E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/15.01.117

Research Article

Determination of Liver Cirrhosis by Liver Function Tests, Lipid Peroxidation (MDA) and Antioxidant Enzyme (SOD)

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Received: 20.02.25, Revised: 03.04.25, Accepted: 16.05.25

ABSTRACT
Liver cirrhosis is a severe condition characterized by the replacement of healthy liver tissue with scar tissue, impairing its function. Caused by various liver diseases, it is a global health issue causing 1.47 million deaths in 2019. Common causes include chronic alcohol abuse, viral infections, obesity, diabetes, high cholesterol, hemochromatosis, Wilson's disease, autoimmune hepatitis, primary biliary cholangitis, and primary sclerosing cholangitis. Prevention and management include lifestyle changes, medications, and liver transplants.
Aims & Objectives: The study aims to determine Liver Cirrhosis by analyzing markers of LFT, MDA, and SOD, estimating SGOT/SGPT ratio, albumin/globulin ratio, MDA, and SOD, and examining their relationship.
Materials and Methods: This study involved 100 patients, 50 with Liver Cirrhosis and 50 normal. Samples were collected from the Department of Medicine and tested at the Department of Biochemistry. The tests included serum SGPT by Kinetic UV Method, SGOT by Kinetic UV Method, Total protein by Roche Cobas 6000 method, Albumin by BCG Method, Globulin by Calculated manually, MDA by Jeans CD method, and SOD by Marlund and Marlund Method.
Results: Liver cirrhosis patients have higher SGOT/SGPT ratio (2.56±0.38 U/L) and Albumin/Globulin ratio (0.81±0.06 g/dl) decreased compared to normal individuals. Serum Malondialdehyde (MDA) and Superoxide Dismutase (SOD) levels also differ between Liver Cirrhosis patients and normal individuals. Serum MDA (0.37±0.02 nmol/ml) increases in Liver Cirrhosis patients, while SOD (4.41±1.43 units/ml) decreases in Normal individuals. These findings highlight the importance of monitoring liver cirrhosis patients.
Discussion: The study found that Liver Cirrhosis patients have a higher SGOT:SGPT ratio, Albumin: Globumin ratio, Malondialdehyde (MDA), and Serum Superoxide Dismutase (SOD) values compared to normal individuals. These results are consistent with previous studies, and further research is needed to estimate the relationship between SOD and Liver Cirrhosis. The results align with previous research and suggest further research is needed to better understand the relationship between these factors.
Summary & Conclusion: The study, involving 50 individuals with Liver Cirrhosis and normal group, found that SGOT and SGPT ratios increased in Liver Cirrhosis patients, while Albumin and Globulin ratios increased. Malondialdehyde (MDA) also increased in Liver Cirrhosis patients, and Superoxide Dismutase (SOD) decreased in Liver Cirrhosis patients, but further research is needed.The conclusion was SGOT:SGPT ratio, Albumin: Globulin ratio, and Serum MDA are key markers for liver disorders detection, but further research is needed to understand Serum SOD levels.

Keywords: SGPT, SGOT, Liver Cirrhosis, Albumin, Globulin, MDA, SOD.

INTRODUCTION

Liver cirrhosis is a condition where the liver becomes severely scarred due to long-term damage, affecting its function.[1,2] The stages of liver cirrhosis include inflammation, fibrosis, cirrhosis, and liver failure. Inflammation causes abdominal discomfort and can lead to liver damage if untreated. Fibrosis develops due to inflammation and obstructs blood flow, but treatment can help. Cirrhosis replaces healthy liver tissue, making the liver hard and lumpy. Liver failure occurs when the liver

cannot perform vital functions, requiring immediate medical intervention and may require a liver transplant. The clinical stages include compensated cirrhosis, where the liver can perform most functions, and decompensated cirrhosis, marked by significant liver dysfunction, leading to severe symptoms like jaundice, ascites, and hepatic encephalopathy.[2]

Etiology: Liver cirrhosis is a late stage of liver scarring caused by various liver diseases and conditions, including chronic alcohol abuse, chronic viral hepatitis, non-alcoholic fatty liver disease (NAFLD), hemochromatosis, Wilson's disease, autoimmune hepatitis, primary biliary cholangitis, and primary sclerosing cholangitis. Common causes include chronic alcohol abuse, viral infections, obesity, diabetes, high cholesterol, hemochromatosis, Wilson's disease, autoimmune hepatitis, primary biliary cholangitis, and primary sclerosing cholangitis.[3]

Epidemiology: Liver cirrhosis is a global health issue causing 1.47 million deaths in 2019. Its prevalence and impact vary across regions and populations. Common causes include chronic hepatitis B and C infections, alcohol-related liver disease, and non-alcoholic fatty liver disease (NAFLD). Mortality increases with age and is higher among males due to higher alcohol consumption and viral hepatitis. The COVID-19 pandemic has exacerbated the burden of chronic liver diseases, disrupting healthcare services and increasing mortality rates.[4,5]

Pathophysiology: Liver cirrhosis is a chronic condition characterized by the replacement of healthy liver tissue with scar tissue, impairing liver function. It can result from chronic liver injury, inflammation, fibrosis, scar tissue formation, regenerative nodules, portal hypertension, impaired liver function, metabolic dysfunction, and reduced bile production. Complications include portal hypertension, hepatic encephalopathy, increased risk of infections, and liver cancer. Prevention and management include lifestyle changes, lifestyle changes, medications, and liver transplants. Lifestyle changes include limiting alcohol intake, maintaining a healthy weight, and getting vaccinated against hepatitis. In severe cases, a liver transplant may be necessary.[6,7,8]

Relation Between Enzymes of LFT, MDA & SOD: Liver cirrhosis is a condition where abnormal liver function tests (LFTs), malondialdehyde (MDA), and superoxide dismutase (SOD) are used to assess the extent of liver damage and oxidative stress. LFTs measure the levels of enzymes and proteins in the blood, such as ALT and AST, which can indicate liver cell damage. High levels can suggest bile duct problems, while low levels can indicate poor liver function.[9] MDA is a marker of oxidative stress and lipid peroxidation, and in liver cirrhosis, it is elevated, leading to increased MDA levels and decreased SOD activity, which contributes to further liver damage. Abnormal LFTs reflect the extent of liver damage and dysfunction, with elevated MDA and altered SOD levels correlated with the severity of oxidative stress and liver injury.[10,11]

The present study determine liver cirrhosis by markers of Liver functions tests, MDA and SOD.

Aims & Objectives:

Aim:

- To determine Liver Cirrhosis by markers of LFT,MDA and SOD. Objectives:
- Estimate SGOT/SGPT Ratio in Liver Cirrhosis.
- Estimate Albumin/Globulin Ratio in Liver Cirrhosis.
- Estimate MDA in Liver Cirrhosis.
- Estimate SOD in Liver Cirrhosis.
- Relation between markers of LFT, MDA and SOD in Liver Cirrhosis.

MATERIALS AND METHODS

A total of 100 patients included in this study 50 patients have diagnosed Liver Cirrhosis and 50 individuals were normal. Samples were collected from Department of Medicine and all the test were performed in Department of Biochemistry, Index Medical College & Hospital Research Center, Indore (M.P.). Total 5 ml venous blood samples is collected from antecubital vein under all aseptic precautions in pulp bulb. It allowed to clot and then centrifuged for serum separation.

S. No.	Test	Procedure
1.	Serum SGPT	Kinetic UV Method[12,13]
2.	Serum SGOT	Kinetic UV Method[14-21]

3.	Serum Total Protein	Roche Cobas 6000[22-25]
4.	Serum Albumin	BCG Method[26-29]
5.	Serum Globulin	Manual Calculation[30,31]
6.	Serum MDA	Jeans CD Method[32]
7.	Serum SOD	Marlund and Marklund Method[33]

RESULTS AND OBSERVATIONS

Table 1: Mean±SD of SGOT: SGPT ratio, Albumin: Globulin Ratio, MDA and SOD for Liver Cirrhosis Patients and Normal Individuals

Case	SGOT/SGPT Ratio	Albumin/Globulin Ratio	MDA	SOD
Liver Cirrhosis Patients	**2.56±0.38 U/L**	**0.81±0.06 g/dl**	**0.37±0.02 nmol/ml**	**4.41±1.43 units/ml**
Normal Individuals	1.19±0.05 U/L	1.37±0.08 g/dl	0.18±1.2 nmol/ml	8.17±1.2 units/ml

The Mean±SD of SGOT/SGPT ratio in case of Liver Cirrhosis patients was 2.56±0.38 U/L and for Normal Individuals was 1.19±0.05 U/L.So, the SGOT/SGPT ratio increased in Liver Cirrhosis condition.Also, the Mean±SD of Albumin/Globulin Ratio for Liver Cirrhosis and Normal cases was 0.81±0.06g/dl and 1.37±0.08 g/dl respectively. So, ratio decreased in liver cirrhosis patients.Serum Malondialdehyde (MDA) was 0.37±0.02 nmol/ml and 0.18±1.2 nmol/ml for Liver Cirrhosis Patients and Normal Individuals respectively.Incase of Superoxide Dismutase (SOD), Mean±SD was 4.41±1.43 units/ml and 8.17±1.2 units/ml respectively for Liver Cirrhosis Patients and Normal Individuals.So, Serum MDA increased in Liver Cirrhosis Patients and decreased for Serum SOD.

DISCUSSION

The Mean±SD of SGOT:SGPT ratio in case of Liver Cirrhosis patients (2.56±0.38 U/L) was raised compared with normal individuals (1.19±0.05 U/L).So, increased value of SGOT:SGPT ratio was seen in Liver Cirrhosis Patients. Our result resembles with the studies conducted by M.Ammar Kalas et al.(2021)[34],R M Theal and K Scott (1996)[35], Paul Y Kwo et al. (2017)[36]. In our present study, we found the Mean±SD value of Albumin:Globumin was 0.81±0.06 g/dl and 1.37±0.08 g/dl respectively for Liver Cirrhosis Patients and Normal Group. Therefore, the value decreased in liver Cirrhosis cases.Our result resemble with the studies conducted by Praveen Sharma (2022)[37],Jia Zhang et al.(2021)[38] and Jinlong Li et al. (2023)[39]. Our present study suggested that the value of Malondialdehyde (MDA) raised in Liver diseases (0.37±0.02 nmol/ml) compared with normal group (0.18±0.02 nmol/ml).Our study resembles with the studies conducted by Wie Zheng et al. (2019)[40], Shira Zelber-Sagi et al. (2020)[41]. Also, the value of Mean±SD of Serum Superoxide Dismutase (SOD) decreased in Liver Cirrhosis Patients (4.41±1.43 units/ml) compared with normal group (8.17±1.2 units/ml). Our Present Study doesn't resembles with the studies conducted by M Ono et al. (1991)[42] and Yajuan He et al. (2022)[43].So, further study is needed to estimate the relation between SOD and Liver Cirrhosis.

Summary: The present study included 50 each individuals have Liver Cirrhosis and Normal group. Samples were collected from the Department of Medicine,Index Medical College & Hospital Research Center,Indore (M.P.) and all test were performed in Department of Biochemistry, Index Medical College & Hospital Research Center,Indore (M.P.).The following results was found:

- The value of SGOT and SGPT ratio increased in Liver Cirrhosis Patients. So, it's a marker for Liver Cirrhosis.
- The value of Albumin and Globulin ratio increased in Liver Cirrhosis. Therefore, in case of liver disease, the value increased.
- The value of Malondialdehyde (MDA) increased Liver Cirrhosis Patients. MDA also an indicator for Liver Cirrhosis.
- The value of Superoxide Dismutase (SOD) decreased in case of Liver Cirrhosis. But more research is needed for the relation between SOD and Liver Cirrhosis.

CONCLUSION

SGOT: SGPT ratio, Albumin: Globumin ratio was an important marker for the detection of any liver disorders. Also, SGOT: SGPT ratio increase whereas Albumin: Globulin ratio decreased. Serum MDA also raised in Liver Cirrhosis. Therefore, SGOT/SGPT ratio, Albumin/Globulin ratio and Serum MDA are best markers for the determination of Liver Cirrhosis. But Serum SOD decreased in Liver Cirrhosis and further research are needed.

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