# Assessment of Liver Dysfunction among Type2 Diabetic Patients Attending To a Rural Teaching Hospital.

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***Abstract:***
***Aim*** *The present study was aimed to assess the liver dysfunction among diabetic patients attending the rural teaching hospital.*
 ***Objectives:*** *To study the activity of serum aspartate aminotransferase (AST), serum alanine aminotransferase (ALT), Total bilirubin (TB), and serum alkaline phosphatase (ALP) in T2DM patients and compare it with that of standard healthy controls.*
 ***Materials and Methods:*** *The present study conducted at MNR medical college and hospital, Sangareddy, India. A total of 150 study subjects who are attending the diabetic clinic are involved in this study during the period from February 2018 to May 2018. An institutional ethical committee approved the present study. A total of 100 type 2 diabetic patients and 50 controls were taken to assess the liver function tests (LFTs) by measuring Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline phosphatase (ALP) and total bilirubin (TB).*
***Results:*** *The mean activity of serum ALT (46.00 ± 3.11 IU/L), serum AST, (51.55 ± 13.55 IU/L), serum ALP (225.20 ± 32.18 IU/L) and TB (2.6 ± 3.2 mg/dl) of type 2 diabetic patients shows significant difference from that of the healthy control subjects.*
***Conclusion:*** *In the present study elevated levels of liver enzymes and total bilirubin if high in type 2 DM patients when compared with controls. It indicates that with the progression of DM conditions the liver dysfunction is more. So during the management of DM regular assessment of liver function is recommended to prevent the prognosis of liver dysfunction.*
***Key words****: Diabetes mellitus, Liver function tests, Alanine aminotransferase, Aspartate aminotransferase, Alkaline phosphatase, Total bilirubin.*

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## I. Introduction

Diabetes mellitus (DM) is one of the leading lifestyle diseases, globally and its prevalence is increasing day by day, especially in developing countries [1,2]. Among DM, type 2 DM is more prevalent and seen in people who do not do enough physical activity and who are obese or overweight. DM defined as a metabolic disorder characterized by hyperglycemia with disturbances in carbohydrate, protein, and lipid metabolism. The liver is one of the principal organs with some functions in the body and also play a key role in metabolisms[1,3,4]. Especially liver plays a crucial role in the regulation of carbohydrate metabolism, where it uses glucose as a fuel, and also store glucose as glycogen and synthesize glucose from non-carbohydrates source by gluconeogenesis. So the role of liver makes more susceptible to diseases in patients having a metabolic disorder, especially DM. Normally liver functioning is essential for the maintenance of sugar levels in blood and also it supply glucose energy source to various organs. Liver disease occuring as a result of DM includes Steatosis, nonalcoholic steatohepatitis (NASH), glycogen deposition, biliary disease, cholelithiasis, cirrhosis, and cholecystitis [5]. People with DM have a greater incidence of liver dysfunction than people who do not have DM [6]. So the present study was aimed to assess the liver dysfunction among diabetic patients attending to the rural teaching hospital.

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## II. Methods and materials

The present study was conducted at MNR medical college and hospital, Sangareddy, India. A total of 150 study subjects who are attending to the diabetic clinic are involved in this study during the period from february 2018 to May 2018. The present study was approved by institutional ethical committee. The investigations were carried out at biochemistry laboratory at MNR medical college, Sangareddy.

**Sample collection:**

5ml of venous blood was collected, after 12 hours fast from the above study subjects. Serum was separated from the whole blood by using centrifuge machine at 3000 rpm for 10 minutes. Following estimations are carried out on the serum samples by standard kit methods and analyses were performed on Aspen Chem ultra auto analyzer.

- Fasting blood sugar (FBS)
- Glycosylated Haemoglobin (HbA1c)
- Alanine Aminotransferase (ALT),
- Aspartate Aminotransferase (AST),
- Alkaline Phosphatase (ALP),
- Total Bilurubin (TB)

Fasting blood glucose estimated by using GOD-POD method [Robonik-semi auto-analyzer) and HbA1c was estimated by using Ion-exchange resin method (Erba glycohaemoglobin test kit). ALP estimated by kinetic method approved by IFCC (Erba ALP test kit), AST and ALT are estimated by IFCC approved kinetic method without pyridoxal phosphate.

**Inclusion criteria:**

Study subjects of both the genders are involved in this study with age group of 35-65 years. The diagnostic criteria of type 2 were done based upon the WHO criteria (WHO 1999).

**Exclusion criteria:**

All the patients with past history of alcoholism, hepatotxic drugs, patients taking insulin, and with chronic and acute liver diseases were excluded from the study.

## III. Results

In the present study, total 150 subjects were divided into two groups, 50 controls and 100 cases (type 2 diabetic patients) with the age range of 35 –60 years. Out of 50 controls, 29 were males and 21 females and in 100 type 2 diabetic patients, 66 were males and 34 females as per Table - 1. The mean ± SD of age in years was 48.59 ± 7.57 in cases and 49.22 ± 7.00 in healthy controls as per Table - 1.

| Table 1: Age and Gender wise distribution of controls and cases | | | | |
|---|---|---|---|---|
| | Controls (n=50) | | Cases(n=100) | |
| Age | Males (n=29) | Females (n=21) | Males (n=66) | Females (n=34) |
| **35- 40** | 05 | 02 | 16 | 03 |
| **41-50** | 09 | 07 | 29 | 12 |
| **51-60** | 15 | 12 | 21 | 19 |
| **Total** | 50 | | 100 | |
| **Mean ± SD** | 49.22 ± 7.00 | | 48.59 ± 7.57 | |

All the parameters like FBS, HbA1c, AST, ALT, ALP, and TB, when compared with controls were found to be extremely statistical significant as shown in table 2.

| Table 2: Comparative study of lipid dysfunction between controls and cases. | | | | |
|---|---|---|---|---|
| **Parameters** | **Controls (n= 50)** | **Cases (n= 100 )** | **t- value** | **P-value** |
| | **Mean ± SD** | **Mean ± SD** | | |
| **FBS** (mg/dl) | 88.60 ± 10.11 | 173.44 ± 34.51 | 16.99 | <0.0001 S* |
| **HbA1c** (%) | 4.80 ± 0.192 | 9.29 ± 1.86 | 16.98 | <0.0001 S* |
| **AST** (IU/L) | 22.28 ± 7.48 | 51.55 ± 13.55 | 14.21 | <0.0001 S* |
| **ALT** (IU/L) | 19.12 ± 4.71 | 46.00 ± 3.11 | 41.74 | <0.0001 S* |
| **ALP** (IU/L) | 65.62 ± 18.33 | 225.20 ± 32.18 | 32.49 | <0.0001 S* |
| **TB (mg/dl)** | 0.40 ± 0.12 | 2.6 ± 3.2 | 4.83 | <0.0001 S* |

**S\* = Extremely statistically significant.**

## IV. Discussion

The present study revealed some relevant information about the impact of DM on the liver functioning. This study was aimed to assess the effect of type 2 DM on the liver and its functions. This study conducted on 50 controls (non-diabetic) and 100 cases. Table 1 show there was no significant difference between the gender and age of the study subjects from the two groups (cases and controls). The diabetic state of the cases was confirmed by recording their detailed clinical history and finally by estimating FBS and HbA1c, we established and included the study subjects in the present study. In the present study the values of FBS and HbA1c, are significantly higher in cases than controls. Similar studies were reported by Valarmathi et al., 2017 and Roshan et al., 2014 [7,8].

In the present study the mean ± SD levels of serum AST in cases was 51.55 ± 13.55 and in controls was 22.28 ± 7.48. The serum AST levels among type 2 DM patients was found higher to be extremely statistical significant in comparison with the controls with p-value <0.0001. Similar studies reported by Goldberg et al., 2007, where higher levels of AST said among diabetic patients [9]. AST is an enzyme considered specific to the liver, and the concentration of AST levels are increased in blood when there is hepatocellular damage Boon NA et al., 2006 [10].

In the present study the mean ± SD levels of serum ALT in cases was 46.00 ± 3.11 and in controls was 19.12 ± 4.71. The serum ALT levels among type 2 DM patients was found higher to be extremely statistical significant in comparison with the controls with p-value <0.0001. Similar studies reported by Gonem et al., 2007; where higher levels of ALT reported among diabetic patients [11]. ALT catalyzes the reversible transamination reaction between L-alanine and α-ketoglutarate to form pyruvate and L-glutamate as such having an essential role in amino acid metabolism and gluconeogenesis (GNG). Among the amino acids alanine is a most effective precursor for GNG.  In type 2 DM the GNG is increased due to increase in substrate delivery (the best example for the substrate is alanine) and increased the conversion of alanine to glucose [12].

In the present study, the mean ± SD levels of serum ALP and TB in cases was 225.20 ± 32.18 and 2.6 ± 3.2 in controls was 65.62 ± 18.33 and 0.40 ± 0.12 respectively. The serum ALP and TB levels among type 2 DM patients were found higher to be extremely statistical significant in comparison with the controls with p-value <0.0001. Similar studies reported by Han et al., 2012; Roshan et al.,2014; where higher levels of ALT reported among diabetic patients. ALP is a serine protease hydrolytic enzyme and active optimally at pH 10 [8,13]. According to a study published by Shaheen et al., 2009 [14]; Saleema et al., 1984 [15]; Paruk et al., 2011 [16]; ALP levels are elevated in the diabetic population. Fat metabolism dysregulated in metabolic syndrome like type 2 DM. So there is the consequent elevation of free fatty acids leading to fatty liver. ALP in the liver found to associated with cell membrane which adjoins the biliary canaliculus, and so high plasma concentration of the liver isoenzyme indicates cholestasis rather than damage to the liver cells. According to a study reported by Vozarova et al.,2002 [17], it was estimated that the liver enzymes AST, ALT, and ALP were significantly higher in cases as compared to control.

## V.  Conclusion

In the present study elevated levels of liver enzymes and total bilirubin if high in type 2 DM patients when compared with controls. It indicates that with the progression of DM conditions the liver dysfunction is more. So during the management of DM regular assessment of liver function is recommended to prevent the prognosis of liver dysfunction.

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