



A STUDY OF ABNORMALITIES OF LIVER FUNCTION TESTS IN PATIENTS WITH HEART FAILURE AND ITS CLINICAL SIGNIFICANCE

Dr. Sharat Sagar Potharaju

Resident, Department of medicine, SIMS.

Dr. Yatish

Associate Professor, SIMS, Hapur.

ABSTRACT

Introduction: Hepatic cell injury can be caused by a number of pathophysiological effects that are caused by heart failure. These pathophysiological effects alone or in combination can cause liver cell injury. Because of this, abnormalities with liver function are common in patients who have heart failure. The purpose of this study is to investigate the prevalence of abnormal liver function test results in patients who are suffering from heart failure as well as the patterns of these abnormalities. **Objective:** The objective of this study is to evaluate the clinical factors that have an impact on liver function tests and to determine whether or not the etiology of heart failure has an effect on abnormalities in liver function tests. **Methods:** This observational cross-sectional study enrolled 180 patients from Saraswathi Institute of Medical Science and Hospital over two years. Every subject was subjected to comprehensive examinations, which included liver function tests such as blood bilirubin, AST, ALT, SAP, serum proteins, and prothrombin time. These comprehensive examinations were carried out on day 1 and day 7 of the admission process. **Results:** One hundred eighty-five people who were diagnosed with heart failure were found to have abnormal liver function tests, which accounted for roughly 64 percent of the total cases. During the course of the remission, the levels of serum bilirubin, serum alkaline phosphatase, and serum transaminases returned to normal. **Conclusion:** The Saraswathi Institute of Medical Sciences has found that coronary artery disease is the most common reason for patients who display signs of heart failure. The majority of patients who were found to have abnormal liver function were those who were diagnosed with coronary artery disease (72%). Patients with hypertensive heart disease (44%) who developed heart failure had modest changes in their liver function throughout the course of their illness. The levels of aspartate transaminase and alanine transaminase in the serum are shown to significantly rise when the patient is experiencing severe heart failure.

KEYWORDS :

INTRODUCTION

The function of the liver is to maintain the body's internal equilibrium.[1] If the liver is not functioning properly, it will drastically alter the homeostasis of the body. Heart failure, whether acute or chronic, can have an effect on the liver because liver is the biggest gland in the adult body. The liver is sensitive to a variety of circulatory disorders due to its high metabolic rate and the fact that it receives 25 percent of the cardiac output for its function. Liver through its vasoactive mechanism and increased oxygen extraction from blood, it can withstand hypoperfusion.

Both right- and left-sided cardiac failure can cause hepatic failure. The liver's blood flow pattern makes zone 3 of the hepatic lobule most susceptible to hypoxia injury. [2] Heart failure has several pathophysiological effects which, alone or in combination causing hepatic cell loss. Because of this, heart failure patients often have liver function issues.

This study emphasize the importance of early identification of hepatic serum biochemical markers in detection in heart failure patients. This recent study suggests using liver function tests to estimate heart failure severity, decreasing the need for invasive and expensive treatments. This study examined how heart failure affects liver function test in 180 patients in Saraswathi Institute of Medical Sciences. Different causes of heart failure are examined for their effects on liver capacity. Remissions and exacerbations are evaluated on the seventh day, and liver function changes are recorded for prognostic purposes. Addressing the cause of heart failure quickly and properly prevents liver damage and restores liver function abnormalities to baseline levels.

AIMS AND OBJECTIVES OF THE STUDY

AIMS:

To study the prevalence and pattern of Liver Function Test Abnormalities in patients with Heart failure.

OBJECTIVES:

- To study the clinical determinants affecting Liver Function Tests in patients with Heart Failure.
- To study whether the etiology of Heart Failure has an impact on Liver Function Test abnormalities.

MATERIALS AND METHODS

The present study titled "A STUDY OF ABNORMALITIES OF LIVER FUNCTION TESTS IN PATIENTS WITH HEART

FAILURE AND ITS CLINICAL SIGNIFICANCE" was carried out in the Department of Medicine, Saraswathi institute of medical sciences.

Study Design: A Cross sectional study

Period Of Study: 2 years i.e. from May 2023 – April 2025

Place Of Study: Saraswathi institute of Medical Sciences

Sample Size: The study was conducted on a total of 180 heart failure patients of different etiologies.

The sample size for the study will be calculated by using formula as below :

$$N = z^2 pq / E^2$$

Where , n = sample size p = prevalence (Considered as 50% from the previous study) q = 100-p = 100-50 = 50% z score = 1.96 approx 2

$$E = 7.5$$

$$\text{Therefore, } n = 4 * 50 * 50 / (7.5)^2$$

$$N = 180$$

So, the sample size is 180 patients.

Study Population:

At the Saraswathi Institute of Medical Sciences Medicine Outpatient Department, patients who were either inpatients or outpatients were included in the study after informed agreement was obtained.

Cases:

The patients with heart failure who were selected were those who fulfilled the inclusion criteria that were defined and did not display the exclusion criteria that were outlined.

Inclusion Criteria

Cases of Heart failure due to both cardiac and non cardiac causes in patients with age more than 18 years of age.

Exclusion Criteria

1. Patients with alcoholic liver disease

2. Past History of jaundice

3. Recent intake of Hepatotoxic drugs or drugs causing raised liver parameters, such as Rifampicin, Isoniazid, Steroids, chlorpromazine, amiodarone, statins, hydralazine, phenytoin, and valproate.

4. Positive viral markers like Hepatitis A, B, C and HIV.

Methodology:

This study was conducted with the consent of 180 individuals diagnosed with heart failure, who were selected based on the Framingham criteria for heart failure diagnosis. All 180 heart failure instances, caused by various factors, were documented from May 2023 to April 2025. On the first and seventh days of hospitalization, liver function tests are done. These tests include serum bilirubin, AST, ALT, SAP, proteins, and prothrombin time. Cardiology, radiology, biochemistry, and laboratory support departments assist with this evaluation. The study investigated liver function changes associated with various types of heart failure to help predict heart failure severity without echocardiography. The findings were used to assess and correlate heart failure severity.

OBSERVATIONS AND RESULTS

The present study titled "A STUDY OF ABNORMALITIES OF LIVER FUNCTION TESTS IN PATIENTS WITH HEART FAILURE AND ITS CLINICAL SIGNIFICANCE" was carried out in the Department of Medicine, Saraswathi

Institute of Medical sciences, Hapur over a period from May 2023 – April 2025. A total of 200 patients screened, 20 were excluded and a final of 180 total patients were included in the study. **Demographic characteristics in the study** Sex distribution of the study population: Seventy-four (41%) of the 180 study participants were female, whereas 106(59%) were male. Our analysis shows a 1.4-to-1 male-female ratio.

Table 2 – Sex Distribution Of Patients In The Study

Total	180
Male	106
Female	74
Ratio	1.4:1

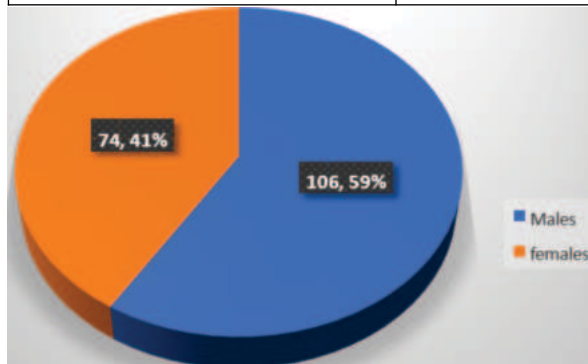


Chart-1– Sex Distribution Of Patients In The Study

Age Distribution Of Cases:

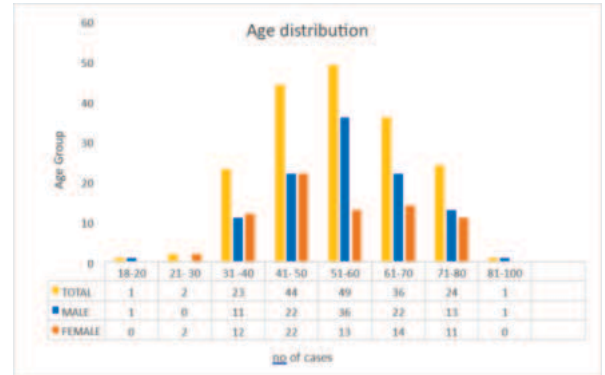
Patients in our study were in age groups ranging from 18yr to more than 80yr and their distribution is as follows:

Table -3 Age Distribution Of Patients In The Study

Age group	Cases			Mean age +/- 2SD
	Total	male	female	
18 -20	1	1	0	54.6+/- 13.7
21- 30	2	0	2	
31 -40	23	11	12	
41- 50	44	22	22	
51-60	49	36	13	
61-70	36	22	14	
71-80	24	13	11	
81-100	1	1	0	
total	180	106	74	

One was between 18 and 20, two were between 21 and 30, twenty-three were between 31 and 40, forty-four were between 41 and 50, forty-nine were between 51 and 60, thirty-six were between 61 and 70, twenty-four were between 71 and 80, and one was over 80.

The biggest number of patients were 51–60 years old, while the lowest were under 30 and beyond 80. The mean age was 54.6 years, with a standard deviation of 13.7.



p value insignificant: 0.08

Chart 2 - Age Distribution Of Patients In The Study

Duration Of Illness:

In the study cohort, patients were divided into three categories according to the length of time they had been experiencing heart failure: less than one year, one to five years, and more than five years. 87 patients had heart failure that lasted for more than five years, 79 patients had heart failure that lasted between one and five years, and 14 patients had heart failure that lasted for less than one year.

Table 4- Duration Of Illness Of Patients In The Study

Years of Heart failure	No of cases	Percentage
< 1yr	14	8%
1-5 yrs.	79	44%
>5 yrs.	87	48%

Maximum number of patients fall in duration greater than 5 years and minimum number of patients in duration less than 1 year



Chart 3- Duration Of Illness Of Patients In The Study

Etiology Of Heart Failure:

Twenty percent of the 180 patients who were diagnosed with heart failure had rheumatic heart disease (RHD), forty percent had coronary artery disease (CAD), twenty percent had cor pulmonale, and eleven percent had cardiomyopathy and nine percent had hypertensive heart diseases.

Table – 5 Etiology of heart failure among the cases

Etiology	No of cases	Percentage
Rheumatic heart disease	36	20%
Coronary heart disease	72	40%
Cor pulmonale	36	20%
Cardiomyopathy	20	11%
Hypertensive heart disease	16	9%

Heart failure is most commonly caused by coronary artery disease, according to the findings of a study that involved 180 patients. Hypertension, on the other hand, was found to be the least prevalent etiological component.

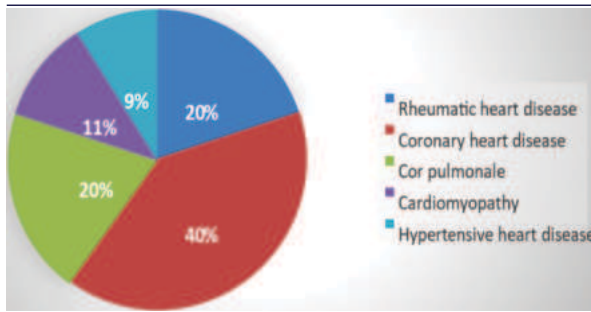


Chart 4 Etiology Of Heart Failure Among The Cases

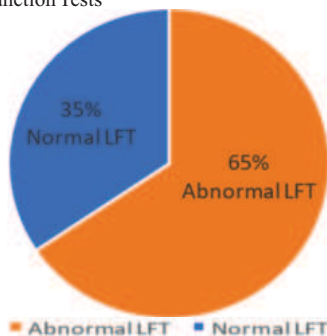
Percentage Of Abnormal Liver Function Tests

Approximately 64% of heart failure patients had abnormal liver function tests.

Table 6- Percentage Of Abnormal LFTs In The Study

LFT abnormality	Cases	Percentage
No. with abnormal LFT	118	65%
No. with normal LFT	62	35%

LFT: Liver Function Tests



P value insignificant – 0.06

Chart 5- Percentage Of Abnormal LFTs In The Study

Abnormal Liver Function Tests As Per Etiology

Out of 36 cases with RHD, 21 cases of CAHD, 36 cases of cor pulmonale, 20 cases of cardiomyopathy, 16 cases of hypertensive heart disease-21;52;25;13;7 patients had abnormal liver function tests respectively.

The most substantial abnormalities in liver function tests (LFTs) were detected in heart failure that was attributed to coronary artery disease, whereas the least abnormalities were related with heart failure that was caused by hypertension. The research was conducted on 180 patients.

Table 7-Abnormal LFTs in the cases as per Etiology

ETIOLOGY	No. of cases	No. of cases with abnormal liver function tests	Percentage
Rheumatic heart disease	36	21	59%
Coronary Atherosclerotic heart disease	72	52	72%
Cor pulmonale	36	25	69%
Cardiomyopathy	20	13	65%
Hypertensive heart disease	16	7	44%

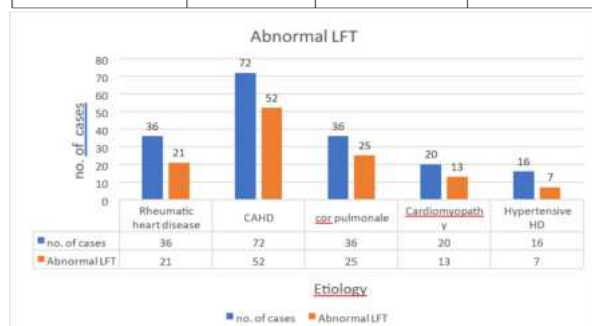


Chart 6- Abnormal LFTs in the cases as per etiology

Clinical Jaundice

Out of 180 patients in our study, 41 of them developed jaundice clinically accounting for about 23%.

Table 8- Percentage Of Clinical Jaundice among the cases

Total no of cases	180
Cases with clinical jaundice	41
Percentage of clinical jaundice	23%

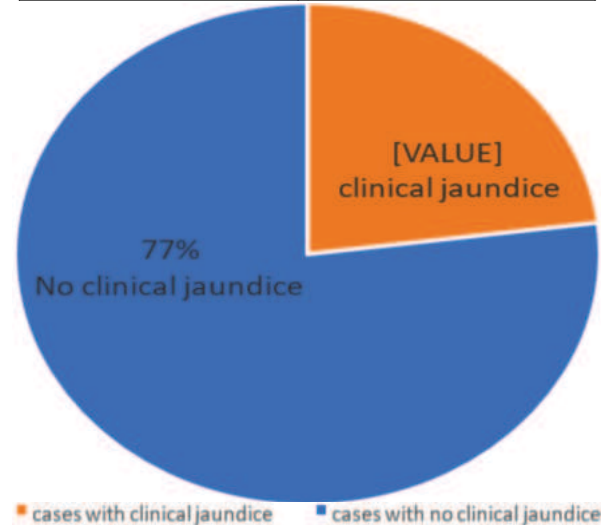


Chart 7- Clinical Jaundice Among The Cases

Ascites

Out of 180 cases in our study, 15 patients developed ascites.

Table 9- Percentage Of Ascites among cases

Total no cases	180
Cases with ascites	15
Percentage	8%

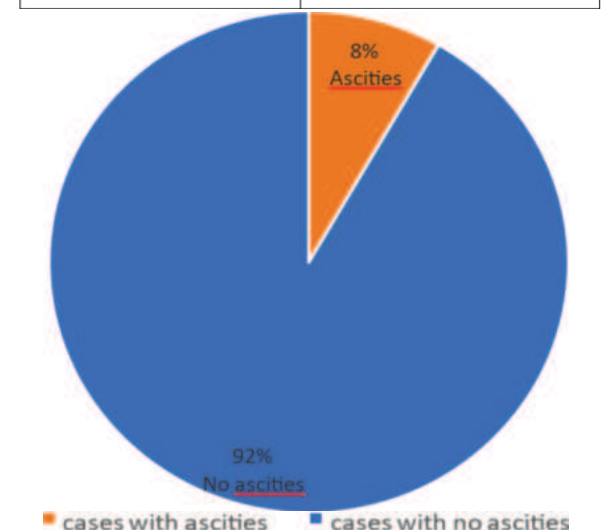


Chart 8-Ascites Among The Cases

Hepatomegaly

Out of 180 cases in our study, 87 of them developed hepatomegaly.

Table 10- Percentage Of Hepatomegaly Among The Cases

Total no cases	180
No of cases with hepatomegaly	87
Percentage	48%

Table 11- No. Of Cases With Hepatomegaly Showing Increased SAP

No of Cases with Hepatomegaly	86 (out of 180)
Cases with raised SAP	31 (out of 180)
No of cases with raised SAP in Hepatomegaly and CCF	15(out of 87)
No of cases with raised SAP without hepatomegaly	16 (out of 93)
Percentage of raised SAP in CCF	17%
Percentage of raised SAP in patients with CCF having hepatomegaly	18%

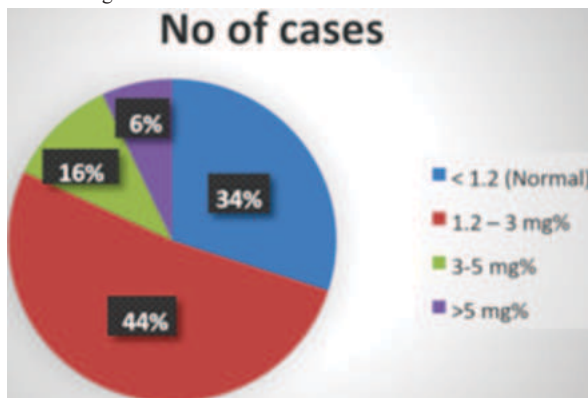
Serum Bilirubin In The Study Population

Out of 180 cases, 79 patients had serum bilirubin levels of 1.2-3mg/dl; 29 of them had range of 3-5mg/dl; 10 of them had levels greater than 5mg/dl.

Table 12- Serum Bilirubin Elevation Among The Cases

Serum bilirubin	No of cases	Percentage
< 1.2 (Normal)	62	34%
1.2 – 3 mg%	79	44%
3-5 mg%	29	16%
>5 mg%	10	6%

P value insignificant: 0.07

**Chart 10- Serum Bilirubin Elevation Among Cases****Serum Bilirubin With Remission And Exacerbation**

Out of 118 patients with abnormal LFTs, 99 patients attained remission and 19 patients went into Exacerbation.

Table 13 -Serum bilirubin with remissions and exacerbations

No of cases with abnormal LFT	118(On follow up, 99 showed remission: 19 showed exacerbation)
No of cases showing exacerbation	19
No of cases showing increase of Serum bilirubin on exacerbation	15, [3- no change]
Percentage	79%
No of cases showing remission	99
No of cases showing reduction of Serum bilirubin on remission	83; [7- showed increase]
Percentage	84%

p- value is insignificant – 0.0912

DISCUSSION

The complicated liver relies on hepato-cardiac vascular connections to execute several metabolic activities. Hepatic failure causes several

biochemical abnormalities in liver function testing. These anomalies show that heart failure affects the liver and may help determine the severity and prognosis of acute or chronic heart failure.

Hepatic impairment due to passive congestion is more common in right-sided heart failure and high right ventricular pressure. Constrictive pericarditis, severe pulmonary arterial hypertension, mitral stenosis, tricuspid regurgitation, cor pulmonale, cardiomyopathy, and Fontan therapy complications for pulmonary atresia and hypoplastic left heart syndrome can cause hepatic congestion.

It is possible for any of these conditions to cause congestion in the liver. Right ventricle dysfunction raises venous pressure, causing hepatocyte atrophy and perisinusoidal edema, which can block oxygen and nutrient delivery. Hepatic congestion produces mild jaundice, liver enzyme abnormalities, and liver medication metabolism alterations.

This study examined the biochemical profiles of 180 heart failure patients with various origins, durations, and mechanisms to identify the prevalence and severity of liver function test abnormalities. This 180-case analysis integrates all references on clinical and biochemical anomalies in hepatic blood supply, liver function, and total liver function after heart failure of various etiologies. This study examines liver dysfunction and its effects at the Saraswathi Institute of Medical Sciences by linking biochemical abnormalities in hepatic function to heart failure. This study suggests that liver function tests may be used to assess heart failure severity without invasive or costly interventions. This Saraswathi Institute of Medical Sciences study examined 180 heart failure patients with various causes. Severity degrees are also distinct. The serum bilirubin, transaminases, alkaline phosphatase, proteins, and prothrombin time of these patients were measured in order to assess the function of their livers. However, depending on how one interprets the findings, either remission or worsening was reported.

The majority of the people who participated in the study were from rural areas, and they came from a variety of different work backgrounds. Respondents in the study ranged in age from 18 to 94 years old, with a mean age of 54.6 years with a standard deviation of 13.7 years. The age range of 51 to 60 years old was the most prevalent among the participants who were examined. Those patients who had a history of drinking alcohol, being pregnant, having hepatitis or jaundice, having other hepatic illnesses, taking hepatotoxic drugs, or having serious comorbidities (such as severe cardiorespiratory sickness or cancer) were not allowed to participate in the study.

Whelan study [53] helps explain liver function test (LFT) variations in acute decompensated heart failure patients. The SURVIVE research began with abnormal liver function tests (LFTs) in 46% of 1,134 patients. At least 11% of these individuals had isolated alkaline phosphatase abnormalities, 26% had isolated transaminases, and 9% had both. High alkaline phosphatase levels were linked to right-sided congestion, filling pressures, and mortality after 180 days. High transaminases were linked to hypoperfusion and increased mortality at 31 and 180 days.[53]

CONCLUSION AND SUMMARY

1. The Saraswathi Institute of Medical Sciences has found that coronary artery disease is the most common reason for patients who display signs of heart failure.
2. The majority of patients who were found to have abnormal liver function were those who were diagnosed with coronary artery disease (72%).
3. Patients with hypertensive heart disease (44%) who developed heart failure had modest changes in their liver function throughout the course of their illness.
4. During the course of the remission, the levels of serum bilirubin, serum alkaline phosphatase, and serum transaminases returned to normal. Both the levels of serum protein and the prothrombin time did not alter while the patient was in remission.
5. Blood bilirubin, serum enzymes, and prothrombin time increased during the acute phase. Serum proteins did not alter during the exacerbation.
6. In patients with severe heart failure who also have hypotension, the levels of aspartate transaminase and alanine transaminase in their serum significantly rise.
7. The findings indicate that an adverse prognosis correlates with serum bilirubin levels exceeding 5 mg at presentation, alongside hypoalbuminemia and a reversed albumin-globulin ratio.
8. Liver function tests were numerically abnormal in the group with heart failure, but it didn't reach statistical significance.