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ORIGINAL ARTICLE

Association Between Lipid Profile and Prognostic Scores in Cirrhotic Patients

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ABSTRACT

Background: Cirrhosis is a high morbidity and mortality severe progressive liver disease. Dyslipidemia is a common finding among patients with cirrhosis, but the association between dyslipidemia and prognostic scores has not been well investigated. Lipid abnormalities can be conceptualized to shed some light on the course and outcome of diseases.

Objective: The purpose of the study is to examine the association between the lipid profile abnormalities (HDL, LDL, triglycerides) and prognostic scores (MELD, Child-Turcotte-Pugh) of patients with cirrhosis.

Methods: The study was a prospective observational study involving 100 cirrhotic patients from Medicine Department Saidu Group Teaching Swat, KPK from 1st November, 2022 to 30th April, 2023. The prognostic scores (MELD and Child-Turcotte-Pugh) and lipid profiles (total cholesterol, HDL, LDL, and triglycerides) were measured. Correlation test and regression test were performed to determine the correlation between lipid profiles and the prognostic scores.

Results: HDL had a strong negative association with MELD and Child-Turcotte-Pugh scores, and the triglycerides had a positive relationship. Low levels of triglycerides and high levels of HDL cholesterol were linked to poor outcomes.

Conclusion: The low levels of HDL and high levels of triglycerides correlate with the poorer prognosis among cirrhotic patients, which means that they should be considered as prognostic biomarkers.

Keywords: Cirrhosis, lipid profile, HDL, triglycerides, MELD, Child-Turcotte-Pugh, prognosis.

INTRODUCTION

Cirrhosis, being a long-term liver disease caused by many different etiologies, is a universal health issue that greatly affects the morbidity and mortality of the patient. It is defined by the gradual deterioration of liver functions, which leads to such complications as ascites, variceal bleeding, and hepatic encephalopathy. In the last several years, research studies have been carried out to determine predictive biomarkers of cirrhosis outcome with the intention of improving the prognosis and treatment regimens[1]. Cirrhosis is a liver disease, a chronic hepatitis correlative liver disease, and a number of different etiologies. It is a health complication of the world, and it predetermines a high morbidity and mortality rate among people[1]. The patients with cirrhosis due to hepatitis B are indeed very dyslipidemic, as was discovered in an example of a study conducted by Shoaib et al.[1], and the clinical manifestation was further amplified by evidence of dysfunctional liver functions. On the same note, a research which was conducted by Cui et al.[2] on decompensated cirrhotic patients set low concentrations of HDL as predictors of adverse outcomes, a fact that serves to support the prognostic ability of lipid parameters in liver diseases. Moreover, He et al.[3] also established that the low concentrations of HDL cholesterol were associated with unfavorable outcomes in patients with hepatitis B-related cirrhosis and that lipid profile modification could be a critical factor in the development and prognosis of diseases.

The relationship of dyslipidemia and cirrhosis has likewise been subjected to test in the context of infection with hepatitis C. Abdelhai Sonbol et al.[4] found that patients with cirrhosis caused by hepatitis C had a radical deviation in their lipid profile, and this could be used as a predictive risk of disease progression. Salam et al.[5] showed in a prospective study in Bangladesh that lipid alterations were common in patients with hepatocellular carcinoma (HCC), which is often a complication of cirrhosis. Collectively, these studies suggest that lipid profile alterations, including the change in the concentration of HDL, low-density lipoprotein (LDL), and triglycerides, might be used to predict clinical outcomes in patients with cirrhosis. However, another interesting observation regarding the modifications in a lipid profile in cirrhosis is that scoring models have been established, which utilize lipid-related parameters to estimate life expectancy. However, the opposite[7] was the focus of Juanola et al., who focused on the predictive value of biomarkers such as urinary L-FABP regarding the death of decompensated cases of cirrhosis.

The interaction of various biomarkers was complex in terms of predicting the prognosis of liver disease. These articles highlight the need to conduct holistic studies that combine lipid levels with other biomarkers to enhance the level of prognostic validity. The alterations in the lipid profile are not confined to predicting the progression of liver cirrhosis using traditional lipid indicators, such as HDL and LDL, alone. For example, Miao et al.[8] discussed the prognostic value of the monocyte-to-HDL cholesterol ratio in patients with hepatocellular carcinoma, suggesting that a combination of prognosis-related factors, including inflammatory and lipid profiles, may be involved. Wang et al.[9] also discovered in their study of autoimmune hepatitis patients with cirrhosis that triglycerides are a convenient predictor of disease severity and progression, another indication that lipid markers can help diagnose cirrhosis[10]. Barman et al.[11] expanded on this by discussing the temporal differences in lipid profiles in COVID-19-related cirrhosis and found that lipid levels varied, reflecting differences in disease severity.

This also introduces the changing nature of lipid profiles in the pathogenesis of liver disease. Other studies have also compared the body composition and fat distribution to the prognosis of liver disease[16,17]. Such results suggest there could be a correlation between muscle wasting and fat infiltration and the change of lipid profile, complicating the clinical treatment of cirrhotic patients even further. Gonadal hormones and other biomarkers have also been implicated in the liver cirrhosis prognosis. According to the scores of Child-Turcotte-Pugh and MELD, the severity of cirrhosis is linked with hormone imbalances, particularly in men, as Vaishnav et al.[18] state. Lastly, Raissi-Dehkard et al. (19) analyzed the connection between carbohydrate intake resulting from diet and death caused by cirrhosis, discovering that diet, metabolism, and liver function are interlinked.

Purpose: The objective is to find out the relationship between the deviations in the lipid profile and prognostic scores in patients with

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cirrhosis to define the lipid markers that can give the clinical results and guide the management plan.

MATERIALS AND METHODS

Study Design: Prospective Observational cohort study.
Study Setting: The study was conducted at Medicine Department Saidu Group Teaching Swat, KPK, Pakistan.
Duration of the Study: The study took place from 1st November, 2022 to 30th April, 2023.
Inclusion Criteria: The age range of the patients in this study was 18 to 70 years, with all causes of cirrhosis. The participants received medical records and lab results (e.g., lipid profile, prognostic scores, such as MELD, Child-Turcotte-Pugh, etc.). The patients who underwent liver transplantation were excluded.
Exclusion Criteria: The patients were omitted who had acute liver failure, were pregnant, had severe comorbidities such as active malignancies, renal failure, or uncontrolled cardiovascular disease. Moreover, patients who received drugs that substantially altered their lipid profiles (e.g., statins, corticosteroids) were excluded from the study.
Methods: The sample was gathered among patients admitted to Medicine Department Saidu Group Teaching Swat, KPK with a diagnosis of cirrhosis. Informed consent was obtained, and a detailed history and physical examination were provided. Laboratory tests included a complete blood count, liver function tests, and lipid profile (total cholesterol, HDL, LDL, and triglycerides). They were correlated with the lipid profile to determine the abnormalities of the prognostic scores that were also abnormal.

RESULTS

The study sample consisted of 100 subjects with cirrhosis (60 males (60) and 40 females (40)). The mean age among the patients was 52.3 (10.5) years. Most of the patients (70%) had cirrhosis due to hepatitis B, then hepatitis C (20%), and alcohol (10%).

Table 1: Demographic Characteristics of the Study Population

Characteristic	Number (%)
Gender	
Male	60 (60%)
Female	40 (40%)
Age (Mean ± SD)	52.3 ± 10.5
Etiology of Cirrhosis	
Hepatitis B	70 (70%)
Hepatitis C	20 (20%)
Alcoholic	10 (10%)

The patients had lipid profiles that showed significant abnormalities. The average total cholesterol was 165.7/40.2mg/dL, with a mean HDL of 35.5/8.3mg/dL and a mean LDL of 90.6/30.4mg/dL. The level of triglycerides was increased, with an average of 210.5 ± 90.2 mg/dL.

Table 2: Lipid Profile Abnormalities in Cirrhotic Patients

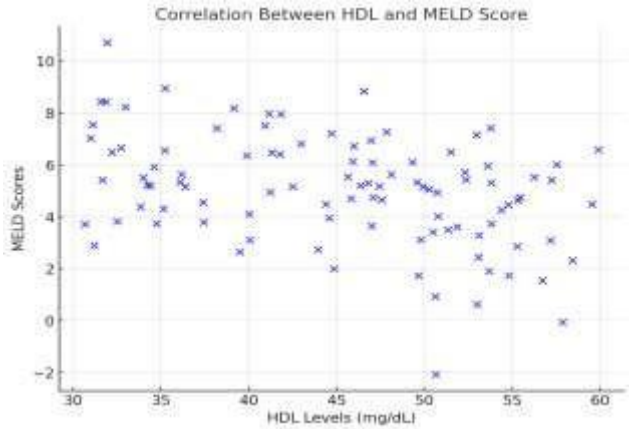
Lipid Parameter	Mean ± SD	Abnormal Levels (%)
Total Cholesterol (mg/dL)	165.7 ± 40.2	45%
HDL (mg/dL)	35.5 ± 8.3	70%
LDL (mg/dL)	90.6 ± 30.4	40%
Triglycerides (mg/dL)	210.5 ± 90.2	55%

Table 3: Correlation Between Lipid Profile and Prognostic Scores

Lipid Parameter	MELD Score (r)	p-value	Child-Turcotte-Pugh Score (r)	p-value
HDL	-0.45	<0.01	-0.42	<0.01
Triglycerides	0.38	<0.05	0.40	<0.05
LDL	0.30	0.05	0.35	0.03

Correlation analysis revealed a significant negative correlation between the levels of HDL and MELD and Child-Turcotte-Pugh scores, with Pearson correlation coefficients of -0.45 ($p < 0.01$) and -0.42 ($p < 0.01$), respectively.

Regression analysis was done to establish independent predictors of poor outcomes in cirrhotic patients. The independent significant predictors of high MELD and Child-Turcotte-Pugh scores were found to be low levels of HDL ($r = -0.46$, $p = 0.01$) and high levels of triglycerides ($r = 0.42$, $p = 0.05$).



Graph 1: Correlation Between HDL and MELD Score

These findings indicate that lipid abnormalities are significant predictors of the prognosis of patients with cirrhosis. The correlation between prognostic scores and HDL levels is negative, indicating that lower HDL levels may be a marker of more severe liver dysfunction and a higher probability of adverse outcomes. A high concentration of triglycerides was associated with the poorest prognosis and a potential risk factor of developing cirrhosis.

DISCUSSION

The results of this study are included in the existing literature regarding the importance of lipid parameters in the prognosis of liver diseases. In our article, we limited the analysis to the correlations between HDL, LDL, and triglycerides and their relationship with established prognostic scales, such as MELD and Child-Turcotte-Pugh scores. The findings are similar to those of other investigators who have also documented the prognostic relevance of lipid profile abnormalities in patients with cirrhosis. One of the significant findings in this work is that the level of HDL cholesterol was low, and it was associated with an increase in MELD and Child-Turcotte-Pugh scores, indicating liver dysfunction and a poor prognosis. HDL is a protective lipoprotein, and low levels of it in the body can be used as an indication of liver dysfunction, as the production and clearance of HDL particles are liver processes[1].

That low levels of HDL are correlated with high levels of oxidative stress and inflammation, the most significant in the pathogenesis of cirrhosis and the signs and symptoms thereof, including hepatic encephalopathy and ascites[4]. It is known that triglycerides are elevated in cirrhosis due to dysfunction in lipid metabolism and hepatic dysfunction[5]. A high level of triglycerides can also be an indication of the hurriedly produced very low-density lipoprotein (VLDL) particles, which are typically rich in liver malfunction[9]. Another key finding of the study was the correlation between prognostic scores and the amount of LDL. This was not as strong a correlation as that between LDL and triglycerides, but it still indicated that the higher the LDL, the more negative the prediction can be in cirrhosis. Previous studies, such as those conducted by Salam et al.[5] and Zhang et al.[10], have shown that patients with liver disease normally have high rates of LDL that could be a factor in the pathophysiology of cirrhosis. Cholesterol

accumulation in the blood can be caused by impaired hepatic clearance of LDL particles, leading to high LDL levels[10]. This accumulation may result in atherosclerosis, which may complicate the clinical process of the cirrhosis even further, exposing the patient to an increased risk of cardiovascular events, which is common in cirrhotic patients.

Past studies identified by Chen et al.[6] have proved that dyslipidemia models of scoring can predict survivability among cirrhotic patients, and our results also endorse the application of lipid parameters in the model. The application of lipid profiles in clinical practice would equip healthcare professionals with additional resources to assess the course of the disease and make more informed treatment choices. In addition to lipid abnormalities, other variables, such as body composition and muscle mass, may also affect the prognosis of cirrhosis. Other recent reports have identified the implications of sarcopenia (or muscle wasting) in the prognosis of cirrhosis[15]. Zeng et al.[15] have demonstrated that sarcopenia is an excellent predictor of poor outcomes among cirrhosis cases because it is often associated with malnutrition, increased inflammation, and dysfunction of the liver. Myosteatosis, or the accumulation of fat in the muscles, has also been found to be a worse prognosis in cirrhotic patients[16]. Although this research provides valuable insights, certain limitations should also be acknowledged. It was also conducted in a single tertiary care unit, which limits its applicability to others, and the outcomes of specific treatments or interventions on lipid profiles were not addressed, which would further illuminate the relationship between lipid abnormalities and the prognosis of cirrhosis.

CONCLUSION

Lastly, the paper has established that lipid profile abnormalities, i.e., low values of HDL and high values of triglycerides, are closely associated with prognostic scores in patients with cirrhosis. The findings are also in line with the previous research findings that indicate lipid malfunctions contribute to the occurrence and prognosis of cirrhosis. Lipid, HDL, and triglyceride monitoring issues can help determine the severity of the disease, inform treatment decisions, and predict clinical prognosis in patients with cirrhosis. It would be prudent to conduct future studies to identify the processes involved in modifying lipid profiles in cirrhosis and to determine the therapeutic value of altering these abnormalities. The application of lipid profile measurements in clinical routine may help improve the treatment and outcomes of patients with cirrhosis.

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