

Original Article**Study of Serum Total Cholesterol in Cirrhosis of Liver And Its Relation With Severity of The Disease***T. Farzana¹, T.F. Chowdhury², S. K. Mandal³, R.A.Saeed⁴, B. R. Rehan⁵.**Abstract**

Background: Lipid metabolism is impaired in different directions in liver cirrhosis. Dyslipidaemia seen in cirrhosis of the liver differs from that found in most of the additional reasons of secondary dyslipidaemias because lipoproteins in circulation are not only present in unusual amount but they also often have unusual composition, electrophoretic movement and forms (Nangliya et al., 2015).

Materials & Method: This cross-sectional study was carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College, Sylhet during the period from 1st January 2016 to 31st December 2016. Fifty patients with cirrhosis of liver fulfilling the inclusion criteria were enrolled as group-A and 50 age-sex matched healthy adults were selected as the control group (group-B).

Result: Fasting serum total cholesterol was estimated. Severity of liver Cirrhosis was categorized according to Child-Pugh scoring system and increasing severity was categorized as Child Pugh class A, B and C. Serum total cholesterol is decreased in patients with liver cirrhosis.

The level of severity of liver damage significantly affects the serum total cholesterol level in cirrhosis; and may be considered as markers of severity of liver damage in cirrhosis.

Conclusion: It may be concluded that hypocholesterolemia exists in patients with liver cirrhosis and screening for severity of cirrhosis by serum total cholesterol is important for intervention with appropriate therapy to reduce the severity of the disease. Key words: Liver cirrhosis, Serum total cholesterol, Child-Pugh score.

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Introduction

Cirrhosis of liver develops because of the liver cells necrosis followed by fibrosis and nodule formation.

It evolves over years as progressive fibrosis and wide-spread hepatocyte loss lead to distortion of the normal liver architecture that disrupts the hepatic vasculature¹.

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Alcohol is now the most frequent cause of liver cirrhosis in the West, but nowadays viral infection is the commonest cause worldwide. With the identification of Hepatitis C virus (HCV), and recognition of non-alcoholic fatty liver disease (NAFLD), idiopathic (cryptogenic) cirrhosis is diagnosed infrequently². The epidemiology of liver cirrhosis differs between gender, ethnic groups and geographic distribution. As many patients with cirrhosis are asymptomatic until decompensation occurs, it is very difficult to assess the real prevalence and

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incidence of cirrhosis in the global population. The prevalence of chronic liver disease/cirrhosis worldwide is estimated to be 100 (range, 25 to 400) per 100,000 (0.1%) subjects, but it varies country to country and region to region³. Chronic liver disease and cirrhosis result in about 35,000 deaths each year in the United States. It is the ninth foremost reason for mortality in the United States and is responsible for 1.2% of all deaths in the United States⁴.

An earlier study reported the incidence of cirrhosis of liver in Bangladesh to be 2.6%. Nutritional deficiency was considered to be the important etiological factor whereas alcoholism had no significant role where 94.2% of the cases were non-alcoholic. A recent study reported that Hepatitis B virus infection is responsible for 41% of cirrhosis of liver in Bangladesh⁵. The transport of triacylglycerol, cholesterol and fat-soluble vitamins from the intestine to the liver and from the liver to peripheral tissue and transportation of cholesterol from peripheral tissue to the liver is by lipoproteins. Apolipoproteins stimulate catalysts essential in lipoprotein metabolism and negotiate the coupling of lipoproteins to cell surface receptors⁶. Lipid metabolism is altered in different styles in liver cirrhosis. Dyslipidemia seen in cirrhosis of the liver differs from that found in most of the additional reasons of secondary dyslipidemia because lipoproteins in systemic circulation are not only present in unusual amount but they also often have an unusual structure, electrophoretic movement and appearance⁷.

Cirrhotic patients need regular follow up to see prognosis. Choosing the appropriate treatment modality depends on the nature and severity of hepatic impairment and assessing its extent by Child-Pugh Turcotte (CPT) classification⁸.

Several studies showed that serum total cholesterol was reduced in liver cirrhosis and the degree of diminution in the serum HDL, LDL and total cholesterol (except triglyceride) was significant with exacerbated hepatic impairment.^{9,10}

Materials & method

This cross-sectional study was carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College, Sylhet during the period from January 01, 2016, to December 31, 2016. Fifty patients with cirrhosis of liver fulfilling the inclusion measures were enrolled as group-A and 50 age-sex matched healthy adults were selected as the control group (group-B). Diseases affecting blood lipids such as hypertension, diabetes, cardiovascular disease, cerebrovascular disease, chronic kidney disease and hypo or hyperthyroidism; and those were recently using lipid lowering drugs were excluded. Fasting serum total cholesterol was estimated. The stage of liver Cirrhosis was characterized according to the Child-Pugh scoring system and increasing severity was categorized as Child-Pugh class A, B and C. Serum total cholesterol was measured by CHOD-PAP method.

Statistical Analysis

Stage of liver Cirrhosis will be characterized according to Child-Pugh scoring system. The score, corresponding to the sum of individual points, allows to classify patients in Child-Pugh grades A: mild (5-6 points), B: moderate (7-9 points) and C: severe (10-15 points) (Durand and Valla, 2005). Collected data were checked and edited first. Science (SPSS) Version 21. Quantitative data were expressed as mean \pm SD (standard deviation). Qualitative data were expressed as frequency and percentage. Appropriate tests were done to see the level of significance. The P value <0.05 was considered statistically significant.

Results

In the present study a total number of 50 patients were selected who fulfilled the inclusion and

exclusion criteria. Among the subjects 45 were male and 5 were female and their average age is 50years.

Table-I Serum lipid level of study subjects

Parameter	Group-A Case (n=50)	Group-B Control (n=50)	t-value	*p-value
S cholesterol (mg/dl)	137.06 ± 26.15	193.74 ± 38.61	-8.594	p<0.001

Data were presented as Mean ± SD.

*Unpaired 't' test was done, p<0.05 was the level of significance.

Figure-I showed the frequency of patients according to severity of liver cirrhosis measured by Child-Pugh score. Child-Pugh class C was in 26 (52.0%) patients, Child-Pugh class B was in 15 (30.0%) and Child-Pugh class A was in 9 (18.0%) patients.

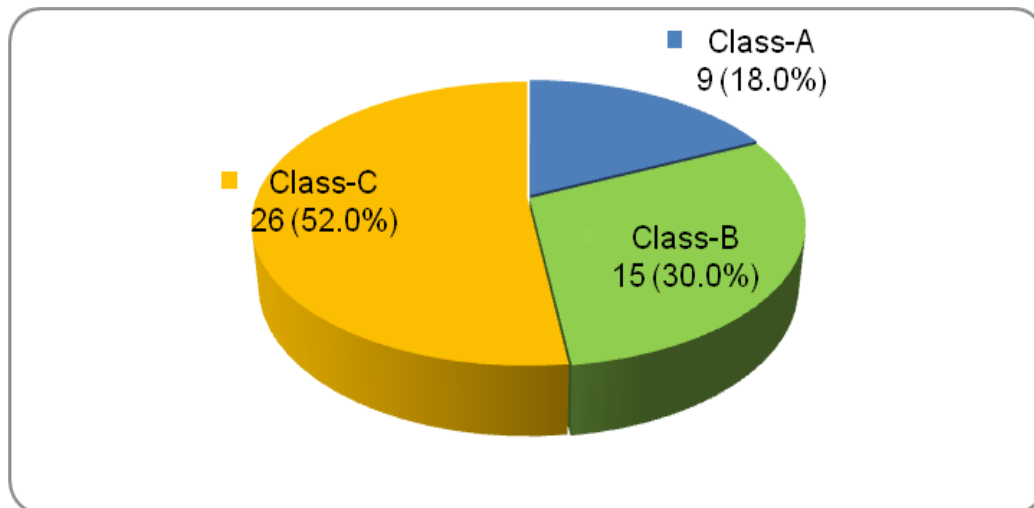


Figure-I: Frequency of patients according to severity of liver cirrhosis (n=50)

Table-II shows a highly significant difference in lipid profile according to severity of cirrhosis as per child pugh classification.

The mean total cholesterol was significantly differ among the participants of different Child-Pugh classes of liver cirrhosis. The total cholesterol level was significantly lower in class-C compared to class-A and class-B. Moreover, the total cholesterol level was notably lower in class-B compared to class-A. (Table-II).

Table-II Lipid profile according to severity of cirrhosis as per Child-Pugh classification (n=50)

Lipid parameter	Child-Pugh class			F value	p-value
	Class-A (n=9)	Class-B (n=15)	Class-C (n=26)		
S.Cholesterol (mg/dl)	167.22±27.53	142.13±7.16	123.69±23.25	15.309	*p<0.001 A vs B, ^t p=0.017 A vs C, ^t p<0.001 B vs C, ^t p=0.023

Data was presented as mean ± SD. Data was analyzed using *one way ANOVA and ^tPost Hoc (Tukey-b); p<0.05 was the level of significance.

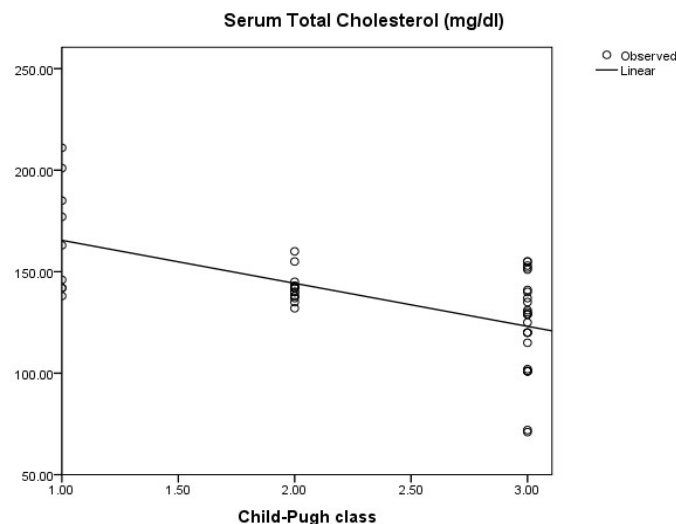
Correlation between severity of cirrhosis and serum total cholesterol of the study subjects were examined by regression analysis.

There was a marked negative correlation of serum total cholesterol level with Child-Pugh class of severity of cirrhosis.

Table III Correlation between severity of cirrhosis and serum total cholesterol (n=50)

Parameter		r	*p
Child-Pugh class A,B,C	Serum Total Cholesterol	-0.626	<0.001

*Regression analysis was performed, p<0.05 was the level of significance.

**Figure-2: Scatter diagram showing correlation between serum total cholesterol level and Child-Pugh class of severity of cirrhosis (n=50)**

Child-Pugh class 1, 2 and 3 in the figure are class A, B and C respectively.

*Logistic regression analysis was performed, p<0.05 was the level of significance.

Discussion

Cirrhosis of the liver results in gross distortion in liver architecture. Serum total cholesterol is one of the essential elements which regulate normal cellular activities and homeostasis. The liver is an important site for cholesterol metabolism. In chronic liver disease, the biosynthetic capacity of the liver is diminished as well as lowering levels of cholesterol is usually followed. Cirrhotic cases require regular visits and frequent hospital admission for proper treatment. However, choosing the appropriate treatment modality relies on the advancement of hepatic impairment and the chance of evaluating its extent (Subhan et al., 2012)¹⁰.

In the present study lower lipid levels were found in patients with cirrhosis of liver. Serum total cholesterol level was 137.06 ± 26.15 mg/dl where as serum total cholesterol was 193.74 ± 38.61 mg/dl in the comparison group of healthy subjects. Serum total cholesterol was significantly lower in cirrhotic patients than that of healthy subjects ($p < 0.001$).

This result was correlated with the study of Holkar, Vaishnav and Hivre, (2014)¹¹ that serum total cholesterol was significantly lower in patients with liver cirrhosis than that of control group ($p = 0.02$). Ghadir et al., (2010)⁹ also found similar results that total cholesterol was significantly lower in patients with liver cirrhosis than that of control group ($p = 0.03$). While Nangliya et al., (2015)⁷ found that total cholesterol was significantly lower in patients with liver cirrhosis than that of control group ($p = 0.001$). Similarly Mandal et al., (2013)¹² found that total cholesterol was significantly lower in patients with liver cirrhosis than that of control group ($p < 0.001$).

The severity of cirrhosis was evaluated by Child-Pugh criteria being class A, mild and C, severe. In this study the mean total cholesterol level 167.22 ± 27.53 mg/dl in Child-Pugh class-A, 142.13 ± 7.16 mg/dl in Child-Pugh class-B

and 123.69 ± 23.25 mg/dl in Child-Pugh class-C of liver cirrhosis. The mean total cholesterol level was markedly varied among the participants of Child-Pugh classes of liver cirrhosis ($p < 0.001$). This result was verified by Asraf, (2012)¹³, Kumar and Harisha, (2015)¹⁴ and Nangliya et al., (2015)⁷ that serum total cholesterol level was significantly different among the Child-Pugh classes of liver cirrhosis ($p < 0.001$, $p < 0.01$ and $p = 0.001$ respectively).

This study showed that there was a significant negative correlation between serum total cholesterol level ($r = -0.626$, $p < 0.001$). Thus the result from this study explored that the higher the Child-Pugh score of cirrhotic patients lower the total cholesterol level which is an important significant indicator to reflect liver damage. Jiang et al., (2010)¹⁵ reported that the liver is the only organ that not only synthesizes most total cholesterol in human body up to 60 – 80%, but it is also the site for total cholesterol transformation and excretion. In cirrhosis of liver, serum total cholesterol level is lessened because of lowered total cholesterol synthesis in the liver and obstructed esterification. This might be due to the above-mentioned purpose.

Conclusion

Serum total cholesterol was reduced in patients with cirrhosis of liver and the diminution of serum total cholesterol was related to the bad prognosis in patients with cirrhosis of liver. It helps in the analysis of the severity of liver damage in cirrhosis of the liver.

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