

# To Assess the Frequency of Cirrhotic Ardiomyopathy among Patients with Cirrhosis of Liver

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## ABSTRACT

**Aim:** To assess the frequency of cirrhotic cardiomyopathy among patients with cirrhosis of liver.

**Study design:** Cross sectional survey (descriptive).

**Setting:** The study was done in the medical Unit IV Services Hospital, Lahore.

**Duration of study:** Study was carried out over a period of six months from 18-05-2012 to 17-11-2012.

**Methods:** A total of 300 patients were included in this study. Presence of diastolic dysfunction (i.e increased E/A ratio or prolonged deceleration time as per operational definition) on echocardiography done by a consultant cardiologist confirmed diagnosis of cirrhotic cardiomyopathy in patients of liver cirrhosis.

**Results:** Majority of the patients i.e. 148 (49.4%) were between 41-50 years of age while only patients 37 (12.3%) were between 20-30. Mean age was  $46.7 \pm 8.9$  years. Regarding sex distribution, 173 patients (57.7%) were male while 127 patients (42.3%) were female. Child-Pugh classification as follows: 38 patients (12.7%) belonged to Child-Pugh A, 118 patients (39.3%) belonged Child-Pugh B and 144 patients (48.0%) belonged to Child-Pugh C. Cirrhotic cardiomyopathy was found to be 147 (49.0%). Stratification was done for stage of disease by Child Pugh Class.

**Conclusion:** This study demonstrates that cirrhotic cardiomyopathy is a common occurrence. There is a direct relationship of cirrhotic cardiomyopathy with the severity of liver disease whereas electrophysiological, echocardiographic and biochemical changes provide base for the condition.

**Keywords:** Cirrhotic cardiomyopathy, liver cirrhosis, echocardiography

## INTRODUCTION

Cirrhosis is very common ailment in Pakistan<sup>1</sup>. It results from necrosis of liver cells followed by fibrosis and nodule formation<sup>2</sup>. It has several major complications<sup>2</sup>. One of them is cirrhotic cardiomyopathy and its prevalence is 50%<sup>3</sup>.

Cardiomyopathy is a group of diseases of myocardium that affects the mechanical or electrical function of heart<sup>4</sup>. Cirrhotic cardiomyopathy is a recently recognized condition in liver cirrhosis which occurs in the absence of any other associated cardiac disease<sup>5</sup>. It is usually clinically mild or silent, however, overt heart failure can be precipitated by stresses such as liver

transplantation or transjugular intrahepatic portosystemic shunt insertion<sup>6</sup>. Moreover, it may play a role in the pathogenesis of hepatorenal syndrome<sup>6</sup>. It is increasingly recognized as a cause of potential morbidity and mortality in the natural history of cirrhosis<sup>7</sup>.

It can be diagnosed if evidence of either systolic or diastolic dysfunction (confirmed on echocardiography), together with supporting criteria such as electrophysiological abnormalities, or abnormal serum markers, is present<sup>7</sup>. No definitive diagnostic criteria are present yet<sup>8</sup>.

Treatment of cirrhotic cardiomyopathy is unsatisfactory<sup>9</sup>. Beta-blockers may be given in patients with prolonged QT interval because it is reported by Henriksen et al that even an acute administration of single dose of propranolol in cirrhotic patients improves prolonged QT interval. Long-term aldosterone antagonism may be helpful in preventing myocardial hypertrophy<sup>7</sup>. Vasodilators, like ACE-inhibitors should not be used due to risk of further aggravation of the systemic vasodilatory state [9]. Once overt heart failure develops measures like bed rest, salt and water restriction, diuretic therapy and careful preload reduction by appropriate drugs should be considered<sup>10</sup>.

Cirrhotic cardiomyopathy is still under diagnosed and remains untreated, especially in developing countries like Pakistan due to lack of awareness of this condition and absence of specific diagnostic criteria. Rationale of my study is to assess the frequency of cirrhotic cardiomyopathy in patients with cirrhosis of liver in order to create awareness of presence of this condition, so that prompt recognition and management can be done especially in patients undergoing stress or surgical procedures. There are no local studies available on prevalence of cirrhotic cardiomyopathy. So I want to generate data for our own population.

## MATERIAL AND METHODS

This cross sectional (descriptive) study was done in the medical Unit IV Services Hospital, Lahore which was carried out over a period of six months from 18-05-2012 to 17-11-2012. Sample size of 300 cases is calculated with 95% confidence level, 6% margin of error and taking expected percentage of cirrhotic cardiomyopathy i.e., 50% in patients with liver cirrhosis. Sampling technique was non probability purposive sampling. Patients of both genders between 20-60 years of age with with cirrhosis of liver (as per operational definition) were included in the study. Patients having congenital heart disease on history and previous clinical record, ischemic heart disease on history and previous clinical record and vulvular heart disease on history and past clinical record were excluded from the study.

A total of 300 cases fulfilling the inclusion criteria were selected from Outpatient department and emergency, Services Hospital, Lahore, after written informed consent. Their information was collected through a proforma. It was included demographic information like name, age and sex. Child-pugh class was calculated for all patients (attached as annexure-B). Patients were referred to cardiology unit. Services Hospital, Lahore for echocardiography to be done by a single consultant cardiologist after informed consent. Presence of diastolic dysfunction (i.e. increased E/A ratio or prolonged deceleration time as per operation definition was confirmed

our diagnosis of cirrhotic cardiomyopathy in patients of liver cirrhosis. All suspected effect modifiers like stage of liver disease was controlled through stratification.

Data was collected and compiled in the computer and analyzed using SPSS version 16.0. Mean and standard deviation was calculated for quantitative variables like age. Gender, presence of cirrhotic cardiomyopathy and stage of cirrhosis as qualitative variables, presented as frequency and percentage. Data was stratified for stage of disease by Child Pugh Class (A, B, C).

## RESULTS

A total of 300 patients were selected in this study during the study period of six month from 18-05-2012 to 17-11-2012. Majority of the patients i.e. 148 (49.4%) were between 41-50 years of age while only 37 patients (12.3%) were between 20-30. Mean age was  $46.7 \pm 8.9$  years (Table 1).

Regarding sex distribution, 173 patients (57.7%) were male while 127 patients (42.3%) were female (Table-2).

Child-Pugh classification as follows: 38 patients (12.7%) belonged to Child-Pugh A, 118 patients (39.3%) belonged Child-Pugh B and 144 patients (48.0%) belonged to Child-Pugh C (Table-3). Cirrhotic cardiomyopathy was found to be 147 (49.0%) (Table-4). Table-5 shows stratification for stage of disease by Child Pugh Class.

Table 1: Distribution of patients by age (n=300)

Age in years	=n	%age
20-30	37	12.3
31-40	49	16.3
41-50	148	49.4
51-60	66	22.0

Mean $\pm$ SD:  $46.7 \pm 8.9$

Table 2: Distribution of patients by sex (n=300)

Gender	=n	%age
Male	173	57.7
Female	127	42.3

Table 3: Distribution of patients by Child-Pugh classification (n=300)

Child Pugh classification	=n	%age
A	38	12.7
B	118	39.3
C	144	48.0

Table 4: Distribution of patients by cirrhotic cardiomyopathy (n=300)

Cirrhotic cardiomyopathy	=n	%age
Yes	147	49.0
No	153	51.0

Table 5: Stratification for stage of disease by Child Pugh Class (n=147)

Child classification	Pugh	Cirrhotic cardiomyopathy	
		=n	%age
A		18	12.2
B		56	38.1
C		73	49.7

## DISCUSSION

Cirrhotic cardiomyopathy is a pathological condition defined as “a chronic cardiac dysfunction in patients with cirrhosis characterized by blunt responsiveness to stress and/or altered diastolic relaxation with electrophysiological abnormalities in the absence of known cardiac disease”<sup>11</sup>.

Liver cirrhosis is associated with several cardiovascular disturbances. Patients with cirrhosis of liver have normal systolic function at rest. As the cirrhosis advances a hyperdynamic circulation characterized by tachycardia, high ejection fraction, and increased cardiac output develops. This systolic dysfunction is unmasked when the patient is put under physical or pharmacological stress<sup>12</sup>. In bacterial infection such as spontaneous bacterial peritonitis where a high cardiac output is required, systolic in-competence becomes evident.

Overt heart failure is not generally a feature of cirrhotic cardiomyopathy, because the associated marked vasodilatation accompanying the hyperdynamic circulation significantly reduces ventricular afterload.

The evidence of in-ability to mount a sufficient cardiac output is further strengthened when patient develops hepatorenal syndrome as a result of reduced cardiac output. The cardiac systolic function is suppressed by negative inotropic cytokines such as TNF- $\alpha$  and interleukin-1b produced by infection leading to the development of Hepatorenal syndrome<sup>13</sup>.

In this study presence of cirrhotic cardiomyopathy was directly proportional with the severity of cirrhosis associated with echocardiographic changes observed that frequency of cirrhotic cardiomyopathy increased from 25% in child-Pugh class A to 51% in class B and up to 60% in child-Pugh class C associated with prolong QT-interval and also observed a proportional increase in the frequency of cirrhotic cardiomyopathy according to the severity of cirrhosis of liver with increase in pro-BNP. The agreed components of this disorder include three

phenomena: electrophysiological changes, echocardiographic abnormalities and the fluctuation of levels of Natriuretic peptides<sup>14</sup>.

In present study, cirrhotic cardiomyopathy was observed in 49% of patients with liver cirrhosis. This is comparable with the study carried out by Shaikh et al, they demonstrated 44.6% cirrhotic cardiomyopathy in their study<sup>15</sup>.

The echocardiographic abnormalities present in these patients were classified into two types: systolic dysfunction and diastolic dysfunction[69]. In this study two dimensional echo with color flow Doppler ultrasound technique (via the transthoracic approach) was utilized to evaluate for these abnormalities.

Systolic dysfunction was presumed to be present when ejection fraction was >55% at rest. Classically other studies like Baik et al<sup>16</sup> focused on stress inducing environments during echocardiography, whereas this study focused on echo abnormalities at rest.

The positive points of my study are study design is simple, non-invasive technique (ECHO) is used, which is widely available in cardiology units. The results are comparable to other similar studies.

Identifying cirrhotic cardiomyopathy at an early stage and addressing it will reduced morbidity and mortality of cirrhotic patients and improve their quality of life.

## CONCLUSION

This study demonstrates that cirrhotic cardiomyopathy is a common occurrence. There is a direct relationship of cirrhotic cardiomyopathy with the severity of liver disease whereas electrophysiological, echocardiographic and biochemical changes provide base for the condition.

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