

An Impact of Liver Cirrhosis on Haematological, Renal & Hepatic Parameters

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Abstract:

Background: Liver disease is a significant global health issue leading to liver failure, cirrhosis, and cancer. Alcohol is a major cause, accounting for 5% of deaths in India. Understanding liver disease molecular mechanisms is vital for developing new treatments and reducing cirrhosis-related mortality.

Objective of The Study: To Assess & Compare the haematological, renal, and liver function parameters among cases and controls.

Material and Methods: The study was conducted at Index Medical College hospitals in Indore. This study included individuals with chronic alcoholic liver disease who sought medical attention at Gastroenterology departments of Medical College hospitals located in Indore and estimate the Haematological Investigation, Kidney Function Test & Liver Function Test.

Result: The study findings demonstrated Haemoglobin concentration and platelet count are highly statistically significant, Urea are statistically significant while Creatinine is a highly statistically significant in a Liver Cirrhosis Cases, and Total Bilirubin, AST, ALT and Albumin are highly statistically significant, while Direct Bilirubin & ALP are statistically significant. Total Protein is statistically not significant in a Liver Cirrhosis Cases.

Conclusion: Liver Cirrhosis shows Hematologic Abnormalities and Public Health Issues. Study evaluates mechanisms regulating hemostasis, coagulation, and fibrinolysis. Anemia in cirrhosis linked to hemorrhage, iron deficiency, and nutrition.

Keywords: Hematologic Abnormalities, Liver Cirrhosis, Fibrinolysis, Hemostasis, Iron Deficiency.

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Introduction

Liver disease is a significant global health issue leading to liver failure, cirrhosis, and cancer. [1] Alcohol is a major cause, accounting for 5% of deaths in India. [2] Preventing and early detection are crucial. [3] Diagnosis involves a clinical features like ascites, bleeding, or hepatic encephalopathy. [4] Liver biopsy to confirm cirrhosis, requiring a multidisciplinary approaches. [5] Understanding liver disease molecular mechanisms is vital for developing new treatments and reducing cirrhosis-related mortality.

Cirrhosis of the liver is a chronic liver disease characterized by the replacement of healthy liver tissue with scar tissue, leading to impaired liver function. It is a progressive condition that can result from various etiologies such as chronic alcohol abuse, viral hepatitis, non-alcoholic fatty liver disease (NAFLD), and autoimmune liver diseases. Cirrhosis not only affects the liver but

also has profound implications for other organ systems, including the haematological and renal systems. In this article, we will explore the haematological, renal, and liver function parameters commonly observed in patients with cirrhosis of the liver. [5]

Objective of the Study: To Assess & Compare the haematological, renal, and liver function parameters among cases and controls.

Material and Methods

The study was conducted at Index Medical College hospitals in Indore. This study included individuals with chronic alcoholic liver disease who sought medical attention at Gastroenterology departments of Medical College hospitals located in Indore. A total of 200 people is involved in this study (100 Experimental & 100 Control) with an inclusion

criteria. The statistical analysis was carried out using SPSS software.

Biochemical Investigations

- **Haematological Investigation:** Haemoglobin (Cyanmethemoglobin method) & platelet counts (Optical platelet counting).
- **Kidney Function Test:** Urea (DAM method), creatinine (Jaffe's method).
- **Liver Function Test:** Total Bilirubin, Direct Bilirubin (Diazo Method), Serum SGOT, SGPT, ALP (IFCC method, kinetic), Total Protein (Biuret Method), Albumin (Bromocresol green Method).

Samples Collection:

- After obtaining informed consent form from patients.
- Blood Samples are collected from General Medicine Ward.

- Collects 4mL blood sample from participants, and
- Transfer 2mL to EDTA tube and another 2mL to Serum Tube.

Sampling Criteria:

Inclusion Criteria for Cases: Liver Cirrhosis subjects, Age- 30-60 years in both males and females.

Exclusion Criteria for Cases: Contagious diseases, Rheumatoid arthritis, multiple myeloma, hepatitis B & C, hepatocellular carcinoma.

Inclusion Criteria for Control: Subjects free from cirrhosis of liver, liver disease & non-alcoholic at age 30-60 years in both gender.

Results

Table 1: Age distribution among cases and controls

Age	Cases No.	Controls No.
30-40	34	30
41 – 50	20	26
51 – 60	46	44
Total	100	100

Table 2: Clinical features of CLD Cases

Clinical features	Cases	
	No.	%
Yellowish of the skin and the eyes	54	54
Itchy skin	24	24
Ascites	07	07
Blood in vomiting	06	06
Swollen abdomen & legs	09	09
Total	100	100

Table 3: Haematological parameters among case and controls

Variables	Groups	Mean & SD	P Value
Haemoglobin (g/dl)	Case	9.4± 2.1	<0.0001
	Control	13.0±2.6	
Platelet Count (lakh cells/cu.mm)	Case	1.26±0.43	<0.0001
	Control	2.71±1.08	

Table 4: Renal function parameters among case and controls.

Variables	Groups	Mean & SD	P Value
Urea (mg/dl)	Case	13.06±1.02	0.0001
	Control	25.13±6.04	
Creatinine (mg/dl)	Case	1.14±0.26	<0.0001
	Control	0.8±0.3	

Table 5: Liver function parameters among case and controls.

Variables	Groups	Mean & SD	P Value
Total Bilirubin (mg/dl)	Case	5.5±2.1	<0.0001
	Control	0.88±0.61	
Direct Bilirubin (mg/dl)	Case	2.4±1.2	0.0001
	Control	0.4±0.2	
AST (IU/L)	Case	76.1±22.7	<0.0001
	Control	20.9±7.2	
ALT (IU/L)	Case	58± 18.4	<0.0001

	Control	23.1±9.2	
AST/ALT ratio	Case	1.42±0.44	<0.0001
	Control	1.0±0.29	
ALP (IU/L)	Case	148.6 ± 31.2	0.0001
	Control	88.6±18.7	
Total Protein (g/dl)	Case	6.6 ± 2.04	0.259
	Control	6.99± 1	
Albumin (g/dl)	Case	3.1 ± 0.98	<0.0001
	Control	4.7±1.4	
A : Gratio	Case	0.93±0.26	<0.0001
	Control	1.6 ± 0.41	

The study findings demonstrated Haemoglobin concentration and platelet count are highly statistically significant in a Liver Cirrhosis Cases, Urea are statistically significant while Creatinine is a highly statistically significant in a Liver Cirrhosis Cases, and Total Bilirubin, AST, ALT and Albumin are highly statistically significant, while Direct Bilirubin & ALP are statistically significant.

Total Protein is statistically not significant in a Liver Cirrhosis Cases.

Discussion

In our studied data the Hemoglobin level, Platelets count, Kidney Function test and Liver Function test parameters are impaired as compared with control groups. Acc. to Longo et al. The Prominent Elevated level of AST through the MI Injury & mild elevated in the cirrhosis of liver, ALT is elevated in the chronic liver disease & chronic alcoholism, ALP is elevated in the inflammation of the bone disorder, Total & direct Bilirubin level is increased due to Obstruction of hepatic biliary disorders. [6] As C.A. Burtis also mentioned, Increase in aminotransferases (AST and ALT) is due to increased permeability of injured hepatic cell and release of the cytosolic inflammatory contents. [7] Acc. to Murali AR, et al, cases shows lower serum levels of haemoglobin, platelet count, total protein, and albumin as compared to controls, indicating chronic disease and liver hepatic cell decline in synthesis function. [8] As decreased platelet count in cases indicates hypersplenism-resistance of the hepatic due to portal hypertension. [8] Low platelet count is also a marker of alcoholic cirrhosis. [8] Acc. to Gonzalez-Casas R, et al, Anemia is caused by repeated varices bleeding, alcoholism, folic acid and vitamin B12 deficiency due to inadequate intake of diet. [9]

Conclusion

Liver Cirrhosis shows Hematologic Abnormalities and Public Health Issues. Patients shows impaired kidney function tests. Study evaluates mechanisms regulating hemostasis, coagulation, and fibrinolysis. Anemia in cirrhosis linked to hemorrhage, iron deficiency, and nutrition. Major thrombocytopenia mechanisms include platelet

sequestration and decreased TPO (Thrombopoietin) production. Abnormal hematologic indices lead to poor prognosis and increased mortality.

References

1. Briones-Orta MA, Avendano-Vazquez SE, Aparicio-Bautista DI, Coombes JD, Weber GF, Syn WK. Osteopontin splice variants and polymorphisms in cancer progression and prognosis. *Biochimica et Biophysica Acta (BBA) - Reviews on Cancer*. 2017 Aug; 1868(1):93–108.
2. Boguslawska J, Sokol E, Rybicka B, Czuby A, Rodzik K, Piekliko-Witkowska A. microRNAs target SRSF7 splicing factor to modulate the expression of osteopontin splice variants in renal cancer cells. *Gene*. 2016 Dec; 595(2):142–9.
3. Cui G, Chen J, Wu Z, Huang H, Wang L, Liang Y, et al. Thrombin cleavage of osteopontin controls activation of hepatic stellate cells and is essential for liver fibrogenesis. *Journal of Cellular Physiology* [Internet]. 2018 [cited 2024 Mar 21]; 234(6):8988–97.
4. Hu J, Li G, Zhang P, Zhuang X, Hu G. A CD44v+ subpopulation of breast cancer stem-like cells with enhanced lung metastasis capacity. *Cell Death & Disease*. 2017 Mar; 8(3):e2679–9.
5. Clemente N, Raineri D, Cappellano G, Boggio E, Favero F, Soluri MF, et al. Osteopontin Bridging Innate and Adaptive Immunity in Autoimmune Diseases. *Journal of Immunology Research*. 2016; 2016:1–15.
6. Longo, Dan L, et al. *Harrison's Gastroenterology and Hepatology*. New York, McGraw-Hill Medical, 2013.
7. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 4th ed., C.A. Burtis, E.R. Ashwood, D.E. Bruns (Eds.). Elsevier Inc. (2006).
8. Murali AR, Attar BM, Katz A, Kotwal V, Clarke P. Utility of Platelet Count for Predicting Cirrhosis in Alcoholic Liver Disease: Model for Identifying Cirrhosis in a US Population. 2015Feb21; 30(8).

9. Gonzalez-Casas R, Jones EA, Moreno-Otero R. Spectrum of anemia associated with chronic liver disease. 2009Oct7; 15(37).