Original Research Article

Non Alcoholic Fatty Liver Disease (NAFLD) in Type 2 Diabetes Mellitus patients - significance of ALT

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Received: 06-10-2020 / Revised: 08-12-2020 / Accepted: 26-12-2020

Abstract

Introduction: Non alcoholic fatty liver disease (NAFLD) is emerging as the most common chronic liver condition. More than 70% of type 2 diabetes mellitus (T2DM) patients have a fatty liver disease – Non Alcoholic fatty liver disease (NAFLD); progression of NAFLD to non-alcoholic steatohepatitis (NASH) dramatically increases the risks of liver diseases like cirrhosis and hepatocellular carcinoma.**Aims & Objectives:** The aim of our study was to assess the elevation of liver enzymes in patients with type 2 diabetes mellitus and NAFLD.**Materials & Methods:**The current cross sectional type of study was carried out in a super speciality hospital, Medical college , in patients with type 2 Diabetes Mellitus. USG Abdomen was done in all patients to diagnose fatty liver. Clinical History ,BMI, Lipid Profile, and Liver function tests (enzymes)was done in all patients .Statistical analysis of the data is done using SPSS version 16.**Results:** The study was done in 100 patients , and out of them , 62% patients were males and 38% were females. These patients, divided into two groups, one with normal ALT and the other with elevated ALT enzyme levels. The patients with Type 2 DM and fatty liver, is 62% and patients with NAFLD is 46%. AST and GGT and ALP enzymes were found normal in these patients with NAFLD. Area under curve for the ROC for predicting fatty liver was solely based on elevated ALT and it was 0.88.**Conclusion:** NAFLD is highly prevalent in patients with Type 2 DM. Hence screening for abnormal liver parameters in T2DM and NAFLD, helps to minimise liver morbidity and in the diabetic population.

Keywords: Pelvic traction, Bilateral Leg traction, Analgesics, Physiotherapy.

Introduction

Non Alcoholic fatty liver disease (NAFLD) is characterized by hepatic steatosis (fatty liver) in the absence of excessive alcohol consumption. The spectrum of NAFLD ranges from simple steatosis to non-alcoholic steatohepatitis (NASH), fibrosis, and cirrhosis with its complications, such as decompensation and hepatocellular carcinoma (HCC).[1]NAFLD is emerging as the most common cause of chronic liver disease in Western countries, as well as worldwide[2].Most patients with NAFLD are asymptomatic and typically are identified with abnormal liver studies on routine laboratory tests. In particular, the liver enzymes, alanine aminotransferase (ALT), and aspartate aminotransferase (AST) levels are elevated. However, these enzymes may not be elevated in all cases of NAFLD, and the levels of these enzymes may not predict the extent of inflammation and cirrhosis[3]

Aims & Objectives: This study undertaken to investigate the association between liver enzymes and NAFLD in patients with type 2 diabetes mellitus (T2DM) determined by ultrasonography scanning in the study population.

Materials & methods

This was a cross-sectional, observational type of study conducted between January and December of 2020. Patients coming to OPD with a diagnosis of T2DM. The patients were taken a proper clinical history , duration of T2DM and physical examination done, including measurements of body mass index (BMI). All patients had liver function biomarkers, including alanine aminotransferase (ALT), aspartate amino-transferase (AST), alkaline phosphatase (ALP), gamma-glutamyl transferase (GGT), glycosylated hemoglobin (HbA1c), hepatitis B surface antigen (HBsAg), and anti-hepatitis C antibody studies. The normal ranges for the analytes were as follows: ALT: 10 - 40 International units per liter (IU/L), AST: 10 - 35 IU/L, GGT: 5 - 30 IU/L, and ALP: 80 - 290 IU/L. The study subjects with or without NAFLD were divided into two groups according to the ALT level.Abdominal ultrasonography was used as an imaging tool for diagnosing NAFLD.All the patients with alcohol consumption, known liver disease, viral hepatitis, and steatogenic medication were excluded. A detailed history of alcohol consumption was taken with critical level being < 20 g/day in women and < 30 g/day in men[5]A P value < 0.05 was set as the level of statistical significance. All analysis was performed by using the Statistical Package for Social Sciences (SPSS)® Statistics, version 16 (IBM SPSS Statistics, Armonk, NY).

Results

This study was carried out in 100 patients, and of those patients,62 (62%) were male and 38 (38%) were female. The patients were divided into two groups based on the ALT levels, i.e., the normal ALT group and the elevated ALT group. The mean age of the patients was 55.7 ± 10.24 years in the normal ALT group and 59.3 ± 12.3 years in the elevated ALT group. The number of T2DM patients with fatty liver was 62 (61.78%) and those with a non-fatty liver was 46 (45.9%) based on ultrasonography scans. Subjects with NAFLD had significantly higher ALT levels ($p < 0.001$) but no significant rise in AST or GGT levels. BMI and triglyceride values were found

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higher in fatty liver patients but were not statistically significant. and without fatty liver based on ultrasonography.
The relationship of liver biochemistry and enzymes in T2DM with

Table 1:Relationship of Liver Biochemistry and Enzymes in T2DM With and Without Fatty Liver Based on Ultrasonography

Parameters	DM without fatty liver	DM with fatty liver	p-value
ALT	22.7 ± 8	58.9 ± 29	< 0.001
AST	20 ± 11	22.3 ± 11	0.26
GGT	13 ± 42	21 ± 51	0.08
ALP	138 ± 52	144 ± 62	0.07

The duration of T2DM was also significantly associated with elevated liver enzymes, irrespective of the presence of a fatty liver, as shown in Figure.

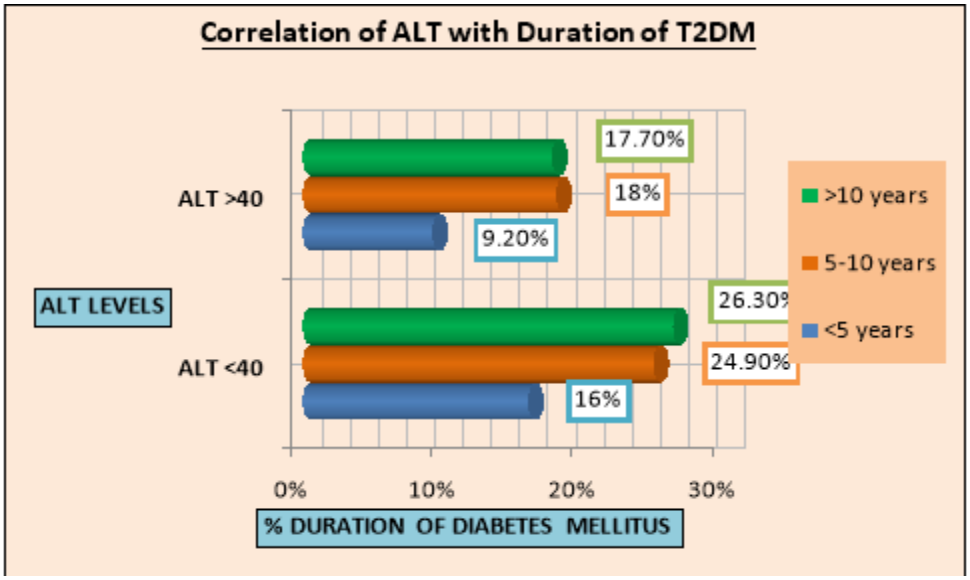

Fig 1: **Bar Diagram Showing Correlation of ALT with Duration of T2DM Irrespective of the Presence of NAFLD.**

The area under the receiver operating characteristic curve(AUC) for the prediction of fatty liver based on the ALT value only and was 0.88 with a confidence interval (CI) between 0.80 and 0.93 ($p < 0.05$).

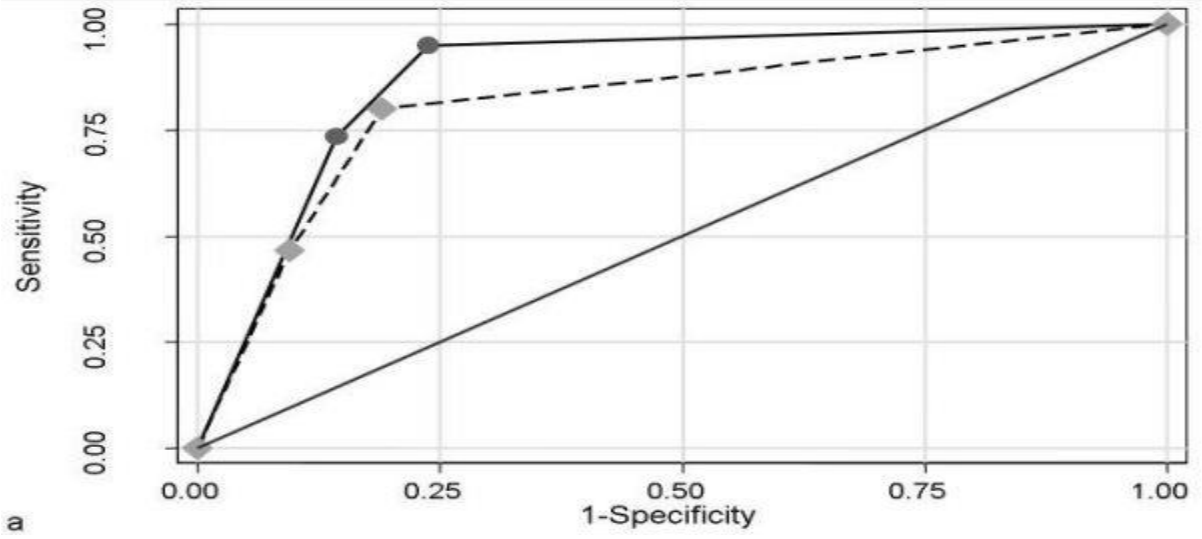

Fig 2:The area under the receiver operating characteristic curve(AUC)

Discussion

Our results showed that liver enzymes, especially ALT, were independently associated with NAFLD in the study population with T2DM.A higher incidence of liver function test abnormalities has been associated with individuals with T2DM than individuals without T2DM[6].In the present study, the ALT was elevated in 48% of the diabetic population, while the AST and ALP were increased only in 14% and 19% of the diabetic population, respectively. NAFLD and NASH have been reported to be the most common chronic causes of elevated liver enzymes and are often a clue for the need for further diagnostic evaluation.Diabetic patients with NAFLD had significantly higher ALT, AST, and GGT levels and a significantly lower AST: ALT ratio in comparison with diabetic subjects without NAFLD, but there was no significant difference in the ALP levels. A controversy of different increased pattern of liver function tests (LFTs) in several research studies, with respect to elevation of AST and GGT also in T2DM patients. A number of studies that support significantly elevated levels of transaminases in the diabetic population, especially more so with NAFLD than non-NAFLD, including the present study[7-10].ALT is located in the hepatocellular cytoplasm, whereas AST is located mostly within the mitochondria.The mechanism of the development of a fatty liver is explained by the insulin resistance that activates lipolysis, resulting in the accumulation of non-esterified fatty acids. This enhanced fat accumulation in the liver is known to be directly toxic to hepatocytes ,resulting in increased ALT levels. Patients with NAFLD have increased risk factor for, liver diseases and cardiovascular diseases[6,5,11].Liver biopsy remains the gold standard for characterizing liver histology in NAFLD, but it is expensive and carries some morbidity and, very rarely, mortality risk. Thus, it should be performed in those who would benefit the most from the diagnostic and prognostic perspectives.

In a study by Prati et al. , ALT cut-off of for healthy males and females was considered to be 30 U/L and 19 U/L, respectively, and to be diagnostically useful in NAFLD . Considering the lower cut-off based on the Prati et al. study, the sensitivity for ALT would considerably increase in diagnosing NAFLD[12].Based on the ROC curve, our study had an AUROC of 0.88 for ALT in predicting NAFLD in diabetic patients. Routine ultrasound examination of the abdomen (for the presence of NAFLD) may be performed in T2DM patients who have elevated liver enzymes, and subsequently, early treatment and reduction of cirrhosis and its complications may be possible.The ultrasonography results of 100 patients with T2DM in our study showed fatty infiltration in 62 % of the patients, which was slightly lower compared to the Prashanta et al., Hernaez et al., and Leite et al. studies with T2DM .The presence of high TG levels, low HDL cholesterol levels, and increased ALT levels were independently associated with a higher risk of histologically confirmed non-alcoholic steatohepatitis (NASH). Higher triglyceride levels were also associated with NAFLD in a study by Leite et al., and among NAFLD patients, they discovered 78% of the patients to have NASH based on the histopathological study . In another study by Leite et al. in 2011, the presence of NASH was independently associated with high serum GGT levels, older age, and male gender . However, Prashanta et al. confirmed NAFLD by liver biopsy in only 54.11% of T2DM patients, which was slightly lower than the Leite et al. study[13,14].imple fatty liver seen in NAFLD does not correlate with increased morbidity or mortality, the progression to NASH dramatically increases the risks of cirrhosis and hepatocellular carcinoma, as suggested by several studies.

Conclusion

So with this study, we can conclude that Non-alcoholic fatty liver disease(NAFLD) is highly prevalent in patients with T2DM. Timely diagnosis and management of the abnormal liver enzymes may help to minimize morbidity and mortality associated with liver-diseases in the diabetic population.

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Conflict of Interest: Nil
Source of support:Nil