflammation and cellular damage, directly leading to the release of these enzymes into the bloodstream. This highlights the importance of routine liver function testing in patients with diabetes.

CONCLUSION

In conclusion, our study found a moderately higher prevalence of HCV (15.2%) in T2DM patients, although this difference was not statistically significant. However, a higher prevalence of HCV was observed in older patients. Routine screening for liver function tests is recommended for T2DM patients.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (IRB)
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTION

TAYYABA TAJ
Conception of Study, Development of Research Methodology Design, Study Design, Manuscript Drafting, Review of Manuscript, and Final Approval of Manuscript.
SYED HASSAN ELAHI
Manuscript Revisions,Study Design, Review of Literature, and Final Approval of Manuscript.
AISHA ESSA
Literature Search, and Final Approval of Manuscript.
SYED MUHAMMAD JUNAID
Literature Search

REFERENCES

1. Chen Y, Ji H, Shao J, Jia Y, Bao Q, Zhu J, et al. Different hepatitis C virus infection statuses are associated with a significant risk of developing type 2 diabetes mellitus: a network meta-analysis. Dig Dis Sci. 2020;65(7):1940–1950. https://doi.org/10.1007/s10620-019-05918-7

2. Adinolfi LE, Petta S, Fracanzani AL, Nevola R, Coppola C, Narciso V, et al. Reduced incidence of type 2 diabetes in patients with chronic hepatitis C virus infection cleared by direct-acting antiviral therapy: a prospective study. Diabetes Obes Metab. 2020;22(12):2408–2416. https://doi.org/10.1111/dom.14168

3. Aldubaie MH, Suryavamshi PM, Irfan UM, Al-Hamed HA, Almogbel TA, Almatroudi A, et al. Prevalence of hepatitis C viral infection among diabetes mellitus patients in Qassim Region, Saudi Arabia. J Pure Appl Microbiol. 2023;17(3):1722–1736. https://doi.org/10.22207/JPAM.17.3.37

4. Abdo AA, Sanai FM, Al-Faleh FZ. Epidemiology of viral hepatitis in Saudi Arabia: are we off the hook? Saudi J Gastroenterol. 2012;18(6):349–357. https://doi.org/10.4103/1319-3767.103425

5. Nawaz A, Zaidi SF, Usmanghani K, Ahmad I. Concise review on the insight of hepatitis C. J Taibah Univ Med Sci. 2015;10(2):132–139. https://doi.org/10.1016/j.jtumed.2014.08.004

6. Alter MJ. Epidemiology of viral hepatitis and HIV co-infection. J Hepatol. 2006;44(Suppl 1):S6–S9. https://doi.org/10.1016/j.jhep.2005.11.004

7. Alzahrani N. Hepatitis C virus, insulin resistance, and diabetes: a review. Microbiol Immunol. 2022;66(10):453–459. https://doi.org/10.1111/1348-0421.13051

8. Butt AA, Yan P, Aslam S, Shaikh OS, Abou-Samra AB. Hepatitis C virus treatment with directly acting agents reduces the risk of incident diabetes: results from ERCHIVES. Clin Infect Dis. 2020;70(6):1153–1160. https://doi.org/10.1093/cid/ciz304

9. Hammerstad SS, Grock SF, Lee HJ, Hasham A, Sundaram N, Tomer Y. Diabetes and hepatitis C: a two-way association. Front Endocrinol (Lausanne). 2015;6:134. https://doi.org/10.3389/fendo.2015.00134

10. Lai SW, Chen PC, Liao KF, Muo CH, Lin CC, Sung FC. Risk of hepatocellular carcinoma in diabetic patients and risk reduction associated with anti-diabetic therapy: a population-based cohort study. Am J Gastroenterol. 2012;107(1):46–52. https://doi.org/10.1038/ajg.2011.384

11. Veldt BJ, Chen W, Heathcote EJ, Wedemeyer H, Reichen J, Hofmann WP, et al. Increased risk of hepatocellular carcinoma among patients with hepatitis C cirrhosis and diabetes mellitus. Hepatology. 2008;47(6):1856–1862. https://doi.org/10.1002/hep.22251

12. Kanwal N, Nasir B, Abrar MA, Kaukab I, Nawaz A, Murtaza G. Prevalence of hepatitis C in diabetic patients: a prospective study. Acta Pol Pharm. 2016;73(3):771–775. [No DOI assigned].

13. Akbar DH, Siddique AM, Ahmed MM. Prevalence of type-2 diabetes in patients with hepatitis C and B virus infection in Jeddah, Saudi Arabia. Med Princ Pract. 2002;11(2):82–85. https://doi.org/10.1159/000058012

14. Khan N, Khan N, Hussain J, Ullah H, Khan H. Frequency of hepatitis C in type 2 diabetics. Gomal J Med Sci. 2014;12(2):81–83. [No DOI assigned].

15. Yousaf Z, Anwar S, Imran F, Ahsan U, Dar YF, Jabeen K, et al. Frequency of type 2 diabetes mellitus among patients with hepatitis C virus infection. J Health Rehabil Res. 2024;4(1):1170–1174. https://doi.org/10.61919/jhrr.v4i1.563

16. Farshadpour F, Taherkhani R, Ravanbod MR, Eghbali SS. Prevalence and genotype distribution of hepatitis C virus infection among patients with type 2 diabetes mellitus. Med Princ Pract. 2018;27(4):308–316. https://doi.org/10.1159/000488985

17. Villar LM, Geloneze B, Vasques ACJ, Pires ML, Miguel JC, da Silva EF, et al. Prevalence of hepatitis B and hepatitis C among individuals with type 2 diabetes mellitus. PLoS One. 2019;14(2):e0211193. https://doi.org/10.1371/journal.pone.0211193

18. Laloo D, Walke P, Bhimo T, Prasad L, Ranabir S. Seroprevalence of hepatitis C infection in type 2 diabetes mellitus. Indian J Endocrinol Metab. 2015;19(2):296–299. https://doi.org/10.4103/2230-8210.149325

19. Eilah DT, Chamba NG, Sadiq AM, Mwasamwaja AO, Kimondo FC, Matay CD, et al. Seroprevalence and associated factors for hepatitis B and hepatitis C viral infection among patients with diabetes mellitus in Northern Tanzania. PLoS One. 2025;20(2):e0319198. https://doi.org/10.1371/journal.pone.0319198