

# Study of Association of Lipid Profile and Non-Alcoholic Fatty Liver Disease

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## Abstract

**Background:** Non-alcoholic fatty liver disease (NAFLD) has become a major health burden in the modern era. Majority of cases of NAFLD are relatively mild and have a benign course. NAFLD can progress to fibrosis, cirrhosis, liver failure and hepatocellular carcinoma and thus contributes to liver related mortality and morbidity. Many studies have reported positive correlation between dyslipidemia and NAFLD. Hence we intend to study association of dyslipidemia and NAFLD, so that occurrence of fatty liver can be prevented by treating dyslipidemia.

**Aim & objective:** Study of association of lipid profile and Non-Alcoholic Fatty Liver Disease.

**Materials & methods:** This was a descriptive study done on 100 patients with sonologically detected Fatty Liver visiting the outpatient services of a tertiary medical college hospital in a city located on west coast of India. The ethics committee approval was obtained. The purpose of study was explained to the patient and informed consent was obtained. Fasting lipid profile was done in these patients. Then the lipid profile and the grades of fatty liver were compared. The data collected were analysed by frequency and percentage.

**Results:** Elevated triglyceride levels were seen in 52% of patients with Grade 1, 76% with Grade 2 and 96% with Grade 3 fatty liver. Also elevated Total Cholesterol was seen in 48% of patients with Grade 1, 71% with Grade 2 and 93% with Grade 3 fatty liver. Low HDL level was seen in 45% of patients with Grade 1, 36% with Grade 2 and 62% with Grade 3 fatty liver. LDL level was increased in 47% of patients with Grade 1, 74% with Grade 2 and 92% with Grade 3 fatty liver. Also increased VLDL level was seen in 46% of patients with Grade 1, 74% with Grade 2 and 93% with Grade 3 fatty liver.

**Conclusion:** The increasing grades of Fatty Liver were associated with elevated serum total cholesterol, LDL, VLDL and low HDL. Hence the grades of NAFLD were directly related to the increasing levels of Serum Cholesterol.

**Keywords:** NAFLD, Serum Total Cholesterol, LDL, VLDL, HDL.

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## 1. Introduction

Non-alcoholic fatty liver disease (NAFLD) has become a major health burden in the modern era. Incidence of NAFLD is rising in the Asia-Pacific region as the society becomes affluent and traditional lifestyles change (increasing fat in the diet, less physical activity). [1] The prevalence of fatty liver in India has been shown to be as high as 15%-30%[1], which is similar to that reported from some of the western countries.[2,3] NAFLD is increasing in Asian countries in par with western countries despite a lower obesity prevalence.[4]

Most patients with NAFLD are asymptomatic of liver disease at the time of diagnosis. Majority of cases of NAFLD are relatively mild and have a benign course. NAFLD can progress to fibrosis, cirrhosis, liver failure and hepatocellular carcinoma and thus contributes to liver related mortality and morbidity. [5] Many studies have reported positive correlation between dyslipidemia and NAFLD. Hence we intend to study association of dyslipidemia and NAFLD, so that occurrence of fatty liver can be prevented by treating dyslipidemia.

### 1.1 Aim & objective

Study on association of Lipid profile and Non-Alcoholic Fatty Liver Disease.

## 2. Materials and methods

### 2.1 Source of data

About 100 patients with sonologically detected fatty liver visiting the outpatient services of a tertiary medical college hospital in a city located on west coast of India were included for this study.

### 2.2 Study design:

This was a descriptive study done on sonologically detected fatty liver patients.

### 2.3 Methodology

Patients who were incidentally found to have fatty liver on ultrasound abdomen during routine health check-up who fulfilled the selection criteria, were included for the study using the formula,

$$n = \frac{Z_{\alpha}^2 p(1-p)}{e^2}$$

$Z_{\alpha} = 1.96$  at 95% CI

$P = 67\%$ ;  $e > 10\%$ ;  $n = 100$

The ethics committee approval was obtained. After describing the purpose of the study, informed consent for participation was obtained from the Subject. Fasting lipid profile was done in these patients. Then the lipid profile and the grades of fatty liver were compared. [6]

**Grade I:** diffusely increased hepatic echogenicity but periportal and diaphragmatic echogenicity is still appreciable.

**Grade II:** diffusely increased hepatic echogenicity obscuring periportal echogenicity but diaphragmatic echogenicity is still appreciable.

**Grade III:** diffusely increased hepatic echogenicity obscuring periportal as well as diaphragmatic echogenicity.

### 2.4 Inclusion criteria:

Patients above 30 years with sonologically detected fatty liver.

### 2.5 Exclusion criteria

- 1) Patients who have history of alcohol consumption
- 2) Chronic liver disease

### 2.6 Analysis:

The data collected was transferred to an Excel data sheet and analysed by frequency and percentage.

## 3. Results

A total of 100 ultrasonographically diagnosed NAFLD cases were included in the study. The mean age group of the subject was 54 years for males and 52 years in females. Females constituted the major group of 65% subjects. On ultrasonography, NAFLD was grade I in 52%, grade II in 40% and grade III in 8% of the subjects. Majority of the patients were in age group of 45 to 58 years.

**Table 1: Correlation between Grades of Fatty Liver and Serum Triglycerides**

Grades of Fatty Liver	Normal Triglyceride	Elevated Triglyceride
Grade 1	48%	52%
Grade 2	24%	76%
Grade 3	4%	96%

Elevated triglyceride levels were seen in 52% of patients with Grade 1, 76% with Grade 2 and 96% with Grade 3 fatty liver (Table 1).

**Table 2: Correlation between Grades of Fatty Liver and Serum Total Cholesterol**

Grades of Fatty Liver	Normal Total Cholesterol	Elevated Total Cholesterol
Grade 1	52%	48%
Grade 2	29%	71%
Grade 3	7%	93%

Elevated Total Cholesterol was seen in 48% of patients with Grade 1, 71% with Grade 2 and 93% with Grade 3 fatty liver (Table 2).

**Table 3: Correlation between Grades of Fatty Liver and Serum HDL levels**

Grades of Fatty Liver	Low HDL	Normal HDL	Elevated HDL
Grade 1	45%	48%	7%
Grade 2	36%	54%	10%
Grade 3	62%	35%	3%

Low HDL level was seen in 45% of patients with Grade 1, 36% with Grade 2 and 62% with Grade 3 fatty liver (Table 3).

**Table 4: Correlation between Grades of Fatty Liver and Serum LDL levels**

Grades of Fatty Liver	Normal LDL	Elevated LDL
Grade 1	53%	47%
Grade 2	26%	74%
Grade 3	8%	92%

Elevated LDL level was seen in 47% of patients with Grade 1, 74% with Grade 2 and 92% with Grade 3 fatty liver (Table 4).

**Table 5: Correlation between Grades of Fatty Liver and Serum VLDL levels**

Grades of Fatty Liver	Normal VLDL	Elevated VLDL
Grade 1	54%	46%
Grade 2	26%	74%
Grade 3	7%	93%

Elevated VLDL level was seen in 46% of patients with Grade 1, 74% with Grade 2 and 93% with Grade 3 fatty liver (Table 5).

On statistical analysis, the grades of NAFLD were directly related to the increasing levels of serum cholesterol. The increasing grades of Fatty Liver were associated with elevated serum total cholesterol, LDL, VLDL and low HDL.

#### 4. Discussion

NAFLD occurs in approximately 20% obese and 5% overweight subjects and appears to be common in some ethnic groups like Philipinos, Indians and aboriginals of Australia/Malaysia. Thus, NAFLD is not a western disease. NAFLD can cause end stage liver disease including some cases of 'cryptogenic cirrhosis' and has been proposed to lead to hepatocellular carcinoma. [7]

Differences in body-fat distribution or antioxidant systems, possibly in the context of a genetic predisposition, may be among the explanations. A net retention of lipids within hepatocytes, mostly in the form of triglycerides, is a prerequisite for the development of non-alcoholic fatty liver disease. The primary metabolic abnormalities leading to lipid accumulation is not well understood, but they could consist of alterations in the pathways of uptake, synthesis, degradation, or secretion in hepatic lipid metabolism resulting from insulin resistance. [8]

In our study elevated triglyceride levels were seen in 52% of patients with Grade 1, 76% with Grade 2 and 96% with Grade 3 fatty liver (Table 1). Also elevated Total Cholesterol was seen in 48% of patients with Grade 1, 71% with Grade 2 and 93% with Grade 3 fatty liver (Table 2). Low HDL level was seen in 45% of patients with Grade 1, 36% with Grade 2 and 62% with Grade 3 fatty liver (Table 3). LDL level was increased in 47% of patients with Grade 1, 74% with Grade 2 and 92% with Grade 3 fatty liver (Table 4). Also increased VLDL level was seen in 46% of patients with Grade 1, 74% with Grade 2 and 93% with Grade 3 fatty liver (Table 5).

The increasing grades of Fatty Liver were associated with elevated serum total cholesterol, LDL, VLDL and low HDL. Hence Grades of NAFLD was directly related to the increasing levels of serum cholesterol. Similar results were found in study done by Agrawal *et al* [9], Majumdar *et al* [10] and Mahaling *et al* [6]. Agrawal *et al* reported hypertriglyceridemia, hypercholesterolemia, elevated LDL and elevated VLDL among patients with NAFLD.[9] Majumdar *et al* also showed that NAFLD was associated with elevated lipid profile.[10] Mahaling *et al* also showed significant increase in lipid profile values among patients with NAFLD.[6]

Liver biopsy is the gold standard for diagnosis of NAFLD. But because of its invasiveness, complication, painfulness and sampling error it is not feasible in every asymptomatic cases. Ultrasonography can be used for the early detection of NAFLD. Ultrasound is the least expensive modality for detecting changes associated with

NAFLD and minimizes the exposure of unnecessary, expensive, complicated and tedious investigation in these patients and asymptomatic cases. Several studies have assessed the sensitivity and specificity of ultrasound for detecting NAFLD, the sensitivity ranged from 60% to 94% and the specificity from 84% to 95%, respectively. [11-14] Hence ultrasound is a simple tool to detect NAFLD which can be supported with significantly increased lipid profile values.

#### 5. Conclusion

The increasing grades of Fatty Liver were associated with elevated serum total cholesterol, LDL, VLDL and low HDL. Hence the grades of NAFLD were directly related to the increasing levels of serum cholesterol.

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