

## The Importance of Lipid Profile in Determining The Severity Of Cirrhosis.

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### ABSTRACT:

**BACKGROUND:** Anatomically, cirrhosis is defined as a diffuse condition characterised by fibrosis and nodule formation. It's caused by the fibrogenesis that happens as a result of chronic liver injury. Low levels of serum cholesterol, low density lipoprotein (LDL), and high density lipoprotein (HDL) are commonly seen in chronic liver disease patients with impaired hepatic biosynthetic capacity. We conducted this study to evaluate the role of lipid profile in a patient with cirrhosis and to examine its link to the severity of cirrhosis due to the high prevalence of chronic liver disease in our nation.

**METHODS:** In this cross-sectional investigation, patients were divided into three groups based on the CTP cirrhosis severity categorization. These patients had a lipid profile in their blood. The study's main goal was to look at how changes in various lipid profile indicators correlated with the severity of liver cirrhosis.

**RESULTS:** A total of 74 patients with cirrhosis were enrolled, with 20 in class A, 25 in class B, and 29 in class C. These patients had a lipid profile in their blood. Cirrhosis severity was associated with a decrease in serum cholesterol and HDL cholesterol. The level of serum triglycerides rises as cirrhosis progresses, while the level of very low density lipoprotein (VLDL) has no link to the severity of cirrhosis.

**CONCLUSION:** Cirrhosis causes a reduction in serum cholesterol and HDL levels. In the future, serum lipid profiles may be utilised as a criterion for determining the severity of liver cirrhosis.

**KEY WORDS:** Chronic liver disease, CTP classification, Lipid profile, Severity of liver cirrhosis.

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### I. INTRODUCTION:

Lipids are key components of biological membranes, as well as free molecules and metabolic regulators that regulate cellular activity and homeostasis. In the metabolism of plasma lipids and lipoproteins, the liver plays a critical role. It collects fatty acids and cholesterol from peripheral tissues and the food, bundles them into lipoprotein complexes, and then releases the complexes into circulation. Due to a loss in lipoprotein synthesising capacity, chronic liver illness is frequently associated with lower plasma TG and cholesterol levels.

Lipoproteins are huge macromolecular complexes that carry hydrophobic lipids (mainly triglycerides, cholesterol, and fat-soluble vitamins) from the bloodstream to the tissues via bodily fluids (plasma, interstitial fluid, and lymph). VLDL triglycerides are mostly made up of long-chain fatty acids that have been esterified in the liver. VLDL triglycerides, like chylomicrons, are hydrolyzed by Lipoprotein lipase, which is found in muscle, heart, and adipose tissue. In most people, LDL cholesterol accounts for more than half of their plasma cholesterol. LDL receptor-mediated endocytosis clears approximately 70% of circulating LDL in the liver<sup>(1-6)</sup>

Because the bulk of endogenous cholesterol is generated in the hepatic microsomes, chronic liver illness impairs cholesterol production and metabolism, resulting in a drop in plasma levels<sup>7</sup>. Cirrhosis patients with severe metabolic impairment may see their serum lipoprotein pattern deteriorate. Cirrhosis has been demonstrated to lower blood levels of high-density lipoprotein (HDL) cholesterol and its major apolipoproteins, as well as serum levels of low-density lipoprotein (LDL) cholesterol<sup>8</sup>. Cirrhosis is the 14th most prevalent cause of mortality worldwide, but it is the 4th most common cause of death in Europe<sup>9</sup>. In their fifth or sixth decade of life, many people succumb to the condition.

The Child-Pugh score is used to determine the severity of chronic liver disease and its prognosis. It was originally used to predict mortality during surgery, but it is now used to decide whether a liver transplant is necessary<sup>10</sup>. In the cases of ascites, ruptured oesophageal varices, alcoholic cirrhosis, hepatitis C virus-related cirrhosis, primary biliary cirrhosis (PBC), primary sclerosing cholangitis (PSC), and Budd-Chiari syndrome,

several studies have indicated that the Child-Pugh score is an independent predictive predictor. The Child-Pugh score, which can be easily calculated at the bedside, has long been used to screen patients for HCC resection and non-hepatic surgery<sup>(11-19)</sup>.

## **II. METHODS:**

From July 2021 to January 2022, this observational study was done in the Department of Medicine, Government General Hospital, Vijayawada.

**Inclusion criteria:** A total of 74 patients were enrolled in the trial. The trial included all consenting patients over the age of 18 who were diagnosed as having liver cirrhosis based on their medical history, physical examination, biochemical parameters, liver ultrasonography, and upper GI endoscopy.

**Exclusion criteria:** Patients less than 18 years and patients with diabetes, myocardial infarction, cardiovascular illness, nephrotic syndrome, thyroid dysfunction, HIV patients, chronic smokers, and patients using medicines that can impact blood lipids and lipoproteins were excluded from the study.

Using the modified CTP score, all cirrhotic patients were divided into three groups based on their severity.

**Diagnostic criteria:** Cirrhosis is expected in patients with a history of chronic liver disease (CLD) who have gastroesophageal varices, ascites, or hepatic encephalopathy, and a liver biopsy is not required to confirm cirrhosis in these circumstances. Physical findings of an enlarged left hepatic lobe with splenomegaly, as well as cutaneous stigmata of liver disease, suggest cirrhosis in patients with CLD but no above-mentioned complications, especially in the presence of thrombocytopenia and impaired hepatic synthetic function (e.g., hypoalbuminemia, prolonged PT/INR). Imaging examination (small nodular liver with splenomegaly and intraabdominal collaterals and presence of ascites) suggests cirrhosis if physical and laboratory symptoms are not suggestive of cirrhosis. Cirrhosis is suspected when the serum AST/platelet ratio index (APRI) is more than 2.

**STATISTICAL ANALYSIS:** The data was entered into an Excel spreadsheet and analysed with SPSS software. The mean and standard deviation of quantitative data were calculated with 95 percent confidence intervals (CIs). The chi – square (2) test was performed to compare nominal data. The Student t test was used to compare continuous variables between two groups. One-way analysis of variance (ANOVA) was used to compare continuous variables between more than two groups. Statistical significance was defined as a P value of less than 0.05.

## **III. RESULTS:**

74 patients were enrolled in the study and further classified it into three groups based on the severity of the cirrhosis, as defined by the Child-Pugh-Turcot classification. Twenty patients were in CTP class A, 25 in CTP class B, and 29 in CTP class C, out of a total of 74. The qualities in the start were similar. Patients who took part in the study had an average age of  $48.27 \pm 11.12$  years. The youngest person was 30 years old, and the oldest person was 72 years old. The majority of the patients were between the ages of 40 and 60. (59.4 percent ). In this study, 75.6 percent of the participants were male, while 24.4 percent were female. The majority of the patients in each CTP class were illiterate (class A 40%, class B 48%, and class C 34%). CTP class A and class B were having no graduate while in class C 17.25% were graduate.

Serum lipid profiles were evaluated in different CTP classes to see if there was a link between lipid profile and cirrhosis severity. The serum cholesterol level in CTP class A was  $167.1 \pm 15.07$ , class B was  $141.30 \pm 20.33$ , and class C was  $134.67 \pm 14.93$  in this investigation. As cirrhosis advances, the level of serum cholesterol drops. This drop in cholesterol level was found to be statistically significant (P 0.001) as cirrhosis progressed.(table 1)

Serum HDL levels in CTP class A were  $47.60 \pm 5.88$ , class B  $38.76 \pm 5.65$ , and class C  $36.32 \pm 5.61$ , all of which showed a downward tendency as cirrhosis progressed. As a result, a drop in HDL levels indicates cirrhosis progression. The reduction in HDL was statistically significant (P 0.001).(table 2).

Table 1: Effect of severity of Cirrhosis on lipid profile.

Parameters	CTP Class A (n=20)	CTP Class B (n=25)	CTP Class C (n=29)
<b>Age (in years)</b>			
30-39	4 (20%)	6 (24%)	7 (24.14%)
40-49	8 (40%)	4 (16%)	10 (34.48%)
50-59	4 (20%)	8 (32%)	10 (34.48%)
60-69	2 (10%)	5 (20%)	2 (6.9%)
70-79	2 (10%)	2 (8%)	0
<b>Sex</b>			
Male	11 (55%)	20 (80%)	25 (86.20%)
Female	9 (45%)	5 (20%)	4 (13.80%)
<b>Education</b>			
Illiterate	8 (40%)	12 (48%)	10 (34.48%)
Primary school	5 (25%)	6 (24%)	4 (13.79%)
Junior high school	2 (10%)	3 (12%)	5 (17.24%)
High school	3 (15%)	4 (16%)	2 (6.90%)
Senior secondary school	2 (10%)	0	3 (10.34%)
Graduate	0	0	5 (17.25%)

Table 2: The overall outcome of patients.

Parameters	CTP Class A (n=20)	CTP Class B (n=25)	CTP Class C (n=29)	P-value
Serum Cholesterol	167.1±15.07	141.30±20.33	134.67±14.93	≤0.001
Serum Triglycerides	127.4±54.24	131.1±71.51	149.59±54.39	0.376
Serum HDL	47.60±5.88	38.76±5.65	36.32±5.61	≤0.001
Serum LDL	94.61±8.50	75.29±14.67	70.92±16.14	≤0.001
VLDL	18.49±1.74	20.91±10.96	18.66±2.40	0.320

#### IV. DISCUSSION:

Out of the five examined variables (serum total cholesterol, LDL cholesterol, VLDL cholesterol, HDL cholesterol, and triglycerides), cirrhotic patients had considerably lower serum total cholesterol, LDL cholesterol, and HDL cholesterol.

The degree of liver illness as measured by the Child-Pugh-Turcot classification demonstrated a positive connection with the amount of decline in serum total cholesterol, LDL cholesterol, and HDL cholesterol.

It was discovered that as the severity of cirrhosis increased, blood total cholesterol in cirrhotic patients reduced dramatically (P 0.001). Cirrhotic patients had considerably lower serum total cholesterol than healthy people (P=0.03), according to a similar study.<sup>20,21</sup>

It was discovered that as the severity of cirrhosis increased, serum LDL cholesterol in cirrhotic patients reduced dramatically. (P-value 0.001). In a comparable study, it was discovered that cirrhotic individuals had considerably lower LDL cholesterol than healthy people (P=0.03).<sup>20,21</sup>

In this study, it was discovered that as the severity of cirrhosis increased, serum HDL cholesterol in cirrhotic individuals fell dramatically (P 0.001). In a similar study, it was discovered that cirrhotic patients' HDL cholesterol was considerably lower than that of healthy people (P=0.03).<sup>20,21</sup>

The amount of serum triglycerides was found to rise with the advancement of cirrhosis in this investigation. However, the relationship between blood triglyceride levels and cirrhosis severity was determined to be statistically insignificant. (P-value of 0.376.) In contrast, this link was statistically significant in a similar study.<sup>20,21</sup>

In this investigation, serum VLDL levels vary as cirrhosis severity increases, in contrast to a previous study that found serum VLDL levels decrease as cirrhosis progresses<sup>22</sup>.

#### V. CONCLUSION:

Cirrhosis of the liver is associated with changes in lipid profile markers. In the coming days, classification criteria for liver cirrhosis severity and liver transplant listing criteria may incorporate serum lipid profile parameters to improve their accuracy, but more large population studies are needed to determine the predictive values of lipid profile to estimate the extent of liver damage in cirrhotic patients.

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