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

Dr Tabassum Yasmin¹, Dr Mohd Shafat Imam Siddiqui²

¹MBBS, MD, Associate Professor, Department of Biochemistry Heritage Institute of Medical Sciences, Varanasi, Uttar Pradesh, India
²MBBS, MD, Associate Professor, Department of Medicine, Heritage Institute of Medical Sciences, Varanasi, Uttar Pradesh, India

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.¹⁷ 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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Causes of cirrhosis</th>
<th>Cases %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Alcoholic</td>
<td>25 (55.5)</td>
</tr>
<tr>
<td>2.</td>
<td>Infective (B plus C)</td>
<td>12 (26.6)</td>
</tr>
<tr>
<td>3.</td>
<td>Cryptogenic</td>
<td>08 (17.7)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>45 (100)</td>
</tr>
</tbody>
</table>

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

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

*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. Chronic liver disease causing disruption of liver tissue and hence derangement of lipid metabolism has been shown in various studies. 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. 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.

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).

References


Author Profile

Dr Tabassum Yasmin, MBBS, MD is Associate professor, Department of Biochemistry, Heritage Institute of Medical Sciences, Varanasi, Uttar Pradesh, India

Dr Mohd Shafat Imam Siddiqui, MBBS, MD is Associate professor, Department of Medicine, Heritage Institute of Medical Sciences, Varanasi, Uttar Pradesh, India