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Original Article

Frequency of Diabetes Mellitus in Patients with Chronic Hepatitis C Infection

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ABSTRACT

Diabetes and hepatitis C infection are prevalent worldwide. 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:** To find out the frequency of diabetes mellitus in chronic hepatitis C infected patients admitted to Department of Medicine, Khyber Teaching Hospital KPK. **Methods:** A cross-sectional Descriptive Study was conducted having 104 patients aged 15 years and above from both genders in department of Medicine for a duration of one year from 2nd March 2020 to 26th February 2021.The inclusion criteria were set for patients who were hepatitis C positive for at least two months investigated through detection of HCV antibodies by ELISA. Chronic hepatitis C was diagnosed on the basis of detecting HCV antibodies by ELISA, and confirmed by detecting HCV RNA by polymerase chain reaction (PCR). Diabetes mellitus was diagnosed on the basis of random blood sugar above 200 mg/dL, fasting blood sugar above 126 mg/dL on two occasions or HBA1C above 6.5 % (diagnostic criteria designed by ADA). **Results:** Only 21(21%) were found to have newly diagnosed diabetes mellitus with a p value 0.37. Those with impaired glucose levels were found in 15(15%), and 59(59%) were with normal glucose level. **Conclusions:** Our study did not find any statistical significance in our result with p-value=(0.37).

INTRODUCTION

Hepatitis C infection and diabetes mellitus type 2 are the two major public health hazards worldwide, the latter being the fastest growing disease in the world. The prevalence of hepatitis C is highest in South central and East Asia [1]. Family history of diabetes and sedentary life style are the key factors contributing to diabetes mellitus[2]. Diabetes leads to the development of microvascular complications of neuropathy, nephropathy and retinopathy in 59.6%, 24.4% and 15.9% of patients respectively [3-5]. There is also a strong association of T2DM with chronic hepatitis C according to some studies. T2DM is highly prevalent in chronic hepatitis C patients, which is why it is recommended for healthcare providers to screen for HCV in diabetic patients [6]. Many other studies have demonstrated a noteworthy association between diabetes mellitus type 2 and chronic hepatitis C infection which is minor with hepatitis B [7, 8]. The incidence of DM type 2 in HCV patients mostly occurs in the absence of other predisposing factors; obesity, positive family history, poor diet control and lack of exercise. This may propose the direct role of hepatitis C in pathogenesis of diabetes mellitus [9]. Diabetes in chronic hepatitis C patients presents in a very peculiar manner, in which chronic degenerative changes in the liver gradually aid in the development of diabetes mellitus, thus acting as a precipitating factor [10]. Increased iron overload is also a

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common finding in chronic hepatitis which is also an important risk factor for development of DM type 2. Given the postulate that HCV by itself induces insulin resistance, a logical hypothesis is that viral eradication should be associated with reduction in insulin resistance. Globally, the trends in HCV are rising among both developing and developed world. This increase in burden of HCV leaves behind the epidemic of diabetes and vice versa that requires further studies. As diabetes is considered rapidly becoming a major public health problem. This is of immense importance to check the rising trends and epidemiology (Descriptive as well as Analytical) of diabetes in various sections of populations. Not enough studies have been done previously on epidemiology of diabetes and its association with chronic hepatitis C patients, especially in this part of the world.

METHODS

A cross-sectional descriptive study was conducted having 104 patients aged 15 years and above from both genders in Department of Medicine for a duration of one year from 2nd March 2020 to 26th Feburuary2021. Chronic hepatitis C was diagnosed on the basis of detecting HCV antibodies by ELISA, and confirmed by detecting HCV RNA by polymerase chain reaction (PCR). Diabetes mellitus was diagnosed on the basis of random blood sugar above 200 mg/dL, fasting blood sugar above 126 mg/dL on two occasions or HBA1C above 6.5 % (diagnostic criteria designed by ADA) The demographic data were collected in the form of information on a preplanned questionnaire mentioning required details regarding name, age, gender, location, family history of the disease, other related diseases and previous treatments taken for hepatitis C. Data were analyzed using Statistical Package for the Social Sciences (SPSS for Windows, release 22.0; SPSS, Inc., Chicago, IL, USA.

RESULTS

A total of 104 patients were included and investigated in this study after taking informed consent. Mean age of the patients' understudy was 54.38 ± 15.81. Male were more 68% as compared to female Table 1.

Table 1: Demographic baseline characteristic of COVID-19 Patients being Evaluated

Variables	Patients (n=104)
Age in Years	
Mean ± SD	54.38 ± 15.81
Sex	
Male	70 (68%)
Female	34 (32%)
Duration since positive PCR test (years)	
Mean ± SD	54.38 ± 15.81
Duration since positive for Diabetes (years)	
Median (Min-Max)	3 (0-9)

Newly diagnosed diabetic individuals were 23 (21%) with chronic hepatitis C, impaired glucose levels were found in 17(15%), and 64(59%) were with normal glucose level. p-value (p= 0.37) table 2. No HCV RNA was detected in 5 (5%) patients with chronic hepatitis, 1(1 %) of which were non diabetic, 3 (3 %) had impaired glucose tolerance and 1% had DM. p-value of our result was 0.37 which did not show any statistical significance in our results.

Table 2: Frequency of Diabetes Mellitus among Chronic Hepatitis C patients

Fasting Blood Sugar	HCV RNA PCR		p-value
	Detected	Not Detected	
Normal	64	1	0.37
Impaired Glucose	17	3	
Diabetic	23	1	

Prevalence of diabetes among chronic hepatitis C patients were observed more among males 62% as compared to females 38% (Figure 1).

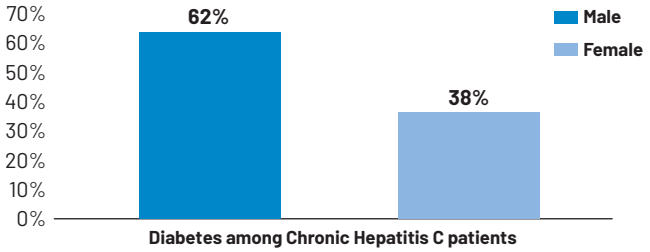

Figure 1: Frequency of diabetes among chronic hepatitis C patients in Gender

A little above 30 patients, aged above 45 years with HbA1c below 6.5 had portal hypertension. In the same age group, but with HbA1c above 6.5, less than 20 patients had portal hypertension. Portal hypertension was not seen in less than 5 patients who had uncontrolled DM and in around 10 patients with controlled DM table 3. This again confirms that patients with chronic HCV had portal hypertension regardless of whether their DM was under control or not. It is evident that liver parenchymal damage and portal hypertension are both associated with increase in age but independent of DM in HCV patients (Table 3).

Table 3: Illustrates the total number of chronic HCV patients with normal liver parenchyma and the total number of patients with coarse liver texture divided on basis of DM type 2 with HBA1C above and below 6.5

Patient Age	Liver Texture	HBA1C Below 6.5	HBA1C Above 6.5	p-value
15 to 30 years	Normal liver parenchyma	4	0	0.001
	coarse echo texture of liver	1	0	
31 to 45 years	Normal liver parenchyma	5	0	0.004
	coarse echo texture of liver	20	11	
Above 45 years	Normal liver parenchyma	3	0	0.000
	coarse echo texture of liver	40	20	

DISCUSSION

Chronic hepatitis C infection and diabetes mellitus are the

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major public health problems worldwide. Many epidemiological studies have demonstrated significant association between chronic hepatitis C and diabetes mellitus. A prospective study on 404 patients was conducted in Korea like our study. As contrast to our study, diabetes was observed more frequently in chronic hepatitis C (24%) than those with HBV, which we did not take account of in our study, furthermore, sample size was larger (10.4%) (p= <0.05) in comparison to our sample size (21%) (P=0.37). However, similar to our study, they have found higher association of DM with increase in age of 40-60 (p=0.005) [11-12]. A study conducted in Southeast Asia with a sample size of 361, in contrast to our sample size of 100, prevalence of diabetes mellitus was 31.5% as compared to 21%. Out of these, 58.2% (n=211) participants were cirrhotic while 46.6% were non-cirrhotic (n=150). Diabetes was significantly associated to cirrhosis (p=0.01) compared to (p=0.37) in our study [13]. Similarly, in China, a study of 359 cases with a mean age of 58, like our study had impaired glucose control of 34.6% which is higher than our study (22%) but their study had taken into account the family history of diabetes, as opposed to our study [14-16]. A large population-based study was conducted in Southern Taiwan with a population size of 180,359 in contrast to our sample size (100) but with a similar mean of age. In this study, 13428 HCV positive patients showed positive association with metabolic syndrome and diabetes mellitus, in contrast to our study. [17]. Another study conducted in 2006 showed similar results to ours. The study population consisted of 180 HCV positive patients. The prevalence of T2DM was 38% in contrast to 21% in our study. There was no significant association of diabetes mellitus in chronic hepatitis C [18]. Another study conducted in Egypt with a sample size of 591 HCV positive patients showed that 150 (25.4%) of them had diabetes mellitus with a p value (p=0.0001) as compared to (p=0.37) in our study. Again, the sample size was greater than ours but the association between the degree of liver disease and development of diabetes mellitus did not differ statistically between the two studies [19, 20]. A similar study conducted in New Orleans; USA performed a retrospective analysis in contrast to our cross sectional with a sample of 9,783 patients. HCV, chronic hepatitis and cirrhosis were independently associated with the development of diabetes mellitus with a prevalence of (21%) and (p=0.004) as compared to (21%) of our study with (p=0.37) [21]. The higher diabetes frequency among chronic hepatitis c patients need diabetologist input as far management is concern.

CONCLUSIONS

We concluded from our study that chronic hepatitis is not significantly associated with new onset diabetes mellitus. We also concluded that liver parenchymal damage and portal hypertension are both associated with increase in age in chronic HCV patients. However, it is completely independent of diabetes mellitus in chronic HCV patients.

Authors Contribution

Conceptualization: TG
Methodology: BJ, MSA, AR, MA, TUH
Formal analysis: AR
Writing-review and editing: N, SK, BJ, TUH

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Kao JH, Ahn SH, Chien RN, Cho M, Chuang WL, Jeong SH, *et al*. Urgency to treat patients with chronic hepatitis C in Asia. Journal of gastroenterology and hepatology. 2017 May; 32(5): 966-74. doi: 10.1111/jgh.13709.

[2] Subramani SK, Yadav D, Mishra M, Pakkirisamy U, Mathiyalagen P, Prasad GB. Prevalence of type 2 diabetes and prediabetes in the Gwalior-Chambal region of central India. International Journal of Environmental Research and Public Health. 2019 Dec ;16(23): 4708. doi: 10.3390/ijerph16234708.

[3] Uddin F, Ali B, Junaid N. Prevalence of Diabetic Complications In Newly Diagnosed Type 2 Diabetes Patients In Pakistan: Findings From National Registry. Journal of Ayub Medical College Abbottabad. 2018 Oct; 30(1)(4): S652-S8.

[4] Afroz A, Alam K, Ali L, Karim A, Alramadan MJ, Habib SH, *et al*. Type 2 diabetes mellitus in Bangladesh: a prevalence based cost-of-illness study. BMC Health Services Research. 2019 Dec; 19(1) :1-2. doi: 10.1186/s12913-019-4440-3.

[5] Afroz A, Zhang W, Loh AJ, Lee DX, Billah B. Macro-and micro-vascular complications and their determinants among people with type 2 diabetes in Bangladesh. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2019 Sep; 13(5): 2939-46. doi: 10.1016/j.dsx.2019.07.046.

[6] Al Humayed SM, Mahfouz AA, Awadalla NJ, Alsabaani AA. Hepatitis C virus infection at primary healthcare level in Abha City, Southwestern Saudi Arabia: Is type 2 diabetes mellitus an associated factor?. International journal of Environmental Research and

DOI: https://doi.org/10.54393/pjhs.v4i05.723

Public Health. 2018 Nov; 15(11): 2513. doi: 10.3390/ijerph15112513.

[7] Qureshi H, Ahsan T, Mujeeb SA, Jawad F, Mehdi I, Ahmed W, *et al*. Diabetes mellitus is equally frequent in chronic HCV and HBV infection. Journal of Pakistan Medical Association. 2002 Jul; 52(7): 280-3.

[8] Qureshi H. Association of diabetes mellitus and chronic hepatitis C infection. Journal of Pakistan Medical Association. 2002 Jul; 52(7): 278-9.

[9] Chehadeh W, Abdella N, Ben-Nakhi A, Al-Arouj M, Al-Nakib W. Risk factors for the development of diabetes mellitus in chronic hepatitis C virus genotype 4 infection. Journal of Gastroenterology and Hepatology. 2009 Jan; 24(1): 42-8. doi: 10.1111/j.1440-1746.2008.05503.x.

[10] Huang YW, Yang SS, Fu SC, Wang TC, Hsu CK, Chen DS, *et al*. Increased risk of cirrhosis and its decompensation in chronic hepatitis C patients with new-onset diabetes: a nationwide cohort study. Hepatology. 2014 Sep; 60(3): 807-14. doi: 10.1002/hep.27212.

[11] Ryu JK, Lee SB, Hong SJ, Lee S. Association of chronic hepatitis C virus infection and diabetes mellitus in Korean patients. The Korean Journal of Internal Medicine. 2001 Mar; 16(1): 18. doi: 10.3904/kjim.2001.16.1.18.

[12] Yi SW, Choi JS, Yi JJ, Lee YH, Han KJ. Risk factors for hepatocellular carcinoma by age, sex, and liver disorder status: a prospective cohort study in Korea. Cancer. 2018 Jul; 124(13): 2748-57. doi: 10.1002/cncr.31406.

[13] Memon MS, Arain ZI, Naz F, Zaki M, Kumar S, Burney AA. Prevalence of type 2 diabetes mellitus in hepatitis C virus infected population: a Southeast Asian study. Journal of Diabetes Research. 2013 Jan; 2013: 1-7. doi: 10.1155/2013/539361.

[14] Chen LK, Hwang SJ, Tsai ST, Luo JC, Lee SD, Chang FY. Glucose intolerance in Chinese patients with chronic hepatitis C. World Journal of Gastroenterology. 2003 Mar; 9(3): 505. 10.3748/wjg.v9.i3.505.

[15] Chung WJ. Chronic hepatitis C and insulin resistance. The Korean Journal of Gastroenterology. 2012 Apr; 59(4): 268-74. doi: 10.4166/kjg.2012.59.4.268.

[16] Arao M, Murase K, Kusakabe A, Yoshioka K, Fukuzawa Y, Ishikawa T, *et al*. Prevalence of diabetes mellitus in Japanese patients infected chronically with hepatitis C virus. Journal of Gastroenterology. 2003 Apr; 38(4): 355-60. doi: 10.1007/s005350300063.

[17] Lin YJ, Shaw TW, Yang HI, Lu SN, Jen CL, Wang LY, *et al*. Chronic hepatitis C virus infection and the risk for diabetes: a community-based prospective study. Liver International. 2017 Feb; 37(2): 179-86. doi: 10.1111/liv.13194.

[18] Noto H and Raskin P. Hepatitis C infection and diabetes. Journal of Diabetes and its Complications. 2006 Mar; 20(2): 113-20. doi: 10.1016/j.jdiacomp.2006.01.001.

[19] 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 Journal. 2011 Dec; 8(1): 1-9. doi: 10.1186/1743-422X-8-367.

[20] 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 Dec; 19: 405-20. doi: 10.1007/s11154-017-9440-1.

[21] Gordon SC, Lamerato LE, Rupp LB, Holmberg SD, Moorman AC, Spradling PR, *et al*. Prevalence of cirrhosis in hepatitis C patients in the Chronic Hepatitis Cohort Study (CHeCS): a retrospective and prospective observational study. The American Journal of Gastroenterology. 2015 Aug; 110(8): 1169. doi: 10.1038/ajg.2015.203.