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Original Research Article

A Prospective Research to Assess Hepatic Measures in Individuals with Congestive Heart Failure

Dr. Rakesh Kumar[1], Dr. Kunal[2], Dr. Sanjay Kumar[3], Dr. Sagar Rajak[4], Dr Sushant Kumar[5]

[1]Senior Resident, General Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

[2]Senior Resident, General Medicine, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India

[3]Senior Resident, General Medicine, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India

[4]Professor, General Medicine, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India

[5]Senior Resident, Paediatrics, Vardhman institute of medical sciences Pawapuri, Nalanda, Bihar, India

Corresponding Author: Dr Sushant Kumar

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Abstract

Aim: The aim of the study to evaluate the hepatic parameters in congestive heart failure patients.

Methods: This is a prospective study was conducted in the Department of General Medicine, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India. The hepatic biochemical parameters like serum bilirubin (direct, indirect and total), serum AST and ALT, Serum alkaline phosphatase, Serum proteins and Prothrombin time were estimated.

Results: Serum bilirubin was 3.98±1.57 mg/dl in class IV and least in class I that is 1.112±0.20mg/dl. Serum AST was highest in class IV 162.14±25.85 IU and least in class I that is 36.61±10.87 IU (p=0.001). Serum ALT was highest in class IV 181.98±31.85 IU and least in class I that is 34.11±10.56 (p=0.001). Serum ALP was highest in class IV 61.22±14.32 IU and least in class I that is 40.41±9.85 (p=0.01). Serum total protein (g/dl) was decreased as the heart failure progressed least in class IV 3.51±1.41 g/dl and highest in class I that is 6.58.13±2.17 gm/dl (p=0.05). Serum albumin (g/dl) was least in class IV 2.89±0.92 g/dl and highest in class I that is 4.65±0.85 gm/dl (p=0.031). Prothrombin time (sec) was highest in class IV 22.24±7.11 sec and least in class I that is 13.12±3.36 sec (p=0.01). The mean value of serum bilirubin (mg/dl) in patients with duration of disease more than 4 year was 3.21±1.27

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mg/dl was significantly higher than the patients with duration of disease less than 4 year significantly (p=0.03). Serum AST was highest with duration of disease more than 4 year 113±27.34 IU and least in patients with duration of disease less than 4 year that is 41.57±9.94 IU (p=0.001). Serum ALT was highest with duration of disease more than 4 year 160.87±25.38 IU and least in patients with duration of disease less than 4 year that is 35.12±9.94 IU (p=0.001). Serum ALP IU was highest with duration of disease more than 4 year 61.12±10.14 IU and least in patients with duration of disease less than 4 year that is 41.15±4.57 IU (p=0.03). Serum total protein (g/dl) was least with duration of disease more than 4 year 4.12±2.22 g/dl and normal in patients with duration of disease less than 4 year that is 6.87±1.68 g/dl (p=0.025). **Conclusion:** Heart failure was common in fifth and sixth decade of life and there was male predominance. Congested hepatomegaly was common presentation jaundice and ascites was also common.

Keywords: CHF, hepatic, jaundice

Introduction

Heart failure (HF) is associated with significant morbidity and mortality.[1] This complex clinical syndrome is punctuated by periods of decompensation,[2] which in turn drives health care utilization (HCU)[3] and negatively impacts quality of life (QoL).[4] As such, in recent years, there has been growing interest in identifying novel strategies for early detection of disease progression to mitigate an individual patient's risk of hospitalization. Remote monitoring of HF patients utilizing existing implantable cardiac devices is one approach that has been evaluated in this context. However, the results from clinical trials and meta-analyses have been variable.[5–10] The seemingly disparate findings across a number of studies are likely influenced by key factors including the number and types of sensors used, the methodology of assessing risk as a point estimate in time rather than as a dynamic variable, the complex topography of HF decompensation, and the disconnect between acquisition of diagnostic data and implementation of appropriate therapeutic actions.[11] It is also important to highlight that evaluation of available HF remote monitoring technologies has almost exclusively focused on population health and health system outcomes with very little emphasis on valuing the patient experience of disease. As such, a more fulsome understanding of the correlation between clinical status and behaviours of HF self-efficacy with device diagnostic data is needed.[8] Heart failure risk status (HFRS) is a validated dynamic HF risk prediction tool available on Medtronic cardiac resynchronization therapy device with defibrillation capability (CRT-D) and implantable cardioverter defibrillator (ICD) devices, which integrates diagnostic data to generate a patient-specific assessment of low, medium, or high risk for HF hospitalization (HFH) in the next 30 days.[8,12] Fouad et al has concluded that heart failure is associated with manifestations of liver failure and laboratory data specific to ischemic hepatitis or congestive hepatopathy.[13] Auer et al has reported that elevated liver enzymes are common in patients with HF.[14] Saner et al has concluded that congestive heart failure should always be considered as a possible cause of acute liver failure.[15] it is clear that hepatic abnormalities are associated with heart failure. With this view present study has been designed to study the prevalence of liver function abnormalities in heart failure patients, pattern of elevation of liver enzymes and correlation of liver function tests with etiology, duration and of heart failure.

Material and Methods

This is a prospective study was conducted in the Department of General Medicine, Vardhman institute of medical sciences, Pawapuri, Nalanda, Bihar, India Total 100 patients with clinically

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and echocardiographically diagnosed of heart failure were include in this study. Patients with pre-existing hepatic disorder, Use of hepatotoxic drug, Chronic alcoholic were exclude from this study.

All patients enrolled for this study was evaluated clinically and echocardiographically. Various demographic parameters like age sex duration of disease were recorded on predesigned Performa. The hepatic biochemical parameters like serum bilirubin (direct, indirect and total), serum AST and ALT, Serum alkaline phosphatase, Serum proteins and Prothrombin time were estimated. For estimation of above parameters ebra EM 200 biochemistry analyser was used. All parameters were compared based on NYSA classification and duration of disease.[16,17]

Statistical analysis

Data were recorded in excel sheet and statistical Analysis was done with software SPSS-21 version. Qualitative data were calculated as percentage and proportions and were analysed by chi-square test. Quantitative data were expressed as mean ± SD and these data were analysed by unpaired student t test. The p value less than 0.05 were taken as significant

Results

In present study 100 patients with various class and duration of heart failure were enrolled for this study for evaluation of changes in hepatic parameters. In our study as per table 1 mean age of patient was 58.68±10.78 years. Number of patients less than 25 years was 3(3%), from 25 to 50 years were 16 (16%). Maximum number of patients was from 50 to 75 years of age that is 57 (57%). Number of patients above 75 years of age was 24 (24%). There was male predominance 73(73%). As per NYSA classification maximum number of cases were class II (47%) followed by class III (26%). Percentage of patients with class I were 20% and class IV were 7%. Regarding duration of disease 12% patients have disease since less than one year. Maximum number of patients has disease from to 4-year duration that is 67%. Duration of disease was more than 4 year in 21% patients.

Table 1: Demography of patients with heart failure

Parameter		**Number**	**Percentage (%)**
Age (mean 58.68±10.78 year)	Below 25year	3	3
	25 to 50	16	16
	50 to 75	57	57
	Above 75	24	24
Sex	M	73	73
	F	27	27
NYSA class	Class I	20	20
	Class II	47	47
	Class III	26	26
	Class IV	7	7
Duration of disease	Less than 1 year	12	12
	1 to 4year	67	67
	More than 4year	21	21

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

Regarding clinical presentation of patient's jaundice was present in 28%, hepatomegaly which was most commonly present that was 47%, ascites was present in 29% and congested hepatomegaly in USG (42%).

Table 2: Clinical presentation of patients with heart failure

Clinical parameter	N (n=100)	Percentage (%)
Jaundice	28	28
Hepatomegaly	47	47
Ascites	29	29
Congested hepatomegaly in USG	42	42

Regarding hepatic biochemical parameters there is significant variation in serum bilirubin (mg/dl) parameter as per progress in class of heart failure (p=0.001). Serum bilirubin was 3.98±1.57 mg/dl in class IV and least in class I that is 1.112±0.20mg/dl. Serum AST was highest in class IV 162.14±25.85 IU and least in class I that is 36.61±10.87 IU (p=0.001). Serum ALT was highest in class IV 181.98±31.85 IU and least in class I that is 34.11±10.56 (p=0.001). Serum ALP was highest in class IV 61.22±14.32 IU and least in class I that is 40.41±9.85 (p=0.01). Serum total protein (g/dl) was decreased as the heart failure progressed least in class IV 3.51±1.41 g/dl and highest in class I that is 6.58.13±2.17 gm/dl (p=0.05). Serum albumin (g/dl) was least in class IV 2.89±0.92 g/dl and highest in class I that is 4.65±0.85 gm/dl (p=0.031). Prothrombin time (sec) was highest in class IV 22.24±7.11 sec and least in class I that is 13.12±3.36 sec (p=0.01).

Table 3: Liver biochemical parameters of patients in comparison with class of heart failure

Parameter	Class I	Class II	Class III	Class IV	P value
Serum bilirubin (mg/dl)	1.112±0.20	1.64±0.62	2.35±0.74	3.98±1.57	0.001
Serum AST IU	36.61±10.87	52.75±20.68	89.57±13.89	162.14±25.85	0.001
Serum ALT IU	34.11±10.56	45.23±11.24	85.36±13.22	181.98±31.85	0.0001
Serum ALP IU	40.41±9.85	43.26±12.55	53.83±11.86	61.22±14.32	0.01
Serum total protein (g/dl)	6.58.13±2.17	5.34±2.11	5.05±2.05	3.51±1.41	0.05
Serum albumin (g/dl)	4.65±0.83	3.29±0.79	3.12±0.51	2.89±0.92	0.031
Prothrombin time (sec)	13.12±3.36	15.06±8.95	18.23±4.31	22.24±7.11	0.01

Regarding comparison of liver biochemical parameters in patients with duration of heart failure as per table 4 it is clear that serum bilirubin was increased with the duration of disease. The mean value of serum bilirubin (mg/dl) in patients with duration of disease more than 4 year was 3.21±1.27 mg/dl was significantly higher than the patients with duration of disease less than 4 year significantly (p=0.03). Serum AST was highest with duration of disease more than

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

4 year 113±27.34 IU and least in patients with duration of disease less than 4 year that is 41.57±9.94 IU (p=0.001). Serum ALT was highest with duration of disease more than 4 year 160.87±25.38 IU and least in patients with duration of disease less than 4 year that is 35.12±9.94 IU (p=0.001). Serum ALP IU was highest with duration of disease more than 4 year 61.12±10.14 IU and least in patients with duration of disease less than 4 year that is 41.15±4.57 IU (p=0.03). Serum total protein (g/dl) was least with duration of disease more than 4 year 4.12±2.22 g/dl and normal in patients with duration of disease less than 4 year that is 6.87±1.68 g/dl (p=0.025). Serum albumin (g/dl) was least with duration of disease more than 4 year 2.77±1.44 g/dl and normal in patients with duration of disease less than 4 year that is 3.74±0.79 g/dl (p=0.11). Prothrombin time (sec) was highest with duration of disease more than 4 year 21.11±3.22 sec and least in patients with duration of disease less than 4 year that is 14.79±2.68 sec (p=0.01).

Table 4: Liver biochemical parameters of patients in comparison with duration of heart failure

Parameter	less than 1 year	1 to 4 years	more than 4 years	P value
Serum bilirubin (mg/dl)	1.09±0.4	1.98±0.56	3.21±1.27	0.03
Serum AST IU	41.57±9.94	48.11±6.14	113 ±27.34	0.001
Serum ALT IU	35.12± 9.94	79.65± 8.45	160.87± 25.38	0.000
Serum ALP IU	41.15± 4.57	44.85±10.14	61.12±10.14	0.03
Serum total protein (g/dl)	6.87±1.68	5.94±1.89	4.12±2.22	0.025
Serum albumin (g/dl)	3.74±0.79	3.01±1.22	2.77±1.44	0.11
Prothrombin time (sec)	14.79±2.68	15.76±3.45	21.11±3.22	0.01

Discussion

Heart failure as a cause of acute liver failure is less documented and poorly understood condition. Auer et al have concluded that hepatic enzymes are elevated in heart failure patients. Pattern of change in hepatic enzyme differ as per in patients with chronic and acute decompensate HF and are surrogates of the type of hemodynamic alterations.[13,14] Shah et al has concluded that hepatic injury as a consequence of heart failure is common but less recognized syndrome.[18] In present study we have observed that mean age of patient was 58.68±10.78 years and maximum number of patients was from 50 to 75 years of age. There was male predominance. This finding is supported by Van Deursen et al.[19] Most of the patients were in class III and class IV group and duration of disease was from 1 with higher class of heart failure than class I. This corroborates with the work of Allen et al.[20]

We have observed that hepatic biochemical parameters were significantly elevated in patients with higher class of heart failure than class I. In our study Serum total protein (g/dl) was decreased as the heart failure progressed least in class IV 3.51±1.41 g/dl and highest in class I that is 6.58.13±2.17 gm/dl (p=0.05). Serum albumin (g/dl) was least in class IV 2.89±0.92 g/dl and highest in class I that is 4.65±0.85 gm/dl (p=0.031). Prothrombin time (sec) was highest in class IV 22.24±7.11 sec and least in class I that is 13.12±3.36 sec (p=0.01). Serum total protein (g/dl) and albumin was significantly decreased in class III and class IV patients in comparison to class I and class II to 4 years. Alvarez has concluded that may cause elevations of liver enzymes and both direct and indirect serum bilirubin and marked elevations in serum aminotransferases which support our study.[21] Nikolaou et al has concluded that Abnormal LFTs were present in about a half of patients presenting with heart failure which corroborates with our finding [22] Samsky et al has reported that severity of hepatic damage increases with

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

duration of disease which supports our study.[23] Naschitz et al has concluded that the spectrum of heart diseases affecting the liver includes mild alterations of liver function tests in heart failure, cardiogenic ischemic hepatitis, congestive liver fibrosis, and cardiac cirrhosis which progress with the progress of disease which support our study. has reported that liver function abnormalities remain common in patients with congestive heart failure but are generally small in magnitude and not associated with clinically apparent hepatic disease which contradict our study.[24]

Conclusion

The present study concluded that heart failure was common in fifth and sixth decade of life and there was male predominance. Congested hepatomegaly was common presentation jaundice and ascites was also common. Change in biochemical parameters was increased with severity and duration of heart disease.

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