ORIGINAL ARTICLE

THE RELATIONSHIP OF DIABETIC CONTROL WITH SERUM ALANINE AMINOTRANSFERASE LEVELS IN PATIENTS WITH NONALCOHOLIC FATTY LIVER DISEASE (NAFLD) AND TYPE 2 DIABETES MELLITUS (T2DM)

Saleem Iqbal, Hamza Ali khan, Muhammad Yousaf khan, Muhammad Darwesh Iqbal, Badar Mahmud Shah, Noor ul Iman

Department of Medicine Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objectives: This study is aimed to find out the relationship of Diabetic control with serum Alanine aminotransferase in patients with Non Alcoholic Fatty Liver Disease and Type 2 Diabetes Mellitus.

Material and methods: This cross sectional descriptive study was conducted from August to October 2019 in general medical outpatient department of Khyber Teaching Hospital Peshawar, a tertiary care hospital in Khyber-Pakhtunkhwa, Pakistan. Patients with non-Alcohol Fatty Liver Disease and T2DM were categorized into two groups. Group A with HbA1c from 6.5-8% and group B with HbA1c of more than 8%. Serum Alanine aminotransferase levels were correlated in these groups with the level of HbA1c. Data was collected through a specially designed proforma and was analyzed through statistical package for social sciences, SPSS version 23.

Results: Amongst 452 patients with T2DM, 289 were females and the rest were males. NAFLD was present in 197 patients. Amongst these 197 patients, Serum Alanine aminotransferase was raised in 17 (27.86%) patients in Group A but was raised in 64 (47.05%) patients in Group 2.

Conclusions: Diabetic control was positively correlated with serum Alanine aminotransferase level in our patients with Non Alcoholic Fatty Liver Disease and Type 2 Diabetes Mellitus.

Keywords: Type 2 Diabetes Mellitus, Non Alcoholic Fatty Liver Disease, Serum Alanine Aminotransferase.

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INTRODUCTION

Type 2 diabetes mellitus (T2DM), is one of the most common metabolic disorder. Various genetic and acquired factors play their roles in the onset and manifestations of this disorder[1,2,3,4]. Insulin resistance is the major underlying factor and is a component of metabolic syndrome. The other components include abdominal obesity, hypertension, hypertriglyceridemia and low serum HDL cholesterol[5,6]. Non-Alcohol Fatty Liver Disease is now included as a component of metabolic syndrome. Patients with metabolic syndrome have 4 to 11 times higher risk of NAFLD as compared to people without metabolic syndrome.[5,7]. Non Alcoholic Fatty Liver Disease (NAFLD) refers to the accumulation of fat, mainly triglycerides in hepatocytes leading to increase in liver weight of up to 5%, provided patient is taking less than 20 grams of alcohol/ day (i.e. approximately 2 standard drinks),and patients do not have viral hepatitis[8]. Primary NAFLD results from insulin resistance. More than 40% of patients with NAFLD have obesity, while more than 20% have T2DM and hypertriglyceridemia and may have other features of metabolic syndrome[9,10].

As one of the common cause of raised serum Alanine aminotransferase is NAFLD, so we want to assess the relationship of diabetic control with serum alanine aminotransferase in patient having both Non Alcoholic Fatty Liver Disease and T2DM[1,9].

Correspondence
Dr. Hamza Ali Khan
Department of Medicine Khyber Teaching Hospital, Peshawar - Pakistan.
Email: hamzaalikhan48@gmail.com
Cell: +92-333-9333841
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MATERIAL AND METHODS

This cross sectional descriptive study was conducted in general medical outpatient department of Khyber Teaching Hospital Peshawar, from August to October2019, after approval from the Committee for Ethical Review of Research involving Human Subjects of Khyber

Teaching Hospital. All patients, >14 years of age, having Type 2 Diabetes Mellitus for more than two years and Non-alcoholic Fatty liver disease, who agreed to be included in the research, were included in the study. Patients below age 14, patients having Type 1 Diabetes Mellitus, patients having comorbid conditions especially those affecting HbA1c, were excluded from the study. Diabetes mellitus was confirmed by doing fasting plasma glucose (equal to or more then 126 mg%) or random plasma glucose (equal to or more the 200 mg%) or HbA1c more than 6.5%. The upper limit of normal for Serum Alanine aminotransferase was 30iu/L for men and 19 iu/L for women[1]. Though biopsy is the gold standard for confirmation of NAFLD but liver biopsy being an invasive procedure is not recommended in asymptomatic individuals[5]. Further as ultra-sonogram has the sensitivity of 80% and specificity of 98%so ultra-sonogram was our investigation of choice[12]. In order to avoid bias due to individuals ultra sound was performed by a qualified radiologist[5,11,12]. Data thus collected according to a preformed proforma, was analyzed through statistical package for social sciences (SPSS version 23), where chi-square test was applied to find out the relationship between the two groups and p-value of 0.05 or less was considered significant for correlation.

RESULTS

Out 1500 patients examined in out patients, only 452 (30.13%) patients had type 2 Diabetes Mellitus, 289(63.93%) were females and the males were only 163(36.06%). The mean age of patients with T2DM was 53.87 years, amongst the 452 patients with T2DM, Non Alcoholic Fatty Liver Disease was present in only 197(43.58%) patients.

DISCUSSION

Out of 1500 patients examined, 452 patients had T2DM, which accounts for 30.13% of the total patients, a figure which is significantly higher than another figure of 11.7%, published recently[13]. Out of these 452 patients 197 (43.58%) had NAFLD. Depending upon the populations studied, 21-72% patients with Type 2 Diabetes mellitus have been reported to have NAFLD[14]. NAFLD was present in 61 (39.86%) in group A and in 136 (45.48%) patients in Group B, i.e., slightly higher in patients with HbA1c of more than 8% as compared to group A with HbA1c of between 6.5-8%. Over all, 81 (41.11%) patients suffering from T2DM had elevated serum alanine aminotransferase level. This figure is significantly lower than 61.2% published by Shiful Islam from Bangladesh[15]. The probable reason being that our population looks to be different from people of Bangladesh in many respects. But exactly a similar figure of 41.05% has been reported by a local study about two years ago from same area[16]. On further observations, we found that serum alanine aminotransferase was elevated in only 17 (27.86%) of patients in Group A, in which the HbA1c was between 6.5-8%, but serum alanine aminotransferase was raised in 64 (47.05%) in patients of Group B with HbA1c of more than 8%. The figure in Group B is almost double as compared to the figure of Group A. This means that in patients suffering from T2DM and NAFLD, worsening of diabetic status is associated with elevation of serum alanine aminotransferase level. In other words serum level of alanine aminotransferase in patients suffering from both T2DM and NAFLD is positively correlated with blood glucose level. Serum alanine aminotransferase is considered as the surrogate marker of NAFLD. Up to 30% of patients with NAFLD have the evidence of metabolic syndrome and insulin resistance i.e. T2DM[1]. A number of studies have been published in which the Serum level of Alanine Aminotransferase has been correlated in patients suffering from NAFLD and T2DM with insulin resistance. The insulin resistance is the major cause of T2DM. Tough some studies have shown that serum level of alanine aminotransferase may be normal in patients suffering from NAFLD and T2DM, but a number of studies have confirmed that serum level of aminotransferase gets elevated with worsening of glycemic status and higher serum level of alanine aminotransferase is associated with insulin resistance for example JangSuk Yoo et al and Rui Wang[17,18,19].

Table 1: Demographics of the Patients with T2DM

	Patient without T2DM	Patient with T2DM	P Value
Frequency of the patients presenting to Medical OPD with T2DM			
	1500	452	
Age wise distribution of the patient presenting to the Medical OPD			
Mean + S.D	47.18 + 16.42	53.87+11.41	0.000
Gender wise distribution of the patient presenting to the Medical OPD			
Male	507	163	0.47
Female	993	289	
Total (n=1952)	1500	452	

Table 2: Presence of NAFLD in T2DM Patients

Blood Sugar Levels	Present	Absent	Pearson's R
Group A (n = 153)	61 (39.86%)	92 (60.13%)	0.64
Group B (n = 299)	136 (45.48%)	173 (54.51%)	
Total (n = 452)	197 (43.58%)	255 (56.41%)	

Table 3: Correlation of Diabetic status with the serum ALT in patients with NAFLD & T2DM

Blood Sugar Levels	Within Normal Limits	Elevated	Pearson's R
Group A (n = 61)	44 (72.13%)	17 (27.86%)	0.011
Group B (n = 136)	72 (52.94%)	64 (47.05%)	
Total (n = 197)	116(58.88%)	81 (41.11%)	

CONCLUSION

Diabetic control was positively correlated with serum Alanine aminotransferase level in our patients with Non Alcoholic Fatty Liver Disease and Type 2 Diabetes Mellitus.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Iqbal S:	Concept, study design, discussion, manuscript writing, facilitation of the reagent and materials, critical review
Khan HA:	Facilitation of the reagent and materials, critical review, interpretation.
Khan MY:	Analysis, interpretation , manuscript writing, study conduction.
Iqbal MD:	Analysis, interpretation , manuscript writing, study conduction
Shah BM:	Critical review, study conduction.
Iman NU:	Over all supervision

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.