

Comparison Of ALT In Type 2 Diabetics with And Without Fatty Liver Disease

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Abstract

Objective: To determine the association of alanine aminotransferase in type 2 diabetic patients with and without fatty liver disease.

Materials and Methods: A cross-sectional study was done for six months at Sheikh Khalifa Bin Zaid Al-Nahyan Hospital Rawalakot. In our study, we included all the patients who presented to the outpatient department (OPD) having type 2 diabetes mellitus. Their age, gender, height, weight, and duration of diabetes mellitus were noted. Their liver function test (LFTS), fasting blood sugar and HBA1c, and fasting lipid profile were also done at the time of their OPD visit and results were noted. They were given an appointment for an ultrasound abdomen from the radiology department for detection of fatty liver disease and the results were noted on the next OPD visit.

Results: Total study population was 90 patients and out of which 35 (38.8%) were male and 55 (61.1%) were female. 58 years was the mean age of our study population. Fatty liver was present in 50% of patients. ALT was raised from a baseline value of 36 in 61% of patients while fasting blood sugar was raised in 83% of patients. The mean fasting blood sugar was 208 mg/dl. ALT was not significantly different in patients with and without fatty liver disease. However, it was found that patients with uncontrolled blood glucose levels have significantly raised ALT which was also statistically proven as the P value was less than 0.05. Also, patients with high blood glucose have a higher incidence of fatty liver disease as compared with normal blood glucose level patients but the difference was not statistically significant as shown by a P value more than 0.05.

Conclusion: Fatty liver disease is more common in Type 2 diabetic patients with uncontrolled blood sugar. There is a high rate of raised ALT in diabetic patients whose blood sugar control is not optimum.

Keywords: Type 2 diabetes mellitus (T2DM), ALT, Non-alcoholic fatty liver disease (NAFLD).

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1. Introduction

Nonalcoholic fatty liver disease (NAFLD) is evolving as the major reason of chronic liver disease globally. The leading reasons for NAFLD include obesity which is present in $\geq 40\%$, type 2 diabetes mellitus in approximately 20% of the population, hypertriglyceridemia in $\geq 20\%$ of cases, and metabolic syndrome or one or more traits of metabolic syndrome^{1,2}. In fatty liver, there is a deposit of triglyceride and other fats in the hepatocytes. Hepatic steatosis is the prominent feature of NAFLD in the population who has no history of significant alcohol consumption. Different conditions come under the umbrella of NAFLD which include simple steatosis, which is commonly labelled as fatty liver, non-alcoholic steatohepatitis (NASH), fibrosis, and liver cirrhosis and its complications, such as portal hypertension and hepatocellular carcinoma^{3,4}. In the coming future, it is presumed that one of the main indications for liver transplantation would be complications associated with NAFLD⁵.

Causes leading to NAFLD include diabetes mellitus, insulin resistance (pre-diabetes), obesity,

dyslipidemia as well as high blood pressure in most patients, and these all are part of metabolic syndrome. Most individuals with NAFLD do not have symptoms and usually, they are diagnosed when deranged liver function tests are detected or ultrasound is done for some other purpose. Alanine aminotransferase (ALT), and aspartate aminotransferase (AST) levels are raised among the liver function tests. Liver enzymes are often within the normal range in many cases of NAFLD and even in the advanced stages of the disease. Therefore, the aminotransferase levels may not accurately forecast the degree of inflammation and cirrhosis^{6,7}. Therefore, we designed a study to appraise the relevance between aminotransferase levels and fatty liver in type 2 diabetic patients assessed by ultrasonography and without performing invasive procedures and examine the incidence of raised ALT as an alternate marker.

2. Materials & Methods

This cross-sectional study was conducted for 6 months duration in the medical unit of Sheikh Khalifa Bin Zaid Al-Nahyan Hospital Rawalakot, Pakistan after approval granted from IRB and letter number is 1738. The study was conducted after taking written informed

consent. The sample size was 90 patients and subjects were chosen by non-probability consecutive sampling. In our study, we included all the patients who presented to the outpatient department (OPD) having type 2 diabetes mellitus. Diabetic patients with chronic hepatitis C, hepatocellular carcinoma, and cirrhosis of the liver were excluded from the study. Their age, gender, height, weight, and duration of diabetes mellitus were noted. The blood sugar fasting was checked for all patients and their HbA1c was noted which is a better predictor of glycemic control. Their liver function test (LFTS) and fasting lipid profile were done at the time of their OPD visit and results were noted.

Their ultrasound abdomen appointment was arranged with the radiology department at the time of examination. A High-resolution B-mode ultrasound system was used to detect whether the fatty liver is present or not. Fatty liver is divided into three grades based on ultrasound findings. In Grade I Fatty liver disease, hepatic echogenicity is diffusely increased but diaphragmatic and periportal echogenicity is fairly visible. Grade II fatty liver is described as widespread raised hepatic echogenicity masking periportal echogenicity but diaphragmatic echogenicity is still noticeable. In Grade III fatty liver disease there is diffusely raised hepatic echogenicity obscuring diaphragmatic and periportal echogenicity⁸.

Data were analyzed with the help of version 22 of SPSS. The chi-square test was applied to find the significance of the difference in ALT in patients with and without liver disease and its association with the control of blood sugar levels. The value of $p < 0.005$ was considered to be significant statistically.

3. Results

The total study population was 90 patients and out of which 35 (38.8%) were male and 55 (61.1%) were female. 58 years was the mean age of our study population as shown in Table 1. Fatty liver was present in 50% of patients. ALT was raised from the baseline value in 61% of patients. It was found that in patients with fatty liver ALT was raised in 62% of patients while it was normal in 38% of patients. Diabetic patients without fatty liver disease ALT were raised in 71% of patients while it was normal in 29% of patients. However, when the chi-square test was applied ALT was not significantly different in patients with and without fatty liver disease as shown in Table 2. The

mean total cholesterol level noted was 183 mg/dl with a maximum of 297 mg/dl and a minimum of 91 mg/dl.

Table-1 Demographic data

Age (Years)	Minimum	
	Maximum	75
	Mean	58.5
Gender	Male	35(38%)
	Female	55(61%)

Fasting blood sugar was raised in 83% of patients while elevated HbA1c was noted in 80% of participants. The mean fasting blood sugar was 208 mg/dl. 72% of patients with raised fasting blood sugars had elevated ALT and 28% had normal ALT. 40% of patients with normal fasting blood sugar had raised ALT and 60% had normal ALT as described in Table 3. It was found that patients with uncontrolled blood sugars had significantly raised ALT which was also statistically proven as the P value was less than 0.05. Also, patients with raised fasting blood sugar and uncontrolled diabetes mellitus had a higher incidence of fatty liver disease when compared with normal blood sugar level patients but the difference was not significant statistically as shown by a P value of > 0.05 .

5. Discussion

Results of ALT were compared with fasting lipid profile, blood glucose control, and body weight by Shreyas Saligram et al in recently identified Type 2 diabetic patients⁹. It was found that ALT was elevated in 25.6% with old age and higher BMI, high triglycerides, and low HDL cholesterol. However, ALT was not related to the control of blood sugars or total cholesterol⁹. In our study, it was noted that patients with uncontrolled blood sugar had raised ALT which was different from Shreyas Saligram et al results. There was a higher incidence of fatty liver disease in patients with raised blood sugars which was not evaluated in Shreyas's study.

In another study conducted in Karachi, Pakistan by Mujeeb Ur Rehman Abro et al and it is found that 65.4% of T2DM patients have a normal value of ALT and 34.6% have raised ALT results whereas in our study it was found that 61% of patients have deranged ALT. The mean age of patients in their study population was 54

years and most patients were overweight. It was observed that raised ALT values were associated with fatty liver disease in T2DM and further emphasized that type 2 diabetic patients should be routinely screened for possible associations with NAFLD and insulin resistance with the help of ultrasonography¹⁰.

Table-2 Association of Fatty Liver with ALT

	Patients with normal ALT	Patients with raised ALT	Total patients
Patients with fatty liver	17	28	45
Patients without fatty liver	13	32	45

Table-3 Association of Blood sugar levels with ALT

	Patients with normal ALT	Patients with raised ALT	Total Patients
Patients with normal blood sugars	9	6	15
Patients with raised blood sugars	21	54	75

Debmalya Sanyal et al also found raised alanine aminotransferase levels in subjects with deranged blood sugars like prediabetics or recently recognized T2DM along with raised cardiovascular risk factors and prevalence of metabolic syndrome¹¹.

An outpatient-based cross-sectional study was conducted by Sanyal et al to determine the liver function tests (LFT) in patients with and without (T2DM) type 2 diabetes mellitus and the status of their liver was assessed with the help of ultrasonography for the presence and absence of nonalcoholic fatty liver disease (NAFLD). It was found that there is a higher degree of association between NAFLD and raised alanine aminotransferase (ALT) and gamma-glutamyl transferase (GGT) but it has no relation with alkaline phosphatase (ALP) levels in patients having impaired glucose tolerance and type 2 (DM) diabetes mellitus^{12,13}. Higher readings of ALT and GGT were significantly associated with metabolic syndrome, raised body mass index (BMI), serum fasting insulin levels, HDL

cholesterol, and TG. More than half of the subjects included in the study with NAFLD had acceptable alanine aminotransferase (ALT) levels, and likewise, 53% of individuals having NAFLD had normal gamma-glutamyl transferase (GGT)¹³. There is the highest negative predictive value of normal alanine aminotransferase (ALT) and GGT whereas nonalcoholic fatty liver disease is present in individuals with mildly raised ALT of more than 40 U/L and GGT of more than 30 U/L with higher positive predictive values for presence of NAFLD in their study population¹³.

Another study was carried out by Amrendra Mandal et al in Nepal in which 210 individuals having type 2 diabetes mellitus were enrolled and found that 55.7% of diabetic patients had fatty liver disease diagnosed with the help of abdominal ultrasonography. Patients with NAFLD had raised ALT but the rest of the liver function tests, like aspartate aminotransferase (AST), alkaline phosphatase, and gamma-glutamyl transferase (GGT) were mostly within the normal range.¹⁴

Research conducted by Shaista Kanwal et al in Peshawar found that 61.3% of patients enrolled for the study have fatty liver disease on ultrasound and these patients have high BMI, uncontrolled blood glucose levels, elevated ALT, and raised triglycerides¹⁵. On the contrary, our study group had no significant difference in ALT in patients with and without fatty liver disease.

Abdus Saboor Shah et al concluded that 47% of patients enrolled in their study had fatty liver disease and 16.6% of patients had diabetes. The prevalence of NAFLD in diabetics is 75%¹⁶ whereas another research done by Aqeela Rashid reported 78.7% cases.¹⁷

In our study, 50% of diabetic patients had fatty liver disease and these findings are almost similar to a study done by Ijaz-ul-Haque Taseer et al.¹⁸

5. Conclusion

Uncontrolled type 2 diabetic patients have a higher incidence of NAFLD. Diabetics may have fatty liver disease despite normal ALT. Glycemic control, ALT levels, and imaging techniques are to be used for screening of fatty liver. Early diagnosis and timely management of diabetes and deranged liver enzymes in diabetic patients reduce the risk of complications related to NAFLD.

CONFLICTS OF INTEREST- None

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Contributions:

K.M, F.B - Conception of study
 K.M, F.B, S.S - Experimentation/Study conduction
 K.M, F.B, L.M -Analysis/Interpretation/Discussion
 K.M, F.B, L.M - Manuscript Writing
 K.M, F.B, S.S - Critical Review
 K.M, F.B - Facilitation and Material analysis

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