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RELATIONSHIP OF GLYCEMIC CONTROL AND CHRONIC HEPATITIS C INFECTION IN TYPE-II DIABETIC PATIENTS

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Abstract:

Aims: To determine the relationship between glycemic control and HCV infection in patients with type 2 diabetes.

Study design: descriptive cross-sectional study.

Duration and location: This study included a sample of 108 type 2 diabetic patients from OPD of General Medicine, Holy Family Hospital, Rawalpindi for one-year duration from March 2019 to March 2020.

Methodology: This cross-sectional study was initiated with approval from the hospital's ethics committee. A total of 108 patients with type 2 diabetes were enrolled in the study. Patients with type 2 diabetes meeting the inclusion and exclusion criteria were selected for the study and were informed of the presence of anti-HCV antibodies in the 3rd generation ELISA test. Samples were sent for anti-HCV antibodies, blood sugar and HbA1c. Patients with type 2 diabetes were considered to have good glycemic control with HbA1c ≤ 6.5%, and patients with HbA1c> 6.5% were considered to have poor glycemic control.

Results: The mean age of the patients was 43.5 years with a standard deviation of 6.8 years. 49 (45.37%) men and 59 (54.63%) women participated in the study. HCV infection occurred in 15 (13.89%) patients with type 2 diabetes. A large number of patients 77 (71.29%) had poor glycemic control based on HbA1c levels, and only 31 (28.70%) patients had good glycemic control. The rate of HCV infections was significantly higher, 33.77% in patients with poor glycemic control compared with 22.58% in patients with good glycemic control, but the result was not statistically significant at a p value of 0.2536.

Conclusion: The incidence of HCV infections among patients with type 2 diabetes with poor glycemic control is significantly high compared to patients with good glycemic control.

Key words: *type 2 diabetes, HCV, glycemic control, HbA1c.*

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INTRODUCTION:

Diabetes mellitus has the highest and rapidly growing incidence rate in the world. It is estimated that by 2030 it will increase by about 69% compared to 2010 in developing countries and about 20% in industrialized countries [1-2]. According to various estimates, between 18 and 24 million people with diabetes are expected in Asia by 2030. This very high incidence is extremely worrying because diabetes increases the risk of many cancers such as breast, kidney, colon, and pancreatic cancer [3-4]. This disease is spreading dramatically, in 2014 more than 287 million people worldwide were diagnosed with diabetes and this number is expected to increase to 592 million by 2035. Another serious health problem in the world is the rapidly growing hepatitis virus infection type C, affecting over 170 million people worldwide. Of these HCV cases, more than 80% of cases have chronic infection. HCV is the leading cause of morbidity and mortality worldwide as it can cause acute hepatitis and chronic liver disease, which further complicate chronic kidney disease, cirrhosis, and liver cancer. diabetes. According to various studies, patients with HCV have an increased risk of developing type 2 diabetes compared with those without HCV [5-6]. Likewise, the risk of HCV infection increases at least twice in a diabetic patient. 3 Hepatitis C infection is considered one of the main causes of serious diseases such as cirrhosis and liver cancer. The latest statistics show that the prevalence of HCV infection in the world is about 3% and affects over 170 million people worldwide. The major effect of hepatitis C infection is the liver, but it can result in many extrahepatic symptoms such as salivary gland inflammation, cryoglobulinemia, and cutaneous porphyria [7-8]. Many studies have shown a significant relationship between type 2 diabetes and HCV infection. However, some studies have also produced conflicting results in this situation, showing no difference between HCV infection rates in people with type 2 diabetes and those without diabetes. According to a study conducted in Taiwan on the association of type 2 diabetes with HCV, HCV seropositivity was found to increase 2.8-fold in patients with type 2 diabetes compared to non-diabetic controls. Similar results were obtained in a study conducted in Italy, which found that the prevalence of HCV in patients with type 2 diabetes was more than 3 times higher (7.6%) compared to those without diabetes with HCV infection of 2.3 %[9-10]. A similar trend was observed in the studies in Pakistan, where the incidence of HCV infection among patients with type 2 diabetes is odd 3.03. In HCV-infected type 2 diabetic patients, glycemic control becomes difficult because HCV increases insulin resistance. The results of this study will therefore help to formulate an effective screening program for patients with type 2 diabetes, as early detection and better treatment of HCV infection will help improve patient prognosis, reducing morbidity and mortality from HCV-type complications.

MATERIALS AND METHODS:

This cross-sectional study was initiated with approval from the hospital's ethics committee. This study included a sample of 108 type 2 diabetic patients from OPD of General Medicine, Holy Family Hospital, Rawalpindi for one-year duration from March 2019 to March 2020. The WHO Sample Size Calculator used parameters such as 95% confidence level, predicted population percentage (HCV prevalence in patients with type 2 diabetes) to calculate sample size. These patients were selected based on the likelihood of subsequent sampling after informed written consent to participate in the study. The study included all male and female type 2 diabetes patients aged 20 to 60 years and patients diagnosed / treated with type 2 diabetes for less than 15 years. Patients with ketoacidosis, diabetic coma or type 1 diabetes mellitus, impaired liver function (ALT> twice the normal) or a positive serology test for hepatitis B, a history of abnormal lipid metabolism, intravenous medication, blood transfusions or organ transplants the history of body tattoos was excluded from the study. Type 2 diabetes mellitus was diagnosed by a fasting plasma glucose level of 126 mg / dL (7.0 mmol / L) or higher or a random plasma glucose concentration of ≥ 200 mg / dL (11.1 mmol / L) in the presence of symptoms. Type 2 diabetic patients meeting the inclusion and exclusion criteria were selected for the study and informed about the presence of anti-HCV antibodies in the 3rd generation ELISA test. Samples were sent for anti-HCV antibodies, blood sugar and HbA1c. Patients with type 2 diabetes were considered to have good glycemic control with HbA1c $\leq 6.5\%$, and patients with HbA1c> 6.5% were considered to have poor glycemic control. All information was collected on a previously designed Performa. SPSS v. 21 was used for data entry and analysis. Quantitative variables were described by means of the mean and standard deviation, and qualitative variables were presented as frequencies and percentages. HCV infection rates were compared using the Chi-square test between patients with good and poor glycemic control. A p value of less than 0.05 was considered significant.

RESULTS:

A total of 108 patients with type 2 diabetes mellitus were selected in this study to investigate the relationship between diabetes and hepatitis C infection. Most of the 42 (39%) patients in the study

were 41-50 years old, followed by 51-60 years of age and 24 (22%) patients aged 31–40 years. The mean age of the patients was 43.5 years with a standard deviation of 6.8 years. 49 (45.37%) men and 59 (54.63%) women participated in the study. HCV infection was present in 15 (13.89%) patients with type 2 diabetes, and in 93 (84.26%) patients with HCV infection it was negative. In our trial, glycemic control was not significantly good in patients with type 2 diabetes. A significant number of patients 77 (71.29%) had poor glycemic control based on HbA1c levels, and only 31 (28.70%) patients had good glycemic control. as shown in Table I.

Table 1: Distribution of Age, HCV infection and Glycemic control (n=108)

Characteristics	Number	Percentage
Age of patients (Year)		
20-30	9	8%
31-40	24	22%
41-50	42	39%
51-60	34	31%
Mean ± SD	43.5±6.8	
Gender of Patients		
Male	49	45.37%
Female	59	54.63%
HCV infection		
Present	15	13.89%
Absent	93	84.26%
Glycemic control		
Good	31	28.70%
Poor	77	71.29%

The results of the study show that the incidence of HCV infection is significantly higher in patients with poor glycemic control, and the incidence of HCV infection is 33.77% compared to patients with good glycemic control based on HbA1c. In the group of patients with good glycemic control, the HCV infection rate was 22.58%. Although the incidence of HCV infection was significantly high in the poorly controlled diabetes group compared to the well-controlled group, the result was not statistically significant and had a p-value of 0.2536 as shown in Table II.

Table 2: Association of Hepatitis C infection with Glycemic Control

Hepatitis C virus	Good Glycemic Control (n= 31)		Poor Glycemic Control (n= 77)		P-Value
	Frequency	Percentage	Frequency	Percentage	
Present	7	22.58 %	26	33.77 %	0.2536 *
Absent	24	77.42 %	51	66.23 %	
Total	31	100	77	100	

DISCUSSION:

The etiology and pathogenesis of type 2 diabetes among HCV positive patients is not clear. Although the function and relationship of insulin resistance with the scale of fibrosis cannot be ignored. Type 2 diabetes is a suddenly emerging problem all over the world [7-10]. The main reasons for its rapid growth are increasing sedentary lifestyle, obesity, a positive family history of diabetes, aging and HIV co-infection, etc. Abnormal glucose homeostasis is a metabolic condition found in diabetic patients. Diabetes affects more than 171 million people worldwide, according to various estimates, and this number is growing tremendously day by day. The same state of evolution in diabetes was observed in Pakistan, with an average burden ranging from 3% to 7.2% in the general population [11-12]. The prevalence of diabetes has been estimated 4 to 6 times more frequently in South Asian countries compared to European countries. The results of this study indicate that HCV infection was more common in elderly patients compared to younger age groups. which is also confirmed in the literature. Due to the higher parenteral exposure, which increases the risk of infection, elderly patients are more susceptible to HCV infection than younger patients. A comparison of the HCV infection rate by sex showed that the rate of infections was significantly higher in men compared to patients with type 2 diabetes. An analysis of the HCV infection rate by gender showed that men had a higher rate of HCV infections. Of the 15 HCV positive cases, 9 (60%) are men and 6 (40%) are women with type 2 diabetes. Similar results to this study were reported by Caronia et al., Who found that male patients had a significantly higher rate of HCV infection compared to female patients [13-14]. The morbidity and mortality associated with diabetes can be minimized by improving the access and quality of the healthcare system, and by effective diabetes control and prompt treatment. Establishing facilities for laboratory tests such as blood glucose and HbA1c testing to monitor diabetes status and the provision of insulin injections will greatly help in reducing diabetes and its complications, especially among the poor in our population. Although many studies have shown an association between diabetes and HCV infection, the relationship has yet to be elucidated. Similarly, the results of this study also did not show any statistically significant association between type 2 diabetes and HCV infection [15].

CONCLUSION:

The results of the studies confirm the clear intolerance of glucose in HCV patients, as the incidence of HCV was significantly high in type 2 diabetic patients with poor glycemic control. The major etiology of type 2 diabetes is complex and its major pathophysiology is insufficient insulin secretion or its action with an increase in hepatic glucose production. All of these factors are major contributors to the development of overt hyperglycemia. Thus, the pathogenic relationship of HCV infection with type 2 diabetes or the relationship of type 2 diabetes with the development of HCV infection requires further studies.

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