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ORIGINAL ARTICLE

Elevated Serum Alanine Transaminase (ALT) in Patients of Type 2 Diabetes Mellitus

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ABSTRACT

Objective: The objective of this study was to determine the prevalence of raised serum alanine transaminase level in patients of type 2 diabetes mellitus.
Design: cross-sectional study
Study Settings: This study was conducted at Department of Internal Medicine Abbas Institute of Medical Sciences Muzaffarabad from November 2020 to April 2021.
Material and Methods: Total 144 patients were included in the study having age from 18 to 60 of both genders with Type 2 DM. It was labeled as elevated if it was ≥50 IU/L. A written informed consent was taken from each patient.
Results: Patient's age ranged from 36 to 70 years having mean value of 44.4±8.3 y. BMI ranged from 21.2 Kg/m2 to 34.7 Kg/m2 with a mean of 27.2±3.7 Kg/m2. Disease duration was from 2 to 14 years with a mean of 7.1±3.8 years. Elevated serum ALT was noted in 38 (26.4%) patients with type-II diabetes.
Conclusion: Elevated serum ALT was noted in a substantial proportion of patients with type-II diabetes and was significantly more frequent in patients with poor glycemic control which warrants good glycemic control to prevent and routine screening of such patients in future practice to timely identify and manage this complication to improve the outcome.
Keywords: Type 2 Diabetes Mellitus, Serum Alanine Transaminase, Prevalence

INTRODUCTION

Diabetes Mellitus (DM) is an important public health issue of the four priority non-communicable diseases targeted by the Researchers World leader. The number of cases and prevalence of diabetes continued to increase over several years last decade.[1,2] DM is a group of metabolic diseases with characteristic hyperglycemia that occurs due to secretion abnormalities and the work of insulin. More than 90% of all diabetic populations are type 2 diabetes mellitus (DMT2) which is characterized by decreased insulin secretion due to progressive reduction of pancreatic beta cell function caused by insulin resistance. DMT2 is associated with atherosclerosis, which causes cardiovascular disease and increased mortality.[3,4]

The role of liver is very important in pathology of this disease. However, all organs of our body are affected by type II diabetes mellitus but liver is not being affected due to this dangerous disease. The epidemiology of this disease highlighted that almost 65% cirrhotic patients are affected with type II diabetes mellitus which may start chronic liver disease.[5] In diabetes patients still it is not known about the pathogenesis which cause deformities in liver biomarkers. In enzymes of liver, ALT (serum alanine aminotransferase) is considered as a sensitive and reliable marker of non-alcoholic fatty liver disease and it is related to liver fat.

Raised serum alanine aminotransferase (ALT) is linked with a variety of outcomes like cardiovascular diseases, muscles, kidneys, metabolic disorder or even result in mortality.[6,7]

In acute stage infection of hepatitis B virus, AST & ALT are raised. In adults human average levels of serum alanine aminotransferase which is in circulation varies from 30-50 IU/L. its level might be 10 times higher as compare to normal values in acute liver disease.[8,9] When patient recovered from hepatitis, ALT level comes in normal value in time of one to four months.[10]

Rashid et al. (2016) reported the frequency of elevated serum ALT to be 31.03% in Bangladeshi patients of type-II diabetes.[11] Mathur et al. (2016) reported the frequency of elevated serum ALT to be 19.8% in Indian patients of type-II diabetes.[12] There is dearth of literature on this topic in local population to the best of our knowledge so we conduct this study in our setup.

MATERIAL AND METHODS

This cross-sectional study was conducted at Department of Internal Medicine Abbas Institute of Medical Sciences Muzaffarabad from November 2020 to April 2021. By convenient sampling technique, total 144 patients were included in the study having age from 18 to 60 of both genders with Type 2 DM. After ethical approval from the same institutional ethical review committee study was conducted. Patients having history of excessive use of alcohol, using hepatotoxic drugs such as NSAIDS, methotrexate, amiodarone, acetaminophen, tamoxifen, bleomycin, metformin, pioglitazone and sodium valproate were excluded from this research.

5 ml of venous blood will be sampled by venipuncture and will be sent for serum ALT level estimation to the hospital laboratory. Elevated serum ALT level will be labeled if any patient having ALT ≥50 was labeled as having raised ALT. Type II diabetics was consider if any patient who has a fasting blood sugar of ≥126 mg/dl.

Collected data was analysed by using SPSS version 19.0. Quantitative variables like age, BMI and diabetes duration was presented as mean ± SD. Qualitative data like gender and elevated serum ALT was presented as percentages and frequency. Post stratification chi-square test was applied. Data stratification was done with age, gender, BMI and duration of diabetes taking p-value ≤0.05 was as significant.

RESULTS

Patient's age ranged from 36 to 70 years having mean value of 44.4±8.3 y. Majority (n=120, 83.3%) of the patients were aged under 55 years. BMI ranged from 21.2 Kg/m^2 to 34.7 Kg/m^2 with a mean of 27.2±3.7 Kg/m2. 61 (42.4%) patients were obese. Disease duration was from 2 to 14 years with a mean of 7.1±3.8 years. It was less than 5 years in 59 (41.0%) patients followed by 5-10 years (31.3%) and more than 10 years (27.7%). Elevated serum ALT was noted in 38 (26.4%) patients with type-II diabetes as presented in Table 2. While there was no statistically significant difference was observed regarding patient's age gender, BMI and duration of disease as shown in Table 3.

Table 1: Baseline characteristics of the randomised population

Parameters	Patients n=144
Age	44.4±8.3
<55 years	120 (83.3%)
≥55 years	24 (16.7%)
Sex M/F	64 (44.4%)
	80 (55.6%)
BMI	
<25 Kg/m2	39 (27.1%)
25-30 Kg/m2	44 (30.6%)
>30 Kg/m2	61 (42.4%)
Disease duration	
<5 years	59 (41.0%)
5-10 years	45 (31.3%)
>10 years	40 (27.7%)

Table 2: Frequency of Elevated Serum ALT in Type-II Diabetic Patients

Serum ALT Level	Frequency	Percentage
Elevated	38	26.4
No	106	73.6
Total	144	100

Table 3: Chi-square test, * observed difference was statistically significant

Characteristics	n	Elevated ALT n (%)	P-value
Age (years)			
<55 years	120	31 (25.8%)	0.735
≥55 years	24	7 (29.2%)	
Gender			
Male	64	17 (26.6%)	0.966
Female	80	21 (26.3%)	
Duration (years)			
<5 years	59	14 (23.7%)	0.785
5-10 years	45	12 (26.7%)	
>10 years	40	12 (30.0%)	
BMI (Kg/m^2)			
<25 Kg/m^2	39	6 (15.4%)	0.105
25-30 Kg/m^2	44	11 (25.0%)	
>30 Kg/m^2	61	21 (34.4%)	

DISCUSSION

In this study, patient's mean age was 44.4±8.3 years. Jibran et al. (2006) reported similar mean age of 45.8±8.8 years in type-II diabetic patients presenting at Mayo Hospital, Lahore.[13] Imtiaz et al. (2014) also reported comparable female predominance as compare to ratio of female of 1:1.2 in such patients.[14]

We observed that mean BMI 27.2±3.7 Kg/m2 and 61 (42.4%) patients were obese. Sarfraz et al. reported similar frequency of 42.0% for obese patients among type-II diabetics at various hospitals of Faisalabad.[15]

In the present study, the mean duration of disease was 7.1±3.8 years. It was less than 5 years in 59 (41.0%) patients followed by 5-10 years (31.3%) and more than 10 years (27.7%). Our results are similar with Zia et al. who reported the mean duration of disease to be 7.2±6.8 years in type-II diabetic patients presenting at Pakistan Institute of Medical Sciences (PIMS) Islamabad.[16] In the present study, elevated serum ALT was noted in 38 (26.4%) patients with type-II diabetes. Our results are similar to those of Takhelmayum et al. (2014) who reported that 26.0% of Indian type-II diabetic patients had elevated serum ALT.[17] A similar frequency of 28.8% has been reported by Odewabi et al. (2013) in Nigeria.[18] Our results are also comparable to those of Ebrahimi-far et al. (2015) who reported similar frequency of 24.0% in Iran.[19] Patra et al. (2012) reported comparable frequency of 22.0% in Indian such patients.[20]

The present study is first of its kind in local population and adds to the existing international evidence on the topic. Limitation of our study was that we didn't consider the effect of good glycemic control on serum ALT level in patients with previously poor glycemic control and raised serum ALT which could further highlight the role of glycemic control on liver function and would help in the risk stratification and management planning of such patients. Such a study is highly recommended in future research.

CONCLUSION

Elevated serum ALT was noted in a substantial proportion of patients with type-II diabetes and was significantly more frequent in patients with poor glycemic control which warrants good glycemic control to prevent and routine screening of such patients in future practice to timely identify and manage this complication to improve the outcome.

REFERENCES

1. Foma MA, Saidu Y, Omoleke SA, Jafali J. Awareness of diabetes mellitus among diabetic patients in the Gambia: a strong case for health education and promotion. BMC Public Health. 2013;13:1124.
2. Chowdhry MA, Butt NI, Shakeel H, Fatima MN, Gondal HS, Tahir H. Is lack of patient knowledge a cause of poorly controlled diabetes mellitus? Pak J Med Health Sci. 2021;15(9):2302-2304.
3. Younossi ZM, Tampi RP, Racila A, et al. Economic and clinical burden of nonalcoholic steatohepatitis in patients with type 2 diabetes in the U.S. Diabetes Care. 2020; 43: 283- 289..
4. American Diabetes Association. Comprehensive medical evaluation and assessment of comorbidities: Standards of Medical Care in Diabetes 2021. Diabetes Care. 2021; 44(suppl 1): S40- S52.
5. Mustafa ME, Mansoor MM, Mohammed A, Babker AA. Evaluation of platelets count and coagulation parameters among patients with liver disease. World Journal of Pharmaceutical Research. 2015 Aug 10;4(10):360-8.
6. Hua Y, Yu H, Chen S, Zhang X, Zhang X, Sun Y. Association Between the Triglyceride Glucose Index and Alanine Aminotransferase Levels: a Cross-sectional Study.
7. Alam S, Raghav A, Reyaz A, Ahsan A, Ahirwar AK, Jain V, Agarwal S, Tripathi P. Prevalence of elevated liver enzymes and its relationship with type 2 diabetes mellitus in North Indian adults. Metabolism Open. 2021 Dec 1;12:100130..
8. Cacciola I, Scoglio R, Alibrandi A, Squadrito G, Raimondo G, Group S-MHS. Evaluation of liver enzyme levels and identification of asymptomatic liver disease patients in primary care. Int Emerg Med 2017;12(2):181-6.
9. Khan MH, Muhammad N, Jawaid HA, Shah SM, Ali MO, Khan SS. Frequency of Anti-Hepatitis B Core Positivity in Patients with Persistently Raised Alanine Aminotransferase. Pak J Med Health Sci. 2021;15(8):1949-1953.
10. Yuen M-F, Chen D-S, Dusheiko GM, Janssen HL, Lau DT, Locarnini SA, et al. Hepatitis B virus infection. Nature Rev Dis Primers.2018;4(1):1-20.
11. Mathur S, Mehta DK, Kapoor S, Yadav S. Liver function in type-2 diabetes mellitus patients. Int J Sci Stud 2016;3(10):43-7.
12. Rashid MHO, Haque MZ, Rahman MK, Khan MMR, Rahman ASMM, Al-Mahtab M, et al. Study on liver dysfunction in type 2 diabetic patients in Bangladesh. Euroasian J Hepato-Gastroenterol 2016;6(1):1-4.
13. Jibran R, Suliman MI, Qureshi F, Ahmed M. Safety and efficacy of repaglinide compared with glibenclamide in the management of type 2 diabetic Pakistani patients. Pak J Med Sci 2006;22(4):385-90.
14. 122. Imtiaz S, Ullah H, Rasool MF, Hashmat F, Saleem M, Khan N. Assessment of compliance of diabetic patients at Nishtar Hospital Multan, Pakistan. Gomal J Med Sci 2014;12:84-8.
15. Sarfraz M, Sajid S, Ashraf MA. Prevalence and pattern of dyslipidemia in hyperglycemic patients and its associated factors among Pakistani population. Saudi J Biol Sci 2016;23(6):761-6.
16. Zia A, Bhatti A, Jalil F, Wang X, John P, Kiani AK, et al. Prevalence of type 2 diabetes–associated complications in Pakistan. Int J Diabetes Dev Ctries 2016;36(2):179-88.
17. 10. Takhelmayum R, Thanpari C, Singh TP. Liver dysfunction in diabetic patients admitted in referral hospital. Bali Med J 2014;3(3):122-4.
18. Odewabi AO, Akinola EG, Ogundahunsi OA, Oyegunle VA, Amballi AA, Raimi TH, et al. Liver enzymes and its correlates in treated and newly diagnosed type 2 diabetes mellitus patients in Oshogbo, south west, Nigeria. Asian J Med Sci 2013;5(5):108-12.
19. Ebrahimi-Far M, Mazdapour M, Kaki A, Mohammadi P, Zakerjafari M, Lavi A, et al. Comparison of biochemical factors and liver enzymes in type 2 diabetes patients and healthy individuals. Bull Env Pharmacol Life Sci 2015;4(2):1-4.
20. Patra TK, Paul R, Mandal SK, Mandal L, Mondal J, Banerjee A, et al. Liver function tests in type 2 diabetes mellitus patients with and without oral hypoglycemic agents and statin intake. Ind Med Gaz 2012;4:388-93.