

Original Research Article

Role of lipid profile in assessment of severity of cirrhosis

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ABSTRACT

Background: Cirrhosis is defined anatomically as a diffuse process with fibrosis and nodule formation. It is the result of the fibrogenesis that occurs with chronic liver injury. For reduced liver biosynthesis capacity, low level of serum cholesterol, low density lipoprotein (LDL) and high density lipoprotein (HDL) is usually observed in the chronic liver disease. Due to the high prevalence of chronic liver disease in our country we have conducted this study to determine role of lipid profile in a patient with cirrhosis and to assess its relationship to the severity of cirrhosis.

Methods: In this cross-sectional study, patients classified in 3 groups as per CTP classification for severity of cirrhosis. Serum lipid profile was observed in these patients. The primary aim was to assess changes in various parameters of lipid profile and its relationship with severity of liver cirrhosis.

Results: About 74 cirrhotic patients were enrolled, 20 in class A, 25 in class B and 29 in class C. serum lipid profile was observed in these patients. Serum cholesterol and HDL cholesterol were decreased with increasing severity of cirrhosis. Serum triglyceride level increases with progression of cirrhosis and very low density lipoprotein (VLDL) level has no correlation with severity of cirrhosis.

Conclusions: Serum cholesterol and HDL level decreases with progression of cirrhosis. In future serum lipid profile can be used in classification criteria for assessing severity of liver cirrhosis.

Keywords: Chronic liver disease, CTP classification, Lipid profile, Severity of liver cirrhosis

INTRODUCTION

Lipids are essential component of biological membrane, free molecules and metabolic regulators that control cellular function and homeostasis. The liver plays a key role in the metabolism of plasma lipids and lipoproteins. It receives fatty acids and cholesterol from peripheral tissues and diet, packages them into lipoprotein complexes and releases these complexes back into circulation.

Chronic liver disease due to various causes are often associated with reductions in plasma TG and cholesterol level due to reduced lipoprotein biosynthetic capacity.

Lipoproteins are large macromolecular complexes that transport hydrophobic lipids (primarily triglycerides, cholesterol, and fat-soluble vitamins) through body fluids (plasma, interstitial fluid, and lymph) to and from tissues. The triglycerides of VLDL are derived predominantly from the esterification of long-chain fatty acids in the liver. As with chylomicrons, the triglycerides of VLDL are hydrolysed by Lipoprotein lipase especially in muscle, heart, and adipose tissue.

The cholesterol in LDL accounts for more than one-half of the plasma cholesterol in most individuals. Approximately 70% of circulating LDL is cleared by LDL receptor-mediated endocytosis in the liver.¹⁻⁶

As majority of endogenous cholesterol is synthesized in the hepatic microsomes, synthesis and metabolism of cholesterol is impaired in chronic liver disease resulting in a decrease in plasma levels.⁷ Severe metabolic impairment in cirrhosis can produce a worsening of the serum lipoprotein pattern. High-density lipoprotein (HDL) cholesterol and its major apolipoproteins have been shown to be reduced in cirrhosis, as also the serum levels of low-density lipoprotein (LDL) cholesterol.⁸ Worldwide, cirrhosis is the 14th most common cause of death, but in Europe, it is the 4th most common cause of death.⁹ Many patients die from the disease in their fifth or sixth decade of life.

The Child-Pugh score is used to assess the severity and prognosis of chronic liver disease. Although it was originally used to predict mortality during surgery, now used to determine the necessity of liver transplantation.¹⁰

Several studies have shown that Child-Pugh score is an independent prognostic marker in the settings of ascites, ruptured oesophageal varices, alcoholic cirrhosis hepatitis C virus- (HCV-) related cirrhosis, primary biliary cirrhosis (PBC), primary sclerosing cholangitis (PSC), and Budd-Chiari syndrome, Child-Pugh score, which can be easily calculated at the bedside, has been widely used for selecting candidates for resection of HCC, and non-hepatic surgery.¹¹⁻¹⁹

METHODS

This observational study was conducted in a Tertiary Centre, department of medicine, GSVM Medical College, Kanpur from January 2017 to July 2018. 74 patients were included in the study. All consenting patients more than 18 years of age diagnosed as cases of liver cirrhosis established by history, general examination, biochemical parameters and ultrasound of liver, upper GI endoscopy were included in the study. patients with history of having diabetes mellitus, myocardial infarction, cardiovascular disease, nephrotic syndrome, thyroid dysfunction, HIV patients, chronic smokers and patients taking drugs which might affect serum lipids and lipoproteins were excluded.

All the cirrhotic patients were classified into three groups as per severity using modified CTP score.

Diagnostic criteria of cirrhosis

Patients with a history of Chronic liver disease (CLD) with gastroesophageal varices, ascites or hepatic encephalopathy are likely to have cirrhosis and liver biopsy is not essential in such cases for confirming cirrhosis.

In patients with a diagnosis of CLD without above mentioned complications, physical finding of an enlarged left hepatic lobe with splenomegaly along with cutaneous stigmata of liver disease suggest cirrhosis, especially in

the setting of thrombocytopenia and impaired hepatic synthetic function (e.g.-hypoalbuminemia, prolonged PT/INR).

If physical and laboratory findings are not suggestive of cirrhosis, imaging study (small nodular liver with splenomegaly and intraabdominal collaterals and presence of ascites) suggests cirrhosis.

A serum AST/platelet ratio index (APRI) of greater than 2 suggests cirrhosis.

Statistical analysis

The data was processed in Excel sheet and analysis was carried out using SPSS Software.

Quantitative data were described as mean and standard deviation with 95% confidence intervals (CIs). For comparison of nominal data, chi – square (χ^2) test was used. Continuous variables between two groups were compared using the Student t test. For comparison of continuous variables between more than 2 groups, one-way analysis of variance (ANOVA) was used. P value <0.05 was considered statistically significant.

RESULTS

In this study, authors included 74 patients. Further we divided it into three class on the basis of severity of cirrhosis as per child-Pugh-Turcot classification. Out of 74 patients, 20 patients were in CTP class A, 25 in CTP class B and 29 in CTP class C (Figure 1). Baseline characteristics were comparable. Mean age of patients who took part in study was 48.27 ± 11.12 years. The lowest age was 30 years and highest age was 72 years. Most of the patients were in 40-60 years of age group (59.4%). 75.6% were male in this study while female was 24.4%. Most of the patients in various CTP class were illiterate (class A 40%, class B 48%, class C 34%. CTP class A and class B were having no graduate while in class C 17.25% were graduate (Table 1).

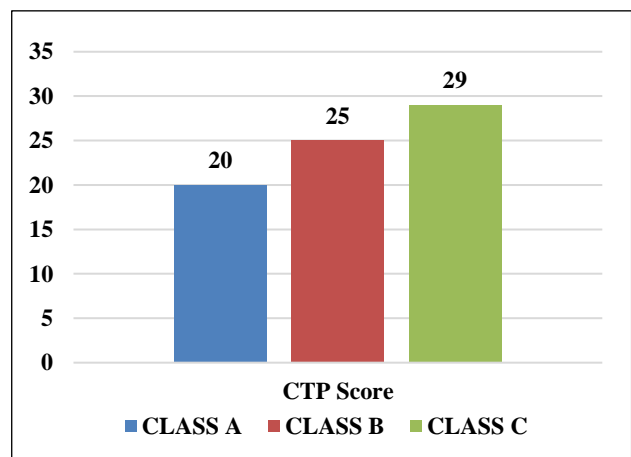


Figure 1. Distribution of patients as per CTP class.

Serum lipid profile were compared in various CTP class to see relationship of lipid profile to the severity of cirrhosis. in this study serum cholesterol level in CTP class A was 167.1 ± 15.07 , class B 141.30 ± 20.33 and in class C 134.67 ± 14.93 . serum cholesterol level decreases as severity of cirrhosis progresses. This decrease in cholesterol level with progression of cirrhosis was found statistically significant ($P \leq 0.001$) (Table 2).

Serum HDL level in CTP class A was 47.60 ± 5.88 , class B 38.76 ± 5.65 and in class C 36.32 ± 5.61 showing decreasing trend with progression of cirrhosis. Thus, decreasing HDL level suggests progression of cirrhosis. This decrease in HDL level was statistically significant ($P \leq 0.001$) (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)
Age (in years)			
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
Sex			
Male	11 (55%)	20 (80%)	25 (86.20%)
Female	9 (45%)	5 (20%)	4 (13.80%)
Education			
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

Serum LDL level in CTP class A was 94.61 ± 8.50 , class B 75.29 ± 14.67 and in class C 70.92 ± 16.14 showing decreasing trend with progression of cirrhosis as in HDL level. This decrease in LDL level with progression of cirrhosis was found statistically significant ($P \leq 0.001$) (Table 2).

Serum triglyceride level in CTP class A was 127.4 ± 54.24 , class B 131.1 ± 71.51 and in class C 149.59 ± 54.39 . serum Triglyceride level increases as severity of cirrhosis progresses. This increase in Triglyceride level with progression of cirrhosis was found statistically not significant (P-value 0.376) (Table 2).

Serum VLDL level in CTP class A was 18.49 ± 1.74 , class B 20.91 ± 10.96 and in class C 18.66 ± 2.40 . serum VLDL

level varies with progression of cirrhosis. Serum VLDL level varies with severity of cirrhosis and no statistically significant relationship found between serum VLDL level and severity of cirrhosis (P-value 0.320) (Table 2).

DISCUSSION

Current study found that serum total cholesterol, LDL cholesterol, HDL cholesterol out of five studied variables, (serum total cholesterol, LDL cholesterol, VLDL cholesterol, HDL cholesterol and triglycerides) were significantly lower in cirrhotic patients.

The amount of decrement in the serum total cholesterol, LDL, HDL cholesterol had a positive correlation with the severity of liver disease as assessed by Child-Pugh-Turcot classification.

In this study, authors found that serum total cholesterol in cirrhotic patients was significantly decreased as severity of cirrhosis increases ($P < 0.001$). In a similar study, it was found that the serum total cholesterol in cirrhotic patients was significantly lower than in healthy persons ($P=0.03$).^{20,21}

In this study, authors found that serum LDL cholesterol in cirrhotic patients was significantly decreased as severity of cirrhosis increases. ($P < 0.001$). In a similar study, it was found that the LDL cholesterol in cirrhotic patients was significantly lower than in healthy persons ($P=0.03$).^{20,21}

In this study, authors found that serum HDL cholesterol in cirrhotic patients was significantly decreased as severity of cirrhosis increases ($P < 0.001$). In a similar study, it was found that the HDL cholesterol in cirrhotic patients was significantly lower than in healthy persons ($P=0.03$).^{20,21}

In this study, authors observed that serum triglyceride level increases with progression of cirrhosis. however, this correlation of serum triglyceride level with severity of cirrhosis was found statistically not significant. (P-value 0.376). which was contrary to a similar study where this correlation was statistically significant.^{20,21} In this study, serum VLDL level varies with increase in severity of cirrhosis which was contrary to a similar study where serum VLDL level decreases with progression of cirrhosis.²²

Limitations of study

This was single centre study having small study population. The cirrhosis pathogenesis involve various pathways of hepatic injury so single parameter may not be effective in deciding severity.

CONCLUSION

Derangement in various parameters of lipid profile is common in liver cirrhosis. classification criteria for severity of liver cirrhosis and liver transplant listing criteria may incorporate serum lipid profile parameters to increase their accuracy in upcoming days, but further 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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