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ORIGINAL RESEARCH

Investigating Cardiac Dysfunctions Among Chronic Liver Disease Patients

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ABSTRACT

Background- Chronic liver disease (CLD) causes pathological alterations in the myocardium in addition to the typical hemodynamic abnormalities. Since the reduced systemic vascular resistance usually compensates for overt heart failure, cardiac pathology is frequently disregarded.

Methods- The current investigation was carried out at the Darbhanga Medical College & Hospital, Darbhanga as an observational study. A total of 75 patients with chronic liver disease were included in the study. After being interviewed, their demographic data, symptoms, and presentation were collected. Then, all of the patients underwent thorough physical examinations, 2D ECHO and ECG cardiological assessments, and blood investigations.

Results: Patients without cardiac dysfunction had a mean age of 40.3 years, whereas those with cardiac dysfunction had a mean age of 46.25 years. Cardiac dysfunctions in CLD patients most frequently affected individuals between the ages of 51 and 60, and 96% of cases included men and 4% involved women. In 28% of individuals, QTc prolongation was identified. Diastolic dysfunctions were common in 24% of CLD patients, while systolic dysfunctions were common in 20% of them.

Conclusion- In order to consider the presence of CV dysfunction and cirrhotic cardiomyopathy in CLD patients and estimate the risk of unfavourable cardiac events, a high level of awareness is required. To enhance these individuals' prognoses, more research is required on particular therapy approaches.

INTRODUCTION

Patients with cirrhosis and portal hypertension are recognised to experience the well-known clinical condition known as hyperdynamic syndrome [1-3]. It is characterised by a rise in heart rate and cardiac output as well as a fall in arterial blood pressure and systemic vascular resistance [4]. Peripheral and splanchnic vasodilatation, caused by increased production/activity of vasodilator factors (such as nitric oxide [NO], carbon monoxide [CO], and endogenous cannabinoids) and decreased vascular reactivity to vasoconstrictors, is the primary cause of hyperdynamic circulation in cirrhotic patients [4-6].

Cardiac disease itself can result in hepatic dysfunction. For instance, chronic congestive cardiac failure or long-term right ventricular dysfunction may result in passive hepatic venous obstruction and cardiac cirrhosis, while poor cardiac output and malperfusion may result in liver and multisystem dysfunction.

Cardiovascular problems are very likely to arise in cirrhotic patients having transjugular intrahepatic portosystemic shunt (TIPS) placement. This could be a result of the diastolic

dysfunction that is prevalent in this patient population [7, 8]. Additionally, cirrhosis-related cardiovascular dysfunction manifests clinically during and following liver transplantation (LT) [9], which may be a symptom of a concealed cirrhotic cardiomyopathy [10]. Clinical signs of CV dysfunction are not always apparent, hence it is essentially hidden. Cardiac output has increased, which is the most noticeable hemodynamic characteristic. In many cases, the left ventricular ejection fraction (LVEF) is found to be higher.

METHODS

At the Darbhanga Medical College & Hospital, Darbhanga, the current study was carried out as an observational study. 75 patients with chronic liver disease who were hospitalised to the Darbhanga Medical College & Hospital, Darbhanga were included in the study. All CLD patients were questioned, and based on a pre-designed structured proforma, their demographic data, symptoms, and presentation were collected. Patients who refused to take part in the trial, however, were not included. In contrast, patients with ischemic heart disease, valvular heart disease, conduction disorders, cardiac arrhythmias, congenital heart defects, diabetes mellitus type 2 (DM type 2), hypertension, hypothyroidism, or hyperthyroidism were excluded from the study.

Each patient underwent a thorough general and physical examination. Each patient's height, weight, BMI, and belly circumference were measured. Vital signs such the pulse, blood pressure, respiration rate, and SPO2 were taken and recorded at the beginning. Then, all of the patients underwent thorough examinations, which included CBC, LFT, RFT, lipid profile, RBS, ascitic fluid analysis, ECG, and 2D ECHO. In the questionnaire, every finding was recorded.

STATISTICAL ANALYSIS

MS Excel was used to compile the data, and IBM SPSS software, version 22, was used to analyse it. Patients were divided into two groups based on whether or not they had cardiac dysfunctions (QTc prolongation, systolic dysfunction, diastolic dysfunction). The chi square test was used to evaluate the relationship between proportions, and the unpaired t test was used to compare mean values. A P value of 0.05 or less was regarded as statistically significant.

RESULTS

Table1: Age distribution of study participants

Age Group(Years)	Without cardiac dysfunction	With Cardiac Dysfunction
≤20	0	0
21-30	13	8
31-40	9	9
41-50	2	2
51-60	13	5
≥60	11	3
$\chi 2$	4.70	
PValue	0.32	

Table2: Etiology of chronic liver disease

Etiology	With Cardiac Dysfunction (%)	Without Cardiac Dysfunctions (%)	Total(%)	$\chi 2$	P Value
Alcohol	21 (27.70)	31 (39)	55 (70.75)	0.040	**0.842**
HepatitisB	3(2.67)	4(6.64)	6(9.30)	0.63	**0.427**

HepatitisC	2(1.34)	0	2(1.37)		
Wilson's	2(1.34)	2(2)	3(5.34)	0.54	**0.461**
Others	4(1.30)	6(6.70)	9 (13.30)		
Total	**32 (42.68)**	**43 (57.30)**	**75**		

Table3: Prevalence of Diastolic Dysfunctionin CLD patients

Diastolic Dysfunction	Frequency(n=50)	Percentage
Present	14	**23**
Absent	**36**	**77**

Table4: Prevalence of Systolic Dysfunction in CLD patients

Systolic Dysfunction	Frequency(n=75)	Percentage
Present	16	**20**
Absent	**59**	**80**

DISCUSSION

When patients with chronic liver disease undergo surgical procedures like TIPS, liver transplants, asymptomatic cases of cardiac dysfunctions are a major factor in morbidity and mortality. We conducted this investigation to determine the frequency of cardiac dysfunctions in CLD patients. In this investigation, cardiac dysfunctions were examined in a total of 75 confirmed instances with CLD without any known cardiac illnesses. The majority (72) of the patients among them were men, which was consistent with findings from prior research like those by Abraham Sonny et al. 28 percent of patients were between the ages of 41 and 50, while 24 percent each were between the ages of 21 and 30 and 51 and 60 (Table 1). Patients without cardiac dysfunction make up a group with a mean age of 40.3 years, whereas patients with cardiac dysfunction make up a population with a mean age of 46.25 years. Patients with CLD who experienced cardiac dysfunction tended to fall within the 51–60-year age range (Table 1).

Increased SVI and CI, which show the existence of vasodilatation, were found to be characteristics of hyperdynamic circulation in 45.7 percent and 42.9 percent of patients, respectively (P=0.032). On standing position, cirrhotic patients exhibit greater CI, SVI, and Cardiac Cycle Efficiency values. Tarquini et al. carried out this study. [11] In 42 percent of the patients, the LVEF was greater than 65 percent, and it dropped in 23 percent of instances, which may be a sign of cirrhotic cardiomyopathy. Low EF may also be caused by ascites, and this risk may increase following peritoneal fluid drainage. With increasing severity of liver disease, the changes in LVEF in a series rose and were statistically significant (P=0.047). According to research by Kwon et al.,[12] LVEF below 60% is closely linked to greater post-liver transplantation mortality in advanced liver disease, demonstrating the necessity of evaluating both LVEF and liver disease severity concurrently.

When diastolic function was examined, 60 percent of patients met two of the three dysfunctional criteria listed above, 45.7% had an enlarged LVMI, and 51.4% had an increased LA size [13] (Table 3). The correlation between all of the parameters and the severity of CLD was statistically significant (P=0.012). As a result, our study also demonstrated the presence of DD as a marker of cardiac dysfunction, which is consistent with other studies, such as a study by De et al. [14] at IPGMER Kolkata 2003. The significance comes in the fact that it is easier to measure even though it is typically not clinically visible. The IPGMER investigation also validated the existence of anomalies in NCPF, pre-ascitic, and ascitic groups of cirrhotic individuals. In a different study by Karki et al.,[15] DD was observed in 61.9 percent of patients, with cirrhotic cardiomyopathy [16] being seen in 51.4 percent of patients and being more prevalent in alcoholics.

Alcohol was the most frequent cause of chronic liver disease in both the groups of study participants who had and did not have cardiac dysfunction (70.67 percent), followed by hepatitis B. (9.33 percent) (Table 2 and 3). There were 75 participants in all. Of those, 53 patients had liver disease associated to alcohol use, while 7 patients had liver disease related to hepatitis B. Wilson's disease (4) and Hepatitis C are two more, less frequent causes (1). One autoimmune cause and nine additional causes were included in the group of 10 patients because either their diagnostics were unavailable at our centre or they lacked identified etiological causes for cirrhosis.The results of the present study are in agreement with those of investigations by Weigand et al, Shivram Prasad et al, and Kirnake et al. Alcohol is generally the most frequent aetiology for cirrhosis in all of these investigations [17,18].

CONCLUSION

Out of a total of 75 participants, there were 14 patients with diastolic dysfunction, or 24 percent of the population. Systolic dysfunctions were seen in 16 out of the 75 research individuals, or 20% of the total population with CLD. According to earlier research and ongoing study, CV dysfunction is a serious but frequently undetectable consequence of CLD. To enhance the prognosis for these patients, more research is required to identify specific therapy approaches.

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