



Journal Homepage: -[www.journalijar.com](http://www.journalijar.com)  
**INTERNATIONAL JOURNAL OF  
 ADVANCED RESEARCH (IJAR)**

Article DOI:10.21474/IJAR01/6186  
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/6186>



### RESEARCH ARTICLE

#### STUDY OF COMPARISON OF LIVER FUNCTION TESTS IN DIABETES CASES AND NON-DIABETICS CONTROLS.

Dr. Gulab Kanwar<sup>1</sup> and Dr. Neeraj Saxena<sup>2</sup>.

1. Senior Professor & Head, Department of Biochemistry, Govt. Medical College, Kota.
2. Final year PG resident, Department of Biochemistry, Govt. Medical College, Kota.

#### Manuscript Info

##### Manuscript History

Received: 02 November 2017  
 Final Accepted: 04 December 2017  
 Published: January 2018

##### Keywords:-

Liver function; LFT; AST; ALT; alkaline phosphatase; Diabetes Mellitus; NMCH; Kota.

#### Abstract

**Introduction:** diabetes is a metabolic disorder characterized by increased levels of blood glucose due to impairment in insulin action and/or insulin secretion. Liver plays a major role in the regulation of carbohydrate metabolism. It uses glucose as a fuel, store glucose as glycogen; also synthesizes glucose from non-carbohydrate sources. Therefore, liver is more susceptible to diseases.

**Materials and methods:** the study comprises of 100 subjects, out of whom 50 were diabetic cases and 50 non-diabetic control subjects. The subjects were those attending outdoor and indoor in New Medical College Hospital Kota, Rajasthan, India. Liver function test estimation by various methods mentioned above on fully automatic analyzer. Quantitative data was summarized in the form of mean  $\pm$  sd and differences in means of both the groups were analyzed by unpaired student's 't' test using graph pad prism. *P-value less than 0.05 were considered significant.*

**Results:** the mean activity of serum bilirubin total ( $1.74 \pm 0.897$ ), bilirubin direct ( $0.474 \pm 0.264$ ), serum ast ( $62.56 \pm 39.84$  iu/l), serum alt ( $49.38 \pm 45.85$  u/l) and serum alp ( $134.32 \pm 67.7$  iu/l) of diabetic patients shows significant difference from that of normal subjects.

**Conclusion:** the outcome of the present study shows that liver enzymes have higher activity in dm patients than controls. Thus screening for liver dysfunction in diabetics and subsequent workup may lead to early detection of hepatic co-morbidities and better management.

Copy Right, IJAR, 2018,. All rights reserved.

#### Introduction:-

##### Diabetes:-

**Diabetes mellitus (DM)**, often considered as **diabetes**, is a group of metabolic diseases characterized by abnormally high blood sugar levels (hyperglycemia) over a prolonged period. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger. If left untreated, diabetes can cause many complications. Acute complications can include diabetic ketoacidosis, nonketotic hyperosmolar coma, or death. Serious long-term complications include heart disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes.

Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease.<sup>1,2</sup>

**Corresponding Author: - Dr. Neeraj Saxena.**

Address: - Final year PG resident, Department of Biochemistry, Govt. Medical College, Kota.

**Diabetes V/S LFT:-**

Type 2 diabetes (T2DM) is associated with a clinical spectrum of liver abnormalities collectively known as non-alcoholic fatty liver disease (NAFLD). NAFLD is a clinic histopathological diagnosis characterized by hepatocellular steatosis and ultimately cirrhosis. Serum alanine aminotransferase (ALT), which is a widely available serum marker of liver damage, is elevated in about 20% of children and adolescents with T2DM, and in most cases this is attributable to NAFLD.<sup>3</sup> Westerbacka J *et al.*<sup>4</sup> had demonstrated that ALT was closely associated with liver fat unlike Aspartate transaminase (AST) and gamma glutamyl transferase (GGT) and hence, ALT is used as a surrogate marker for many epidemiological studies.<sup>5</sup>

Liver function tests (LFTs) are usually used in the clinical practice screen for liver disease; the tests include the serum aminotransferases, bilirubin, alkaline phosphatase albumin and prothrombin time. Aminotransferases such as Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) are measure the concentration of intracellular hepatocellular enzyme that have leaked into the circulation and serve as amarker of hepatocellular injury. Alkaline phosphatase (AP),  $\gamma$ -glutamyl transpeptidase (GGT), and bilirubin act as markers of biliary function and cholestasis. Albumin and prothrombin reflect liver synthetic function.

Individuals with type 2 diabetes have a higher incidence of liver function test abnormalities than individuals who do not have diabetes. Mild chronic elevations of transaminases often reflect underlying insulin resistance.

**Pathophysiology:-****Pathophysiological aspects of insulin resistance in NAFLD: role of lipids and energy metabolism<sup>6</sup>:-**

NAFLD is associated with hepatic and peripheral insulin resistance, resulting in an insufficient suppression of hepatic gluconeogenesis, decreased glycogen synthesis and increased lipid accumulation.

*De novo* synthesis of FFA is driven by sterol regulatory element binding-protein 1c (SREBP-1c) and carbohydrate response element binding-protein (ChREBP) and is catalysed by hyperinsulinaemia and hyperglycaemia. Whereas hepatic triglycerides stored in lipid droplets can be relatively inert or even protective, FFA might substantiate insulin resistance, causing lysosomal instability with leakage of cathepsin B and induction of the NF- $\kappa$ B-TNF $\alpha$  pathway, or by activating the caspase-1-IL-1 $\beta$ /IL-18 pathways through the NALP3 inflammasome. Diacylglycerol promotes insulin resistance through the activation of protein kinase C (PKC) $\epsilon$  and c-Jun N-terminal kinase (JNK). The hepatocyte attempts to limit FFA by increasing mitochondrial  $\beta$ -oxidation. Coenzyme A (CoA)-linked FFAs are shuttled into the mitochondrial matrix via carnitine *O*-palmitoyltransferase (CPT)1 and CPT2. Excessive acetyl-CoA is channelled into the tricarboxylic acid (TCA) cycle and NADH into the electron transport chain. Exhaustion of the antioxidant capacities of superoxide dismutase (SOD)2 and glutathione peroxidase (GPX) ultimately results in increased oxidative stress mediated by superoxide (O<sub>2</sub><sup>-</sup>) anions, H<sub>2</sub>O<sub>2</sub> and mitochondrial leakage, leading to aggravation of insulin resistance and progression to NASH and fibrosis.

**Aims and Objectives:-**

1. To study the derangements of liver function test (LFT) in Diabetes cases
2. To compare the differences in serum liver function test in diabetic cases and non-diabetics controls.

**Materials and methods:-****Place of study and duration :-**

Department of Biochemistry, Government Medical College, Kota and Central Laboratory NMCH and MBS Hospital Kota from period of November 2016 to Oct 2017.

**Subject Selection:-**

50 Healthy control subjects of age 30-80 years and 50 Diabetic (T2DM) Patients of aged matched with history of diabetes for more than 2 years.

Patients of known case of alcoholism, HIV infection, patients having chronic liver disease or using hepatotoxic drugs, cor-pumonale or congestive cardiac failure patients having proteinuria and pregnant women were excluded from study. **Informed consent obtained from each subject.**

All samples were analyzed for LFT on ERBA EM-360 auto analyzer based on wet chemistry principle.

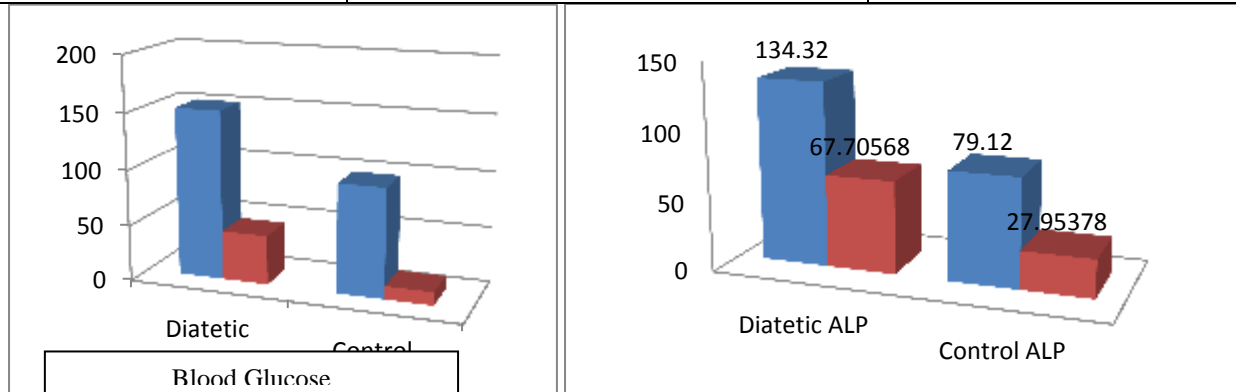
**Statistical analysis:-**

Quantitative data was summarized in the form of MEAN ± SD and differences in means of both the groups were analyzed by unpaired student ‘t’ test using graph pad prism. *P-value less than 0.05 were considered Significant.*

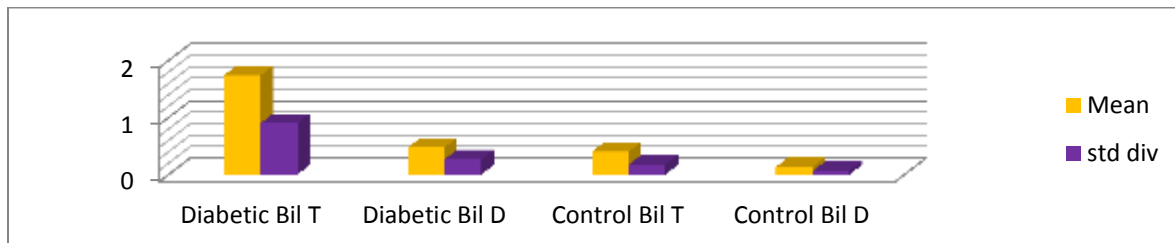
**Observation And Result:-**

glucose (mg/dl)	Diabetic	Control
<b>Mean</b>	<b>151.32</b>	<b>97.46</b>
<b>Std Div</b>	<b>44.12</b>	<b>11.84</b>

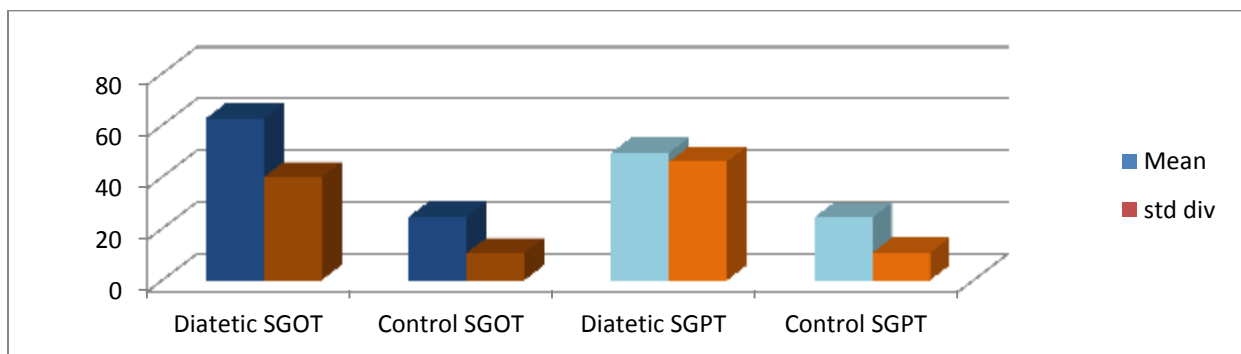
Alkaline phosphatase (u/l)	Diatetic ALP	Control ALP
<b>Mean</b>	<b>134.32</b>	<b>79.12</b>
<b>std div</b>	<b>67.70</b>	<b>27.95378</b>



mg/dl	Diabetic Bil T	Bil D	Control Bil T	Bil D
<b>Mean</b>	<b>1.74</b>	<b>0.474</b>	<b>0.4</b>	<b>0.132</b>
<b>std div</b>	<b>0.896934</b>	<b>0.264042</b>	<b>0.171429</b>	<b>0.058693</b>



u/l	Diatetic SGOT	Control SGOT	Diatetic SGPT	Control SGPT
<b>Mean</b>	<b>62.56</b>	<b>24.46</b>	<b>49.38</b>	<b>24.2</b>
<b>std div</b>	<b>39.84</b>	<b>10.46</b>	<b>45.85</b>	<b>10.56</b>



### Discussion and Conclusion:-

In our study, we found gross difference in serum bilirubin level (1.74 compare to 0.4 of controls  $P < 0.05$ ). Though the diabetic patient were hepatic asymptomatic. Like bilirubin level of two groups if we compare the ALT, AST and alkaline phosphatase levels of the two patients, the distributions of ALT, AST, and alkaline phosphatase show similar significant difference. In all samples the average levels were greater in 'diabetic' group. Altogether, our diabetic cases had at least one liver test abnormality, including mild transaminase elevation. But none of them had any symptoms of liver dysfunction. In our study, there has no significant difference among the distribution of total protein levels between the two groups of population. But the average albumin level in 'patients with diabetes' group is more than the 'healthy control' group (3.37 compared to 3.75;  $p > 0.05$ ). According to previously mentioned studies this difference is mainly due to higher average fasting and post prandial sugar level in diabetes.

The results of this study are in accordance with previously reported high prevalence rates of Altered Liver Enzymes in patients with type 2 diabetes mellitus in other populations. Raised ALT and AST are more common among the diabetes patients as compared to controls. Abnormal liver function tests among diabetes patients can be indicator of associated non alcoholic fatty liver disease. There has been a direct correlation between blood glucose and elevated liver enzymes, in accordance with previous studies. Checking for liver enzymes, ALT and AST should be carried out to screen the possibility of underlying fatty liver, which might need further evaluation and early intervention to prevent from progression into cirrhosis and chronic liver disease, especially in patients with Diabetes & high BMI. Although there are currently no consensus guidelines or recommendations regarding LFT screening in patients with type 2 diabetes mellitus, these findings lend support to the practice of routine liver function monitoring in subjects with type 2 diabetes mellitus.

Therefore, if LFT screening is to be adopted, it would be incumbent on the physician to ensure that abnormal findings are appropriately investigated, or that the patient be timorously referred to a tertiary institution with the necessary facilities.

### References:-

1. Joshi SR, Parikh RM. India - diabetes capital of the world: now heading towards hypertension. *J Assoc Physicians India*. 2007;55:323-4. [[PubMed](#)]
2. Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. *Australas Med J*. 2013;6(10):524-31. [[PMC free article](#)][[PubMed](#)]
3. Pinhas-Hamiel O, Zeitler P. Acute and chronic complications of type 2 diabetes mellitus in children and adolescents. *Lancet*. 2007;369:1823-31. [[PubMed](#)]
4. Westerbacka J, Corner A, Tiikkainen M, Tamminen M, Vehkavaara S, Häkkinen AM, et al. Women and men have similar amounts of liver and intra-abdominal fat, despite more subcutaneous fat in women: Implications for sex differences in markers of cardiovascular risk. *Diabetologia*. 2004;47:1360-9. [[PubMed](#)]
5. Schindhelm RK, Diamant M, Dekker JM, Tushuizen ME, Teerlink T, Heine RJ. Alanine aminotransferase as a marker of non-alcoholic fatty liver disease in relation to type 2 diabetes mellitus and cardiovascular disease. *Diabetes Metab Res Rev*. 2006;22:437-43. [[PubMed](#)]
6. Tilg, H. *et al.* (2016) NAFLD and diabetes mellitus. *Nat. Rev. Gastroenterol. Hepatol.* doi:10.1038/nrgastro.2016.147.