Original Research Article

# Study of cardiac dysfunctions in chronic liver disease patients

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## Abstract

**Background**: Cardiac dysfunctions are a major cause of mortality in chronic liver disease patients, especially those who undergo surgical procedures like TIPS, LT. **Aims and Objectives:** The present study aimed to determine the prevalence of cardiac dysfunctions in chronic liver disease patients**. Methodology**: The present study was conducted as an observational study at Hamidia Hospital Bhopal. The study included a total of 75 patients diagnosed as a case of chronic liver disease who were then interviewed and their demographic information and symptoms and presentation was obtained. All the patients were then subjected to detailed physical examination, cardiological assessment using ECG and 2D ECHO and blood investigations. **Results**: The Mean age of patients without Cardiac dysfunction was 40.3 years, whereas the Mean age of patients with Cardiac dysfunction was 46.25 years. Cardiac dysfunctions in CLD patients most commonly occurred in age group of 51-60 years and 96% cases were males and only 4% cases were females. QTc prolongation was found in 28% of patients. The prevalence of Diastolic Dysfunctions was 24% and the prevalence of Systolic Dysfunctions in CLD patients was 20 %. **Conclusion**: Subclinical cardiac dysfunctions are present in a significantly large number of patients with Chronic liver disease. These dysfunctions are associated with more cardiovascular complications especially when these patients are subjected to surgical procedures such as TIPS, liver transplantation. Hence there is a need for a comprehensive cardiac assessment and standardized diagnostic protocol for patients of liver cirrhosis, especially undergoing procedures such as TIPS, liver transplantation.

**Keywords:** cirrhosis, cardiac dysfunction, QT prolongation.



## Introduction

Cirrhosis is a major cause of mortality and morbidity globally. The burden and the etiologies vary in different locations and demographic groups. A major cause of liver-related deaths in the world[1], it constitutes the terminal stage of liver fibrosis in which the architecture is distorted[2]. In the early stages, cirrhosis is termed compensated, with relatively few symptoms. Decompensations such as ascites, esophageal variceal bleed, hepatic encephalopathy, and increased bilirubin concentration, therefore leads the patient to seek medical care, and with the onset of decompensation, the morbidity and mortality of liver cirrhosis rises as well with the one-year case fatality rates rising to as high as 80% depending upon the etiology[3,4]. The WHO estimates that cirrhosis is responsible for 1.1% of all deaths occurring worldwide[5]. The various known etiologies of cirrhosis are –fatty liver disease (alcoholic and non-alcoholic), viral (hepatitis B, hepatitis C and hepatitis D), Autoimmune (autoimmune hepatitis, primary biliary cirrhosis, primary sclerosing cholangitis, IgG4 cholangiopathy), Chronic biliary disease(recurrent bacterial cholangitis, bile duct obstruction), Storage disease (Wilson's disease, hemochromatosis, alpha-1 antitrypsin deficiency), Cardiovascular causes (Budd Chiari syndrome, and Osler's disease) and rare causes include medications and porphyria[6]. In India, a region contributing to almost one-third of the population of Asia, the studies show that the epidemiology of cirrhosis has changed considerably, with alcohol being the most common etiology for liver cirrhosis[7]. Other Indian studies show that alcohol is responsible for 49% of overall cases of cirrhosis[8], a particular study from central India showed 46% of all cases of cirrhosis attributable to alcohol[9]. Decompensated cirrhosis leads to hepatic dysfunction and/or portal hypertension and either or both of these are responsible for complications like ascites, varices, coagulation disorders, spontaneous bacterial peritonitis, hepatic encephalopathy, hepatorenal syndrome, hepatopulmonary syndrome and hepatocellular carcinoma. The presence of cardiomyopathy in cirrhotic patients has been described since 1960s, though it had been erroneously attributed to alcoholic cardiotoxicity[1,6,7]. In patients of CLD without known cardiac dysfunction, new terminology "cirrhotic cardiomyopathy" was introduced which encompasses systolic & diastolic dysfunctions of heart and electrophysiological abnormalities[8-11]. The term "Hyperdynamic syndrome" encompasses increased cardiac output, heart rate, decreased peripheral vascular resistance and mean arterial BP[12-15]. The endogenous vasodilators activity and production is increased. These include NO, CO, cannabinoids). It has been observed that the CLD patients with subclinical cardiac dysfunctions are at high risk of cardiovascular complications during or after the procedure. Post op morbidity and mortality is significantly high. Similarly in patients undergoing liver transplant post op morbidity

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and mortality is significantly high. All these data suggest that there is a need for a careful cardiovascular assessment in patients of chronic liver disease, especially those who are planned for surgical procedures like TIPS, LT. Also there is a need for standard diagnostic protocols for these patients.

**Methodology**

The present study was conducted as an observational study at Hamidia Hospital Bhopal. The study included a total of 75 patients diagnosed as a case of chronic liver disease and admitted in the Hamidia Hospital Bhopal. All the CLD patients were interviewed and their demographic information and symptoms and presentation based on predesigned structured proforma was obtained. However, patients not willing to participate in the study were excluded. Patients with clinical features and laboratory tests suggestive of chronic liver disease were included in the study whereas patients of ischemic heart disease, valvular heart disease, conduction defects, cardiac arrhythmias, congenital heart defects, DM type 2, hypertension, hypothyroidism, hyperthyroidism were excluded from the study.

After obtaining ethical clearance from Institute's ethical Committee, written consent was obtained from patients or their relatives. All the patients were then subjected to detailed general and physical examination. Height, weight, BMI and abdominal circumference was obtained for all the patients. Vitals such as pulse, Blood pressure, respiratory rate, SPO2 was measured at baseline and documented. All the patients were then subjected to detailed investigations including CBC, LFT, RFT, lipid profile, RBS, Ascitic fluid analysis, ECG, 2D ECHO. All the findings were noted in questionnaire.

Statistical analysis-Data was compiled using MS Excel and analyzed using IBM SPSS software version 22. Patients were categorized into two groups according to presence or absence of cardiac dysfunctions (QTc prolongation, systolic dysfunction, diastolic dysfunction). Chi square test was applied to assess the association between proportions whereas mean values were compared using unpaired t test. P value less than 0.05 was considered statistically significant.

**Results**

**Table 1:Age distribution of study participants**

| Age Group (Years) | Without cardiac dysfunction | With Cardiac Dysfunction |
|---|---|---|
| ≤ 20 | 0 | 0 |
| 21-30 | 10 | 4 |
| 31-40 | 12 | 6 |
| 41-50 | 12 | 9 |
| 51-60 | 8 | 10 |
| ≥60 | 1 | 3 |
| $\chi 2$ | 4.71 | |
| P Value | 0.318 | |

**Table 2:Etiology of chronic liver disease**

| Etiology | With Cardiac Dysfunction (%) | Without Cardiac Dysfunctions (%) | Total (%) | $\chi 2$ | P Value |
|---|---|---|---|---|---|
| Alcohol | 23 (30.67) | 30 (40) | 53 (70.67) | 0.0393 | 0.843 |
| Hepatitis B | 2 (2.66) | 5 (6.67) | 7 (9.33) | 0.627 | 0.428 |
| Hepatitis C | 1 (1.33) | 0 | 1 (1.33) | | |
| Wilson's | 1 (1.33) | 3 (4) | 4 (5.33) | 0.539 | 0.462 |
| Others | 5 (1.33) | 5 (6.67) | 10 (13.33) | | |
| Total | 32 (42.67) | 43 (57.33) | 75 | | |

**Table 3: Prevalence of QT prolongation in CLD patients**

| QT Prolongation | Frequency (n=75) | Percentage |
|---|---|---|
| Present | 21 | 28 |
| Absent | 54 | 72 |

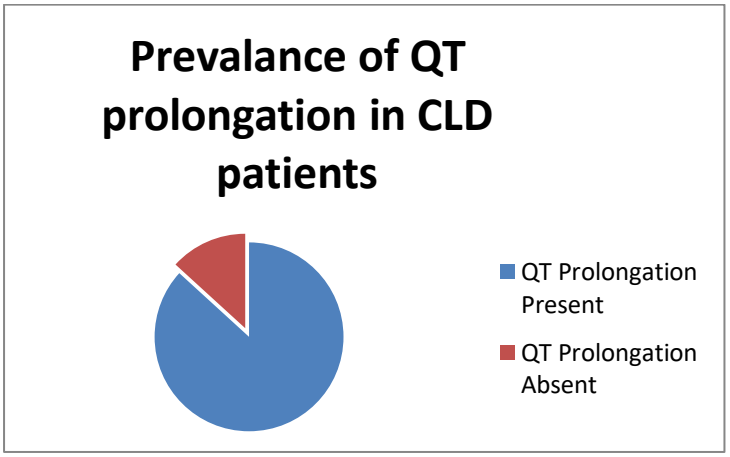


**Fig. 1:Prevalence of QT prolongation in CLD patients**

**Table 4: Prevalence of Diastolic Dysfunction in CLD patients**

| Diastolic Dysfunction | Frequency (n=50) | Percentage |
|---|---|---|
| Present | 18 | 24 |
| Absent | 57 | 76 |

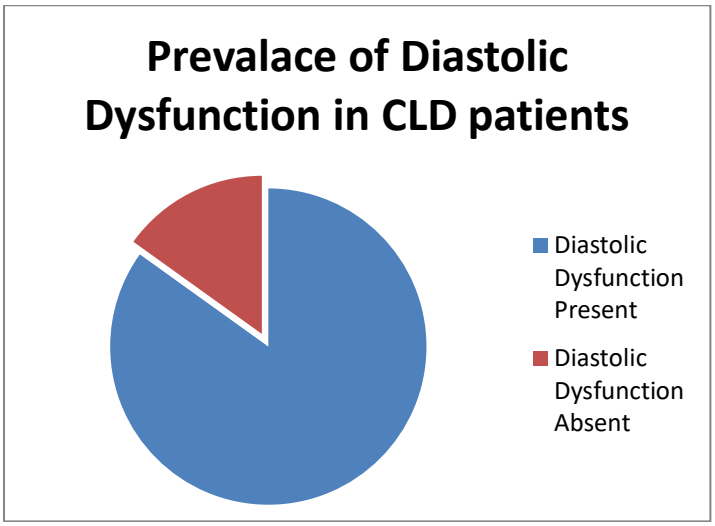


**Fig. 2: Prevalence of Diastolic Dysfunction in CLD patients**

**Table 5: Prevalence of Systolic Dysfunction in CLD patients**

| Systolic Dysfunction | Frequency (n=75) | Percentage |
|---|---|---|
| Present | 15 | 20 |
| Absent | 60 | 80 |

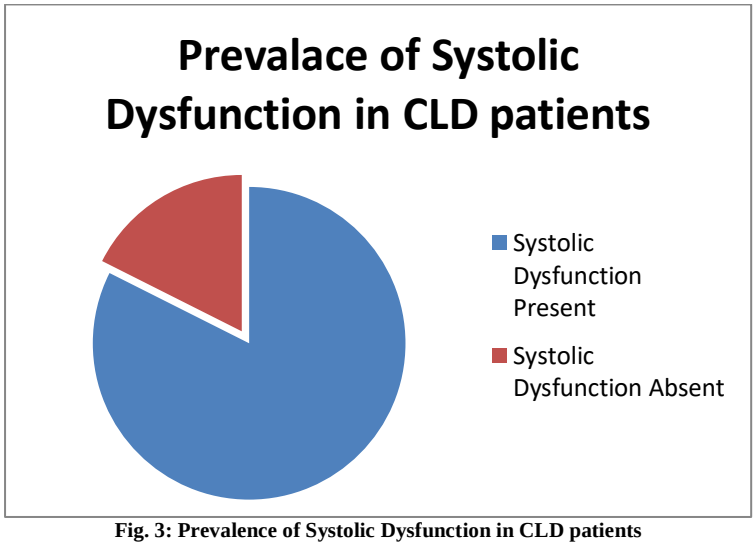


**Fig. 3: Prevalence of Systolic Dysfunction in CLD patients**

**Discussion**

In patients with Chronic Liver Disease, subclinical cases of cardiac dysfunctions are a major cause of morbidity and mortality in patients undergoing surgical procedures such as TIPS, Liver transplantation. Our study was aimed at finding the prevalence of cardiac dysfunctions in CLD patients. In this study, total 75 known cases of CLD without any known cardiac diseases were screened for cardiac dysfunctions. Among them majority (72) of patients were male, this was in accordance with other studies done such as Abraham Sonny et al. Most of the patients were in the age group of 41-50 YEARS (28%), followed by 24% belonging to age groups 21-30 years and 51-60 years each. The Mean age of patients without Cardiac dysfunction population is 40.3 years, whereas the Mean age of patients with Cardiac dysfunction population is 46.25 years. Cardiac dysfunctions in CLD patients most commonly occurred in age group of 51-60 years.

The most common etiology for Chronic Liver Disease in the study participants in both the groups i.e. with and without cardiac dysfunctions was Alcohol (70.67%) followed by hepatitis B (9.33%). Among total 75 participants, total of 53 patients had alcohol related liver disease, 7 patients has hepatitis B related liver disease. Other less common causes include Wilson's disease (4), Hepatitis C (1). 10 patients were included in other causes including 1 autoimmune cause, 9 unknown causes as either their diagnostics were not available at our centre or they had no diagnosed etiological causes for cirrhosis. Finding of current study is in consistent with other studies like one

done by Weigand et al, Shivram prasad et al, and Kirnake et al. In all these studies, Alcohol is overall the most common etiology for cirrhosis[6,8].

**Conclusion**

Among 75 study participants, QTc prolongation was found in 21 patients (28%). The prevalence of Diastolic Dysfunctions was 24%, i.e. Diastolic dysfunction was seen in 18 patients out of total 75 study participants. The prevalence of Systolic Dysfunctions in CLD patients was 20 %, i.e. it was seen in 15 patients out of 75 study participants. This was in accordance with previous studies done by Carey et al. (1995)[16], Tiukinhoy- Liang et al. (2006)[17], Patel et al. (2011) where prevalence was respectively 27%, 26% and 18%.

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