

Study on Lipid Peroxidation and Lipid Profile Status in Patients of Liver Cirrhosis

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Abstracts: *Liver plays a vital role in lipid metabolism. It contributes both in exogenous and endogenous cycles of lipid metabolism and transport of lipids through plasma. Synthesis of many apo-lipoproteins takes place in liver. Chronic liver disease affects people in their most productive years of life and has a significant impact on the economy as a result of premature death, illness and disability. Derangement of serum lipid Profile is a common observation in cirrhotic. The aim of the study is to know the lipid profile & lipid peroxidation status anomalies in hepatic cirrhosis. An overnight fast blood samples was collected for the estimation of lipid profile & MDA concentration. Lipid peroxidation has been shown to play a role in cellular injury and enhanced lipid peroxidation status has also been demonstrated in experimental models with liver damage. In this study we have tried to show correlation of lipid peroxide with various types of hepatic cirrhosis. Here we tried to evaluate the different lipid parameters such as Total cholesterol, Triglycerides, HDL-c, VLDL-c and LDL-c as the important lipoproteins estimated in the present study of 45 patients of cirrhosis and compared with controls.*

Keywords: Lipid profile, lipid peroxidation and liver cirrhosis.

1. Introduction

Lipids are essential component of biological membranes, free molecules and metabolic regulators that control cellular function and homeostasis.⁽¹⁾ Liver plays a vital role in lipid metabolism. It contributes both in exogenous and endogenous cycles of lipid metabolism and transport of lipids through plasma. Synthesis of many apo-lipoproteins takes place in liver. Chronic liver disease affects people in their most productive years of life and has a significant impact on the economy as a result of premature death, illness and disability.⁽²⁾ Derangement of serum lipid Profile is a common observation in cirrhotic. Very little was known earlier about the alterations of lipids and lipoproteins in patients with cirrhosis. Hence in cirrhosis the concentrations of these lipids and lipoproteins are altered. There are very few studies on dyslipidemia in cirrhosis in India but this subject has been dealt in detail worldwide. Although there are vast array of biochemical tests available for diagnosing and assessing severity of liver cell damage, desired sensitivity and specificity are lacking. Furthermore these tests reflect the extent of hepatic cell damage, rather than hepatic function assessment which is more important to evaluate the patient's condition and prognosis. Data regarding lipid levels in cirrhosis was available in 1862 when Austin Flint had suggested that the blood cholesterol level was affected by the liver diseases.⁽³⁾ It was in 1978 that Neil McIntyre studied the levels of plasma lipoproteins pattern in liver diseases.⁽⁴⁾ Lipid peroxidation has been shown to play a role in cellular injury and enhanced lipid peroxidation status has also been demonstrated in experimental models with liver damage. In this study we have tried to show correlation of lipid peroxide with various types of hepatic cirrhosis. Here we tried to evaluate the different lipid parameters such as Triglycerides, Total cholesterol, HDL-c, VLDL-c and LDL-c as the important lipoproteins estimated in the present study of 45 patients of cirrhosis and compared with controls.

2. Material and Method

The present study was conducted in Saraswati Institute of Medical Sciences, Hapur, India, during the period from September 2014 to April 2015. Randomly selected, 45 cirrhosis patients admitted in Saraswati Institute of Medical Sciences & Hospital, Hapur along with 45 healthy controls were studied for following parameters.

1. Total Cholesterol (TC) by enzymatic end point CHOD-POD methods.⁽⁵⁾
2. Triglyceride (TG) by enzymatic glycerol phosphate oxidase/peroxidase methods.⁽⁶⁾
3. HDL-Cholesterol by direct enzymatic end point method.^(7,8)
4. LDL-Cholesterol by Friedewald's formula.⁽⁹⁾
5. VLDL-Cholesterol by Friedewald's equation.
$$LDL-c = Tc - HDL-c(TG/5)$$

6. Measurement of Serum MDA Concentration:

Serum MDA was estimated by double heating method. The principle of this method was based on spectrophotometric measurement of color occurring during reaction of thiobarbituric acid (TBA) with MDA. Concentration of TBA reactive substances was calculated by absorbance coefficient of MDA-TBA complex and expressed in nmol/ml.⁽¹⁰⁾

Statistical Analysis

Data were analyzed by SPSS student t-test and one way ANOVA. A P-value < 0.05 was considered statistically significant.

3. Results and Discussion

In the present study, a total of 45 cases and 45 controls were studied. Table 1 shows the different cause of cirrhosis. Chart

A shows the percentage of different cause of cirrhotic patients involved in this study. Table 2 shows mean & S.D. of lipid profile and lipid peroxidation in cirrhotic patients compared with the healthy controls:

Table 1: Shows Causes of Cirrhosis in Study Patients

Sl. No.	Causes of cirrhosis	Cases %
1.	Alcoholic	25 (55.5)
2.	Infective (B plus C)	12 (26.6)
3.	Cryptogenic	08 (17.7)
Total		45 (100)

Table 2: Shows mean & S.D. of lipid lipid profile and lipid peroxidation in cirrhotic patients compared with the healthy controls:

Parameters	Cases (n=45)	Controls (n=45)	P-value
Total Cholesterol (mg/dl)	138.0±13.5	186.0±23.1	0.030
TG (mg/dl)	94.3±42.3	192.5±58.6	0.012
HDL-c (mg/dl)	33.50±12.78	41.78±5.04	0.000
LDL-c (mg/dl)	78.48±24.24	103.36±10.44	0.000
VLDL-c (mg/dl)	23.53±15.04	27.52±2.87	0.005
MDA (nmol/ml)	1.8±0.2	0.6±0.19	0.001

***Statistically significant (P-value <0.05)**

Dyslipidemia is a frequent finding in chronic liver disease. Dyslipidemia is also seen in other illnesses like Diabetes Mellitus and chronic renal failure etc. Many national studies are available regarding dyslipidemia in Diabetes Mellitus or Chronic Renal Failure.⁽¹¹⁾ Chronic liver disease causing disruption of liver tissue and hence derangement of lipid metabolism has been shown in various studies.⁽¹²⁾ The present study shows that patients with liver diseases had lower lipid levels and all the parameters of lipid profile as such: TC, TG, HDL-c, LDL-c and VLDL-c were significantly lower in patients with cirrhotic liver compared with control. Similarly, the patients with liver diseases had higher level of lipid peroxidation as compared with control. Lipid peroxidation (LP) refers to oxidative degradation of lipids particularly poly unsaturated lipids of cell wall resulting in cell damage. End products of LP are reactive aldehydes such as malondialdehyde which has been usually estimated to assess the lipid peroxidation status of a person. An increased concentration of end products of LP is the evidence of cellular injury. In case of liver cirrhosis patients in our study there is raised LP status to many folds as compared to healthy controls. Raised LP status in liver cirrhosis patients appear to be important in potentiating the initial tissue damage in early cirrhosis from worse to worst with a ultimate grave prognosis. Besides, the amount of decrease in the serum HDL-c, LDL-c and TC was significant with increasing severity of liver damage. Hepatic cirrhosis treatment includes preventing further damage to the liver, treating its complications, preventing liver cancer or detecting it early and liver transplantation. This decrease in the serum TC and TG levels in patients with cirrhosis of liver compared with healthy control has been observed previously in many other studies, which is expected, as the synthetic functions of the liver are decreased. Study conducted by Perales et al⁽¹³⁾ (1997), have shown that in chronic liver disease condition without cholestasis; lipid profile i.e. LDL-c, HDL-c and VLDL-c levels significantly decrease and

become worse as the disease progresses. These finding supports our observations that as the liver disease progresses the functioning of liver is affected adversely, causing low levels of LDL-c, HDL-c and TC in patients. Siagris et al⁽¹⁴⁾(2006) from Greece found lower TC level in patients compared to the comparison group. According to Joel et al⁽¹⁵⁾ (2006) most common cause of cirrhosis is alcoholism accounted for 60 to 70% of cases followed by HBV infection in 10% of cases. In our study 55.5% were alcoholic and 26.6% were infective and 17.7% cryptogenic respectively (Table 1) which is similar to the finding with Joel et al. In this study we observed decreased levels of TC, TG, HDL-c, LDL-c and VLDL-c in patients with hepatic cirrhosis. Other study like Taylor et al⁽¹⁶⁾ (1979) also show similar findings. Decrease in lipid levels is also observed in disorders like malabsorption, malnutrition, malignancy and hyperthyroidism. Hence the patients suffering from or diagnosed as having other concomitant illnesses should be excluded from the study.⁽¹⁷⁾

4. Conclusion

Our findings suggest that the patients with liver diseases had lower lipid levels and all the parameters of lipid profile as such TC, TG, HDL-c, LDL-c and VLDL-c were significantly lower in patients with hepatic cirrhotic. Similarly, the patients with liver diseases had higher level of lipid peroxidation. An increased concentration of end products of LP is the evidence of cellular injury. Lipid derangements are commonly seen in chronic liver disease. Dyslipidemia is a common finding in chronic liver disease. It helps diagnosis of severity of liver disease and also acts as a good prognostic sign. Estimation of serum lipid profile and lipid peroxidation allows better assessment of hepatic function and evaluation of prognosis of patients with hepatic cirrhosis.

5. Abbreviations Used

Malondialdehyde (MDA) & Total Cholesterol(TC), Triglyceride(TG), High Density Lipoprotein Cholesterol(HDL-c), Low Density Lipoprotein Cholesterol(LDL-c), Very LOW Density Lipoprotein Cholesterol(VLDL-c), Lipid peroxidation (LP).

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