

Frequency of Diabetes Mellitus in Hepatitis C Patients: A Cross-Sectional Study

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ABSTRACT

Background: The burden of both diabetes mellitus (DM) and hepatitis C virus (HCV) infection are widespread problems around the globe. The one chronic disease the later communicable disease is associated as far mortality is concern. People with hepatitis C infection are prone to develop type 2 diabetes. **Objective:** The study's main objective is to estimate the frequency of people with Hepatitis C who also have diabetes mellitus. **Study Design:** Cross sectional study. **Settings:** This study was conducted at Department of Medicine Shaikh Zayed Hospital, Lahore Pakistan. **Duration:** February 2022 to July 2022. **Methods:** Total sample of participants would be determined by using Raosoft software. The sample size was selected to be n=100 after taking prevalence of 58.3%, 9% margin of error and confidence level at 95 %. SPSS version 20 was used for the statistical analysis. **Results:** The average age of the 100 enrolled individuals who tested positive for hepatitis C RNA was 48.46 ± 9.05 years. There were 66 females and 34 men in the sample, making the female to male ratio 1.9:1. N=55 (55% of the total) patients were diagnosed with diabetes but patients diagnosed incidentally on laboratory tests for newly diagnosed cases of diabetes were 29 % (n=29) while remaining were on either dietary restriction or were non-compliant to medications. Most of the patients had HBA1C >7.6 i-e; n=24 (24%) while the others from 6.5-7.0% n= 23 (23%) while the remaining 8 (8%) patients had HBA1C from 7.1-7.5%. **Conclusion:** Further study is essential to build effective and inexpensive strategies for the monitoring and treatment of diabetes in hepatitis C patients due to the increased frequency of diabetics reported in HCV RNA positive individuals.

Keywords: Chronic liver disease, Diabetes mellitus, Hepatitis C.

INTRODUCTION

About 3% of the global population has hepatitis C, and every year it causes the deaths of over 350 million people.^{1,2} Hepatitis C has a 4.8% incidence rate in Pakistan. Sharing needles and injecting drugs are major contributors to the disease's spread. The World Health Organization (WHO) estimates that about 170 million people around the world are chronic HCV carriers, putting them at risk for liver cancer and/or liver cirrhosis.³

According to 2013 WHO estimates, diabetes mellitus ranks as the eighth leading cause of death worldwide.

Between 1.5 million and 5.3 million deaths occur annually as a direct result of it.^{4,5} While in Pakistan, the overall population rate has been rising from 3% to 7.2%.⁵

Several studies have linked HCV infection with an increased risk of developing diabetes by increasing insulin resistance.⁶⁻¹⁰ While the exact mechanism is often a mystery, research points to HCV's interaction with the insulin receptor via the release of pro-inflammatory cytokines. Elhawary et al. discovered that 13.84 percent of HCV-positive individuals had diabetic mellitus, most commonly type II DM.¹¹ Chronic hepatitis C virus infection is highly correlated with type II diabetes (10.6%), according to research by Sindhu et al.¹² An

additional observational study by Ansari et al. reported that 58.3% of hepatitis C patients also had diabetes.¹³

Diabetes is closely linked to liver illness, and its prevalence is rising gradually among HCV patients, according to new research. Although insulin resistance appears to be one of the most common pathophysiological mechanisms interfering with insulin signaling in hepatocytes, other co-factors, such as the production of inflammatory mediators and rising oxidative stress, also play a role.¹⁴ According to research conducted by the Pakistan Medical Research Council the rate of HCV infection was shown to be much greater in diabetic individuals when compared to the general population.⁸

The main objective of our research is to evaluate the prevalence of HCV and diabetes mellitus and their associated morbidities by counting the number of patients who are seropositive for both diseases. This research revealed an alarming rise in the incidence of this problem.

METHODS

Patients with seropositive HCV RNA who met the inclusion criteria were identified via the incidental or symptomatic diagnosis of patients attending the outpatient Department of Medicine Shaikh Zayed Hospital, Lahore. The patient gave their permission after being fully informed. The study was conducted after ethical committee review from institution. All patients visiting outpatients department or admitted in wards with or without cirrhosis will be included in study. Patients with HCV RNA are diagnosed either on routine checkups or symptomatic. Patients previously diagnosed diabetic were not included in the study. Sterile syringes were used to draw blood, and the results of the fasting blood glucose (FBS) and random blood glucose (RBS) tests were analyzed. Fasting blood glucose levels were measured, and levels two hours following a 75 g oral glucose load were also measured. Patients with HCV RNA positivity who also have symptoms of hyperglycemia and a casual plasma glucose ≥ 11.1 mmol/l (200 mg/dl) or Glycated hemoglobin (Hb A1C) 6.5% should be tested for diabetes mellitus. No one funded patient himself/ herself bear cost of laboratory test. All new cases of diabetes were enrolled in the study. All the patients with chronic HCV positive were enrolled in the study no cirrhosis.

The SPSS.20 statistical package was used for the study's analysis. Patient age and HCV disease duration were used to determine the mean and standard deviation. Age, gender, and HCV infection duration were used to create separate groups. Frequencies and percentages served as

the units of measurement for the quantitative variables. HCV positive patients history not more than five years.

RESULTS

The average age of the 100 patients enrolled who tested positive for HCV RNA was 48.46 9.05 years (table 1). Women outnumbered men by a ratio of 1.9:1, as there were 66 of them to just 34 of them. There were 55 (55%) diabetic individuals out of a total of 100 (table 1). The 55 patients had a mean FBS of 117 15.63, but a mean RBS of 205 46.88 after an oral glucose tolerance test, with HBA1c also elevated. HBA1c averaged 6.6% 0.99%. The majority of patients (n=24, 24%) had HBA1C >7.6 i-e, while another 23 (23%) had HBA1C between 6.5-7.0%, and the leftover 7 (7%) had HBA1C between 7.1-7.5% (figure 5). Of the 55 individuals with diabetes, n=29(29%) were found by chance by a laboratory test, whereas n=26(26%) were already aware they were diabetic but were not on diet restriction or were not taking any medications for diabetes (figure 2). Therefore, the results of our study mainly included patients newly diagnosed as an incidental finding on labs i-e; 29% out of 100 patients. Patients with prediabetic range were not included in the study. Only patients with diabetes were included in the study.

Table 1: Demographic variables

Demographic variables	Characteristics	Frequency (percentage)
Age (years)	Mean \pm SD	48.46 \pm 9.05 Range 40
Gender	(Male/Female Ratio M:F)	34:66
Diabetics	Frequency	55 (55%)
Fasting blood sugar (mg/dl)	Mean \pm SD	117 \pm 15.63
Random blood sugar (mg/dl)	Mean \pm SD	205 \pm 46.88
HBA1C %	Mean \pm SD	6.6 \pm 0.98

Figure 1: Frequency of different ranges of HbA1c

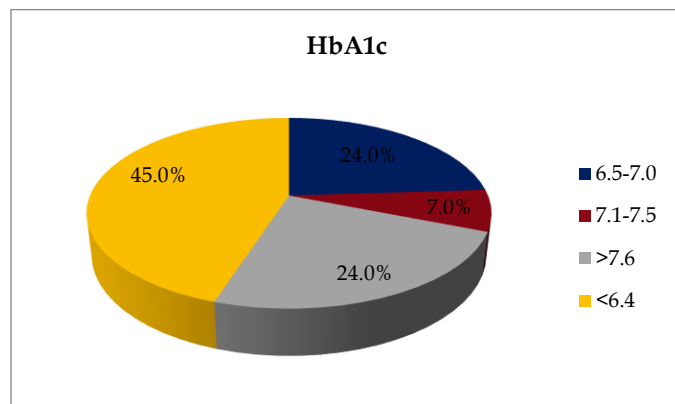
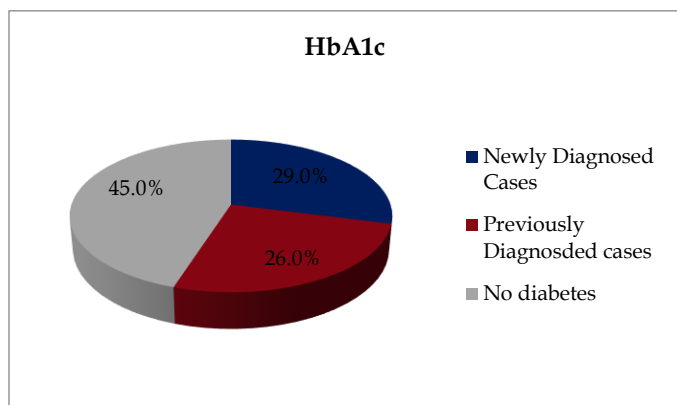


Figure 2: Frequency of Diabetics

DISCUSSION

The worldwide prevalence of chronic liver disease is estimated to be between 5 and 10%, making it a major cause of mortality and disability. The death rate from cirrhosis is 19.6 per 100,000 people, making it the seventh leading cause of death. The incidence of HCV is between 2-10% worldwide. However, 8.3% of the adult population worldwide has diabetes, and the prevalence is the same for both men and women. When diabetes and chronic hepatitis C, two widespread public health issues, occur together, they pose a serious threat to patients.¹⁵

Many people die every year from DM and HCV, two of the world's most widespread and lethal diseases. Chronic liver disorders, cirrhosis, and HCC are most common in developing nations, yet the hepatitis C virus has infected almost 170 million individuals worldwide. According to data released by the WHO in 2000, the incidence of T2DM in adolescents older than twenty was predicted to be around 2.8%. Many nations' healthcare budgets are severely strained by the rising costs associated with diabetes and HCV. Because the same person can contract both diseases, they pose a far greater threat. Like many other infectious diseases, HCV has a wide range of potential origins.¹⁶ Type 2 diabetes is a critical cofactor of HCV, and there is evidence to amend the consequences of HCV irrespective of the stage of insulin resistance, which occurs before the patient would display overt symptoms of diabetes. Recently, it has become generally accepted that chronic hepatitis C is a condition associated with abnormal metabolic processes and is linked with T2DM and insulin resistance. Several researches have focused on how and why diabetic people have viral hepatitis symptoms. Researchers found that people with diabetes mellitus were more likely to contract HCV than those without the disease. This could be because diabetic people are more likely to undergo medical operations, which can lower the patient's immunity, making them more susceptible to HCV infection. Over 30 years ago, researchers discovered a correlation between type 2

diabetes mellitus and persistent liver infections. Since then, other studies have investigated the correlation between HCV and T2DM, yielding evidence for or against a relationship between the two. Various factors, including experimental design, sample size, and unintentional population selection, could account for these divergent findings. The scope and scientific basis for many schools of thought based on the association between HCV and DM are lacking. There is frequent data whether or not having T2DM can increase the risks on an individual catching HCV, however a few meta-analyses have shown that HCV may increase the risk of diabetes.

Our research showed that roughly 55% of HCV patients also had diabetes. Of the 55% of patients with diabetes, 29% were newly diagnosed cases who had no prior history of the disease, while 26% were long-term diabetics who were noncompliant with their medications and relied solely on dietary changes to control their condition. However, hepatitis C and diabetes both show signs of rising prevalence in earlier research, with estimates ranging from 10% to 58.3%.¹²⁻¹³ In patients with hepatitis C, Anjum et al. found that 38.1% had decreased glucose tolerance.¹⁷ Type 2 diabetes is more common in individuals with HCV than in non-diabetics, according to cross-sectional studies conducted by Huang et al. (6.9% vs. 4.5%, $P=0.001$).¹¹ Patients with both diabetes and chronic hepatitis C have a higher chance of developing cirrhosis and hepatocellular carcinoma than those with hepatitis C who are not diabetic. Anti-retroviral treatment for hepatitis C has been associated with better glycemic management, according to a number of clinical investigations.¹⁸

In our research, people between the ages of 48 and 50 were most frequently afflicted. Similarly aged HCV patients have a higher incidence of DM, as reported by Aziz et al.¹⁹ In contrast to previous research, however, we found that females were more common than males.²⁰ Infection has been observed primarily in Asian youth. Age and HCV infection have been identified as the independent variables in previous research. Although some research has found an association between older age and diabetes and hepatitis, this is not the case everywhere. According to NHANES's analysis, the prevalence of diabetes increases by a factor of two between the under-40 and over-40 age groups. Our research shows that female patients outnumber male patients who present with diabetes, but the difference is not statistically significant. Increasing In our sample, diabetes primarily affected those above the age of 36. Statistically significant differences were found between fasting and random blood sugars and diabetes mellitus. Patients with a higher body mass index (BMI) and larger waist circumference are more likely to develop HCV-

induced fibrosis or severe illness. The majority of our HCV patients had elevated fasting, non-fasting, and HBA1c levels. Diabetes risk factors include cirrhosis, age, and hepatitis C virus infection. Similarly strong associations have been reported throughout multiple cohort studies. Both HCV infection and glucose intolerance raise the likelihood of developing diabetes. The rate of HCV infection is significantly higher than that of HBV, at 24-26% versus 9-13%. Although our investigations are the largest of their kind, others have found a higher frequency of HCV infection.

CONCLUSION

An increased incidence of newly diagnosed diabetics has been found in patients with HCV RNA positive. This is because diabetics have been found to affect treatment responses. Additional research is required to promote adequate and cost-effective programs for the supervision and management of diabetic, which affects treatment responses to antivirals if strict glycemic control is not achieved.

LIMITATIONS

Because just one public hospital participated in the study, the findings cannot be applied generally.

SUGGESTIONS / RECOMMENDATIONS

The study suggested that frequent and ongoing health education programs be run for such issues to enhance awareness of self-care in various settings.

CONFLICT OF INTEREST / DISCLOSURE

None.

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REFERENCES

1. Mohd Hanafiah K, Groeger J, Flaxman AD, Wiersma ST. Global epidemiology of hepatitis C virus infection: new estimates of age-specific antibody to HCV seroprevalence. *Hepatology*. 2013 Apr;57(4):1333-42.
2. Gravitz L. Introduction: a smouldering public-health crisis. *Nature*. 2011 Jun 8;474(7350):S2-4.

3. Gacche RN, Al-Mohani SK. Seroprevalence and Risk Factors for Hepatitis C Virus Infection among General Population in Central Region of Yemen. *Hepat Res Treat*. 2012;2012:689726.
4. The top 10 causes of death Fact sheet N°310. World Health Organization. Oct 2013. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>
5. Jayawardena R, Ranasinghe P, Byrne NM, Soares MJ, Katulanda P, Hills AP. Prevalence and trends of the diabetes epidemic in South Asia: a systematic review and meta-analysis. *BMC public health*. 2012 Dec;12(1):1-1.
6. Naing C, Mak JW, Ahmed SI, Maung M. Relationship between hepatitis C virus infection and type 2 diabetes mellitus: meta-analysis. *World J Gastroenterol*. 2012 Apr 14;18(14):1642-51.
7. Younossi ZM, Stepanova M, Nader F, Younossi Z, Elsheikh E. Associations of chronic hepatitis C with metabolic and cardiac outcomes. *Aliment Pharmacol Ther*. 2013 Mar;37(6):647-52.
8. Yahya KM, Iqbal K. Presence of Hepatitis C Virus Infection Among Diabetic Patients in Faisalabad, Pakistan. *Journal of University Medical & Dental College*. 2011;2(1):13-6.
9. Aziz MS. Diabetes mellitus; prevalence in patients of chronic hepatitis C *Professional Med J*. 2012;19(1):68-72.
10. Anjum MS, Maqbool S, Saeed MH, Hussain T, Kalsoom N. Chronic viral hepatitis c infection; frequency of impaired glucose tolerance in patients. *Professional Med J*. May 2013;20(3):374-80.
11. Elhawary EI, Mahmoud GF, El-Daly MA, Mekky FA, Esmat GG, Abdel-Hamid M. Association of HCV with diabetes mellitus: an Egyptian case-control study. *Virology*. 2011 Jul 26;8:367.
12. Sindhu GA, Naz S, Qureshi FS, Ahmed Z, Islam T. Diabetes mellitus; incidence of chronic hepatitis C patients. *Professional Med J*. 2013;20(2):220-6.
13. Ansari S, Ghani H, Junejo SA. Frequency of retinopathy in hundred cases of chronic hepatitis C on interferon therapy at Liaquat University Hospital Hyderabad. *Med Channel*. 2010;16(2):240-3.
14. Elkrief L, Chouinard P, Bendersky N, Hajage D, Larroque B, Babany G, Kutala B, Francoz C, Boyer N, Moreau R, Durand F, Marcellin P, Rautou PE, Valla D. Diabetes mellitus is an independent prognostic factor for major liver-related outcomes in patients with cirrhosis and chronic hepatitis C. *Hepatology*. 2014 Sep;60(3):823-31.
15. White DL, Ratziu V, El-Serag HB. Hepatitis C infection and risk of diabetes: a systematic review and meta-analysis. *J Hepatol*. 2008 Nov;49(5):831-44.
16. Huang JF1, Dai CY, Hwang SJ, Ho CK, Hsiao PJ, Hsieh MY, et al. Hepatitis C viremia increases the association with type 2 diabetes mellitus in a hepatitis B and C endemic area: an epidemiological link with virological implication. *Am J Gastroenterol*. 2007 Jun;102(6):1237-43.
17. Antonelli A, Ferrari SM, Giuggioli D, Di Domenicantonio A, Ruffilli I, Corrado A, et al. Hepatitis C virus infection and type 1 and type 2 diabetes mellitus. *World journal of diabetes*. 2014 Oct 10;5(5):586.
18. Pattullo V, Heathcote J. Hepatitis C and diabetes: one treatment for two diseases?. *Liver International*. 2010 Mar;30(3):356-64.
19. Anjum MS, Maqbool S, Saeed MH, Hussain H, Kalsoom N. Chronic viral hepatitis c infection; frequency of impaired glucose tolerance in patients. *Professional Med J*. May 2013;20(3):374-80.
20. Aziz MS. Diabetes mellitus; prevalence in patients of chronic hepatitis C; *Professional Med J*. Jan - Mar 2012;19(1):68-72.