

# Prevalence of Cirrhotic Cardiomyopathy and Correlation with Child-Pugh Score

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## ABSTRACT

**Background:** The deterioration of cardiac function in patients with liver cirrhosis has been a great debate for past two decades. A newer entity called “Cirrhotic Cardiomyopathy” has been described which includes a variety of features like QT prolongation, systolic and diastolic dysfunction. This is of extreme importance since cardiac function plays a major role in mortality and morbidity of the patient.

**Aim:** To assess the prevalence of cirrhotic cardiomyopathy and to assess its correlation with Child Pugh score.

**Methodology:** A hospital based cross sectional study was conducted in department of general medicine and department of gastroenterology. The study period was one and a half years after obtaining approval from the ethical committee. The study population was 93 and the patients admitted in general medicine and gastroenterology were enrolled for the study.

**Results:** 44.4% patients were in age group 31-45, 69% had abdominal distension as chief complaint, 77.4% patients were alcoholics, 61.3% of patients had features of liver cell failure and 54.8% were in hepatic encephalopathy. 45.2% patients were under Child B and 45.2% under Child C. 77% of patients had features of cirrhotic cardiomyopathy of which 49.9% were child C. 56% patients had diastolic dysfunction. Systolic dysfunction was found in 30.1% patient which had a statistical significance of 0.02. While comparing with Child Pugh score diastolic dysfunction was significant with a p value of 0.035 considering the variables taken in the study Albumin and INR values were statistically

significant with a p value of 0.038 and 0.043 respectively.

**Conclusion:** Our study showed a staggering rise in the presence of cirrhotic cardiomyopathy in patients with end stage liver disease when compared to previous studies. Presence of systolic dysfunction was statistically significant, whereas on correlating with Child Pugh score only diastolic dysfunction was significant.

**Keywords:** cirrhotic cardiomyopathy, liver cirrhosis, Child Pugh score

## INTRODUCTION

Chronic liver disease is a pathological entity which is associated with a spectrum of clinical manifestations. Cirrhosis is the end result of all chronic liver disease. Interactions between the functions of the heart and the liver have been described, with liver diseases affecting the heart, heart diseases affecting the liver, and conditions that simultaneously affect both. Results of experimental and clinical studies have shown impaired myocardial contractility as well as electrophysiological abnormalities in patients with cirrhosis<sup>1</sup>. Alcohol being one of the most common causes of liver cirrhosis can itself cause cardiomyopathy, which is termed as “Alcoholic cardiomyopathy”. These abnormalities were initially thought to be a manifestation of alcoholic cardiomyopathy. But in the mid 1980’s, studies in nonalcoholic patients and in experimental animal models showed a similar pattern of

blunted cardiac contractile responsiveness<sup>2-4</sup>. Thus these cardiovascular changes are grouped as a separate entity and now termed Cirrhotic cardiomyopathy<sup>5-8</sup>.

Diastolic dysfunction is present in the vast majority of patients with cirrhotic cardiomyopathy, and simple echocardiographic indices such as the E/A (early/late diastolic volume) ratio may detect diastolic dysfunction even at rest. This may therefore represent the best available screening tool to diagnose cardiac dysfunction<sup>18</sup>.

Our study was designed to precisely evaluate the changes in cardiovascular system in a group of patients with Chronic liver disease-Cirrhosis based on clinical examination, electrocardiography, and M-Mode 2-dimensional echocardiography.

### Aims and Objectives

#### Primary objective

- To assess the Prevalence of Cirrhotic cardiomyopathy in patients with liver cirrhosis.

#### Secondary objective

- To establish its correlation with Child-Pugh score.

## MATERIALS AND METHODS

**Study design:** Hospital based Cross sectional study

**Study area:** Department of General Medicine, Sri Manakula Vinayagar Medical College, Kalitheerthalkuppam.

**Duration of study:** 18 months from date of approval.

**Study Participants:** All patients with liver cirrhosis admitted under General Medicine and Gastroenterology department.

**Sample Size:** Sample size was calculated by purposive study considering the average number of cases with cirrhosis and set to be 93.

#### Inclusion Criteria:

- All patients with liver cirrhosis.

#### Exclusion Criteria:

- Patients with establish Hypertension.

- Patients with diagnosed Diabetes Mellitus.
- Patients who are a known case of Coronary artery disease, other heart diseases.
- Previous history of cardiac surgery.
- Known case of congenital heart disease.

### Methodology:

A detailed history was elicited from the patient with special reference to cardiovascular symptoms. A thorough general and systemic examination was done. All the patients were subjected to routine investigations viz, Blood urea sugar, complete haemogram & liver function tests. All patients were subjected to ultrasound scan abdomen to confirm the diagnosis of chronic liver disease. Patients with ascites underwent abdominal paracentesis and fluid was analyzed for protein content and cells after obtaining written consent. All patients were then subjected to electrocardiography and M- mode 2- Dimensional echocardiography.

### Source of Data:

Patients who were admitted in General Medicine and Medical Gastroenterology, SMVMCH with clinical suspicion or biochemical abnormality suggestive of liver cirrhosis

## RESULTS

Table 1: Association between Cirrhotic cardiomyopathy and Child Pugh score

Child Pugh Score	Cirrhotic cardiomyopathy	
	Present	Absent
A	6 (7.8)	2 (12.5)
B	33 (42.9)	9 (56.2)
C	38 (49.4)	5 (31.2)
Total	77 (100.0)	16 (100.0)
P value		0.45

Cirrhotic cardiomyopathy was present in 77 patients of which 38 patients 49.4% were under Child C

Table 2: Association between Cirrhotic cardiomyopathy and Ejection fraction

Ejection fraction	Cirrhotic cardiomyopathy	
	Present	Absent
Normal	49 (63.6)	16 (100.0)
Decreased	28 (36.4)	0 (0.0)
Total	77 (100.0)	16 (100.0)
P value		0.002

Reduced ejection fraction was observed in 28 patients (36.4%) with cirrhotic cardiomyopathy

Table 3: Association between Cirrhotic cardiomyopathy and QT interval

QT interval	Cirrhotic cardiomyopathy	
	Present	Absent
Normal	35 (45.5)	16 (100.0)
Prolonged	42 (54.5)	0 (0.0)
Total	77 (100.0)	16 (100.0)
P value		0.01

QT prolongation was observed in 42 patients (54.5%) with cirrhotic cardiomyopathy

Table 4: Association between Cirrhotic cardiomyopathy and Sex

Gender	Cirrhotic cardiomyopathy	
	Present	Absent
Female	10 (13.0)	4 (25.0)
Male	67 (83.0)	12 (75.0)
Total	77 (100.0)	16 (100.0)
P value		0.22

67 patients with cirrhotic cardiomyopathy were males which accounted for 83%

Table 5: Association between Cirrhotic cardiomyopathy and Alcohol

Alcohol addiction	Cirrhotic cardiomyopathy	
	Present	Absent
Present	61 (79.2)	10 (62.5)
Absent	16 (20.8)	6 (37.5)
Total	77 (100.0)	16 (100.0)
P value		0.15

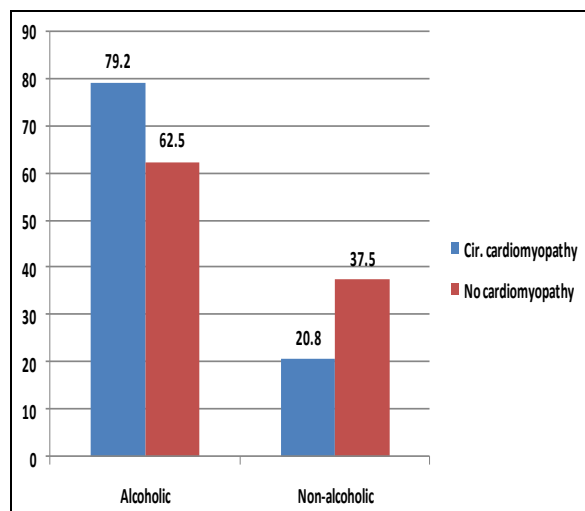


Fig 1: 61 Patients with cirrhotic cardiomyopathy (79.2%) were alcoholics

Table 6: Association between Cirrhotic cardiomyopathy and Smoking

Smoker	Cirrhotic cardiomyopathy	
	Present	Absent
Yes	45 (58.4)	6 (37.5)
No	32 (41.6)	10 (62.5)
Total	77 (100.0)	16 (100.0)
P value		0.25

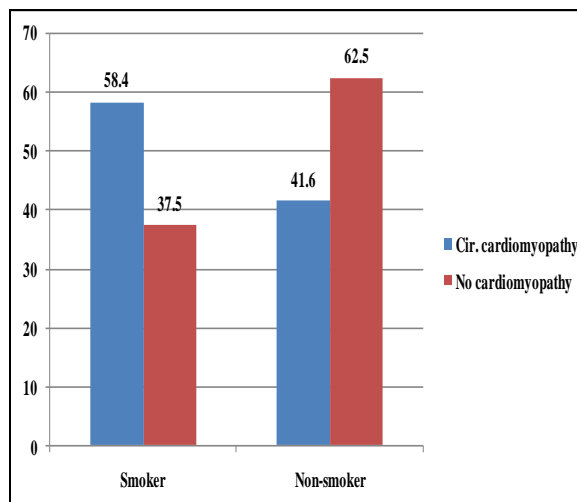


Fig 2: 58.4% of patients with cirrhotic cardiomyopathy were smokers

Table 7: Association between Cirrhotic cardiomyopathy and Liver cell failure

Signs of LF	Cirrhotic cardiomyopathy	
	Present	Absent
Yes	50 (64.9)	7 (43.8)
No	27 (35.1)	9 (56.2)
Total	77 (100.0)	16 (100.0)
P value		0.11

About 64.9% of patients exhibited features of liver cell failure

Table 8: Association between Variables and Cirrhotic cardiomyopathy

Variables	Presence of Cirrhotic cardiomyopathy		P value
	Yes Mean (S.D)	No Mean (S.D)	
Age	50.66 (12.34)	45.44(12.37)	0.15
Systolic BP	96.75(12.71)	97.38(9.28)	0.45
Diastolic BP	65.35(7.38)	67.75(5.50)	0.12
Urea	26.53(14.12)	32.25(20.13)	0.33
Creatinine	.94(0.38)	1.0(0.42)	0.68
Hemoglobin	9.59(2.53)	9.9375(3.15)	0.7
Platelet count	142.45(79.77)	131.88(80.31)	0.4
SGOT	83.00(87.68)	51.94(40.45)	0.08
SGPT	31.29(17.84)	37.75(38.82)	0.88
ALP	188.91(114.16)	153.31(79.71)	0.1
BT	5.6182(6.36)	2.67(2.01)	0.08
BD	3.0013(3.92)	1.06(1.11)	0.06
Protein	7.16(0.68)	7.45(0.79)	0.14
Albumin	3.34(0.65)	3.78(0.78)	0.04
Prothrombin time (T)	21.2000(6.39)	18.2067(2.85)	0.08
PT@	13.497(1.69)	13.393(0.63)	0.73
INR	1.6234(0.51)	1.3533(0.23)	0.04
Ejection fraction	50.74(10.91)	56.25(4.65)	0.18
QT time interval	443.44(30.51)	417.25(16.25)	0.01
	N= 77	N=16	

Considering the variables Albumin, INR, Prothrombin time and QT interval were statistically significant.

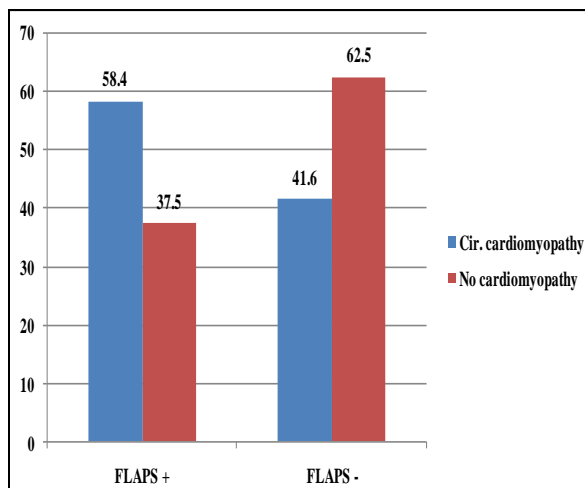


Fig 3: 58.4% with cirrhotic cardiomyopathy were under hepatic encephalopathy

Table 9: Association between Cirrhotic cardiomyopathy and Diastolic dysfunction

Child Pugh Score	Diastolic dysfunction	
	Present	Absent
A	5 (8.9)	1 (4.8)
B	19 (33.9)	14 (66.7)
C	32 (57.1)	6 (28.6)
Total	56 (100.0)	21 (100.0)
P value		0.03

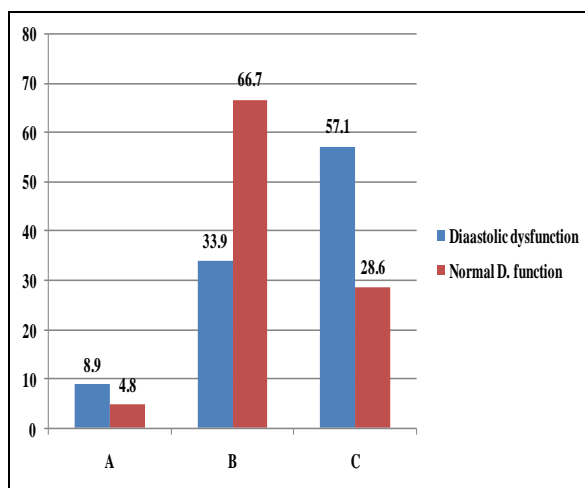


Fig 4: Of the patients with cirrhotic cardiomyopathy 57.1% were under Child C.

Table 10: Association between QT prolongation and Child Pugh score

Child Pugh Score	QT prolongation in ECG	
	Present	Absent
A	4 (9.5)	2 (5.7)
B	21 (50.0)	12 (34.3)
C	17 (40.5)	21 (60.0)
Total	42 (100.0)	35 (100.0)
P value		0.23

Table 11: Association between Ejection fraction and Child Pugh score

Child Pugh Score	Ejection fraction	
	Normal	Decreased
A	4 (8.2)	2 (7.1)
B	25 (51.0)	8 (28.6)
C	20 (40.8)	18 (64.3)
Total	49 (100.0)	28 (100.0)
P value		0.03

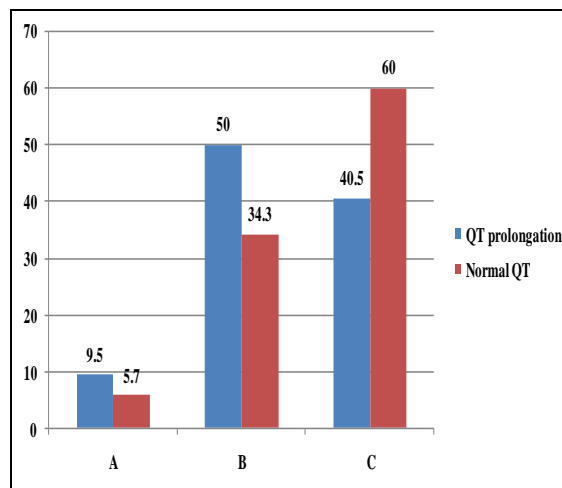


Fig 5: 50% of patients with cirrhotic cardiomyopathy were under Child B.

Table 12: Association between Cirrhotic cardiomyopathy and Diastolic dysfunction

Diastolic dysfunction	Cirrhotic cardiomyopathy	
	Present	Absent
Present	56 (72.7)	0 (0.0)
Absent	21 (27.3)	16 (100.0)
Total	77 (100.0)	16 (100.0)
P value		0.03

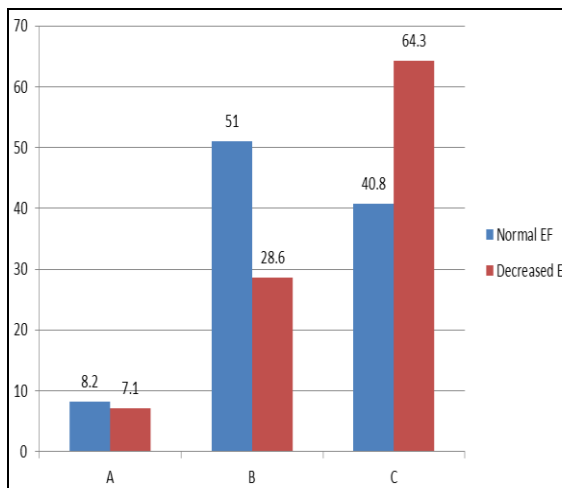


Fig 6: 51% of patients with cirrhotic cardiomyopathy were under Child B.

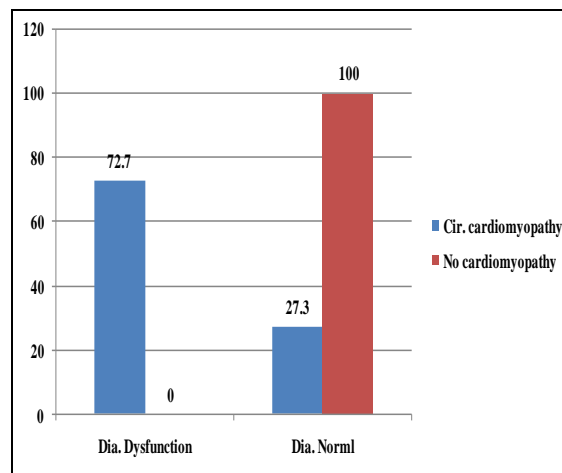


Fig 7: 72.2% were affected by Diastolic dysfunction which was statistically significant

## DISCUSSION

77 (82.8%) patients had one or more features of cirrhotic cardiomyopathy, whereas 16 patients (17.2%) who participated in our study did not have any features or findings suggestive of cirrhotic cardiomyopathy

Among the three stages A,B,C of Child Pugh classified patients the occurrence of cirrhotic cardiomyopathy was found in 6,33,38 patients respectively in each group which accounted for 7.8%, 42.9% & 49.9% respectively.

While assessing the components of cirrhotic cardiomyopathy, 28 (30.1%) patients suffered from systolic dysfunction, 56 (60.2%) patients had diastolic dysfunction and 42 (45.2%) patients had QT prolongation in ECG, of which only systolic dysfunction had statistical significance ( $p=0.002$ ).

On sorting the components of cirrhotic cardiomyopathy according to Child Pugh score out of the 28 patients with systolic dysfunction, 7.1% belonged to Child A, 28% belonged to Child B and 64% patients belonged to Child C. Although the presence of systolic dysfunction in Child C patients was far greater than patients of Child B & Child A, there was no statistical significance on comparing with Child Pugh staging of Cirrhosis ( $p=0.124$ ).

Most of the cirrhotic cardiomyopathy patients had Diastolic dysfunction which is found either alone or in combination with other features such as systolic dysfunction and QT prolongation. Of all the patients with diastolic dysfunction, 5 (8.9%) patients belonged to Child A, 19 (33.9%) belonged to Child B and 32 (57.1%) patients belonged to Child C groups. This association of diastolic dysfunction with Child Pugh classification was significant with a  $p$  value of 0.035.

On considering the feature of QT prolongation, 4 patients were in Child A, 21 in Child B and 17 patients with Child C. there was no significant relation between QT prolongation and severity of disease ( $p=0.231$ ).

While assessing other parameters like age, sex, blood pressure, renal function, haemoglobin levels, platelet count, liver function test and coagulation profile it is found that none of the parameters had clinical significance except serum albumin levels ( $p=0.038$ ) and INR values ( $p=0.043$ ).

Our study clearly demonstrated that hyperdynamic circulation progressively increase with the severity of the liver dysfunction. The study quoted for this include MengHG, Lin HC et al 1994 which also concludes that the severity of cirrhosis is closely related to the degree of hyperkinetic circulatory state and portal hypertension.

## CONCLUSION

Our study demonstrates that there is cardiac involvement in about 82.7% of study participants which is far higher than previous studies conducted. Cardiomyopathy is a frequent complication of liver cirrhosis. Diastolic dysfunction constitutes the major manifestation of cirrhotic cardiomyopathy. Cardiac evaluation is a pre-requisite in patients with cirrhosis undergoing stress like surgery because the presence of cardiac involvement adds to the morbidity and mortality.

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