



## Nonalcoholic fatty liver disease in type 2 diabetes mellitus with obesity

### KEY WORDS

Nonalcoholic fatty liver disease, type 2 Diabetes mellitus, Obesity

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### ABSTRACT

Recent times overweight and obesity have reached epidemic levels in India. Nonalcoholic fatty liver disease (NAFLD) is significant lipid deposition in hepatocytes of liver without history of excessive alcohol consumption. Type 2 Diabetes Mellitus (T2DM) is the commonest cause of NAFLD. Patients may have varying combination of obesity, diabetes, hyperlipidemia, hypertension and impaired fibrinolysis. This study was done to find out the prevalence of NAFLD in T2DM with obesity and find out the correlation of biochemical risk factors and liver enzymes with ultrasound findings. Our study showed 55% prevalence of NAFLD in obese T2DM patients. The Risk of developing NAFLD is increased with poor glycemic control, hypercholesterolemia and hypertriglyceridemia which is evident with increasing liver enzymes. The incidence of NAFLD can be brought under control with good glycemic control and periodic evaluation of liver enzymes.

### Introduction:

Overweight and obesity have reached epidemic levels in India<sup>1</sup>. Nonalcoholic fatty liver disease (NAFLD) is significant lipid deposition in hepatocytes of liver without history of excessive alcohol consumption<sup>2</sup>. Most people with NAFLD presents with simple steatosis and may proceed to steatohepatitis, fibrosis, cirrhosis and liver failure<sup>3</sup>. Type 2 Diabetes Mellitus (T2DM) is the commonest cause of NAFLD and the varying presentation is due to insulin resistance<sup>4</sup>. Patients may have varying combination of obesity, diabetes, hyperlipidemia, hypertension and impaired fibrinolysis<sup>5</sup>. NAFLD is the most common cause for elevated transaminase levels<sup>6</sup>. Studies have shown improvement in liver parameters after treatment with insulin sensitizing agents like thiazolidinedione group of drugs<sup>7</sup>. This study was done to show the prevalence of NAFLD and association of liver enzymes with diabetes risk factors.

### Objectives of the study:

1. To find out the change in liver enzymes in obese T2DM patients and its correlation with NAFLD.
2. To find out the association of biochemical risk factors such as poor glycemic control and dyslipidemia for NAFLD in obese T2DM patients.

### Materials and methods:

After obtaining institutional ethics committee approval study was done

Cross sectional study

Sample size: 100 ( 50 males and 50 females)

**Inclusion criteria:** Established cases of T2DM patients (35-80 years) without complications on treatment with sulphonylureas/ biguanides or both. Nonalcoholic with body mass index (BMI)>25 BMI, Fasting blood sugar, blood pressure, Liver enzymes Aspartate transaminase(AST),Alanine transaminase(ALT),Gamma glutamyl transferse (GGT), Alkaline phosphatase(ALKP),Total cholesterol ,Triglycerides,High density lipoprotein(HDL), Urea,Creatinine levels are measured in fully automated analyzers.

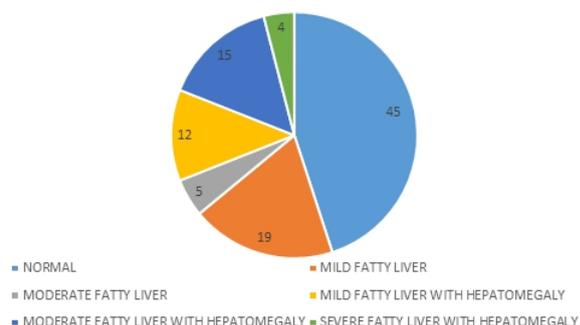
Statistical analysis was done with Microsoft excel software system.

### Results :

The mean age of our study group is 53.87 years and the mean BMI is 28.28 kgm<sup>2</sup>

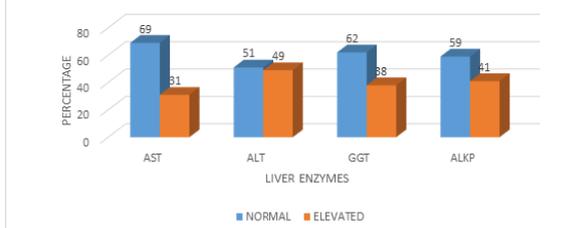
Based on ultrasound findings 55% showed features of NAFLD (Fig 1)

Fig 1:RESULTS OF ULTRASONOGRAPHY OF ABDOMEN



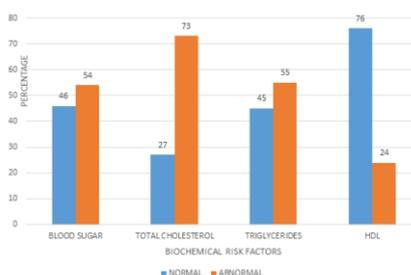
AST,ALT,GGT are elevated in 31%,49% and 38% respectively. Alkaline phosphatase is elevated in 41% of patients(Fig 2).

Fig 2: NORMAL AND ABNORMAL FREQUENCY OF MARKERS OF LIVER ENZYMES FOR NAFLD



Fasting blood sugar is elevated in 54% of the study population. Hypercholesterolemia and hypertriglyceridemia is present in 73% and 55% respectively. HDL level is altered in 24% of the study population (Fig 3)

Fig 3: NORMAL AND ABNORMAL FREQUENCY OF BIOCHEMICAL RISK FACTORS FOR NAFLD



**Table 1: CORRELATION OF ELEVATED LIVER ENZYMES WITH ULTRASOUND FINDINGS**

ENZYMES	USG ABDOMEN		TOTAL (%)	P value
	NORMAL (%)	FATTY LIVER(%)		
AST NORMAL	45	24	69	P< 0.0005*
ELEVATED	-	31	31	
ALT NORMAL	37	14	51	P< 0.0005*
ELEVATED	8	41	49	
GGT NORMAL	43	19	62	P< 0.0005*
ELEVATED	2	36	38	
ALKP NORMAL	41	18	59	P< 0.0005*
ELEVATED	4	37	41	

\* statistically significant

**Table 2: CORRELATION OF BIOCHEMICAL RISK FACTORS WITH ULTRASOUND FINDINGS**

BIOCHEMICAL RISK FACTORS	USG ABDOMEN		TOTAL (%)	P value
	NORMAL (%)	FATTY LIVER(%)		
FASTING BLOOD SUGAR CONTROLLED	36	10	46	P< 0.0005*
POORLY CONTROLLED	9	45	54	
TOTAL CHOLESTEROL NORMAL	19	8	27	P< 0.002*
ELEVATED	26	47	73	
TRIGLYCERIDES NORMAL	34	11	45	P< 0.0005*
ELEVATED	11	44	55	
HDL NORMAL	45	31	76	P< 0.0005*
LOW	-	24	24	

\*Statistically significant

### Discussion:

The public health implications of the emerging pandemic of obesity are dire in light of the growing list of associated metabolic consequences. Recent year's obesity has been implicated in the development of NAFLD. In this study ultrasound findings shows 55% prevalence of NAFLD in the study population which is also supported by the elevated liver enzymes (Table 1). Elevated liver enzymes indicate presence of hepatocyte injury. The mechanism of cell injury may be due to the excess of free fatty acids found in insulin resistant state. Other mechanisms may be cell membrane disruption, mitochondrial dysfunction and defect in regulation of metabolism<sup>8</sup>. Other potential explanation may be due to oxidant stress from reactive lipid peroxidation and increase in proinflammatory cytokines<sup>9</sup>.

Poor glycemic control is a major biochemical risk factor for NAFLD<sup>10</sup>. Abnormalities of triglyceride storage and lipolysis in insulin sensitive tissues (liver) are early markers of insulin resistance and are detected earlier than fasting hyperglycemia<sup>9</sup>.

This study reveals that poor glycemic control, hypercholesterolemia, hypertriglyceridemia, low HDL levels are important biochemical risk factors for development of NAFLD in obese T2diabetics (Table 2)

### Conclusion:

NAFLD is one of the common liver disorders which is highly prevalent in obese and diabetic individuals. Patients with NAFLD are characterized by elevated circulating concentration of liver enzymes like AST, ALT, GGT and ALKP. So by periodic evaluation of liver enzymes along with other biochemical risk markers can predict the development of NAFLD in obese type 2 diabetic individuals. Our results support the implication of type 2 diabetes as toxic state for

hepatic system and highlights the already strong rationale for aggressive intervention on obesity and type 2 diabetes at population level.

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