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ORIGINAL ARTICLE

Correlation of fasting serum cholesterol level with severity of chronic liver disease.

Muhammad Iftikhar Yousaf[1], Usama Faizan[2], Humaira Mubeen Afzal[3], Muhammad Asif[4], Muhammad Ali Sabir[5], Muhammad Haroon Yousaf[6]

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ABSTRACT… Objective: To evaluate correlation of fasting serum cholesterol level with severity of chronic liver disease (CLD). **Study Design:** Cross-sectional Survey. **Setting:** North Medical Ward, Mayo Hospital Lahore. **Period:** June 2020 to December 2020. **Material & Methods:** Patients having chronic liver disease with age 25-85 years and of either gender, were included. After 12 hours of fasting, 5ml of blood was drawn from patients under all aseptic precautions into sterile disposable syringes and blood samples were sent to laboratory for measurement of total cholesterol. Total cholesterol (TC) in mg/dl was noted from their reports. CLD severity patients was defined by using Modified Child Pugh classifications. Data was entered in SPSS version 20 and analyzed by same software. **Results:** Total 100 cases diagnosed with chronic liver disease (CLD) were studied, with an average age of 53.8±10.76 years. The majority of participants, constituting 72%, were male. Overall average TC was 119.85±31.51mg/dl. Out of all 27% patients belonged to CPT class A, 28% had CPT class B and 45% had CPT class C. Spearman correlation between Child Pugh score and total cholesterol level was calculated. A negative spearman correlation was found as r= -.672. It was significant at the level of 0.01. **Conclusion:** As per the study conclusion, total serum cholesterol level was observed to be the significantly corelated with degree of liver damage. The significance of this correlation highlights the potential clinical utility of serum total cholesterol as a prognostic tool for evaluating the degree of liver damage.

Key words: Chronic Liver Disease, Child Pugh Score, Total Cholesterol.

INTRODUCTION

Chronic liver disease refers to a spectrum of long-term liver conditions characterized by progressive damage and inflammation to the liver tissue. It encompasses a range of disorders that impact the liver's structure and function, potentially leading to serious complications over time. Chronic liver disease can develop gradually, often remaining asymptomatic in its early stages, and may development to more severe conditions, like liver and hepatocellular carcinoma (HCC).[1,2] Chronic liver disease (CLD) contributes to around 2 million annual global fatalities. The majority of these deaths result from complications related to cirrhosis and HCC, positioning them as the 11th and 16th leading causes of mortality, respectively.[3] Numerous metabolic irregularities are frequent in chronic liver disease (CLD), including conditions such as dyslipidemias, deficiencies in clotting factors, and, in certain instances, venous thromboembolism resulting from a lack of anticoagulation factors.[4,5] Certainly, in Western countries, approximately 40% of hepatocellular carcinoma (HCC) instances primarily stem from metabolic factors, including NAFLD and MetS.[6,7] NAFLD is distinguished by the buildup of fats within liver cells. This condition can advance to non-alcoholic steatohepatitis (NASH) and may be accompanied by the development of fibrosis (41%).[6,8] In this background, disrupted lipid metabolism stands out as a critical aspect to contemplate. More precisely, changes in the fatty acid and level of cholesterol metabolism play a significant role in propelling tumor advancement, especially in the case of hepatocellular carcinoma (HCC).[6,9] Considering the essential function of the liver in lipid metabolism, the severity of CLD induces changes in lipid profiles.[10] Although an

1. MBBS, FCPS, Assistant Professor Gastroenterology, (SMDC), Lahore.
2. MBBS, FCPS, Senior Registrar Gastroenterology, (SMDC), Lahore.
3. MBBS, FCPS, Senior Registrar Medicine, Avicenna Medical and Hospital
4. MBBS, FCPS, Senior Registrar Medicine, Jinnah Hospital, Lahore.
5. MBBS, FCPS, Senior Registrar Medicine, (SMDC), Lahore.
6. MBBS, FCPS, Professor Medicine, (SMDC), Lahore.

Correspondence Address:
Dr. Muhammad Iftikhar Yousaf
Department of Gastroenterology
(SMDC), Lahore.
iftikhar_yousaf@live.com

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extensive array of literature addresses how CLD impacts lipid profiles across various causes, there is a noticeable absence of comprehensive evaluations of CLD severity, such as assessing fibrosis grading, in numerous studies. Additionally, advanced CLD or liver cirrhosis is frequently categorized separately as a distinct etiology.[10] In accordance to the above statements the, it's crucial to understand how CLD affects fasting cholesterol levels and the potential relationship between these abnormalities and the severity of the disease. Therefore, the study aims to explore whether there exists a correlation between the concentration of fasting serum cholesterol and the extent of CLD severity.

MATERIALS & METHODS

This cross-sectional survey was conducted at north medical ward, Mayo hospital Lahore. This study was completed in 6 months after approval of synopsis from June 2020 to December 2020.

All the patients with Age 25-85 years, both genders and diagnosed as having chronic liver disease on ultrasound (coarse liver, splenomegaly and portal vein diameter) were included. All the patients having diabetes (BSR>200mg/dl), history of malignancy and cardiovascular disease, patients having chronic renal failure (serum creatinine>1.2mg/dl) and patients who were on glucose or lipid lowering drugs were excluded.

After approval study from ethical committee, 100 patients that fulfilled the inclusion criteria were enrolled in study from north medical ward. Consent was obtained from every patient after providing them with the necessary information. Relevant demographic details, such as name, age, and gender, were recorded. After 12 hours of fasting, 5ml of blood was drawn from patients under all aseptic precautions into sterile disposable syringes and blood samples were sent to laboratory for measurement of total cholesterol. Total cholesterol (TC) in mg/dl was noted from their reports. The severity of liver disease was assessed using the Child-Pugh Classification, which takes into account factors such as the presence of ascites, levels of bilirubin and albumin in the plasma, Prothrombin time, and the extent of encephalopathy. This classification categorized patients based on their scores: A score of 5 to 6 denoted Grade A (indicating well-compensated disease), a score of 7 to 9 represented Grade B (reflecting significant functional compromise), and a score of 10 to 15 indicated Grade C (indicating decompensated disease). The researcher personally documented all the data on a standardized form. The information was then entered into SPSS version 20 for analysis. Frequencies and percentages were computed for all qualitative variables, such as gender and the severity of CLD. Mean and standard deviation were calculated for all quantitative variables like age, serum cholesterol level and Child-Pugh score. Spearman correlation was calculated to see relationship between serum cholesterol level and severity of chronic liver disease. P-value < 0.05 was considered as significant.

RESULTS

In this study, 100 patients diagnosed as having chronic liver disease were recruited. The mean age of these 100 patients was 53.80±10.76 years following by (3%) patients were in age group 25-35 years, (24%) patients in age group 36-45 years, 31% patients belonged to age range of 46-55years, (25%) patients to age range of 56-65 years and (17%) patients to age range of 66-75 years. Among the total of 100 patients, 72.0% individuals were male, while females were 28.0%. The male to female ratio was found to be 2.5: 1. Table-I

Out of 100 patients, 27 (27%) patients belonged to Child-Pugh class A, 28 (28%) belonged to Child Pugh class B and 45 (45%) belonged to Child Pugh class C. Mean total cholesterol level of 100 patients was 119.85±31.51 mg/dl. Table-I.

Out of 100 patients, 38 individuals (38%) exhibited serum cholesterol levels falling within the range of 50-100 mg/dl, 44 patients (44%) displayed serum cholesterol concentrations ranging from 101-150 mg/dl, 17 patients (17%) had serum cholesterol levels in the range of 151-200 mg/dl, and one patient (1%) demonstrated a serum cholesterol level between 201-250 mg/dl. Figure-1

Spearman correlation between Child Pugh score and total cholesterol level was calculated. A negative spearman correlation was found as r= -.672. It was significant at the level of 0.01. A scatter plot of serum cholesterol levels and Child Pugh score showed that as Child Pugh scores increased, serum total cholesterol levels decrease. This showed an inverse elation between the two variables. Figure-2.

Variables		Statistics
Age (mean+SD)		53.8+10.76 years
Gender	Males	72(72.0%)
	Females	28(28.0%)
Child Pugh classification	Child Pugh class A	27(27.0%)
	Child Pugh class B	28(28.0%)
	Child Pugh class C	45(45.0%)
Total serum cholesterol in mg/dl		119.85+31.51 mg/dl

Table-I. Descriptive statistic of demographic and clinical variables n=100

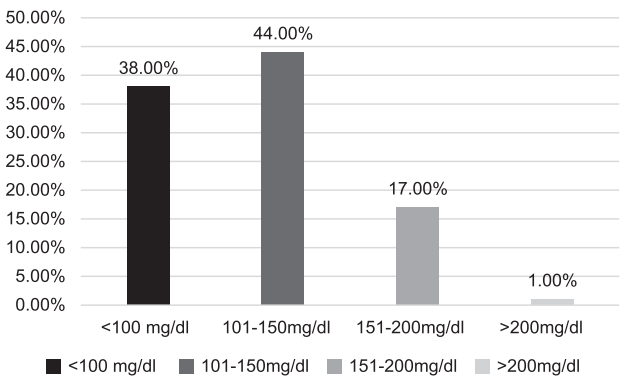
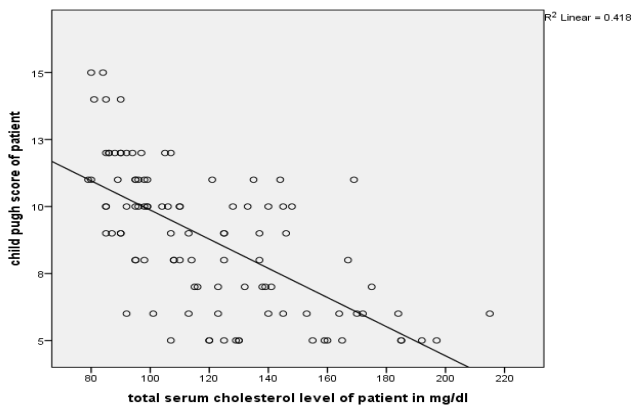


Figure-1. Patients distribution according to different ranges of cholesterol n=100



(r- value = -0.672, P- value = 0.001)
Figure-2. Correlation between Child Pugh score and total serum cholesterol n=100

DISCUSSION

Chronic liver disease encompasses a range of conditions that vary in terms of severity, from mild inflammation to advanced cirrhosis. The liver plays a crucial role in lipid metabolism, including the synthesis, storage, and regulation of cholesterol. In Pakistan chronic liver disease has been reported to be fifth leading cause of death. Chronic liver disease is one of major causes of morbidity in Pakistan.[11,12] Current study has been conducted to investigate if a correlation exists between the level of fasting serum cholesterol and the degree of severity in chronic liver disease (CLD). In this study Pearson correlation analysis revealed a significant negative correlation with a coefficient of -0.672, which held statistical significance at the 0.001 level. The scatter plot depicting serum cholesterol levels against the Child Pugh score demonstrated a pattern where higher Child Pugh scores were associated with lower serum total cholesterol levels. This observation indicates an inverse relationship between these two variables. On the other it has been stated that the hypocholesterolemia is frequently linked to chronic liver diseases arising from diverse causes due to reduced lipoprotein biosynthetic capacity.[13,14] A notable decrease in serum cholesterol is a prevalent observation in cases of decompensated chronic liver disease, and it exhibits a substantial correlation with the Child-Pugh class. This finding could enhance the dependability of the Child-Pugh classification in evaluating the severity and prognosis of patients with chronic liver disease.[15] In the comparison of this study Janičko M et al[16] reported that individuals with cirrhosis exhibit reduced levels of total cholesterol in their serum, and these outcomes were observed within a substantial patient cohort. Numerous other datasets indicate that chronic liver diseases significantly disrupt lipid metabolism, often resulting in hypocholesterolemia, which is frequently observed in cases of cirrhosis and viral hepatitis.[17-19] Our findings were also supported by the Farooque U et al[4] as the average serum levels of HDL, LDL, triglyceride and the total cholesterol, exhibited a notable decrease as the severity of the disease increased according to the Child-Pugh Classification. On the other hand, Mehboob FA et al[20] also found comparable findings.

Our study showed male predominance in patients of chronic liver disease male to female ratio being 2.5: 1. This is similar to the other studies in Pakistan.[20-23] The higher proportion of male patients may be due to increased risk factors to males posed by barbers etc. In the current series, most of the cases belonged to Child Pugh Class C (45%) while 27% fell in Child Pugh class A. The study, done in Jinnah Postgraduate Medical Centre Karachi, similarly showed higher proportion of patients in Child class C.[15] This may be due to the bias that tertiary care centers mostly receive patients at an advance stage of disease. Since a noteworthy correlation was established between serum cholesterol levels and the severity of chronic liver disease (as per the Child Pugh class) at a significant value of -0.672 (P=0.01), serum cholesterol could potentially serve as a crucial measure to enhance the predictive accuracy for one of the prevailing major diseases. Due to several limitation of this study specifically limited sample size, further investigations on a larger scale are imperative to validate and reinforce our observed outcomes.

CONCLUSION

The findings of this study underscore a substantial correlation between total serum cholesterol levels and the extent of liver damage in individuals with chronic liver disease (CLD). This correlation indicates that serum total cholesterol can serve as a valuable indicator of the severity of liver impairment. Consequently, it is recommended that serum total cholesterol measurement be incorporated as a routine component in the assessment of patients diagnosed with chronic liver disease.

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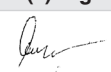
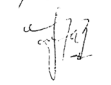
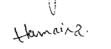
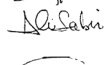
AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Iftikhar Yousaf	Cheif Author	
2	Usama Faizan	Data collection.	
3	Humaira Mubeen Afzal	Methodology.	
4	Muhammad Asif	Funding Acquisition.	
5	Muhammad Ali Sabir	Writing, editing	
6	Muhammad Haroon Yousaf	Supervision.