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ORIGINAL ARTICLE

Presence of concurrent derangements of liver function tests in type 2 diabetes: A retrospective observational study.

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ABSTRACT… Objective: To know the frequency of deranged liver functions in patients with diabetes mellites and to ascertain the association between two conditions. **Study Design:** Retrospective Cross-sectional study. **Setting:** Department of Pathology Shaheed Zulfiqar Ali Bhutto Medical University, PIMS hospital Islamabad. **Period:** 1st January, 2020 to 1st January, 2021. **Material & Methods:** All patients with diabetes and deranged liver functions were included in the study. Ethical approval was taken from the hospital ethical committee. Data was entered into the predefined proforma. Data was collected from hospital laboratory system. Data analyzed by using SPSS and p value of ≤ 0.05 was taken as significant. **Results:** In this study 102 people of both genders were included, out of these 62 were diabetic patients and 40 were age matched controls. Deranged liver function test was present between 39.20% and among these raised ALP was noted in 19.60%, ALT in 14.70% and total bilirubin in 4.90%. Liver function tests were compared between gender, and it was found that total bilirubin was significantly different between two groups. **Conclusion:** It can be concluded from the study that diabetes is associated with liver function derangement. ALT is significantly high in diabetic patients compared to controls.

Key words: ALT, Diabetes, Deranged, Liver Function Test.

INTRODUCTION

Diabetes Mellitus is an endocrinological problem in which secretion of the hormone called insulin is decreased or completely absent. Type 2 diabetes mellitus in which partial deficiency or resistance to insulin is more frequent type of diabetes mellitus, while in type 1 diabetes mellitus there is absolute deficiency of insulin.[1]

Liver plays a pivotal role in the glucose homeostasis. Evidence of deranged liver functions is observed in diabetes mellitus and a slight elevation of liver enzymes is seen in insulin resistance. Free fatty acids present in insulin resistance are injurious to the liver and result in elevation of the liver enzymes. Association of diabetes mellitus and worsening and progression of liver disease is found by different researchers. This derangement also affects choice of the drug therapy.[2]

Liver enzymes like ALT, AST and gamma GT are elevated in patients with diabetes mellitus and are good predictor of the prognosis of the disease.[3,4,5] Many studies are conducted in different countries to know the disturbances in the liver enzymes and diabetes mellitus and they have found positive association between two.[5,6] So it is important to know the state of the liver early, as it usually does not improve with glucose control and will affect the drug choice not only for diabetes but also for other diseases.

Aim of the present study was to know the frequency of deranged liver functions in patients with diabetes mellites and to ascertain the association between two conditions. So that local statistics can be found and which will help clinicians to make some local references for treatment and management.

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MATERIAL & METHODS

This is a retrospective study conducted in the department of pathology Shaheed Zulfiqar Ali Bhutto hospital from 1/1/2020 to 1/1/2021 to know the liver enzyme derangement in patients with diabetes mellitus. Ethical permission was taken from the ethical committee with ethical number F.1-1/2015/ERB/SZABMU/899. All patients with diabetes and deranged liver functions were included in the study and age matched controls were added to compare results. Patients with hepatitis B and hepatitis C, autoimmune hepatitis, taking hepatotoxic drugs and any other cause of deranged liver function were excluded from the study. Patients with type 2 Diabetes mellitus (cases) without any previous known liver diseases. Diagnosed patients of diabetes ≥6 months and under oral anti-diabetic agents and/or insulin or under dietary controls.

Data was entered and analyzed in SPSS20. Qualitative variables will be analyzed using frequency percentages and quantitative variables by mean with standard deviation. Chi square test was used to assess the significance and p value of ≤0.05 will be taken as significant.

RESULTS

In this study 102 people of both genders were included, out of these 62 were diabetic patients and 40 were age matched controls. The mean age of the study population was 53.2 years ±13.6 with minimum age being 23 years and maximum was 83 years. The majority was males and is shown in Figure below.

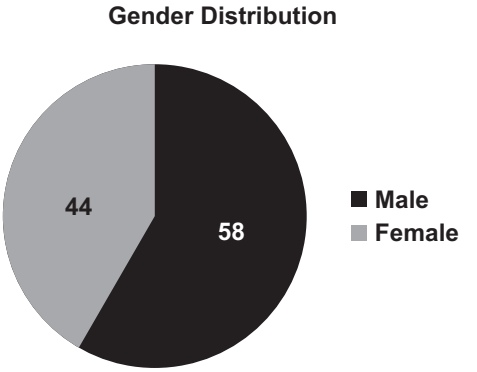

Figure-1. Gender distribution of study population

Deranged liver function test was present between 39.20% and among these raised ALP was noted in 19.60%, ALT in 14.70% and total bilirubin in 4.90%. Liver function tests were compared between genders and it was found that total bilirubin was significantly different between two groups, rest of the parameters have not shown any significant difference, as shown in below Table-I.

Mean ALT, ALP and total bilirubin was compared between patients and controls and the results are shown in Table-II.

Regression analysis was done between liver function tests and random blood sugar and was found that ALT is significantly associated with random blood sugar level but ALP and T. bilirubin was not found to be significantly associated as shown in Table-III.

Group Statistics						
	Gender	N	Mean	Std. Deviation	Std. Error Mean	P-Value
ALT	male	58	36.40	29.749	3.906	0.01
	female	44	32.36	30.415	4.585	
ALP	male	58	102.47	62.381	8.191	0.045
	female	44	140.98	107.371	34.278	
Total Bilirubin	male	58	.517	.2842	.0373	0.02
	female	44	.743	.0487	.1581	
Random blood sugar	male	58	148.31	83.153	10.919	0.98
	female	44	150.23	80.185	12.088	

Table-I. Gender wise comparison between study population

Group Statistics						
	Random Blood Sugar	N	Mean	Std. Deviation	Std. Error Mean	
ALT	Patients	62	38.66	34.875	4.429	0.002
	Controls	40	28.45	18.879	2.985	
ALP	Patients	62	127.45	111.355	24.556	0.36
	Controls	40	106.10	69.851	11.044	
Total Bilirubin	Patients	62	.540	.341	.0434	
	Controls	40	.730	.0764	.1702	0.127

Table-II. Comparison of liver function tests between patients and controls

	β	p-value	Model R^2
ALT	.768	0.004	.080
ALP	.012	0.82	0.001
T.Bilirubin	-11.42	.310	.010

Table-III. Regression results showing association between ALT, ALP, total bilirubin and random blood sugar.

DISCUSSION

Liver is an important organ that plays an important role in metabolism ALT and GGT are good indicators of the liver injury like non-alcoholic fatty liver disease and insulin resistance due to fat deposition.[7,8] So these inexpensive markers can be used to predict the diabetes and also development of liver derangement with advancing diabetes.[9]

In the present study frequency of deranged liver function test was found in 39.20%. and among these ALT was 19.60 %, ALP 14.70% and total bilirubin 4.90%. These values are lower than those reported by Mandal et al.[6] Bora et al reported that 71.25% patients with diabetes have deranged liver function test which almost twice than this study.[1] Another study also have reported similar results.[10] Sumilra et al reported that 57% patients with diabetes have raised level of ALT which is around three times than present study.[11] A study by Kumar Jha et al reported raised level of ALT level in 17.25% and 12.94% have raised ALP, these findings are similar to current study.[12]

In the present study liver function tests were compared between two genders and it was found that total bilirubin, ALP and ALT were significantly different between two groups. Karimabad et al had reported that ALT, ALP and GGT were associated with age and gender.[13] Bora et al also reported that ALP was frequently deranged in male and ALT in female diabetic patients.[1,14,15]

Mean level of liver function tests was compared between controls and patients and it was found that ALT was significantly higher in diabetic patients while ALP and total bilirubin was not significantly different between two groups. A study from Ethiopia has reported that ALT and AST are significantly higher in diabetic patients.[16] One study from India showed extremely significant differences with respect to ALT between controls and diabetic patients. They also showed that total bilirubin and ALP were significantly raised in diabetic patients.[17] Another study showed a positive correlation betweenHbA1c and ALP and fasting blood glucose and AST, ALT, TP and albumin.[18] One study has suggested that impaired insulin metabolism result in liver cell damage because fat accumulation and enzyme leakage.[19] Studies have shown that diabetes result in nonalcoholic steatohepatitis, cirrhosis and hepatic carcinoma.[20,21]

CONCLUSION

It can be concluded from the study that ALT, ALP and total bilirubin were significantly high in patients with diabetes than controls. ALT is significantly different between genders. Regression analysis of blood glucose and liver functions showed significant difference with respect to ALT. So this study encourage more attention towards liver evaluation during diabetes treatment to prevent development of complications.

RECOMMENDATIONS

Better management of diabetes is necessary to prevent liver damage. Nowadays the incidence of diabetes is increasing in Pakistan and especially in the disability associated with diabetes complications can be prevented with early

intervention. Early intervention can decrease morbidity and mortality with better quality of life.

LIMITATIONS

It was a single center and retrospective study, so the results cannot be generalized to general population. HbA1C was not included and undiagnosed hepatitis B and C cases may be missed, though we excluded patient diagnosed of viral hepatitis.

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3	Maryam Rafiq	Statsitical analysis, interpretation of results, Reviewed and approved the manuscript.	maryam rafiq
4	Nudrat Fayyaz	Data collection, writing the manuscript, formulation of tables reviewwed and approved.	nudrat fayyaz
5	Farah Hanif	Result interpretation, manuscript writing and revising it critically for important intellectual content.	farah hanif
6	Muhammad Fiaz	Result interpretation, manuscript writing and revising it critically for important intellectual content.	M. Fiaz