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A Cross - Sectional Study for Lipid Profile as an Indicator of Severity in Cirrhosis of Liver

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Abstract: ***Background: A number of scoring systems, such as the Child - Pugh score and Model for End - Stage Liver Disease (MELD) score, are available to evaluate the severity of cirrhosis. The altered lipid profile can serve as a predictive biomarker of cirrhosis because the liver is the primary organ involved in the conversion of excess carbohydrates into lipids. We evaluated the lipid profile anomalies in liver cirrhosis patients and found a correlation between them and the severity of the disease. Materials and methods: This study examines the lipid profile of patients admitted to a tertiary care centre in Uttar Pradesh as a potential indicator of the severity of liver cirrhosis. After cirrhosis was confirmed by a thorough investigation, all eligible patients with the disease had their fasting serum lipid profile evaluated. Serum low - density lipoprotein (LDL) and very - low - density lipoprotein (VLDL) were calculated using the Friedwald formula, whereas total serum cholesterol, triglycerides (TGL), and high - density lipoprotein (HDL) were measured directly. Results: The study included 110 patients in total. Seventy - two (65.45%) of them were men. The most frequent causes of cirrhosis among them were alcohol (82, 74.5%), hepatitis B (9, 8.1%), and non alcoholic steato hepatitis (NASH) (7, 6.3%). For increasing severity as determined by the Child - Pugh score and MELD score, there is a discernible dose - response association (decreasing trend) in the lipid levels. Furthermore, in comparison to the corresponding groups, patients with as cites or spontaneous bacterial peritonitis had considerably lower cholesterol, LDL, and HDL levels. Conclusion: This study observed that there is a significant reduction in levels of lipid profile parameters like serum total cholesterol, LDL, VLDL, TGL, and HDL in patients with cirrhosis as the severity increases. Further formulation of the scoring system in association with a preexisting scoring system may provide a better assessment of patients' prognosis in view of morbidity and mortality. We recommend it is necessary to assess the fasting lipid profile in all patients with cirrhosis and prognosticate their disease progression.***

Keywords: Cirrhosis, Hepatitis, Non alcoholic Steatohepatitis, Lipid profile

1. Introduction

The advanced stage of hepatocellular injury induced by a variety of etiologies is represented by liver cirrhosis, which may eventually lead to hepatocellular cancer and liver failure. The range of cirrhosis prevalence worldwide is 4.5–9.6%, or an estimated fifty million cases.[1 - 3] In the United Kingdom, liver illnesses are the fifth most common cause of mortality, based on official statistics.4 It is the second most common cause of death in the United States of America.5.1.3 million people died and 2.8 million people were afflicted with cirrhosis in 2015.[6, 7] Because cirrhosis - related problems account for around a million deaths annually, cirrhosis ranks as the eleventh most common cause of mortality worldwide.[8] Globally, an estimated 1.5 billion people suffer from chronic liver disease (CLD), and the age - standardized incidence of both cirrhosis and CLD is 20.7/100, 000, up 13% from 2000. Similarly, the United States of America has seen a rise in the prevalence and mortality of cirrhosis in recent years.[9].

A number of grading methods, including the Child - Pugh and MELD scores, are available to determine the severity of cirrhosis. Because the liver is the primary location for the conversion of excess carbohydrates into fatty acids and TGLs, it plays a crucial role in lipid metabolism. Large amounts of phospholipids and cholesterol are produced by the liver. In CLD, there are problems with cholesterol synthesis and metabolism. The plasma levels eventually decrease as a result of this. The significant metabolic disruption in cirrhosis has been demonstrated to lower serum levels of LDL cholesterol as well as HDL cholesterol and its key apolipoproteins. In light of this, we evaluated the lipid profile anomalies in liver cirrhosis patients and their relationship to the severity of the disease.

2. Material and Methods

Study Design: It is an analytical cross - sectional study.

Study Setting: The study was conducted in a tertiary care hospital situated in the Uttar Pradesh, India. We included patients with cirrhosis admitted to the hospital.

Inclusion Criteria
Patients of age ≥18 years with cirrhosis.

Exclusion Criteria
Diabetes mellitus/hypertension.
Cerebrovascular disease.
Patients on lipid - lowering drugs.
Pancreatitis.
Chronic kidney disease.
Hypo/hyperthyroidism

Statistical Analysis
The primary data was collected, and it was analyzed using Statistical Package for the Social Sciences 25.0 version software.

3. Results

The study included 110 patients in total. Seventy - two (65.45%) of them were men. The most frequent causes of cirrhosis among them were alcohol (82, 74.5%), hepatitis B (9, 8.1%), and nonalcoholicsteatohepatitis (NASH) (7, 6.3%). A total of 40 (36.3%), 46 (41.8%), and 24 (21.8%) patients were classified with Child - Pugh score categories A, B, and C, respectively. Similarly, based on the MELD score, 3 (2.7%), 14 (12.7%), 34 (30.9%), and 59 (53.6%) were classified under the scores ≤10, 11– 18, 19–24, and >24, respectively.

The mean and SD of each lipid level for each category based on the Child - Pugh score is given below. A clear dose - response relationship (decreasing trend) is seen in the levels of lipids for increasing severity based on the Child - Pugh score.

Similarly, the distribution of each lipid level for each category based on the MELD score is given. Except for the patients with a MELD score of ≤10, a clear dose - response relationship (decreasing trend) is seen with all other levels of lipids for increasing severity based on the MELD score.

The distribution and association of lipid profile with the presence of ascites, spontaneous bacterial peritonitis are given below. The cholesterol, LDL, and HDL were significantly lower among patients with ascites and among patients with spontaneous bacterial peritonitis compared to their respective groups.

Table 1: Lipid profile according to Child - Pugh score

Lipid Profile Characteristics		A (n - 40)	B (n - 46)	C (n - 24)
Cholesterol	Mean ± SD	176.7	148.2	120.8
TGL	Mean ± SD	152.2	130.2	92.6
LDL	Mean ± SD	101.3	85.5	75.2
VLDL	Mean ± SD	30.2	26.2	18.8
HDL	Mean ± SD	45.1	36.2	28.5

Table 2: Lipid profile according to MELD score

Lipid Profile Characteristics		<10 (n - 3)	11 - 18 (n - 14)	19 - 24 (n - 34)	>24 (n - 59)
Cholesterol	Mean ± SD	164.1	171.3	162.5	140.8
TGL	Mean ± SD	142.3	142.2	1425	118.1
LDL	Mean ± SD	93.3	99.5	93.8	83.6
VLDL	Mean ± SD	27.8	28.6	27.7	24.4
HDL	Mean ± SD	42.2	42.6	42.2	33.8

Table 3: Presence of ascites and distribution of lipid profile

Lipid Profile Characteristics		Ascites: Yes (n - 93)	Ascites: No (n - 17)	p - value
Cholesterol	Mean ± SD	149.5	166.5	0.007
TGL	Mean ± SD	130.2	133.5	0.365
LDL	Mean ± SD	88.5	96.8	0.005
VLDL	Mean ± SD	26.5	25.5	0.365
HDL	Mean ± SD	35.4	41.2	0.032

Table 4: Presence of SBP and distribution of lipid profile

Lipid Profile Characteristics		SBP: YES (n - 18)	SBP: NO (n - 92)	p - value
Cholesterol	Mean ± SD	141.6	154.5	0.017
TGL	Mean ± SD	123.5	132.6	0.178
LDL	Mean ± SD	84. .5	91.5	0.025
VLDL	Mean ± SD	25.4	27.5	0.178
HDL	Mean ± SD	35.4	39.5	0.045

4. Discussion

In this tertiary care hospital - based study, we found significantly low levels of lipids among patients with severe cirrhosis (based on the Child - Pugh score or MELD score). Lipid profile abnormalities have a well - documented negative correlation with the severity of cirrhosis. This study ensures that lipid profile abnormalities in cirrhosis as the synthetic function is impaired in these patients.

In our study, we found that parameters like serum total cholesterol, LDL, VLDL, HDL, and TGLs were significantly lower as the stage of severity of cirrhosis advanced. The decreased levels of LDL and HDL might be attributed to the reduced synthesis of apolipoproteins A and B. Since apo B is involved in the synthesis of VLDL, the reduced level of TGLs is explained in cirrhosis. This can be due to insulin resistance found in liver cirrhosis. The insulin signaling mechanism in cirrhosis is found to be critical for lipogenesis regulated by phosphoinositide 3 - kinase and AKT serine/threonine kinase 2 signaling pathways. Among the various transcription factors, sterol regulatory element binding protein - 1c has a stimulatory effect on the genes involved in lipogenesis.

Unlike other studies, in our study, all the parameters of lipid profile, namely, serum total cholesterol, serum HDL, TGLs (measured by direct method), serum VLDL, and LDL (calculated by formula), have been negatively correlated with the severity of cirrhosis. However, the association of lipid profile with the short and long - term clinical outcomes in parallel or integrated with the Child - Pugh score or MELD score was not done.

Considering lipid profile abnormalities in CLD is of paramount importance to assess the severity since the changes are correlating statistically significant with previously existing severity assessment scores like the CTP score and with the MELD score

5. Conclusion

This study observed that there is a significant reduction in levels of lipid profile parameters like serum total cholesterol,

LDL, VLDL, TGL, and HDL in patients with cirrhosis as the severity increases. Further formulation of the scoring system in association with a preexisting scoring system may provide a better assessment of patients' prognosis in view of morbidity and mortality. We recommend it is necessary to assess the fasting lipid profile in all patients with cirrhosis and prognosticate their disease progression.

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