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Original Article

Cardiac Dysfunction in Patients with Chronic Liver Disease: A Comprehensive Study

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ABSTRACT:

Background: Undergoing transjugular intrahepatic portosystemic shunt (TIPS) procedures and liver transplantation (LT). The specific objectives were to assess the frequency of cardiac abnormalities, such as diastolic dysfunction, systolic dysfunction, and arrhythmias, in this patient population, and to investigate potential risk factors associated with these cardiac issues. The study also sought to evaluate the impact of pre-existing cardiac dysfunction on postoperative outcomes and mortality in chronic liver disease patients undergoing TIPS and LT. **Methods**: Furthermore, the study gathered relevant clinical and demographic information from these patients. Physical examinations were conducted to assess their overall health. Cardiological evaluations included electrocardiograms (ECG) and two-dimensional echocardiograms (2D ECHO) to detect cardiac abnormalities. Blood investigations were performed to obtain relevant health data and identify potential risk factors. **Results**: The study found notable differences in the mean age of patients with and without cardiac dysfunction, with those experiencing cardiac dysfunction having a higher mean age (46.15 years) compared to those without (40.2 years). Cardiac dysfunctions in chronic liver disease (CLD) patients were predominantly observed in the age group of 51-60 years, and a significant majority (95%) of these cases were male, while only a small percentage (5%) were female. The study also revealed a prevalence of diastolic dysfunction in 24% of CLD patients, and systolic dysfunction was prevalent in 20% of the same patient population. **Conclusion**: The study underscores a critical concern regarding subclinical cardiac dysfunctions found in a substantial number of chronic liver disease (CLD) patients. These subclinical dysfunctions have significant implications, particularly when these patients undergo surgical procedures like transjugular intrahepatic portosystemic shunt (TIPS) or liver transplantation.

Keywords: cirrhosis, cardiac dysfunction, QT prolongation.

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INTRODUCTION

Cirrhosis represents a significant global health concern, contributing substantially to both mortality and morbidity. This condition's prevalence and underlying causes vary across regions and demographic groups. Cirrhosis is the advanced stage of liver fibrosis, characterized by the distortion of liver architecture[1,2]. In its early phases, cirrhosis is considered "compensated" and typically presents with minimal symptoms. However, as the disease progresses, "decompensations" such as ascites, esophageal variceal bleeding, hepatic encephalopathy, and elevated bilirubin levels become evident, prompting patients to seek medical attention. With the onset of decompensation, the morbidity and mortality associated with liver cirrhosis significantly increase, with one-year case fatality rates reaching as high as 80%, depending on the underlying cause of cirrhosis. This highlights the critical importance of early diagnosis and management to improve patient outcomes[3,4]**.**Cirrhosis is a global health concern, contributing to a significant portion of all deaths worldwide. The World Health Organization (WHO) estimates that cirrhosis is responsible for approximately 1.1% of all global deaths. This condition can arise from a diverse range of underlying causes. These include fatty liver diseases (both alcoholic and non-alcoholic), viral infections (hepatitis B, hepatitis C, and hepatitis D), autoimmune conditions (such as autoimmune hepatitis, primary biliary cirrhosis, primary sclerosing cholangitis, and IgG4 cholangiopathy), chronic biliary diseases (resulting from recurrent bacterial cholangitis or bile duct obstruction), storage diseases (like Wilson's disease, hemochromatosis, and alpha-1 antitrypsin deficiency), cardiovascular factors (including Budd-Chiari syndrome and Osler's disease), and rare causes such as drug-induced liver injury and porphyria. Understanding the diverse etiologies of cirrhosis is essential for effective diagnosis and management[5,6,7]. In India, a country with a substantial portion of the Asian population, the epidemiology of cirrhosis has undergone significant changes. Alcohol has emerged as the leading cause of liver cirrhosis in the region. Studies conducted in India indicate that alcohol is responsible for a substantial proportion of cirrhosis cases. For instance, research has shown that alcohol contributes to 49% of all cirrhosis cases in the

country.[8] A specific study conducted in central India found that alcohol was attributed to 46% of all cases of cirrhosis. This shift in etiology highlights the importance of addressing alcohol-related issues and implementing measures for the prevention and management of alcohol-induced cirrhosis in India.The increased production and activity of endogenous vasodilators, such as nitric oxide (NO), carbon monoxide (CO), and cannabinoids, have been observed in patients with chronic liver disease (CLD). Subclinical cardiac dysfunctions in these patients pose a significant risk of cardiovascular complications, particularly during or after surgical procedures. Post-operative morbidity and mortality rates are notably high in this population, including those undergoing procedures like Transjugular Intrahepatic Portosystemic Shunt (TIPS) and liver transplantation (LT)[9]. These findings underscore the necessity for a thorough cardiovascular assessment in individuals with chronic liver disease, especially when they are scheduled for surgical interventions. Furthermore, the development of standardized diagnostic protocols tailored to the unique needs of these patients is imperative. Such protocols can enhance patient care and improve outcomes, reducing the associated risks and complications.

MATERIALS AND METHODS

The study encompassed a total of 150 patients who had been diagnosed with chronic liver disease (CLD). These CLD patients underwent interviews, during which demographic information, as well as their symptoms and clinical presentations, were collected using a predefined structured proforma. Patients who were unwilling to participate were excluded from the study. Inclusion criteria encompassed patients exhibiting clinical features and laboratory test results indicative of chronic liver disease. Exclusion criteria, on the other hand, involved patients with conditions such as ischemic heart disease, valvular heart disease, conduction defects, cardiac arrhythmias, congenital heart defects, type 2 diabetes mellitus, hypertension, hypothyroidism, and hyperthyroidism[10]. The study proceeded after obtaining ethical clearance from the Institute's ethical committee and securing written consent from the patients or their respective relatives. Each patient underwent a comprehensive general and physical examination, including measurements of height, weight, body mass index (BMI), and abdominal circumference.[11,12] Vital signs like pulse rate, blood pressure, respiratory rate, and peripheral oxygen saturation (SPO2) were assessed at baseline and documented. Furthermore, a battery of investigations was carried out, including complete blood count (CBC), liver function tests (LFT), renal function tests (RFT), lipid profile, random blood sugar (RBS), analysis of ascitic fluid, electrocardiography (ECG), and two-dimensional echocardiography (2D ECHO). The findings from these examinations and tests were meticulously recorded in a structured questionnaire.

RESULTS

Table1: Age distribution of study participants

Age Group(Years)	Without cardiac dysfunction	With Cardiac Dysfunction
≤20	0	0
21-30	20	8
31-40	24	12
41-50	24	18
51-60	16	20
≥60	2	6
$\chi 2$	4.71	
PValue	0.318	

Fig 1: Prevalence of QT prolongation in CLD patients

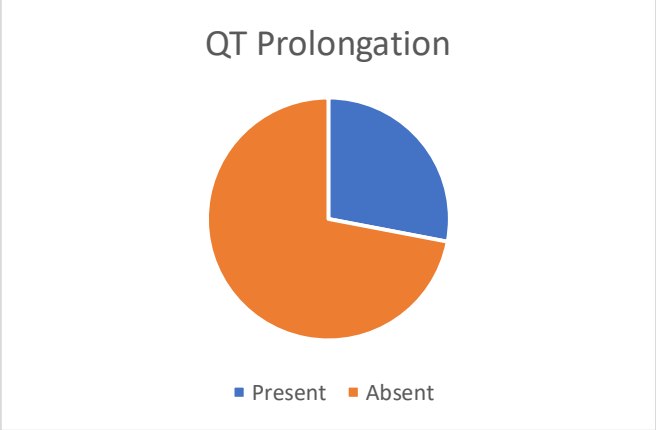
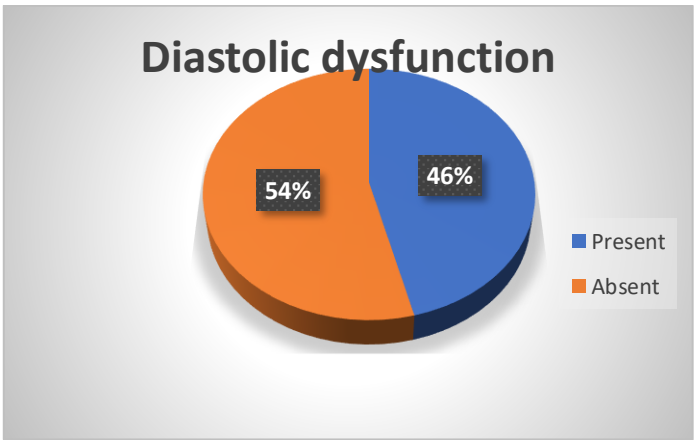


Table2: Prevalence of Diastolic Dysfunction in CLD patients

Diastolic Dysfunction	Frequency(n=100)
Present	46
Absent	54



DISCUSSION

In patients with Chronic Liver Disease (CLD), subclinical cardiac dysfunctions represent a significant contributor to morbidity and mortality, particularly in the context of surgical procedures like Transjugular In trahepatic Portosystemic Shunt (TIPS) and liver transplantation[13]. The primary objective of our study was to determine the prevalence of cardiac dysfunctions among CLD patients. We conducted a screening of 150 individuals diagnosed with CLD who did not have any known cardiac diseases. Of the 150 patients included in the study, the majority, specifically 120, were male. This gender distribution aligns with findings from other studies, such as the one conducted by Abraham Sonny et al. When examining the age distribution of these CLD patients, we observed that the largest proportion (28%) fell within the age group of 41-50 years. Following this, 24% of the patients belonged to two age groups: 21-30 years and 51-60 years, respectively.For the subgroup of CLD patients without cardiac dysfunction, the mean age was 40.3 years. In contrast, for those with cardiac dysfunction, the mean age was slightly higher at 46.25 years. The age group most commonly affected by cardiac dysfunctions in CLD patients was 51-60 years. These findings shed light on the prevalence of cardiac dysfunctions in CLD patients and underscore the importance of addressing cardiac health in this population, particularly within certain age groups[14]. The predominant etiology for Chronic Liver Disease (CLD) among the participants in our study, encompassing both those with and without cardiac dysfunctions, was alcohol consumption, accounting for approximately 70.67% of the cases[15]. Following alcohol-related liver disease, the second most common etiology was hepatitis B, which was responsible for 9.33% of cases. Among the total 75 participants, 53 individuals were diagnosed with liver disease attributed to alcohol consumption, and 7 patients had hepatitis B-related liver disease. There were a few cases with less common etiologies, including Wilson's disease in 4 patients, and hepatitis C in 1 patient. Additionally, 10 patients had liver disease with other causes, which encompassed 1 autoimmune-related case and 9 cases with unknown etiologies. In these nine cases with unknown causes, either the diagnostic information was not available at our medical center or there was no diagnosed etiological cause for the development of cirrhosis. The findings of our current study align with similar investigations, such as those conducted by Weigand et al[16], Shivram Prasad et al, and Kirnake et al. In these studies, alcohol consistently emerged as the most common etiology for cirrhosis. This reinforces the global trend where alcohol consumption remains a leading cause of CLD, emphasizing the importance of addressing alcohol-related liver disease as a major public health concern.

CONCLUSION

Among the 150 participants in our study, we observed several cardiac dysfunctions. Specifically, QTc prolongation was found in 21 patients, representing 28% of the study population. In addition, diastolic dysfunction was identified in 18 patients, resulting in a prevalence of 24%. We also identified systolic dysfunction in 30 patients, giving it a prevalence of 20% in our cohort.These findings are in line with previous studies conducted by Carey et al. (1995), Tiukinhoy-Liang et al. (2006), and Patel et al. (2011). Their investigations also reported similar prevalences of cardiac dysfunctions in patients with Chronic Liver Disease. Specifically, they observed prevalence rates of 27%, 26%, and 18%, respectively, for different cardiac dysfunctions. These findings collectively highlight the substantial burden of cardiac dysfunctions in individuals with Chronic Liver Disease and emphasize the importance of considering these complications in the clinical management of these patients, especially when planning for surgical

procedures or interventions that could pose additional risks to their cardiovascular health.

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