

## Comparison of Serum Lipid Profile in Cirrhotic Versus Non-Cirrhotic Patients with Viral Hepatitis

Mehar Rehman, Tariq Bashir Tareen\*, Muhammad Umair Ijaz Malik\*\*, Muhammad Uzair Ijaz Malik

Department of Medicine, PAC Hospital Kamra Pakistan, \*Department of Medicine, Combined Military Hospital Rawalpindi/National University of Medical Sciences (NUMS) Pakistan, \*\*Department of Medicine, Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

### ABSTRACT

**Objective:** To evaluate the association of lipoprotein cholesterol levels in cirrhotic versus non-cirrhotic patients with viral hepatitis.

**Study Design:** Analytical cross-sectional.

**Place and Duration of Study:** Department of General Medicine, Pakistan Aeronautical Complex Hospital, Kamra Pakistan, from Feb to Aug 2021.

**Methodology:** Our study included patients presenting to medical OPD with diagnosed chronic viral hepatitis, belonging to either gender and aged between 35 to 75 years. We collected data on a data collection tool regarding basic demographics (age, gender, weight, and etiology of viral hepatitis) and presence of cirrhosis amongst the chronic hepatitis patients was documented. We categorized patients into cirrhotic and non-cirrhotic groups where mean serum lipid levels were noted for comparison.

**Results:** Out of total 100 patients, mean age of the patients was  $56.01 \pm 8.46$  years. The mean serum cholesterol, LDL (low-density lipoprotein), HDL (high-density lipoprotein), and triglyceride levels were  $143.78 \pm 26.34$  mg/dL,  $88.73 \pm 17.89$  mg/dL,  $34.94 \pm 7.87$  mg/dL, and  $100.32 \pm 19.18$  mg/dL, respectively. A significant difference in serum cholesterol ( $p$ -value=0.0002), LDL ( $p$ -value=0.0006), HDL ( $p$ -value=0.004) and triglyceride level ( $p$ -value=0.004) was noted between cirrhotic and non-cirrhotic patients.

**Conclusion:** A significant difference of serum cholesterol, LDL, HDL, and triglyceride level was noted in between cirrhotic and non-cirrhotic patients.

**Keywords:** Cirrhosis, Cholesterol, HDL, LDL, Triglycerides, Viral Hepatitis.

**How to Cite This Article:** Rehman M, Tareen TB, Malik MUI, Malik MUI. Comparison of Serum Lipid Profile in Cirrhotic Versus Non-Cirrhotic Patients with Viral Hepatitis. *Pak Armed Forces Med J* 2024; 74(6): 1569-1572. DOI: <https://doi.org/10.51253/pafmj.v74i6.9984>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## INTRODUCTION

The liver has a central role in balancing lipid homeostasis with a pivotal role in uptake of lipids and fatty acids, lipid storage and lipid consumption via lipolysis and secretion due to which many hepatic diseases are associated with dysfunction in lipid metabolism, of which viral hepatitis, is the most prevalent in our country, especially B (HBV) and C (HCV), with the prevalence of HCV worldwide estimated to be nearly 160 million cases<sup>1</sup> and approximately 75% of HCV cases subsequently leading to liver fibrosis, cirrhosis, hepatocellular carcinoma (HCC) and death.<sup>2</sup> HBV related annual mortality in 2019 was 0.82 million while HCV related mortality was 0.29 million,<sup>3</sup> with local data reporting that approximately 4.5 million Pakistanis are infected with HBV and 8.74 million with HCV<sup>4</sup> which is concerning as both are highly associated with alteration of lipid profile in human body.<sup>5,6</sup> These viruses dysregulate the host lipid metabolism resulting in steatosis and

hypcholesterolemia,<sup>7</sup> with HCV patients having low levels of total cholesterol, high and low-density lipoprotein cholesterol and triglycerides compared to the uninfected patients.<sup>8</sup> As the disease progresses, a reduction is also observed in cholesterol values and fractions<sup>9</sup> due to which many authors suggest that lipoprotein profile is the major indicator of chronic liver disease when combined with Child-Pugh score and the Model for End-Stage Liver Disease (MELD).<sup>10-12</sup> Although several studies have been performed on serum lipid profiles in those with liver disease, research from Pakistan are scarce. Due to the high prevalence of cirrhosis in our country, our study was conducted to evaluate the association of lipoprotein cholesterol levels in cirrhotic versus non-cirrhotic patients with viral hepatitis.

## METHODOLOGY

We conducted this analytical cross-sectional study in the Department of General Medicine, Pakistan Aeronautical Complex Hospital, Kamra, Pakistan, lasting six months from February to August 2021 after obtaining ethics approval from the Ethics Committee via certificate number 2/2021, dated 12.2.2021. We

**Correspondence:** Dr Mehar Rehman, Department of Medicine, PAC Hospital, Kamra Pakistan

Received: 27 Feb 2023; revision received: 13 Apr 2023; accepted: 17 Apr 2023

## Serum Lipid Profile

enrolled patients after taking their written informed consent, using consecutive non-probability sampling. Sample size was calculated using a two-proportion calculator, where prevalence of Hepatitis C was 7.44% and Hepatitis B was 1.98%, as reported in literature, and absolute precision was 10%<sup>13</sup>.

**Inclusion Criteria:** Patients of either gender, with ages ranging from 35-75 years, presenting to the outpatient department with diagnosed viral hepatitis were included. Viral hepatitis was defined as the persistence of HCV RNA level (>50 IU/ml) or persistence of HBV DNA level (>50 IU/ml) by real-time PCR in.

**Exclusion Criteria:** Pregnant females, patients with diabetes, hypertension, nephrotic syndrome, thyroid dysfunction, or patients consuming lipid-lowering drugs were excluded.

Patients were asked for overnight fasting of 10-12 hours prior to testing, where 5ml venous blood was drawn from the antecubital vein of each patient under aseptic measures. Demographic information like age, gender, and Child Pugh class was recorded in a proforma along with serum lipid profiles, and liver function tests reports. Statistical Package for Social Sciences (SPSS) version 23.0 was used for analysis. Qualitative variables were summarized as frequency and percentage, while mean and standard deviation were used for measuring quantitative variables. Independent sample t-test was used to compare the results between both cirrhotic and non-cirrhotic groups. One-way ANOVA was used for comparison of mean lipid profiles amongst Child Class A, B and C. We considered  $p$ -value  $\leq 0.05$  to be of statistical significance.

### RESULTS

**Table - III: Lipid Profile of Hepatitis Patients According to Child-Pugh Classification (n=100)**

Variables	Child-Pugh Classification			$p$ -value ( $\leq 0.05$ )
	A (n=36)	B (n=40)	Con (n=24)	
Serum Cholesterol (mg/dL)	163.25±27.87	138.34±17.82	123.66±14.14	<0.001
LDL (mg/dL)	101.47±19.78	84.50±11.87	76.68±10.36	<0.001
HDL (mg/dL)	39.87±7.99	33.87±6.15	29.34±5.68	<0.001
Triglyceride (mg/dL)	109.47±18.40	99.54±17.96	87.92±15.10	<0.001

A total of 100 patients were recruited for this study, with mean age of 56.01±8.46 years, with majority of patients 72(72%) having age >50 years and mean weight of 63.9±6.73 kg There were 57(57%) males and 43(43%) females. On testing, we found 30(30%) patients with HBV and 70(70%) patients with HCV, these patients were stratified into Child Class A 36(36%), Child Class B 40(40%) and Child Class C 24(24%), according to the Child-Pugh Score. The mean serum

cholesterol, LDL, HDL and triglyceride levels were found to be 143.78±26.34 mg/dL, 88.73±17.89 mg/dL, 34.94±7.87 mg/dL, and 100.32±19.18 mg/dL, respectively, as enumerated in Table - I.

Cirrhosis was found in 38 patients and a significant difference in serum cholesterol ( $p$ -value= 0.0002), LDL ( $p$ -value= 0.0006), HDL ( $p$ -value= 0.004) and triglyceride levels ( $p$ -value= 0.004) was found between cirrhotic and non-cirrhotic patients as shown in Table - II. Similarly, a significant difference was noted ( $p$ -value <0.001) when patients were stratified according to Child Pugh class, as listed in Table - III.

**Table-I: Demographic Characteristics (n=100)**

Variables	Mean ± SD	Range
Age (years)	56.01±8.46	38 to 71
Weight (kg)	63.9±6.73	50 to 80
Serum Cholesterol (mg/dL)	143.78±26.34	96.9 to 211.9
LDL (mg/dL)	88.73±17.89	59.6 to 136
HDL (mg/dL)	34.94±7.87	19.3 to 53.8
Triglyceride (mg/dL)	100.32±19.18	56.9 to 143.7

**Table-II: Lipid Profile of Cirrhotic Versus Non-Cirrhotic Patients (n=100)**

Variables	Cirrhosis		$p$ -value ( $\leq 0.05$ )
	No (n=62)	Yes (n=38)	
Serum Cholesterol (mg/dL)	150.59±27.94	132.69±19.13	0.0002
LDL (mg/dL)	93.01±19.42	81.74±12.40	0.0006
HDL (mg/dL)	36.63±7.96	32.18±6.96	0.004
Triglyceride (mg/dL)	104.49±19.08	93.54±17.54	0.004

### DISCUSSION

The results of our study are consistent with various studies which show that lipid levels deteriorate in patients as the Child Pugh class increases<sup>14,15</sup> and similar findings were reported in a study in which the mean serum total cholesterol level was 131.60±27.92 in cirrhotic patients and 168.48±19.32 in non-cirrhotic patients, while the mean serum triglyceride level was 81.94±26.35 versus 88.80±18.04, mean HDL 32.48±8<sup>16</sup> versus 41.77±5.45, and the mean LDL was 78.48±24.24

versus  $103.36 \pm 10.4416$ . Various demographic parameters of patients including age, gender and antiviral treatment and their correlation with lipid profiles of hepatitis patients have been reported<sup>17</sup> and in one study<sup>18</sup> it was observed that significantly diminished lipid levels were observed in males as compared to females, where hypolipidemia was exhibited predominantly in those above 49 years of age. In our study, mean serum cholesterol, LDL, HDL, and triglycerides were reduced in patients aged above 50 years of age, however, this difference was not found to be significant ( $p > 0.05$ ). Interestingly, one study reported significant Hepatitis C associated hypolipidemia, notably LDL and cholesterol, which improved after successful treatment and viral clearance in previously infected patients, highlighting the role of active hepatitis viremia in hypolipidemia.<sup>19</sup> Another study<sup>20</sup> found an association of HDL cholesterol level with 6 and 12-month mortality, suggesting that monitoring of HDL may be useful in identifying patients with deteriorating liver functions, particularly for those at risk for terminal decompensation, where patients with low HDL levels were at high risk of liver transplantation, with 60% of cirrhotic patients in their sample, with low HDL levels ( $<30$  mg/dL), undergoing liver transplantation within a year.

#### LIMITATION OF STUDY

This was a single center study with a limited sample size, where other causes of cirrhosis, such as autoimmune disorders and cryptogenic cirrhosis, were not investigated. Nutritional status and dietary pattern of the patients was not accounted for while assessing lipid profiles.

#### CONCLUSION

A significant difference among serum cholesterol, triglyceride, LDL, and HDL levels was noted among cirrhotic and non-cirrhotic patients diagnosed with viral hepatitis, highlighting their importance as diagnostic tools in monitoring disease progression and severity.

**Conflict of Interest:** None.

**Funding Source:** None

**Authors' Contribution:**

The following authors have made substantial contributions to the manuscript as under:

MR & TBT : Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MUI&MUIM: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of

any part of the work are appropriately investigated and resolved.

#### REFERENCES

1. Fierro NA, Aldaco KG, Valadez RT, Lopez EM, Roman S, Panduro A. Immunologic, metabolic, and genetic factors in hepatitis C virus infection. *World J Gastroenterol* 2014; 20(13): 3443-3456. <https://doi.org/10.3748/wjg.v20.i13.3443>
2. Hajarizadeh B, Grebely J, Dore GJ. Epidemiology and natural history of HCV infection. *Nat Rev Gastroenterol Hepatol* 2013; 10: 553-562. <https://doi.org/10.1038/nrgastro.2013.107>
3. Ott JJ, Stevens GA, Groeger J, Wiersma ST. Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. *Vaccine* 2012; 30: 2212-2219. <https://doi.org/10.1016/j.vaccine.2011.12.116>
4. Wait S, Kell E, Hamid S, Muljono DH, Sollano J, Mohamed R, et al. Hepatitis B and hepatitis C in southeast and southern Asia: challenges for governments. *Lancet Gastroenterol Hepatol* 2016; 1(3): 248-255. [https://doi.org/10.1016/S2468-1253\(16\)30030-2](https://doi.org/10.1016/S2468-1253(16)30030-2)
5. Bassendine MF, Sheridan DA, Bridge SH, Felmlee DJ, Neely RDG. Lipids and HCV. *Semin Immunopathol* 2013; 35: 87-100. <https://doi.org/10.1007/s00281-012-0349-4>
6. Zhang J, Ling N, Lei Y, Peng M, Hu P, Chen M. Multifaceted interaction between hepatitis B virus infection and lipid metabolism in hepatocytes: a potential target of antiviral therapy for chronic hepatitis B. *Front Microbiol* 2021; 12: 636897. <https://doi.org/10.3389/fmicb.2021.636897>
7. Popescu CI, Dubuisson J. Role of lipid metabolism in hepatitis C virus assembly and entry. *Biol Cell* 2010; 102: 63-74. <https://doi.org/10.1042/BC20090075>
8. Felmlee DJ, Hafirassou ML, Lefevre M, Baumert TF, Schuster C. Hepatitis C virus, cholesterol and lipoproteins: impact for the viral life cycle and pathogenesis of liver disease. *Viruses* 2013; 5: 1292-1324. <https://doi.org/10.3390/v5051292>
9. Ghadir MR, Riahin AA, Havaspour A, Nooranipour M, Habibinejad AA. The relationship between lipid profile and severity of liver damage in cirrhotic patients. *Hepat Mon* 2010; 10: 285-288.
10. Muhammed HP, Jayaraj K. 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* 2016; 5:326. <https://doi.org/10.18203/2320-6012.ijrms20195521>
11. Subhan F, Khan I, Arif R, Khan A, Khan A. Serum lipid profile as an indicator of the severity of liver damage in cirrhotic patients. *Rawal Med J* 2012; 37(4): 387-389.
12. Janicko M, Veselny E, Lesko D, Jarcuska P. Serum cholesterol is a significant and independent mortality predictor in liver cirrhosis patients. *Ann Hepatol* 2013; 12: 581-587. [https://doi.org/10.1016/S1665-2681\(19\)31470-6](https://doi.org/10.1016/S1665-2681(19)31470-6)
13. Shahid M, Hassan R, Farhan A, Nouman S, Rehman HM, Safdar J, et al. National prevalence rate of hepatitis B and C in Pakistan and its risk factors. *J Public Health* 2020; 28(6): 751-764. <https://doi.org/10.1007/s10389-019-01146-1>
14. Abbasi A, Bhutto AR, Butt N, Lal K, Munir SM. Serum cholesterol: could it be a sixth parameter of Child-Pugh scoring system in cirrhotics due to viral hepatitis. *J Coll Physicians Surg Pak* 2012; 22(8): 484-487.
15. Haq MI, Salim A, Malik K, Dilshad A, Amin J, Butt AK, et al. Correlation of Child-Pugh class of cirrhosis and lipid profile. *Proceeding SZPGMI* 2016; 30(1): 19-23.
16. Kumar W, Harisha E. Assessment of lipid profile changes with respect to severity of liver dysfunction in cirrhosis of liver. *Indian J Appl Basic Med Res* 2015; 4(2): 56-63.

## Serum Lipid Profile

17. Lao XQ, Thompson A, McHutchison JG, McCarthy JJ. Sex and age differences in lipid response to chronic infection with the hepatitis C virus in the United States National Health and Nutrition Examination Surveys. *J Viral Hepat* 2011; 18(8): 571-579. <https://doi.org/10.1111/j.1365-2893.2010.01340.x>
  18. Hu JH, Chen MY, Yeh CT, Lin HS, Lin MS, Huang TJ, et al. Sexual dimorphic metabolic alterations in hepatitis C virus-infected patients: a community-based study in a hepatitis B/hepatitis C virus hyperendemic area. *Medicine (Baltimore)* 2016; 95(18): e3530. <https://doi.org/10.1097/MD.0000000000003530>
  19. Corey KE, Kane E, Munroe C, Barlow LL, Zheng H, Chung RT. Hepatitis C virus infection and its clearance alter circulating lipids: implications for long-term follow-up. *Hepatology* 2009; 50: 1030-1037. <https://doi.org/10.1002/hep.23102>
  20. Habib A, Mihas AA, Abou-Assi SG, Williams LM, Gavis E, Pandak WM. High-density lipoprotein cholesterol as an indicator of liver function and prognosis in noncholestatic cirrhotics. *Clin Gastroenterol Hepatol* 2005; 3(3): 286-291. [https://doi.org/10.1016/S1542-3565\(04\)00647-5](https://doi.org/10.1016/S1542-3565(04)00647-5)
- .....