

The Incidence of Diabetes Mellitus in Hepatitis C Infection in Turkey

Bilge Bas¹, Senay Ozturk Durmaz², Mehmet Celik³

¹ Antalya Training and Research Hospital, Department of Gastroenterology, Antalya, Turkey

² Antalya Kepez State Hospital, Department of Infectious Diseases and Clinical Microbiology, Antalya, Turkey

³ Antalya Kepez State Hospital, Department of Endocrinology and Metabolism, Antalya, Turkey

***Corresponding Author:** Bilge Bas, Antalya Training and Research Hospital, Department of Gastroenterology, Antalya, Turkey.

ABSTRACT

Objective: Impaired glucose tolerance in patients with chronic liver disease is an important risk factor for diabetes. However, the presence of hepatitis C without chronic liver disease can make glucose intolerance with some mechanisms. In this study, we aimed to evaluate the prevalence of diabetes mellitus in individuals with HCV infection and healthy control groups in Turkey.

Methods: This study was performed retrospectively between 2016-2018. The incidence of diabetes mellitus was determined in patients with HCV infection and compared with the control group. Anti HCV was measured by micro elisa method and HCV RNA was measured by reverse transcriptase polymerase chain method. Diagnosis of diabetes mellitus was made according to the criteria of American diabetes association.

Result: 48 male and 34 female were in the study group and 53 male and 37 female were in the control group. The mean age was 38 in the study group and 42 in the control group. There was no difference between them. In the control group, 7 (7.7%) individuals met diabetic criteria. This rate was statistically compatible with the rate of diabetes in the community ($p > 0.05$). When we evaluate the study group, 12 of 82 (14.6%) patients had diabetes diagnostic criteria. This value is statistically significant when compared with the general population ($p < 0.001$).

Keywords: Diabetes mellitus, Hepatitis C infection, Insulin resistance

INTRODUCTION

Both hepatitis C and diabetes mellitus are common health problems worldwide. In Turkey, approximately 750000 people are thought to be infected with hepatitis C (1). Hepatitis C also shows extra hepatic findings approximately 2/3 of the cases as well as liver diseases (2). Impaired glucose tolerance in patients with chronic liver disease is an important risk factor for diabetes. However, the presence of hepatitis C without chronic liver disease can make glucose intolerance with immunological mechanisms. HCV infection is also a systemic disease which also shows signs other than liver disease such as oxidative stress, gene expression, mitochondrial dysfunction and lipid metabolism disorders (3). HCV infection induces liver necrosis by increasing tumor necrosis factor alpha. With the combination of diabetes and hepatic steatosis, progression of liver cirrhosis is accelerated. In patients with diabetes, the incidence of HCV infection and the

incidence of diabetes in patients with HCV infection is higher than in the normal population. The aim of this study was to determine the frequency of diabetes in patients with HCV.

MATERIALS AND METHODS

In this retrospective study conducted between 2016-2018, 82 patients with HCV infection were included. 90 healthy individuals who admitted to the hospital for check up were taken as a control group. Age range between 18 and 65 for both groups. Patients were randomly selected for the control group. Patients with body mass index (BMI) between 25-27 were included in both patient and control group. Diagnosis of diabetes mellitus was made according to the criteria of American Diabetes Association (Table 1). Anti HCV was confirmed by Enzyme Linked Immunosorbent Assay (ELISA) method and HCV RNA was measured by reverse transcriptase polymerase chain method

The Incidence of Diabetes Mellitus in Hepatitis C Infection in Turkey

(PCR). SPSS version 21.0 was used for statistical evaluation. Variables were descriptively expressed using mean±SD or number, percentage and tables. Odds ratio and 95% confidence interval

was used to determine level of significance and (P<0.05) was considered as statistically significant.

Table 1. Diabetes Diagnostic Criteria (Only one of the following criteria is sufficient for diagnosis)

Fasting blood sugar \geq 126 mg/dl
Random Plasma Glucose \geq 200 mg/dl + symptoms of diabetes
2-hour plasma glucose in OGTT \geq 200 mg/dl
HbA1c \geq %6.5

RESULTS

82 patients with HCV infection were 48 male and 34 female and there were 53 male and 37 female in the control group. The mean age was 38±8 in the study group and 42±7 in the control group. There was no difference between them. In the control group, 7 (7.7%) individuals met diabetic criteria. Given society in Turkey was

7.5 % in the overall rate of diabetes (4), this rate was statistically compatible with the rate of diabetes in the community (p>0.05). When we evaluate the study group, 12 of 82 (14.6%) patients had diabetes diagnostic criteria. This value is statistically significant when compared with the general population (p<0.001) (Table 2).

Table 2. Socio-demographic characteristics of study group and control group

	Study group number/percent		Control group number/percent		Diabetes prevalence in normal population*	P value	
		Diabetes mellitus		Diabetes mellitus		p1	p2
Gender							
male	48 (58.5%)	7 (8.8%)	53 (58.8%)	5 (5.5%)			
female	34 (41.5%)	5 (6%)	37 (41.2%)	2 (2.2%)			
total	82 (100%)	12 (14.6%)	90 (100%)	7 (7.7%)	7.5%	<0.01	>0.05
Age (in years)							
18-65	38 ±8	40±5	42±7	43±6			

p1: ratio between study group and normal population, p2: ratio between control group and normal population

* TURDEP 2 data

DISCUSSION

The presence of HCV infection in Turkey are between 0.1-2%. The risk of diabetes is higher in patients with HCV infection than in the normal population. There are some risk factors that increase the development of diabetes in this group of patients. Table. However, HCV-positive patients have diabetes starting with a mechanism induced by HCV without these risk factors. For example, patients who undergo liver transplantation due to HCV are at increased risk of developing diabetes compared to those who undergo transplantation for other reasons (5). There are some theories that attempt to explain this relationship between HCV and diabetes. Approximately half of patients with chronic HCV infection have liver fatty tissue. HCV disrupts retinoid X receptor-associated gene expression and causes direct accumulation of fat in hepatocytes (2). Insulin resistance begins as a result of steatohepatitis. The resulting insulin resistance causes more fat accumulation in hepatocytes and a vicious cycle begins and

results in diabetes. There are also studies showing a direct effect of the HCV core gene on insulin resistance (3). This study demonstrated that HCV-infected mice develop insulin resistance at an early age, regardless of weight gain. In a study by Massini et al., HCV showed a direct destructive effect on pancreatic islet cells (8). In addition, it has been shown that diabetes decreases with the reduction of viral load in patients with HCV infection. Also HCV is known to be an autoimmune activation, an autoimmune reaction initiated by HCV may also be associated with autoimmune destruction of pancreatic islet cells.

Obesity is known to be an important risk factor for fatty liver and diabetes. So we kept the BMI range between 25-27 in both groups. In addition, the lack of other risk factors for diabetes in our patients supports that HCV could be a major risk factor.

In our study, diabetes was significantly higher in HCV-infected patients than in the normal population.

REFERENCES

- [1] Tozun N, Ozdogan O, Cakaloglu Y, Idilman R, Karasu Z, Akarca U, et al. Seroprevalance of hepatitis B and C infections in Turkey. *Turk J Gastroentero* 2017;28:147-8
- [2] Cacoub P, Comarmond C, Domont F, Savey L, Desbois A, Saadoun D. Extrahepatic manifestations of chronic hepatitis C virus infection. *Ther Adv Infect Dis* 2016;3(1):314
- [3] Chang M.L. Metabolic alterations and hepatitis C: From bench to bedside. *World J Gastroente ro* 2016;22: 1461-1476
- [4] Ilhan Satman • Beyhan Omer • YildizTutuncu • Sibel Kalaca • Selda Gedik • Nevin Dinccag. Twelve-year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults. *Eur J Epidemiol* 2013;28:169–180
- [5] Fabrizi F, Messa P, Martin P, Takkouche B. Hepatitis C virus infection and post-transplant diabetes mellitus among renal transplant patients: a meta-analysis. *Int J Artif Organs*. 2008;31:675-82.
- [6] Masayuki Nagahashi¹, Yasunobu Matsuda², Kazuki Moro¹, Junko Tsuchida¹, Daiki Soma¹, Yuki Hirose¹. DNA damage response and sphingolipid signaling in liver diseases. *Surg Today*. 2016; 46: 995–1005.
- [7] Lerat H, Imache M.R., Polyte J, Gaudin A, Mercey M, Donati F, et al. Hepatitis C virus induces a prediabetic state by directly impairing hepatic glucose metabolism in mice. *J Biol Chem*. 2017; 292: 12860–12873.
- [8] Masini M, Campani D, Boggi U, Menicagli M, Funel N, Pollera M, et al. Hepatitis C virus infection and human pancreatic beta-cell dysfunction. *Diabetes Care*. 2005;28 (4): 940-1.

Citation: Bilge Bas et.al, “The Incidence of Diabetes Mellitus in Hepatitis C Infection in Turkey”, *International Journal of Research Studies in Medical and Health Sciences*. 2019; 4(4): 01-03.

Copyright: © 2019 Bilge Bas et.al, This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.