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General Medicine

DE NOVO ACUTE HEART FAILURE VERSUS ACUTE DECOMPENSATED CHRONIC HEART FAILURE: A COMPARATIVE CLINICAL STUDY

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ABSTRACT **Background:** Acute heart failure (AHF) includes both acute decompensated chronic heart failure (ADHF) and de novo heart failure (DNHF). Understanding differences between these entities may facilitate risk stratification and optimize management strategies. **Methods:** In this observational study, patients admitted with AHF were classified as ADHF or DNHF. Demographic characteristics, comorbidities, clinical presentation, laboratory investigations including N-terminal pro–B-type natriuretic peptide (NT-proBNP), echocardiographic findings, treatment modalities, and in-hospital outcomes were analyzed..**Results:** Baseline demographic characteristics and symptom profiles were comparable between the two groups. Dyspnea and pedal edema were the most common presenting symptoms. Ischemic heart disease was significantly more prevalent among ADHF patients than DNHF patients (66.2% vs. 10.0%, $p < 0.001$). ADHF patients demonstrated higher NT-proBNP levels (8857.26 ± 2993.28 pg/mL vs. 6082.90 ± 2412.78 pg/mL, $p < 0.001$), lower left ventricular ejection fraction (32.85 ± 7.80% vs. 38.37 ± 8.02%, $p = 0.002$), and a higher prevalence of regional wall motion abnormalities (67.7% vs. 10.0%, $p < 0.001$). Markers of renal function and electrolyte levels were similar between groups. ADHF patients required more intensive management, including higher rates of intensive care unit admission (80.0% vs. 40.0%, $p < 0.001$), inotropic support (69.2% vs. 36.7%, $p = 0.004$), and mechanical ventilation (43.1% vs. 13.3%, $p = 0.005$). Prolonged hospitalization (≥8 days) was more common in ADHF patients (50.7% vs. 20.0%, $p = 0.011$). In-hospital mortality was significantly higher in the ADHF group compared with the DNHF group (33.8% vs. 3.3%, $p < 0.001$).**Conclusions:** Although demographic characteristics and presenting symptoms were similar between groups, ADHF was associated with greater disease severity, worse cardiac function, increased resource utilization, and significantly higher in-hospital mortality. A prior history of chronic heart failure is an important prognostic indicator in patients presenting with acute heart failure.

KEYWORDS : Acute heart failure; acute decompensated heart failure; de novo heart failure; NT-proBNP; ischemic heart disease; left ventricular ejection fraction; intensive care unit admission; in-hospital mortality.

INTRODUCTION

Heart failure (HF) is a clinical syndrome characterized by typical symptoms such as dyspnea, fatigue, and ankle swelling, often accompanied by signs including elevated jugular venous pressure, pulmonary crackles, and peripheral edema, resulting from structural and/or functional cardiac abnormalities that lead to reduced cardiac output and/or elevated intracardiac pressures at rest or during stress.[1]

HF represents a major global health burden, with an estimated prevalence of 1–2% among the adult population in developed countries.[2–5] In India, rapid urbanization, industrialization, and lifestyle transitions have contributed to an increasing prevalence of cardiovascular disease (CVD), which is currently the leading cause of mortality. Coronary heart disease (CHD), one of the major contributors to HF, affects millions of individuals, and patients with CHD have a substantial risk of developing HF.[6–8]

Acute heart failure (AHF) is a heterogeneous syndrome requiring urgent medical attention and encompasses two distinct clinical entities: de novo heart failure (DNHF) and acute decompensated chronic heart failure (ADHF). Although HF was traditionally associated with reduced left ventricular ejection fraction (LVEF), contemporary evidence recognizes HF as a diverse syndrome with varying phenotypes and clinical presentations.[9] [10]

DNHF refers to the first presentation of HF in patients without a prior diagnosis of HF and is commonly precipitated by acute events such as myocardial ischemia, hypertensive emergencies, myocarditis, or acute valvular dysfunction. In contrast, ADHF occurs in patients with established chronic HF who develop worsening symptoms due to progressive congestion, medication non-adherence, arrhythmias, infections, or renal dysfunction.[11] While both conditions manifest as AHF, they differ significantly in terms of underlying pathophysiology, burden of comorbidities, extent of cardiac remodeling, and physiological reserve.

These differences may be reflected in clinical characteristics, laboratory findings, and echocardiographic parameters. Biomarkers such as natriuretic peptides, cardiac troponins, renal function markers, and inflammatory indicators may vary between DNHF and ADHF, reflecting distinct disease mechanisms. Furthermore, previous studies have suggested that patients with ADHF may experience poorer short-term and long-term outcomes, including higher rates of hospitalization and mortality, compared with those presenting with DNHF.[12]

Despite increasing recognition of these differences, AHF is often evaluated as a single clinical entity, potentially overlooking clinically relevant distinctions that may influence risk stratification and management. Understanding the variations in clinical presentation, laboratory profile, echocardiographic findings, and in-hospital outcomes between DNHF and ADHF may facilitate earlier identification of high-risk patients and enable more individualized therapeutic approaches.[13]

Therefore, the present study was undertaken to compare the clinical characteristics, laboratory parameters, echocardiographic findings, management strategies, and in-hospital outcomes of patients presenting with de novo heart failure and acute decompensated chronic heart failure.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Medicine at Al-Ameen Medical College Hospital, Vijayapur, Karnataka, India, over a period of 20 months from April 2024 to December 2025. The study included patients admitted to the medical wards and intensive care unit (ICU) with a diagnosis of acute heart failure (AHF).

Adult patients aged more than 18 years who fulfilled the Framingham diagnostic criteria for heart failure were eligible for inclusion in the study. Patients younger than 18 years, those not meeting the Framingham criteria, and those with alternative causes of fluid overload such as chronic kidney disease, cirrhosis, or other non-cardiac conditions were excluded. Patients who died or were discharged against medical advice within 24 hours of admission were also excluded. Written informed consent was obtained from all participants or their legally authorized representatives before enrollment.

Consecutive patients meeting the eligibility criteria were included in the study. Detailed demographic and clinical data, including age, sex, and presenting symptoms such as dyspnea, pedal edema, orthopnea, and paroxysmal nocturnal dyspnea, were recorded at admission. Based on prior history of heart failure, patients were categorized into two groups: de novo heart failure (DNHF), defined as the first presentation of heart failure in patients without a previous diagnosis of heart failure, and acute decompensated heart failure (ADHF), defined as acute worsening of symptoms in patients with established chronic heart failure.

Clinical information regarding comorbidities, including diabetes mellitus and hypertension, as well as personal habits such as smoking and alcohol consumption, was obtained. Laboratory investigations performed at admission included N-terminal pro–B-type natriuretic peptide (NT-proBNP), serum creatinine, serum sodium, serum potassium, total cholesterol, and low-density lipoprotein (LDL) cholesterol levels. All patients underwent transthoracic echocardiography, and parameters including left ventricular ejection fraction (LVEF), presence of regional wall motion abnormalities (RWMA), and diastolic dysfunction were documented. Information regarding in-hospital management, including intensive care unit admission, inotropic support, mechanical ventilation, duration of hospital stay, and in-hospital mortality, was collected prospectively using a structured case-record proforma.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) software version 20.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), as appropriate, while categorical variables were presented as frequencies and percentages. Comparisons between groups were performed using the Chi-square test for categorical variables. A two-tailed p-value of less than 0.05 was considered statistically significant.

RESULTS

The baseline demographic and clinical characteristics were comparable between the two groups. The majority of patients in both the ADHF and DNHF groups were aged ≥60 years, with a similar male predominance. Body mass index distribution did not differ significantly between groups, with most patients being overweight. Functional status as assessed by NYHA classification was also comparable, with the majority of patients presenting in NYHA Class II or III. Similarly, the prevalence of presenting symptoms, including dyspnea, orthopnea/paroxysmal nocturnal dyspnea, and pedal edema, showed no statistically significant differences. These findings suggest that demographic characteristics and initial clinical presentation alone may not reliably distinguish ADHF from DNHF.

Table 1. Baseline Demographic and Clinical Characteristics of Patients with Acute Decompensated Heart Failure and De-novo Heart Failure

Variable	ADHF (n=65)	DNHF (n=30)	p-value
Age <40 years	4 (6.2%)	2 (6.7%)	0.96
Age 40–59 years	29 (44.6%)	12 (40.0%)	
Age ≥60 years	32 (49.2%)	16 (53.3%)	
Male sex	40 (61.5%)	18 (60.0%)	0.75
Female sex	25 (38.5%)	12 (40.0%)	
BMI <25 kg/m²	18 (27.7%)	10 (33.3%)	0.49
BMI 25–29.9 kg/m²	30 (46.2%)	14 (46.7%)	
BMI ≥30 kg/m²	17 (26.1%)	6 (20.0%)	
NYHA Class II	30 (46.2%)	12 (40.0%)	0.55
NYHA Class III	29 (44.6%)	13 (43.3%)	
NYHA Class IV	6 (9.2%)	5 (16.7%)	
Dyspnea	42 (64.6%)	18 (60.0%)	0.29
Orthopnea/PND	31 (47.7%)	13 (43.3%)	0.83
Pedal edema	39 (60.0%)	17 (56.7%)	0.82

The prevalence of traditional cardiovascular risk factors, including diabetes mellitus, hypertension, smoking, and alcohol consumption, was similar in both groups. However, significant differences were observed in cardiac structural and functional characteristics. Ischemic heart disease and regional wall motion abnormalities were markedly more common among patients with ADHF than those with DNHF (both $p < 0.001$). Furthermore, patients with ADHF demonstrated significantly lower left ventricular ejection fraction, indicating more advanced systolic dysfunction. Although diastolic dysfunction was frequently observed in both groups, the difference was not statistically significant. These findings suggest a greater burden of chronic ischemic myocardial damage and impaired ventricular function among patients presenting with ADHF.

Table 2. Comorbidities

Variable	ADHF (n=65)	DNHF (n=30)	p-value
Diabetes mellitus	35 (53.8%)	13 (43.3%)	0.57
Hypertension	41 (63.1%)	17 (56.7%)	0.65
Smoking	21 (32.3%)	11 (36.7%)	0.82
Alcohol use	15 (23.1%)	8 (26.7%)	0.80

Among laboratory parameters, NT-proBNP levels were significantly higher in patients with ADHF, reflecting greater hemodynamic stress and neurohormonal activation. Renal function, electrolyte levels, and lipid profile parameters were comparable between groups. Patients with ADHF required substantially more intensive management, as evidenced by higher rates of ICU admission, inotropic support, and mechanical ventilation. In addition, prolonged hospitalization was significantly more common among ADHF patients. Most importantly, in-hospital mortality was markedly higher in the ADHF group compared with the DNHF group. These findings indicate that ADHF is associated with greater disease severity, increased healthcare resource utilization, and poorer short-term outcomes than DNHF.

FIGURE 1. NT-proBNP levels in ADHF vs DNHF

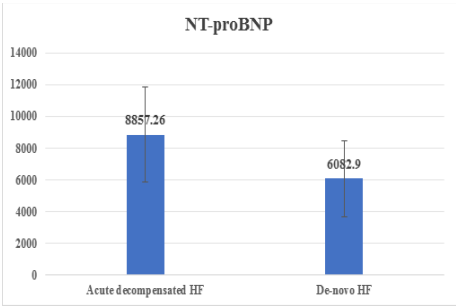


Table 3. Laboratory Parameters, Management, and In-hospital Outcomes

Variable	ADHF (n=65)	DNHF (n=30)	p-value
NT-proBNP (pg/mL)	8857.26 ± 2993.28	6082.90 ± 2412.78	<0.001
Serum creatinine (mg/dL)	1.38 ± 0.43	1.40 ± 0.50	0.789
Serum sodium (mEq/L)	134.86 ± 3.72	134.14 ± 2.72	0.345
Serum potassium (mEq/L)	4.41 ± 0.46	4.31 ± 0.46	0.351
Total cholesterol (mg/dL)	180.32 ± 31.97	183.07 ± 29.95	0.693
LDL cholesterol (mg/dL)	106.57 ± 21.82	102.57 ± 25.22	0.431
ICU admission	52 (80.0%)	12 (40.0%)	<0.001
Inotrope use	45 (69.2%)	11 (36.7%)	0.004
Mechanical ventilation	28 (43.1%)	4 (13.3%)	0.005
Length of stay ≤3 days	2 (3.1%)	9 (30.0%)	0.011
Length of stay 4–7 days	30 (46.2%)	15 (50.0%)	
Length of stay ≥8 days	33 (50.7%)	6 (20.0%)	
In-hospital death	22 (33.8%)	1 (3.3%)	<0.001
Survived	42 (64.6%)	25 (83.3%)	
DAMA	1 (1.5%)	4 (13.3%)	

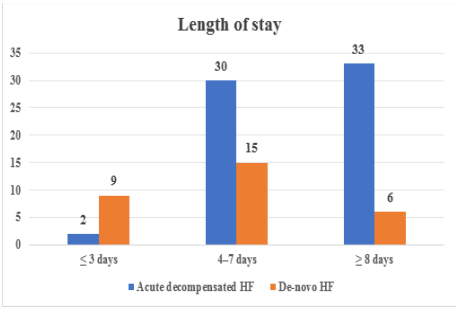
Overall, while demographic characteristics, symptom profile, and common cardiovascular risk factors were similar between the two groups, patients with acute decompensated heart failure exhibited significantly greater cardiac dysfunction, higher NT-proBNP levels, increased requirement for intensive care interventions, longer hospital stays, and substantially higher in-hospital mortality compared with patients presenting with de novo heart failure. These findings underscore the adverse prognostic impact of pre-existing chronic heart failure in patients presenting with acute decompensation.

DISCUSSION

The present study compared the clinical characteristics, laboratory parameters, echocardiographic findings, management strategies, and

in-hospital outcomes of patients presenting with acute decompensated heart failure (ADHF) and de novo heart failure (DNHF). The principal findings were that although demographic characteristics, symptom profile, and common cardiovascular risk factors were similar between the two groups, patients with ADHF demonstrated significantly greater disease severity. This was evidenced by a higher prevalence of ischemic heart disease and regional wall motion abnormalities, significantly elevated NT-proBNP levels, lower left ventricular ejection fraction (LVEF), greater need for intensive care interventions, longer hospital stay, and markedly higher in-hospital mortality.

FIGURE 2. Length of stay in ADHF vs DNHF



Clinical Characteristics and Comorbidities

In the present study, age, sex distribution, body mass index, NYHA functional class, and presenting symptoms were comparable between ADHF and DNHF patients. Similarly, the prevalence of diabetes mellitus, hypertension, smoking, and alcohol consumption did not differ significantly between the groups. These findings suggest that clinical presentation alone may not reliably distinguish ADHF from DNHF at the time of admission.

Previous studies have reported variable results regarding demographic differences between these phenotypes. Younis et al.14 reported that patients with de novo acute heart failure were significantly younger than those with ADHF, whereas Nawrocka-Millward et al.15 and Pelaez-Martinez et al.16 found minimal demographic differences between the groups. Our findings are more consistent with the latter observations, indicating that demographic characteristics may not always differentiate acute heart failure phenotypes.

Echocardiographic Findings and Biomarkers

A major finding of our study was the significantly higher prevalence of ischemic heart disease and regional wall motion abnormalities among ADHF patients. These findings support the concept that chronic ischemic myocardial injury contributes substantially to the pathogenesis of ADHF. Furthermore, LVEF was significantly lower in ADHF patients, indicating more advanced ventricular dysfunction.

These observations are consistent with previous studies demonstrating a greater burden of ischemic heart disease and reduced systolic function in patients with chronic heart failure exacerbations. Nawrocka-Millward et al.15 reported a significantly higher prevalence of ischemic etiology and lower LVEF among ADHF patients, while Sundermeyer et al.17 demonstrated a higher prevalence of ischemic cardiomyopathy in acute-on-chronic heart failure presentations. Collectively, these findings emphasize the importance of echocardiographic assessment for identifying underlying cardiac pathology and risk stratification. NT-proBNP levels were significantly higher in the ADHF group, reflecting greater neurohormonal activation and hemodynamic stress. Similar findings have been reported by López-Vilella et al.18 and Nawrocka-Millward et al.15, who demonstrated the prognostic significance of elevated natriuretic peptide concentrations in patients with acute heart failure.

Table 4. Echocardiographic findings

Ischemic heart disease	**43 (66.2%)**	**3 (10.0%)**	**<0.001**
RWMA present	44 (67.7%)	3 (10.0%)	<0.001
Diastolic dysfunction	46 (70.8%)	25 (83.3%)	0.22
Ejection fraction (%)	32.85 ± 7.80	38.37 ± 8.02	0.002

In-Hospital Management and Outcomes

The greater severity of ADHF was further reflected in management requirements. Patients with ADHF had significantly higher rates of ICU admission, inotropic support, and mechanical ventilation compared with DNHF patients. In addition, prolonged hospitalization was significantly more common among ADHF patients. Most importantly, in-hospital mortality was markedly higher in ADHF than in DNHF (33.8% vs. 3.3%). These findings suggest that the presence of established chronic heart failure confers a substantial adverse prognostic impact when patients present with acute decompensation. Similar observations have been reported by Younis et al.14, Lassus et al.19, and Sundermeyer et al.17, who demonstrated poorer short- and long-term outcomes among patients with ADHF compared with de novo presentations.

FIGURE 3. Ejection Fraction in ADHF vs DNHF

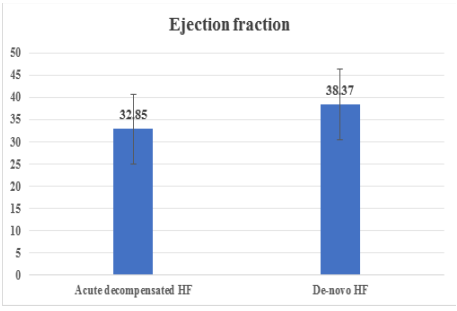
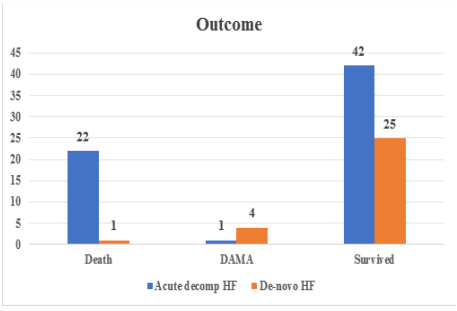


FIGURE 4. Outcome in ADHF vs DNHF



CONCLUSION

In this prospective observational study, patients with acute decompensated heart failure and de novo heart failure demonstrated similar demographic characteristics, symptom profiles, and prevalence of common cardiovascular risk factors. However, acute decompensated heart failure was associated with a significantly higher prevalence of ischemic heart disease and regional wall motion abnormalities, greater neurohormonal activation as reflected by elevated NT-proBNP levels, and more severe left ventricular systolic dysfunction. Furthermore, patients with acute decompensated heart failure required more intensive in-hospital management, including higher rates of ICU admission, inotropic support, and mechanical ventilation, and experienced longer hospital stays and substantially higher in-hospital mortality. These findings highlight the prognostic significance of a pre-existing history of chronic heart failure in patients presenting with acute heart failure. Early identification of high-risk patients and appropriate risk-stratified management strategies may help improve short-term outcomes and optimize resource utilization in this vulnerable population.

Footnotes

Conflict of Interest: Nil

Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this original research paper

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