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CAN AST/ALT RATIO PREDICT FOR FUNCTIONAL SEVERITY IN CHRONIC HEART FAILURE WITH REDUCED LEFT VENTRICULAR EJECTION FRACTION?

General Medicine

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ABSTRACT

Background: Chronic heart failure (CHF) is a prevalent condition that often coexists with liver dysfunction due to chronic congestion and hypoperfusion. The AST/ALT ratio has been proposed as a potential marker for the severity of CHF. This study aims to evaluate the predictability of the AST/ALT ratio for functional severity in CHF patients with reduced left ventricular ejection fraction (LVEF). **Methods:** This hospital-based cross-sectional study was conducted at SMS Medical College, Jaipur. A total of 96 CHF patients with reduced LVEF were included. Patients were divided into two groups based on their AST/ALT ratio: Group-1 (AST/ALT < 1) and Group-2 (AST/ALT ≥ 1). Clinical parameters, liver function tests, and echocardiographic data were analyzed. **Results:** The mean age of the cohort was 51.71 ± 18.67 years, with a male predominance (62.5%). Patients with AST/ALT ratio >1 had significantly lower LVEF (23.83% vs. 28.93%, P = 0.012) and higher NYHA class (2.59 vs. 2.12, P = 0.02). Liver function abnormalities were prevalent, particularly in serum bilirubin, AST, ALT, and prothrombin time. The AST/ALT ratio was a significant predictor of LVEF (P = 0.04). **Conclusions:** The AST/ALT ratio is a valuable marker for assessing the functional severity of CHF with reduced LVEF. Regular monitoring of liver function and comprehensive management of CHF are essential for improving patient outcomes.

KEYWORDS

Chronic heart failure, AST/ALT ratio, liver function, left ventricular ejection fraction, NYHA classification.

INTRODUCTION

Chronic heart failure (CHF) is a leading cause of morbidity and mortality worldwide.1 CHF is often associated with liver dysfunction due to chronic congestion and hypoperfusion, which can significantly impact patient outcomes.2 Multiple theories have attempted to explain the cardio- vascular-hepatic relationship that has been documented with abnormal liver function test results in patients with CVD, including heart failure, ischemic heart disease, and atherosclerosis.3-5 Hepato-Cardiovascular diseases shows globally marked increase in last 15 years which was reported by world health organization (WHO). Even in India cardiovascular diseases are the largest cause of disability and deaths.6

The AST/ALT ratio, a marker of liver function, has been proposed as a potential indicator of heart failure severity.7 As our understanding of the intricate communication between the heart and liver continues to expand so does our management, in clinical practice, combined heart and liver dysfunctions coexist in the setting of the main heart and liver diseases because of complex cardiohepatic interactions.8 This study aims to evaluate the predictability of the AST/ALT ratio for functional severity in CHF patients with reduced left ventricular ejection fraction (LVEF).

Methods: This hospital-based cross-sectional study was conducted at SMS Medical College, Jaipur. A total of 96 CHF patients with reduced LVEF were included. The study protocol was approved by the institutional ethics committee, and informed consent was obtained from all participants.

Inclusion Criteria: Diagnosed with chronic heart failure, Reduced left ventricular ejection fraction (LVEF < 40%). Exclusion Criteria: Acute liver disease, Recent myocardial infarction and Severe renal impairment patients were excluded from study.

Data Collection: Clinical data, including age, gender, duration of illness, NYHA classification, and etiology of CHF, were recorded. Liver function tests (LFTs) were performed, including serum bilirubin, AST, ALT, ALKP, serum albumin, and prothrombin time. Echocardiographic measurements were obtained to assess LVEF.

Statistical Analysis: Patients were divided into two groups based on their AST/ALT ratio: Group-1 (AST/ALT < 1) and Group-2 (AST/ALT ≥ 1). Differences between groups were analyzed using t-tests for continuous variables and chi-square tests for categorical variables. A multivariate linear regression model was used to identify predictors of LVEF. A P-value < 0.05 was considered statistically significant.

RESULTS

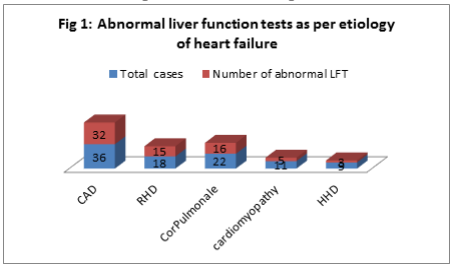
Demographic and Clinical Characteristics: The mean age of the cohort was 51.71 ± 18.67 years, with a male predominance (62.5%). The majority of patients were in the age groups 61-70 years (38%) and 51-60 years (26%).

Table 1 Linear regression analysis for prediction of LVEF (%)

Variables	r	95% CI	P value
Age	0.18	47.25–52.94	0.102
BMI	0.8	27.80–30.99	0.06
Diabetes mellitus	0.433	1.56–1.75	0.879
Hypertension	1.903	1.46–1.66	0.502
AST/ALT ratio	6.796	0.85–1.01	0.04
NT-proBNP	0.001	932.91–2007.76	0.195

AST/ALT Ratio and Clinical Parameters: Group-2 (AST/ALT ≥ 1) patients had significantly lower LVEF (23.83% vs. 28.93%, P = 0.012) and higher NYHA class (2.59 vs. 2.12, P = 0.02) compared to Group-1 (AST/ALT < 1). Group-2 also had a higher proportion of males (75% vs. 51%, P = 0.009) and a shorter duration of heart failure (3.55 vs. 4.43 years, P = 0.021).

Liver Biochemical Abnormalities: Significant liver biochemical abnormalities were observed, with high percentages of abnormal serum bilirubin, AST, ALT, and prothrombin time levels. These abnormalities were more prevalent in Group-2.



Duration of Illness: Most patients had a duration of illness between 1 to 5 years (59.5%), highlighting the chronic nature of CHF. Etiology of CHF-The most common cause of CHF was coronary artery disease (38%), followed by rheumatic heart disease (23%), cor pulmonale (19%), cardiomyopathy (11.5%), and hypertensive heart disease (8.5%).

NYHA Classification: The majority of patients fell into NYHA class II (45.3%), followed by class III (23.95%), class I (16.66%), and class IV (13.67%). Predictors of LVEF: The multivariate linear regression model identified the AST/ALT ratio as a significant predictor of LVEF (P = 0.04). Other variables, such as age, BMI, diabetes, and hypertension, did not show significant predictive value for LVEF.

DISCUSSION-

The findings of this study indicate that the AST/ALT ratio is a valuable marker for assessing the functional severity of CHF with reduced LVEF. Higher AST/ALT ratios are associated with more severe heart failure, poorer liver function, and worse clinical outcomes. This underscores the importance of regular monitoring of liver function in CHF patients and the need for comprehensive management strategies.
The study's limitations include its cross-sectional design, single-center setting, and relatively small sample size, which may limit the generalizability of the findings. Future studies with larger, multi-center cohorts and longitudinal follow-up are needed to validate these results and further explore the relationship between liver function and heart failure severity.

CONCLUSION

The AST/ALT ratio is a significant predictor of functional severity in CHF patients with reduced LVEF. Regular monitoring of liver function and comprehensive management of CHF are essential for improving patient outcomes. Early intervention and tailored treatment plans based on NYHA classification and liver function markers can help mitigate the progression of heart failure and enhance patient quality of life.

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