Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Gastroenterology

HDL (High Density Lipoprotein) and LDL (Low Density Lipoprotein) Levels in Cirrhosis Patients and their Association with Severity

Dr. Md. Mamunur Rashid[1*], Dr. Md. Abu Sufian[2]

[1]Assistant Registrar, Department of Gastroenterology, Rangpur Medical College Hospital, Rangpur, Bangladesh
[2]Medical Officer, Department of Gastroenterology, Rangpur Medical College Hospital, Rangpur, Bangladesh

DOI: https://doi.org/10.36347/sjams.2025.v13i03.012 | **Received:** 12.01.2025 | **Accepted:** 17.02.2025 | **Published:** 10.03.2025

***Corresponding author:** Dr. Md. Mamunur Rashid
Assistant Registrar, Department of Gastroenterology, Rangpur Medical College Hospital, Rangpur, Bangladesh

Abstract **Original Research Article**

Background: Cirrhosis is a chronic liver illness characterized by the loss and regeneration of hepatic parenchymal cells, as well as a broad increase in connective tissue, resulting in lobular architectural disarray. Cirrhosis of the liver is a major public health concern, causing significant morbidity and mortality worldwide. ***Aim of the study:*** The purpose of this study is to investigate the changed levels of HDL and LDL in patients with cirrhosis of the liver and their connection to severity. ***Methods:*** A hospital-based case control observational study was carried out in the Department of Gastrointestinal, Hepatobiliary, and Pancreatic Disorders (GHPD), BIRDEM in Dhaka, between January 2018 and September 2019. A total of 90 cirrhotic patients were chosen based on inclusion and exclusion criteria, with an age- and gender-matched control group of 90 healthy individuals. All data was collected, documented in a Microsoft Excel workbook, and analyzed with descriptive statistics in SPSS 23.0. ***Results:*** The most of cirrhotic patients were male (70%) where 30% were female. The mean age of cirrhotic patients was of 51.29±12.90 years and in control group mean age was 49.89±11.83 years. The mean value of HDL and LDL were 25.02±10.85 and 79.82±35.83 respectively. The mean (±SD) of HDL was 35.51±11.46 mg/dl in control group, 26.81±9.26 in Child-Pugh A group, 27.77±12.98 mg/dl in Child-Pugh B group and 19.30±7.71 mg/dl in Child-Pugh C group. The mean HDL between Child-Pugh A and Child-Pugh B patients was not statistically significant (p =0.736). The mean LDL between Child-Pugh A and Child-Pugh B patients was not statistically significant (p =0.197). The CP Score and HDL showed a strong negative connection (r=-0.287; p=0.006). There is a substantial negative association (r=-0.262; p=0.013) between the CP Score and LDL. ***Conclusion:*** Patients with liver cirrhosis frequently have hypolipidemia. According to our research, cirrhosis patients had lower lipid profile characteristics; the more severe the cirrhosis, the larger the drop in serum lipid profile. Between the three groups of cirrhosis in our investigation, the mean serum level of HDL and LDL were statistically significant (P<0.05). In cirrhotic patients, there was a statistically significant inverse relationship between the mean HDL and LDL cholesterol and the degree of liver damage. All cirrhotic patients' lipid profile measures can be used to gauge the disease's severity. Serum lipid levels could be a useful gauge of how severe liver disease is.

Keywords: High density lipoprotein, low density lipoprotein, cirrhosis, liver illness.

INTRODUCTION

Cirrhosis is a chronic liver illness characterized by diffuse loss and regeneration of hepatic parenchymal cells, as well as diffuse increase in connective tissue, resulting in disruption of the lobular architecture [1]. The Child-Pugh classification is used to predict survival rates in cirrhosis patients [2]. Lipids are essential for regulating cellular function and homeostasis. The liver is essential for lipid metabolism, synthesis, and transport [3]. One investigation on lipoproteins in the plasma of individuals with post-alcoholic liver cirrhosis found that in alcoholic cirrhosis, total cholesterol, HDL, VLDL, and HDL-cholesterol all reduced [4]. Lipoproteins are essential for the absorption of dietary cholesterol, long chain fatty acids, and fat-soluble vitamins. Several investigations have revealed that chronic liver illness causes disturbance of liver tissue and, as a result, modification of lipid metabolism [5]. Dyslipidemia seen in chronic liver illness varies from that seen in the majority of other causes of secondary dyslipidemias because circulating lipoproteins are not only abnormally abundant, but also typically have aberrant composition, electrophoretic mobility, and appearance. Chronic dyslipoproteinemia, in addition to the other complications observed in cirrhotic patients, can cause changes in lipids in cellular membranes, which can lead to the formation of aberrant red blood cells, including

echinocytes, and changes in membrane function that may have pathophysiologic implications. Given the high incidence of chronic liver disease in our nation, the purpose of this study is to identify the lipid profile of cirrhosis patients and establish whether it is associated with the severity of the disease. Hypolipidemia, in particular decreased HDL-C level is also an important risk factor for cardiovascular disease and vascular events [6, 7]. Portal hypertension, hepatic encephalopathy hepatorenal syndrome, spontaneous bacterial peritonitis and esophageal variceal bleeding are the major complications of cirrhosis [8]. Khairy *et al*. (2012) found that in cirrhotic patients with and without HCC, there was a significant decrease in serum LDL and HDL levels compared with the control group [9]. Comparison of the lipid profile with the severity of cirrhosis indicated LDL but not HDL levels decreased linearly with progression of liver damage (Child C vs. Child A). Compared to cirrhotic patients without HCC, cirrhotic patients with HCC had a considerably lower HDL level. All lipid profile measures were lower in the severe form of liver disease, regardless of etiology. Furthermore, the amount of decrease in serum HDL and LDL was negatively correlated with the severity of liver disease. This revealed that lipid characteristics correlated inversely with illness severity [10]. The result was also consistent to the previous studies [11]. The purpose of this study is to investigate the changed levels of HDL and LDL in patients with cirrhosis of the liver and their connection to severity.

METHODOLOGY

This was a hospital-based case control observational study that ran from January 2018 to September 2019 at the Department of Gastrointestinal, Hepatobiliary, and Pancreatic Disorders (GHPD), BIRDEM in Dhaka. Based on inclusion and exclusion criteria, 90 cirrhotic patients were identified, as well as an age- and gender-matched control group of 90 healthy people. All data was gathered, documented in a Microsoft Excel spreadsheet, and analyzed with descriptive statistics in SPSS 23.0.

Inclusion criteria

The inclusion criteria were intended to select group of patients with

1. All patients of cirrhosis of liver were included on the basis of clinical, laboratorial, radiological and endoscopic intervention methods in GHPD Department of BIRDEM General Hospital
2. Age ≥ 18 years

Exclusion criteria

The following types of patients were excluded from this study:

1. Diabetes mellitus
2. Hypertension
3. Obesity
4. Acute pancreatitis
5. Patients with HCC
6. Patients with ESRD
7. Patients on lipid lowering drugs
8. Patient unwilling to give voluntary consent to participate in the study

RESULT

Table-1 shows that the majority of cirrhotic patients (70%) were male, whereas 30% were female. The mean age of cirrhotic patients was 51.29±12.90 years, while the control group's mean age was 49.89±11.83 years. The mean age of cirrhotic patients was of 51.29±12.90 years and in control group mean age was 49.89±11.83 years. The mean value of HDL and LDL were 25.02±10.85 and 79.82±35.83 respectively. This value of lipid profile was less than control group and statistically significant (Table-2). Table-3 shows that the mean (±SD) of HDL was 35.51±11.46 mg/dl in control group, 26.81±9.26 in Child-Pugh A group, 27.77±12.98 mg/dl in Child-Pugh B group and 19.30±7.71 mg/dl in Child-Pugh C group. Table-4 demonstrates that the mean HDL between Child-Pugh A and Child-Pugh B patients was not statistically significant (p =0.736). There was no significant correlation between Child-Pugh score and LDL (p=0.048) (Table-5). The mean LDL between Child-Pugh A and Child-Pugh B patients was not statistically significant (p =0.197) (Table-6). Figure-1 shows that the significant negative correlation (r=-0.287; p=0.006) between CP Score with HDL. Figure 2 reveals a substantial negative association (r=-0.262; p=0.013) between the CP Score and LDL.

Table 1: Baseline characteristics of the study subjects (N=180)

Study subjects		
Sex	**Case n (%)**	**Control n (%)**
Male Female	63 (70%) 27 (30%)	56 (62.22%) 34(37.77%)
Age in years (mean±SD)	51.29±12.90	49.89±11.83
Total	90	90

Table 2: Comparison of means of serum lipid profile of study group and control group

Lipid profile	Study Group	Control group
HDL (mg/dl)	25.02±10.85	45.51±9.45
LDL (mg/dl)	79.82±35.83	103.88±29.03

Table 3: Distribution of the study patients according to High density lipoprotein (HDL) (N=180)

Child Pugh Classes	HDL (mg/dl) Mean±SD	P value
Child Pugh A	26.81±9.26	
Child Pugh B	27.77±12.98	0.005
Child Pugh C	19.30±7.71	
Control group	35.51±11.46	

Table 4: Multiple Comparison studies of HDL between Child-Pugh classes

Groups	Mean Difference	P value
Control Vs Child A	8.70	<0.001
Control Vs Child B	7.74	<0.001
Control Vs Child C	16.21	<0.001
Child A Vs Child B	0.96	0.736
Child B Vs Child C	8.47	<0.001
Child A Vs Child C	7.51	0.040

Table 5: Distribution of the study patients according to Low density lipoprotein (LDL) (N=180)

Child Pugh Classes	LDL (mg/dl) Mean±SD	P value
Child A	90.81±38.60	
Child B	79.13±32.14	0.048
Child C	68.04±32.89	
Control group	103.88±29.03	

Table 6: Multiple Comparison studies of LDL between Child-Pugh classes

Groups	Mean Difference	P value
Control Vs Child A	13.07	0.048
Control Vs Child B	24.13	<0.001
Control Vs Child C	35.84	<0.001
Child A Vs Child B	11.68	0.197
Child B Vs Child C	11.04	0.200
Child A Vs Child C	22.77	<0.001

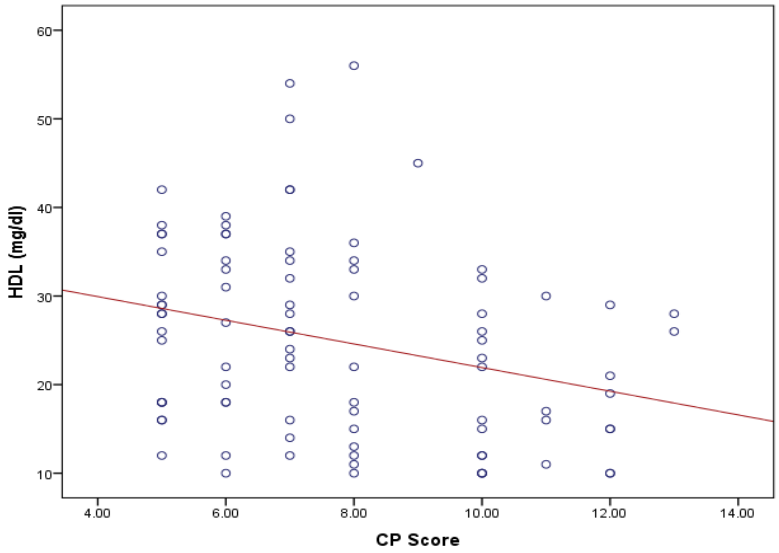

Figure 1: Showing the significant negative correlation (r=-0.287; p=0.006) between CP Score with HDL

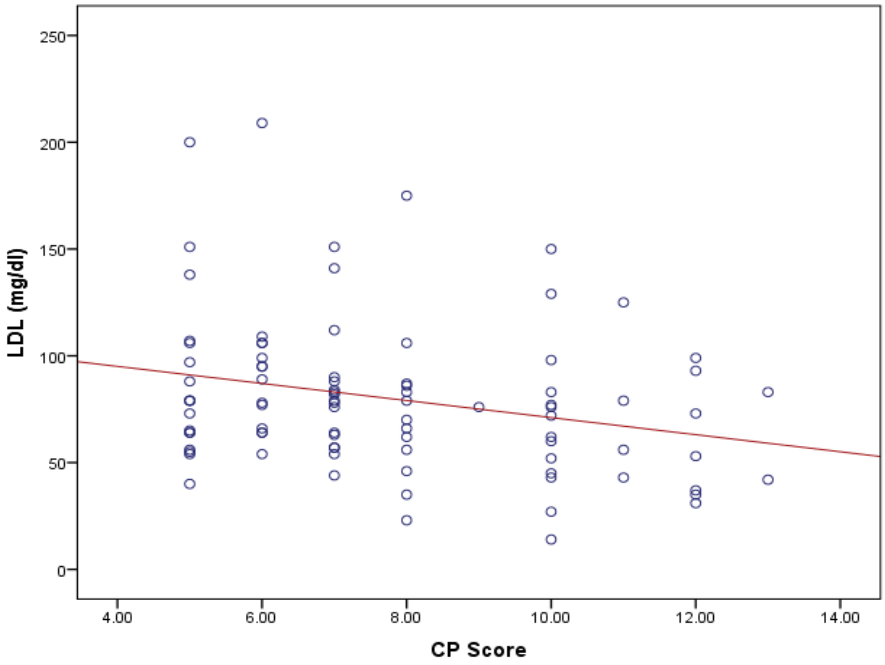

Figure 1: Showing the significant negative correlation (r=-0.262; p=0.013) between CP Score with LDL

DISCUSSION

The final stage of any chronic liver disease is cirrhosis. Lipid metabolism is severely disrupted in severe liver disease, such as cirrhosis. Therefore, it makes sense to anticipate that people with significant liver impairment will have an aberrant serum lipid profile. The Child-Pugh score is typically used to determine the extent of liver damage. In this study, 90 cirrhotic individuals' serum lipid profiles were examined to see if they were associated with worsening liver damage. Ninety healthy, normal individuals also had their serum lipid profiles measured. Both the inpatient and outpatient departments of GHPD at BIRDEM General Hospital saw these patients. According to our research, 70% of cirrhotic patients were men and 30% were women. In Bangladesh, the male predominance (4.6:1) was reinforced by the male-to-female patient ratio of 2.3:1 [12]. Another study found a male preponderance [10]. In line with the findings of earlier research, the mean age of cirrhotic patients was 51.29±12.90 years, while the mean age of the control group was 49.89±11.83 years. According to Satish *et al*. (2018), the patients' average age was 50.5 years [13]. The ranges of mean age in all of these studies are comparable to ours because similar results were observed in other research [10, 14]. In this study, the mean HDL and LDL were statistically significant between four groups of study patient in ANOVA test. In all cases there were declining pattern of each component of serum lipid profile with increasing severity of liver damage in cirrhosis of liver. Results of our study were similar to the result found in other studies. Ghadhir *et al*. (2010) found that mean value of HDL and LDL were 36.98 mg/dl and 89.37 mg/dl respectively [3]. This value of lipid profile was less than control group and statistically significant (P value <0.05). This results were in accordance to our study. In our study the mean (±SD) of HDL was 35.51±11.46 mg/dl in control group, 26.81±9.26 in Child-Pugh A group, 27.77±12.98 mg/dl in Child-Pugh B group and 19.30±7.71 mg/dl in Child-Pugh C group. Jatav *et al*. (2018) found that the mean HDL (31.99±7.85) and LDL (79.58±23.13) were statistically significant between four groups of study patient in ANOVA test [15]. In all cases there were declining pattern of each component of serum lipid profile with increasing severity of liver damage in cirrhosis of liver. The fasting serum HDL and LDL were inversely correlated with severity of the liver damage in cirrhotic patients which was statistically significant. The findings of our study were similar to the studies [3, 14]. In multiple comparison test, the mean HDL and LDL were not statistically significant between Child-Pugh A and Child-Pugh B patients in multiple comparison tests. This was probably due to narrow difference range of score between Child-Pugh A and Child-Pugh B of the study patients. Vijay *et al*. (2015) found that serum LDL and HDL cholesterol level were significantly decreased with advancement of liver disease (Child A to C) and tukey's test showed a statistically significant mean difference within the groups (Child A-B, A-C and B-C groups) [16]. Khairy *et al*. (2012) showed that in cirrhotic patients with and without HCC, there was a significant decrease in serum LDL and HDL levels compared with the control group. Comparison of the lipid profile with the severity of cirrhosis indicated that serum LDL but not HDL levels decreased linearly with progression of liver damage (Child C vs. Child A) [9]. Compared to cirrhotic patients without HCC, cirrhotic patients with HCC had a considerably lower HDL level. Since the liver produces 90% of the HDL in vivo, changes in serum HDL concentrations are directly correlated with the severity of liver disease. For the

diagnostic and prognostic assessment of liver disease, serum HDL is therefore the best target. HDL was identified by Habib *et al*. (2005) as a predictive factor for cirrhosis and a predictor of liver function [17]. Results of this study was similar to our study. In our study Pearson Correlation coefficient(r) with score was done and showed negative correlation of child-pugh score with the severity of liver disease and indicated an inverse correlation of lipid parameters with the severity of the disease. Similarly Muhammed *et al*. (2017) noticed that the amount of decrement in the serum HDL and LDL had a negative correlation with the severity of liver disease and indicated an inverse correlation of lipid parameters with the severity of the disease [10].

Limitation of the study:

The study featured a single focus point and minimal sample sizes. As a result, the study's conclusions may not completely reflect the entire situation.

CONCLUSION & RECOMMENDATION

Patients with liver cirrhosis frequently have hypolipidemia. According to our research, cirrhosis patients had lower lipid profile characteristics; the more severe the cirrhosis, the larger the drop in serum lipid profile. Between the three groups of cirrhosis in our investigation, the mean serum level of HDL and LDL were statistically significant ($P<0.05$). Between the study patients and the control group, the mean HDL and LDL were statistically significant. In the multiple comparison test, the mean HDL and LDL levels between the patients in Child A and Child C were statistically significant. However, in the multiple comparison test, there was no statistically significant difference in the mean HDL and LDL between Child-Pugh A and Child-Pugh B patients. In cirrhotic patients, there was a statistically significant inverse relationship between the mean HDL and LDL cholesterol and the degree of liver damage. We discovered a correlation between the degree of cirrhosis progression and the decreases in blood LDL and HDL levels in cirrhosis patients. All cirrhotic patients' lipid profile measures can be used to gauge the disease's severity. Serum lipid levels could be a useful gauge of how severe liver disease is. To determine the predictive values of using lipid profile measurements as a tool to gauge the degree of liver damage in cirrhotic patients, more research is required.

REFERENCES

1. Abbasi, A., Bhutto, A.R., Butt, N., Lal, K., Munir, S.M. 2012. ‘Serum cholesterol: Could it be a sixth parameter of Child Pugh scoring system in cirrhotic due to viral hepatitis?’Journal of the college of Physicians and Surgeons Pakistan, 22, 484-87.
2. Bacon, B.R. 2008. ‘Cirrhosis and its complications’, In: Fauci, Braunwald, Kasper, Hauser, Lango, Jamson, editor, *et al*. Harrison’s Principles of Internal Medicine, New York: McGraw Hill, P. 1971-80.
3. Ghadir, M.R., Riahin, A.A., Havaspour, A., Nooranipour, M., Habibinejad, A.A. 2010. ‘The Relationship between lipid profile and severity of liver damage in cirrhotic patients’, Hepat, 10, 285-8.
4. Breier, C., Lisch, H.J., & Braunsteiner, H. 1983. 'Apolopoproteins, activities of hepatic lipase and leci-thin-cholesterol acyltransferase in the plasma of patients with post-alcoholic end-stage liver cirrhosis', Klin Wochenschr, 15, 929-31.
5. Wis niewska-Ligier, M., Wozniakowska-Gesicka, T., Kups, J., & Sulat-Syncerek, D. 2006. 'Lipid metabolism in children with chronic hepatitis C, A preliminary report’, Hepato gastroenterology, 53, 887-91.
6. Castelli, W.P. 1988. ‘Cholesterol and lipids in the risk of coronary artery disease- the Framingham Heart Study’, Can J Cardiol, 4, 5-10.
7. Moller, S., Henriksen, J.H. 2002. ‘Cirrhotic cardiomyopathy: a pathophysiological review of circulatory dysfunction in liver disease’, Heart, 87, 9-15.
8. Kasper, D.L, Hauser, S.L., Jameson, L. 2015. Textbook of Harrison’s Principles of Internal Medicine. 19th ed., New York: McGraw-Hill, 2, 443.
9. Khairy, H., Morsy., Mohamed, A.A., Ghaliony., Mohammad, A., Kobeisy, 2012. ‘Lipid profile among cirrhotic patients with and without hepatocellular carcinoma’, Journal of the Arab Society for Medical Research, 7, 33–37.
10. Muhammed, H.P., Jayaraj, K. 2017. ‘Correlation of lipid profile in patients with severity of liver disease: a cross sectional study in a tertiary care hospital.’Int J Res Med Sci, 5, 326-9.
11. Holkar, S.R., Vaishnav, D.M., Hivre, M.D. 2014. ‘Serum lipid pattern in patients of liver cirrhosis’, Int J AnatPhysiolBiochem, 1, 9-12.
12. Alam, M.J., Rahman, S., Ahmed, M.F., Debnath, C.R., Hoque, M.I., & Hussain, M.M., *et al*. 2014. ‘Distribution of Liver Disease in Bangladesh’, Euroasian Journal of Hepato-Gastroenterology, 4(1), 25-30.
13. Satish Sachdeva., Jaswinder Singh., Ashish Kumar., Jasvir Singh., Rajiv Aggarwal., Gourav Bansal, *et al*. 2018. ‘Lipid profile in patients with liver cirrhosis’, International Journal of Contemporary Medical Research, 5(1), 21-23.
14. Mehboob, F., Ranjha, F.A., Masud, S. 2007. 'Changes in serum lipid profile among patients suffering from Chronic liver disease', ANNALS, 133, 209-211.
15. Jatav, J.K., Shakya, R.K., Singh, S. 2018. ‘Study of Lipid Profile changes in Cirrhosis of Liver’, Int J Sci Stud, 6, 108-114.
16. Vijay laxmi, & Nangliya, 2015. ‘Evaluation of Lipid profile in Patients with Liver Cirrhosis and their association with Liver Cirrhosis and their

association with severity of the disease'. International Journal of Recent Trends in Science and Technology, 16, 79-82.

17. Habib, A., Mihas, A.A., Abou-Assi, S.G., Williams, L.M., Gavis, E., Pandak, W.M., *et al*.2005. 'High-density lipoprotein cholesterol as an indicator of liver function and prognosis in noncholestatic cirrhotics', Clin Gastroenterol Hepatol., 3, 286-91.