



Role of Aminotransferase in Patients of Type 2 Diabetes Mellitus

Iman Bashir¹, Safar Khalid², Tauqeer Hussain³

¹ Bahawal Victoria Hospital, Bahawalpur

² BHU Hospital 227/7R

³ THQ Hasil pur Districts Bahawalpur

ABSTRACT

Introduction: Diabetes mellitus is a heterogeneous group of disorders characterized by persistent hyperglycemia with carbohydrate, lipid, and protein metabolism resulting from defects in insulin secretion and/or insulin action.

Objectives: The main objective of the study is to find the role of aminotransferase in patients of type 2 diabetes mellitus.

Methodology of the study: This cross sectional study was conducted in BVH, Bahawalpur during 2021. The data was collected from 100 patients of both genders. Patients whose fasting plasma glucose (FPG) ≥ 126 mg/dl on 2 occasion were included in the study. Patients with any concomitant diseases which can alter liver function and patient with hepatitis, alcoholic and taking any medicine were excluded from the study.

Results: The data was collected from 100 patients with a mean age of 53.72 ± 9.82 years old and mean duration of disease of 7.41 ± 6.01 years were included in the final analysis. There were no significant difference in the levels of Fas, AST, Cl, K, Ca, BUN, creatinine and uric acid in type II diabetics compared to the non-diabetic healthy control group.

Conclusion: Serum alanine aminotransferases are frequently high in patients of type 2 diabetes mellitus. However, there was no association with gender, body mass index, or duration of diabetes.

KEYWORDS: Aminotransferase, DM, Health, Patients.

INTRODUCTION

Diabetes mellitus is a heterogeneous group of disorders characterized by persistent hyperglycemia with carbohydrate, lipid, and protein metabolism resulting from defects in insulin secretion and/or insulin action. Type 2 diabetes is caused by impaired β -cells function and capacity to secrete sufficient insulin, coupled with a decline in target tissue sensitivity to insulin (insulin resistance) [1]. Globally, type 2 diabetes is one of the most common non-communicable diseases, which is increasing at an alarming rate and affecting a significant number of people. It is rapidly rising as a global health care problem and threatening to reach endemic levels by 2030, especially in low and middle income countries [2].

This metabolic disorder (diabetes) affects many organs, including the liver, which plays a key role in the regulation of carbohydrate, lipid, and protein metabolism. Elevated serum aminotransferases level; Aspartate aminotransferase (AST), alanine aminotransferase (ALT) and γ -glutamyltransferase (GGT) were commonly observed in diabetes [3]. Alanine aminotransferase and aspartate aminotransferase are the most specific marker of hepatic injury, which is located in the hepatocellular cytosol and mitochondria, respectively [4]. A recent report shows a significant association of increased ALT and AST with insulin resistance, T2DM, and metabolic syndrome.

Diabetes mellitus (DM) is often simply considered as diabetes, a syndrome of disordered metabolism with abnormally high blood glucose levels (hyperglycemia) [5]. The two most common forms of DM are Type-1 diabetes and Type-2 diabetes (T2DM) both leading to hyperglycemia, excessive urine production, compensatory thirst, increased fluid intake, blurred vision, unexplained weight loss, lethargy, and changes in energy metabolism. In T2DM, the loss of a direct effect of insulin to suppress hepatic glucose production and glycogenolysis in the liver causes an increase in hepatic glucose production [6]. In T2DM, hyperinsulinemia in combination with a high free fatty acid (FFA) flux and hyperglycemia are known to up-regulate lipogenic transcription factors. Moreover, pathways that decrease the hepatic FFA pool, i.e., both FFA oxidation and efflux of lipids from the liver are impaired [7].



OBJECTIVES

The main objective of the study is to find the role of aminotransferase in patients of type 2 diabetes mellitus.

METHODOLOGY OF THE STUDY

This cross sectional study was conducted in BVH, Bahawalpur during 2021. The data was collected from 100 patients of both genders. Patients whose fasting plasma glucose (FPG) ≥ 126 mg/dl on 2 occasion were included in the study. Patients with any concomitant diseases which can alter liver function and patient with hepatitis, alcoholic and taking any medicine were excluded from the study. Five milliliters (5 mL) of venous blood was drawn from each volunteer participant using disposable plastic syringes. The blood was poured into a plane containers and centrifuged after clotting. Serum was kept at -20 °C in sterile circumstance in specialized hospital laboratory until the analysis was done. SGOT, SGPT, and GGT were determined by means of enzymatic tests. Data was entered and dissected with the assistance of measurable bundle for sociologies (SPSS v. 18.0). Mean and standard deviation (SD) was processed for quantitative factors like age, weight, tallness, circulatory strain, BMI, ALT level and length of diabetes. Recurrence and rate were introduced for subjective factors like sex and raised ALT levels. The outcomes were introduced as tables and diagrams. The impact modifiers were dealt with by delineation based on sex, BMI and length of diabetes mellitus.

RESULTS

The data was collected from 100 patients with a mean age of 53.72 ± 9.82 years old and mean duration of disease of 7.41 ± 6.01 years were included in the final analysis. There were no significant difference in the levels of Fas, AST, Cl, K, Ca, BUN, creatinine and uric acid in type II diabetics compared to the non-diabetic healthy control group.

Table 01: Demographic variables of patients and control

Variables	Control n=100 Mean \pm SD	Patients n = 100 Mean \pm SD	p values
BMI kg/m ²	23.01 \pm 5.19	32.9 \pm 6.52	<i>p</i> < 0.01
Duration of the disease/years	–	7.41 \pm 6.01	–
Age/years	47.25 \pm 10.15	53.72 \pm 9.82	<i>p</i> = 0.360
Glucose mmol/L	5.16 \pm 0.41	9.77 \pm 4.03	<i>p</i> < 0.001
ALT U/L	34.38 \pm 7.3	39.35 \pm 12.02	<i>p</i> < 0.001
AST U/L	20.78 \pm 5.56	22.51 \pm 9.67	<i>p</i> = 0.154
Glycated Hb %	–	8.82 \pm 1.95	–
Fasting glucose	5.23 \pm 0.73	9.66 \pm 3.8	<i>p</i> < 0.001

Table 2: Comparison of serum ALT levels with patient gender, body mass index, and duration of diabetes (N=144)

Patient characteristics	Serum alanine aminotransferase (ALT), IU/L		P value
	Raised (n=30; 20.8%)	Normal (n=114; 79.2%)	
Gender			
Male	24 (80%)	83 (72.8%)	0.42
Female	6 (20%)	31 (27.2%)	
Body mass index, kg/m²			
Less than 30	24 (80%)	77 (67.5%)	0.18
30 or more	6 (20%)	37 (32.5%)	
Duration of diabetes mellitus, years			
Less than 10 years	17 (56.7%)	75 (65.8%)	0.35
10 years or more	13 (43.3%)	39 (34.2%)	



DISCUSSION

Elevated ALT and AST were observed in 4.5% and 5.3% of our diabetic patients, respectively. However, the mean values were within the normal range [8]. At least 50% of patients with type 2 diabetes had NAFLD [9]. This result is in agreement with that of the study by Erbey and his co-worker, which reported that the prevalence of elevated ALT levels among U.S. type 2 diabetics was 7.8%, and this prevalence was higher among obese (BMI > 25 kg/m²) compared to non-obese diabetics (10.6% vs. 6.6%) [10]. Glycation is the most common complication of T2DM that results oxidative stress in tissue. This oxidative stress and cytokine production in the liver cause alterations of liver enzymes due to the hepatocellular damage. Thus, further results dysregulation of blood glucose maintenance, since it plays a key role in such maintenance [11-13]. This condition results in the abnormal introduction of liver enzymes into the circulation and become elevated. In the present study, we have assessed the level of liver enzymes, including ALT, AST, and GGT among age-sex matched T2DM participants and an apparently healthy control groups [14-15].

CONCLUSION

Serum alanine aminotransferases are frequently high in patients of type 2 diabetes mellitus. However, there was no association with gender, body mass index, or duration of diabetes. Isolated elevated ALT has little value in predicting liver injury in diabetes patients. Supporting radiological and histological evidences hold great value.

REFERENCES

1. Kitade H, Chen G, Ni Y, Ota T. Nonalcoholic fatty liver disease and insulin resistance: new insights and potential new treatments. *Nutrients*. 2017;9(4):387.
2. Marchesini G, Forlani G, Bugianesi E. Is liver disease a threat to patients with metabolic disorders? *AnnMed*. 2005;37(5):333–346.
3. Sanal MG. Biomarkers in nonalcoholic fatty liver disease-the emperor has no clothes? *World J Gastroenterol*. 2015;21(11):3223–3231.
4. Ko SH, Baeg MK, Han KD, Ko SH, Ahn YB. Increased liver markers are associated with higher risk of type 2 diabetes. *World J Gastroenterol*. 2015;21(24):7478–87.
5. Portillo-Sanchez P, Bril F, Maximos M, Lomonaco R, Biernacki D, Orsak B, et al. High prevalence of nonalcoholic fatty liver disease in patients with type 2 diabetes mellitus and normal plasma aminotransferase levels. *J Clin Endocrinol Metab*. 2015;100(6):2231–2238.
6. Kwon YM, Oh SW, Hwang SS, Lee C, Kwon H, Chung GE. Association of nonalcoholic fatty liver disease with components of metabolic syndrome according to body mass index in Korean adults. *Am J Gastroenterol*. 2012;107(12):1852.
7. Viswanathan V, Kadiri M, Medimpudi S, Kumpatla S. Association of non-alcoholic fatty liver disease with diabetic microvascular and macrovascular complications in South Indian diabetic subjects. *Int J Diabetes Developing Countries*. 2010;30(4):208–212.
8. Abro MU, Butt A, Baqa K, Waris N, Khalid M, Fawwad A. Association of serum liver enzyme Alanine Aminotransferase (ALT) in patients with type 2 diabetes. *Pak J Med Sci*. 2018;34(4):839-43.
9. Judi L, Toukan A, Khader F, Ajlouni K, Khatib MA. Prevalence of elevated hepatic transaminases among Jordanian patients with type 2 diabetes mellitus. *Ann Saudi Med*. 2010;30(1):25–32.
10. Arshad S, Tahir S, Tahir B, Tahir N, Rasool T, Munir S, et al. Risk factors associated with diabetes mellitus in local population of Lahore, Pakistan. *Global J Health Sci*. 2017;9:42-51.
11. Ahmed S, Ali N, Abdullah Z, Ilyas M, Naeem U. Study of raised alanine aminotransferase in patients of type 2 diabetes mellitus. *Pak Armed Forces Med J*. 2008;58(3):248-52.
12. Agarawal J. Prevalence of elevated hepatic enzymes among north Indian patients with type 2 diabetes mellitus. *Santosh University J Health Sci*. 2015;1(1):3-6.
13. Meybodi MA, Afkhami-Ardekani M, Rashidi M. Prevalence of abnormal serum alanine aminotransferase levels in type 2 diabetic patients in Iran. *Pak J Biol Sci*. 2008;15;11(18):2274-7.



14. Ni H, Soe HH, Htet A. Determinants of abnormal liver function tests in diabetes patients in Myanmar. *Int J Diabetes Res.* 2012;1(3):36-41.
15. Shibabaw T, Dessie G, Molla MD, Zerihun MF, Ayelign B. Assessment of liver marker enzymes and its association with type 2 diabetes mellitus in Northwest Ethiopia. *BMC Res Notes.* 2019;12(1):707.

Cite this Article: Iman Bashir, Safar Khalid, Tauqeer Hussain (2022). Role of Aminotransferase in Patients of Type 2 Diabetes Mellitus. International Journal of Current Science Research and Review, 5(6), 1926-1929