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Liver function test parameters in patients having type 2 diabetes mellitus and hypertensive diabetes

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Abstract
Background: Abnormality in liver function test parameters in patients with type 2 diabetes mellitus (T2DM) is common, but study comparing this association in patients with hypertensive diabetes is lacking.
Aims and objective: To compare the liver function test parameters and its correlation with the lipids parameters in patients with T2DM and hypertension with diabetes.
Materials and Methods: Two hundred patients were studied in the Department of Medicine, Gandhi Medical College and associated Hamidiya Hospital, Bhopal from January 2015 to June 2016. Patients were divided into Group A (n=100, patients having T2DM) and Group B (n=100, hypertensive diabetes mellitus patients). Detailed demographic, glycemic, lipid and thyroid function test parameters were estimated in all the study population. Data collected was analysed using SPSS ver.20 and p value of <0.05 was considered as significant.
Results: Demographic parameters except age (p=0.0003) was comparable. Glycemic parameters were also comparable except HbA1c (p=0.021) and average blood glucose (p=0.022) level in both the groups. Liver function test parameters including alkaline phosphate, bilirubin direct, bilirubin total, bilirubin indirect, gamma-glutamyl transpeptidase (GGT), aspartate aminotransferase (SGOT) and alanine aminotransferase (SGPT) were insignificantly higher in Group A compared to Group B (p>0.05). However, bilirubin direct, GGT, SGOT and SGPT were higher than the normal range in Group A.
Conclusion: Liver function test parameters such as bilirubin direct, GGT, SGOT and SGPT were higher in patients with T2DM but comparable with patients with hypertensive diabetes mellitus (p>0.05).

Keywords: liver function test, T2DM, hypertension, hypertensive diabetes

Introduction

Screening of liver function tests (LFTs) for liver disease in clinical practice is commonly used by the physician. Liver function tests are also being used to monitor progression of known disease and also to monitor the adverse effects caused by hepatotoxic drugs [1, 2].

Most commonly used LFTs in clinical practice are alkaline phosphatase, serum aminotransferases and bilirubin. Two very important aminotransferases such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST) are the measure of the intracellular hepatic enzymes that have leaked out in to systemic circulation. These markers serves a marker of hepatocytes injury [2].

Association between diabetes mellitus and liver injury is well established. Carbohydrate homeostasis is also regulated by liver. In patients with hyperglycemia, intracellular glycogen is increased in hepatocytes in reaponse to increase glycogen synthesis [3]. In response to this, there is a mild to moderate increase in aminotransferases. This abnormality was found to be reversed by the good glycemic control [4].

Hypertension with diabetes is a deadly duo; high blood pressure (hypertension) can result in to worsening many diabetes related complications such as eye and kidney disease [5, 6]. Reports have also shown that most of people with diabetes develop hypertension duration their life [7].

Data is limited comparing the liver function tests parameters in patients with diabetes and hypertension diabetes. Hence, in present study we tried to find out the difference of liver function tests between patients with diabetes and hypertension diabetes.

Materials and Methods

A prospective study was performed on 200 T2DM patients in the Department of Medicine, Gandhi Medical College and associated Hamidiya Hospital, Bhopal from January 2015 to June 2016.

All the patients were divided into Group A (n=100, patients having T2DM) and Group B (n=100, hypertensive diabetics).

A written Informed consent from all patients and Institutional Ethics Committee approval was obtained before starting the study.

Patients with confirmed T2DM or newly diagnosed T2DM as per the criteria set by American Diabetes Association (ADA) 2016, fasting plasma glucose (FPG) ≥126 mg/dl, or random or two hour post prandial plasma glucose (PPG) of ≥ 200 mg/dl were included in the present study.

Patients with diabetes having history of alcohol intake, hepatotoxic drugs such as amiodarone and antituberculous drugs, having history of any liver disease, acute hepatitis and having any form of evidence of hepatitis B and C virus infection were excluded from the present study.

Demographic parameters such as age, height, weight and body

mass index (BMI) were recorded for all the patients. Glycemic parameters such as fasting plasma glucose (FPG), post prandial glucose (PPG), HbA1c and average blood glucose was estimated after drawing blood from all the patients. Estimation of parameters deciding liver function such as Alkaline Phosphate, Bilirubin Direct, Bilirubin Total, Bilirubin Indirect, Gamma-Glutamyl Transpeptidase (GGT), aspartate aminotransferase (SGOT) and alanine aminotransferase (SGPT) were estimated for each patients under study.

All the statistical analysis was performed using IBM SPSS ver. 20. Mean and standard deviations were calculated for time varying variables and percentages were calculated for categorical variables. P value <0.05 was considered as significant.

Results

Out of 200 patients, there were 82.45% male and 17.55% female in patients in Group A whereas in group B there were 78.76% male 22.24% female.

Table 1: Demographic parameters between diabetes and hypertensive diabetes patients

Variable	DM (n=100)	DM+HTN (n=100)	P value
Age (year)	42.14±11.02	54.77±12.15	0.002
Height (meter)	6.66±21.46	6.45±22.34	NS
Weight (kg)	66.54±12.64	72.34±11.46	NS
BMI (kg/m^2)	23.62±4.30	24.66±5.72	NS
FBS(mg/dl)	144.58±32.94	146.44±41.29	NS
PPG (mg/dl)	248.11±81.67	238.86±76.10	NS
HbA1c (%)	9.61±2.44	8.24±1.83	0.001
ABG (mg/dl)	268.41±74.55	192.08±52.33	0.02

Data is expressed as mean± SD, DM+ HTN; diabetic hypertensive, DM; diabetes, BMI; body mass index, FBG; fasting blood glucose, PPG; post prandial glucose, HbA1c; glycated hemoglobin, ABG; average blood glucose calculated from HbA1c values, P value < 0.05 is considered as significant.

Table 2: Comparison of liver function parameters between diabetes and hypertensive diabetes

Variable	Group D (n=42)	Group HD (n=99)	Reference range*	P value
Alkaline Phosphate	124.32±64.98	106.84±42.36	44 to 147 IU/L	NS
Bilirubin Direct	2.32±12.48	0.18±0.12	0.1-0.4 mg/dL	NS
Bilirubin Total	0.58±0.36	0.56±0.32	0.2-1.2 mg/dL	NS
Bilirubin Indirect	0.42±0.22	0.42±0.22		NS
GGT	54.17±62.34	40.20±40.16	0-45 U/L	NS
SGOT or AST	43.74±64.92	26.76±15.2	5 to 40 U/L	NS
SGPT or ALT	62.72±124.76	34.22±26.62	7 to 56 U/L	NS

Data is expressed as mean± SD, DM+ HTN; diabetic hypertensive, DM; diabetes, GGT; Gamma-Glutamyl Transpeptidase, SGOT or AST; aspartate aminotransferase, SGPT or ALT; alanine aminotransferase, P value < 0.05 is considered as significant, * Wehbi M 2016

Discussion

Reports have shown the higher incidence of abnormal liver function tests in patients with T2DM compared to patients without diabetes [9, 10]. In present study we tried to compare the liver function test parameters in patients with diabetes (Group A) and hypertensive diabetes (Group B). Reports have also shown that raised ALT is most common abnormality in diabetes patients [10].

Ni *et al*. performed a study on 81 T2DM patients in Myanmar and reported that around 20% of the patients were found to have elevated level of ALT and AST in T2DM patients. [9] In present study also SGOT and SGPT were higher than the normal range in Group A which is consistence with the study done by Ni *et al*. In present study in Group B, none of the parameter was higher than the reference range, neglecting the role of hypertension in patients with diabetes on liver function test parameters.

Choudhary *et al*. compared the liver function test parameters in 25 patients of T2DM and 25 patients of type 1 diabetes mellitus. Choudhary *et al*. reported that SGOT, SGPT, ALP and GGT were significantly high in patients with T2DM as compared to T1DM. But no association was observed in bilirubin values between both the groups [11]. In present study, GGT, SGOT and SGPT were higher than the normal along with the bilirubin direct which was contrary to the study done by Choudhary *et al*. [11]. A study done by Salih on 55 blood sample of diabetic patients also reported raised AST and ALT parameters which is in accordance with the present study data. [1]Munazza *et al*. studied liver function test on 50 pregnant women with preeclampsia after 20 weeks of gestation. Munazza *et al*. reported increased level of serum bilirubin and liver enzymes such as ALT, AST and ALK in pregnant women with preeclampsia as compared to normal pregnant women [12]. This showed that liver function test parameters are affected by increase in blood pressure in pregnant women, but such association of hypertension and liver function test parameters was not obtained in present study.

Gonem *et al*. studied 959 patients to investigate liver function test especially ALP, ALT and bilirubin level and observation are in accordance with the present study findings [13].

This raised level of liver function test might be the marker of non-alcoholic steatohepatitis (NASH) and insulin resistance [13]. Presently, routine screening of liver function test is not being followed in patients with T2DM, but emerging evidence along with present study data suggests that abnormal liver function test might be the marker of insulin resistance and metabolic syndrome.

Conclusion

Abnormal liver function results were common among diabetes mellitus patients. In present study, liver function test parameters such as bilirubin direct, GGT, SGOT and SGPT

were higher in patients with T2DM but comparable with patients with hypertensive diabetes mellitus. Tests for liver function could be done in patients with diabetes.

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