

ORIGINAL ARTICLE

Frequency of Diabetes Mellitus in Liver Cirrhosis Patients at Tertiary Care Hospital

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ABSTRACT

Background: Diabetes mellitus is a metabolic condition comprising of irregularly elevated level blood glucose. There are several different types of Diabetes mellitus. Several studies show the association between Diabetes mellitus and liver cirrhosis.

Aim: To assess the frequency of diabetes mellitus in liver cirrhosis patients at tertiary care hospital

Methodology: Our study was descriptive Cross-Sectional Study carried out at the Department of Medicine, Lady Reading Hospital, Peshawar for duration of one year from 08-11-2021—08-05-2022. The detailed medical history and physical examination, demographic detail of the patients such as age, gender, and address were recorded. The data entry and analysis was done by using IBM SPSS version 23.

Results: This study was conducted on 144 patients presenting with liver cirrhosis. The mean age of patients was 49.73±13.26 years. The frequency of diabetes mellitus in liver cirrhosis patients in our study was 20 (13.9%)

Conclusion: Our study concludes that the frequency of diabetes mellitus in patients with liver cirrhosis is high. To validate and identify the true effect of this co-morbidity in the Pakistani community, additional prospective studies with larger populations that examine the incidence of liver deterioration in diabetic patients are required.

Keywords: Liver cirrhosis, Diabetes mellitus, Insulin resistance, Endocrinopathies,

INTRODUCTION

The word diabetes is originated from the Greek word “diabetes” which means “siphon” which implies “To Pass-Through” while “Mellitus” word is taken from Latin which means “Sweet”. In past years, an enormous amount of work has been done along with multiple discoveries. Different management approaches have been developed for the appropriate handling of this disease. In spite of this progress, diabetes mellitus (DM) continues to be a major health problem worldwide. DM is recorded to be the seventh most prominent cause of mortality in the United States¹⁻³.

DM is a metabolic condition comprising of irregularly elevated level blood glucose. There are several different types of DM, such as “type 1”, “type 2”, neonatal diabetes, maturity-onset diabetes of the young, gestational diabetes and secondary causes from reasons connected to endocrinopathies and steroid usage. The most frequent subtype of DM includes Type 1 diabetes mellitus (T1DM) responsible for 5–10% patients with diabetes while Type 2 diabetes mellitus (T2DM) is responsible for 90–95% patients with diabetes. T1DM is generally observed in children, while T2DM is observed to be common in older adults with a history of prolonged hyperglycemia due to a substandard lifestyle primarily involves poor nutritional options. The mechanism of disease for T1DM and T2DM are completely dissimilar, with several etiologies, presentations, and management. T1DM is categorized as beta cells destruction in the pancreas, which results in absence or enormously low level of insulin. T2DM has a more serious onset that includes insulin impairment brought on by an imbalance in insulin level and insulin sensitivity. Insulin resistance depends upon multiple factors such as obesity and aging^{4,6}. The histological development of regenerating nodules bordered by fibrous bands as a result of chronic liver injury, which eventually results in chronic liver problem and portal hypertension is defined as cirrhosis. A study showed that about 80% of patients who suffered from liver cirrhosis could be affected with glucose metabolism disorders, 30% showed DM⁷. In a previous study, DM was found in 16% of patients already affected with liver cirrhosis⁸.

DM has become one of the leading causes of diseases and deaths worldwide as DM speed up liver inflammation and fibrosis

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which results in severe liver failure. In cirrhotic patients, DM increases the risks for bacterial infections by increasing the chances of mortality. Both these diseases are fatal and prevalent in our general population. This study is meant to identify the frequency of DM in cirrhotic patients. The results our research will be shared among medical professionals for adopting the effective treatment modality for the patient care and management of DM.

MATERIALS AND METHODS

Our study was descriptive Cross-Sectional Study carried out at the Department of Medicine, Lady Reading Hospital, Peshawar for duration of one year from 08-11-2021—08-05-2022. By taking the proportion of 16% DM in patients with liver cirrhosis⁸, taking a Confidence level of 95% and Margin of error of 6 %, our study sample size was 144 by using the WHO sample size calculator. The inclusion criteria in our study were all the patients with liver cirrhosis of both the gender having 25-70 years age. The exclusion criteria were patients with a history of pancreatic tumors and patients refuse to participate. Study was carried out after taking approval from the College of Physicians and Surgeons Pakistan research unit and ethical committee of the hospital. The aim of the study was explained to all patients by also mentioning the risks and benefits of this research work before taking the informed written consent from the patients. The detailed medical history and physical examination, demographic detail of the patients such as age, gender, and address were recorded. All patients with a known medical history of liver cirrhosis were subjected for the assessment of DM by ordering the HBA1c test if readings of 6.5% (48 mmol/mol) or higher are achieved then the patient were considered as positive for DM. All the data of the patient were recorded on a pre-designed proforma. The data entry and analysis was done by using IBM SPSS version 23. For BMI and age mean and standard deviation were computed whereas for gender, DM, and type of DM, frequencies and percentages were determined.

RESULTS

Totally 144 patients with liver cirrhosis were enrolled in the current research. The mean±SD age of the patients was 49.73±13.26

years. The mean±SD height of the patients was 1.69±0.01 meter. The mean±SD weight of the patients was 78.22±7.06 kg. The mean±SD BMI recorded was 27.34±2.55 kg/m². According to the age distribution, 38(26.4%) patients were 25 to 40 years old, 51(35.4%) patients were in the age of 41 to 55 years while 55(38.2%) patients were in range of 56 to 70 years (Figure 1). Regarding gender distribution, there were 81(56.3%) males and 63 (43.8%) females in our study (Figure 2). The frequency of diabetes mellitus in liver cirrhosis patients in our study was 20(13.9%) (Figure 3). The frequency of type 1 diabetes mellitus among diabetic patients was 12 (8.3%) and the frequency of type 2 diabetes among diabetic patients was 10 (5.6%) (Figure 4).

Figure 1: Distribution of patients on the basis of age

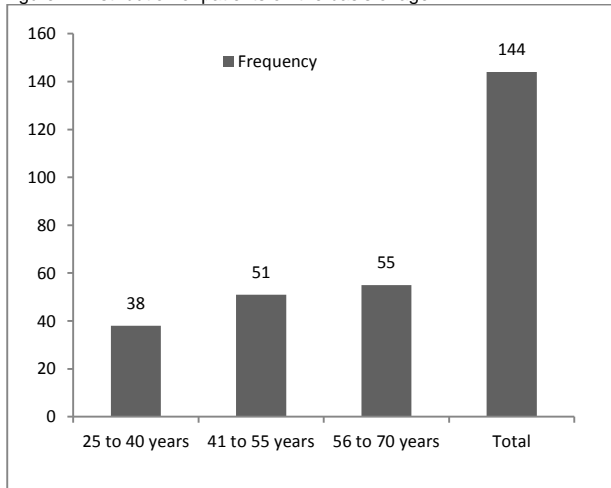


Figure 2: Distribution of patients on the basis of gender

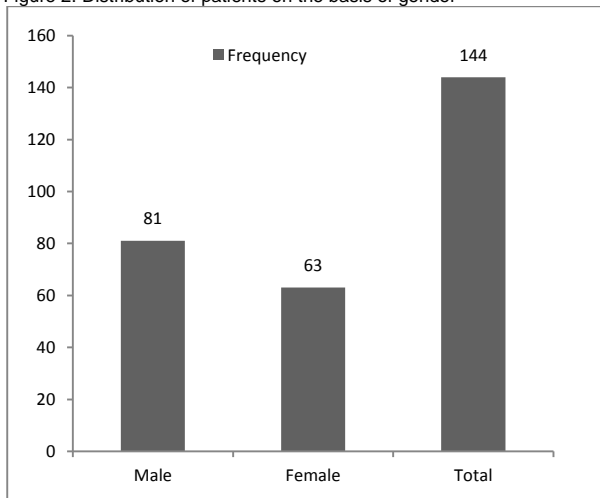


Figure 3: Frequency of diabetes mellitus amongst liver cirrhosis patients

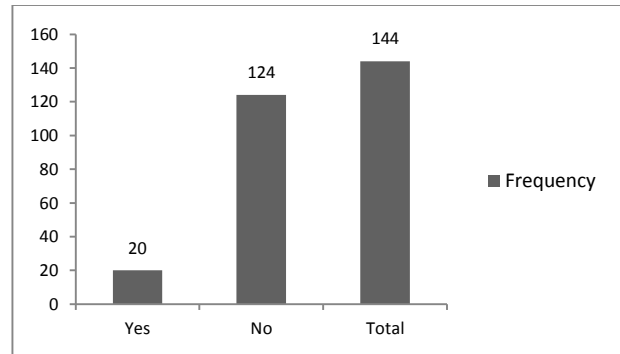
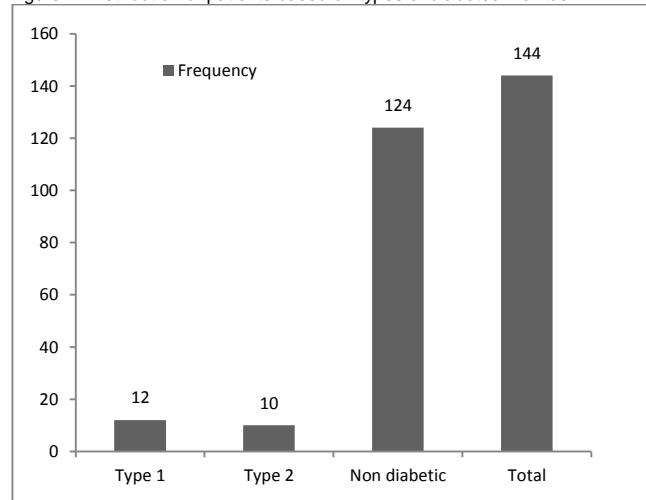


Figure 4: Distribution of patients based on types of diabetes mellitus



DISCUSSION

The patients with liver cirrhosis, 30 to 40% may have overt diabetic mellitus (DM)⁹. When liver disease is advanced, the DM is clinically visible. In the presence of hepatic insulin resistance, the development of DM may be caused by a gradual disruption of insulin secretion¹⁰.

Liver has an important role in maintenance of glucose homeostasis by storing or releasing glucose in response to metabolic needs. The dysregulation of release of hepatic glucose has a crucial function in the pathogenesis of diabetes and disorders related to insulin resistance. Even after accounting for other risk factors, DM is an important risk factor for causing hepato-cellular carcinoma, increasing the risk of the disease by two to four times¹¹. The patho-physiological effects of insulin on hepatocytes can be interfered with by acute or CLD, which can also exacerbate insulin resistance. Because of conditions like insulin resistance, glucose intolerance, and diabetes, the metabolic balance of glucose is compromised in the presence of hepatic illness. Adipose tissue and muscle both acquire insulin resistance, which when paired with hyperinsulinemia might appear to be a significant pathophysiologic basis for diabetes in liver disease¹².

Among 147 patients of liver cirrhosis presenting to our hospital, the frequency of diabetes in our study was 20 (13.9%). Similar findings have been reported by a study which showed that the frequency of diabetes in liver cirrhosis patients was 16%⁸. In accordance with our study, another study carried out by Ramón et al. reported 21% prevalence of DM in patients with liver cirrhosis¹³. Another study carried out in Brazil reported high (64.5%) prevalence of DM in liver cirrhosis patients as compared to our study¹⁴. Another study done in Japan also reported high prevalence of DM in liver cirrhosis patients as compared to our study¹⁵.

The bulk of the rise in peripheral glucose level is due to a small amount of postprandial glucose because glucose absorbed from the gastrointestinal tract is transported to the liver through the portal vein, where the majority of glucose is stored. Therefore, it is plausible that liver may contribute more to systemic blood glucose level maintenance after a meal than peripheral tissue. Patients with cirrhosis may have subclinical DM. Clinically hepatogenous diabetes is different clinically from type 2 DM because it is more usually related with cirrhosis problems and increases mortality in cirrhotic patients. It is also less frequently associated with microangiopathy¹⁶.

Retrospective investigations have demonstrated that DM lowers survival and raises the chance of cirrhosis complications of any origin. The DM causes severe liver failure by escalating hepatic inflammation and hastening the fibrosis process. 7,000 people with type 2 diabetes were included in a population-based study and observed 2.52 times higher risk of death at age 5 as compared to general population¹⁷. In recent years, obesity has become more common everywhere, but especially in developed nations. Obesity affects 50% of adults in Mexico, putting it second in the world only to the United States¹⁸.

Despite the aforementioned challenges, there are not many research studies on the assessment of the effect of DM on mortality and morbidity in reported liver cirrhosis patients. Additionally, the existence of intolerance of glucose and subclinical diabetes by OGTT is not often assessed in liver cirrhosis patients without proven DM¹⁹. Small sample was the major limitation of our study.

CONCLUSION

Our study concludes that the frequency of diabetes mellitus in patients with liver cirrhosis is high. To validate and identify the true effect of this co-morbidity in the Pakistani community, additional prospective studies with larger populations that examine the incidence of liver deterioration in diabetic patients are required.

Conflict of interest: Nil

REFERENCES

- Unnikrishnan R, Anjana RM, Mohan V. Diabetes mellitus and its complications in India. *Nature Reviews Endocrinology*. 2016;12(6):357-70.
- Plows JF, Stanley JL, Baker PN, Reynolds CM, Vickers MH. The pathophysiology of gestational diabetes mellitus. *Int J Mol Sci*. 2018;19(11):3342.
- Asmat U, Abad K, Ismail K. Diabetes mellitus and oxidative stress—A concise review. *Saudi pharmaceutical journal*. 2016;24(5):547-53.
- Mata ARd, Álvares J, Diniz LM, Ruberson Ribeiro da Silva M, Alvernaz dos Santos BR, Guerra Junior AA, et al. Quality of life of patients with Diabetes Mellitus Types 1 and 2 from a referral health centre in Minas Gerais, Brazil. *Expert Rev Clin Pharmacol*. 2016;9(5):739-46.
- Femlak M, Gluba-Brzózka A, Cialkowska-Rysz A, Rysz J. The role and function of HDL in patients with diabetes mellitus and the related cardiovascular risk. *Lipids Health Dis*. 2017;16(1):1-9.
- Deepthi B, Sowjanya K, Lidiya B, Bhargavi R, Babu P. A modern review of diabetes mellitus: an annihilatory metabolic disorder. *J In Silico In Vitro Pharmacol*. 2017;3(1).
- García-Compeán D, González-González JA, Lavalle-González FJ, González-Moreno EI, Maldonado-Garza HJ, Villarreal-Pérez JZ. The treatment of diabetes mellitus of patients with chronic liver disease. *Ann Hepatol*. 2015;14(6):780-8.
- Quintana JOJ, García-Compeán D, González JAG, Pérez JZV, González FJL, Espinosa LEM, et al. The impact of diabetes mellitus in mortality of patients with compensated liver cirrhosis—a prospective study. *Ann Hepatol*. 2016;10(1):56-62.
- Kinoshita T, Shimoda M, Sanada J, Fushimi Y, Hirata Y, Irie S, et al. Association of GA/HbA1c ratio and cognitive impairment in subjects with type 2 diabetes mellitus. *J Diabetes Complications*. 2016;30(8):1452-5.
- Hickman IJ, Macdonald GA. Impact of diabetes on the severity of liver disease. *The American journal of medicine*. 2007;120(10):829-34.
- Tolman KG, Fonseca V, Dalpiaz A, Tan MH. Spectrum of liver disease in type 2 diabetes and management of patients with diabetes and liver disease. *Diabetes Care*. 2007;30(3):734-43.
- Picardi A, D'Avola D, Gentilucci UV, Galati G, Fiori E, Spataro S, et al. Diabetes in chronic liver disease: from old concepts to new evidence. *Diabetes Metab Res Rev*. 2006;22(4):274-83.
- Kobashi-Margáin RA, Gutiérrez-Grobe Y, Ponciano-Rodríguez G, Uribe M, Méndez-Sánchez N. Prevalence of type 2 diabetes mellitus and chronic liver disease: a retrospective study of the association of two increasingly common diseases in Mexico. *Ann Hepatol*. 2010;9(3):282-8.
- Torquato MTdCG, Montenegro Junior RM, Viana LAL, Souza RAHGd, Lanna CMM, Lucas JCB, et al. Prevalence of diabetes mellitus and impaired glucose tolerance in the urban population aged 30-69 years in Ribeirão Preto (São Paulo), Brazil. *Sao Paulo Med J*. 2003;121:224-30.
- 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. *J Gastroenterol*. 2003;38(4):355-60.
- Nielsen MF, Caumo A, Aagaard NK, Chandramouli V, Schumann WC, Landau BR, et al. Contribution of defects in glucose uptake to carbohydrate intolerance in liver cirrhosis: assessment during physiological glucose and insulin concentrations. *American Journal of Physiology-Gastrointestinal and Liver Physiology*. 2005;288(6):G1135-G43.
- Blanco CDV, Gentile S, Marmo R, Carbone L, Coltorti M. Alterations of glucose metabolism in chronic liver disease. *Diabetes Res Clin Pract*. 1990;8(1):29-36.
- Petrides AS, Vogt C, Schulze-Berge D, Matthews D, Strohmeyer G. Pathogenesis of glucose intolerance and diabetes mellitus in cirrhosis. *Hepatology*. 1994;19(3):616-27.
- Harrison SA. Liver disease in patients with diabetes mellitus. *J Clin Gastroenterol*. 2006;40(1):68-76.