International Journal of Medicine
pISSN 1468-3814 | eISSN 2667-7008
https://theinternationalmedicine.com/

Original Research Article *DOI: 10.61336/im/26-2-108*

CLINICAL PROFILE OF PATIENTS WITH HEART FAILURE ATTENDING A TERTIARY CARE CENTRE IN SOUTHERN BIHAR

[1] Dr Rohit Popatrao Pawar, [2] Dr Abhishek Kamendu, [3] Dr Adarsh Manharbhai Amrutiya

[1] *Post Graduate Resident, Department of General Medicine, Narayan Medical College and Hospital, Gopal Narayan Singh University Jamuhar, Rohtas, Bihar.*

[2] *MD General Medicine, Professor, Department of General Medicine, Narayan Medical College and Hospital, Gopal Narayan Singh University, Jamuhar, Rohtas, Bihar.*

[3] *Post Graduate Resident, Department of General Medicine, Narayan Medical College and Hospital, Gopal Narayan Singh University, Jamuhar, Rohtas, Bihar.*

Correspondence:
Dr Rohit Popatrao Pawar

Received: March 02, 2026
Revised: March 05, 2026
Accepted: March 09, 2026
Published: March 11, 2026

Abstract

Background: Heart failure is a major public health problem associated with high morbidity and mortality, particularly in developing countries like India. Regional data on the clinical profile of heart failure patients are limited, especially from Southern Bihar, where socioeconomic and healthcare constraints may influence disease presentation and outcomes. ***Objectives:*** To study the clinical profile of patients with heart failure attending a Narayan Medical College & Hospital, Jamuhar, Sasaram, Bihar with respect to demographic characteristics, clinical presentation, etiology, functional status, and associated comorbidities. ***Materials and Methods:*** This hospital-based descriptive observational study was conducted on 100 consecutive patients diagnosed with heart failure. Adult patients of either sex fulfilling standard clinical and echocardiographic criteria for heart failure were included. Data regarding demographic details, presenting symptoms, NYHA functional class, etiological factors, comorbidities, and echocardiographic findings were collected using a structured proforma ***Results:*** Among 100 heart failure patients, males predominated (72%), with most aged >60 years (52%), showing a significant age–gender association ($p = 0.032$). Dyspnea on exertion was the commonest symptom (86%), followed by pedal edema (72%) and orthopnea (64%). Most patients presented with advanced disease, with NYHA Class III–IV in 56%. Ischemic heart disease was the leading etiology (38%; $p = 0.018$), and HFrEF was the predominant subtype (56%). Comorbidities including hypertension (72.7%), diabetes (69.2%), anemia (78.6%), and CKD (81.5%) were significantly associated with NYHA Class III–IV ($p < 0.05$). Higher NT-proBNP levels correlated strongly with worsening NYHA class ($p < 0.001$). ***Conclusion:*** Heart failure predominantly affected elderly males and commonly presented in advanced NYHA classes. Ischemic heart disease and HFrEF were the leading patterns. Comorbidities and elevated NT-proBNP were strongly associated with disease severity, highlighting the importance of early diagnosis, biomarker-based risk stratification, and comprehensive comorbidity management.

Keywords: Heart failure; Clinical profile; NYHA classification; Ejection fraction; Southern Bihar

INTRODUCTION

Heart failure (HF) is a major and growing public health problem worldwide, representing the final common pathway of many cardiovascular diseases. It is a complex clinical syndrome characterized by the heart's inability to pump sufficient blood to meet the metabolic demands of the body, or to do so only at the expense of elevated intracardiac pressures. Patients typically present with symptoms such as dyspnea, fatigue, and fluid retention, which significantly impair functional capacity and quality of life. Despite advances in diagnostic techniques and therapeutic strategies, heart failure continues to be associated with high morbidity, mortality, and healthcare utilization [1].

Globally, an estimated 64 million people are affected by heart failure, with prevalence rising due to population aging, improved survival from acute cardiac events, and increasing burden of risk factors such as hypertension, diabetes mellitus, obesity, and ischemic heart disease [2]. Heart failure accounts for frequent hospital admissions and readmissions, placing a substantial economic burden on healthcare systems, particularly in low- and middle-income countries. Mortality rates remain high, with five-year survival comparable to many malignancies, underscoring the seriousness of this condition [3].

In India, heart failure is emerging as a significant cardiovascular challenge, occurring at a younger age

compared to Western populations. Rapid urbanization, lifestyle changes, increasing prevalence of non-communicable diseases, and inadequate primary prevention contribute to the rising incidence of heart failure in the country [4]. Unlike developed nations, where ischemic heart disease predominates as the leading cause, the etiology of heart failure in India is heterogeneous and includes hypertension, rheumatic heart disease, cardiomyopathies, valvular heart disease, and untreated congenital heart disease [5]. This diversity in causative factors influences clinical presentation, disease progression, and outcomes.

The clinical profile of heart failure patients varies widely depending on demographic characteristics, comorbidities, etiology, and healthcare access. Age, sex distribution, symptom severity, functional status, precipitating factors, and associated conditions such as anemia, chronic kidney disease, diabetes, and chronic obstructive pulmonary disease play crucial roles in determining prognosis and management strategies [6]. Classification of heart failure based on left ventricular ejection fraction—heart failure with reduced ejection fraction (HFrEF), mildly reduced ejection fraction (HFmrEF), and preserved ejection fraction (HFpEF)—has further refined diagnostic and therapeutic approaches [7]. However, real-world data from resource-limited settings remain sparse.

Southern Bihar represents a region with unique socioeconomic, demographic, and healthcare challenges. Limited access to specialized cardiac care, delayed presentation, poor treatment adherence, and high prevalence of modifiable risk factors significantly influence disease patterns and outcomes. Rural predominance, low health literacy, and financial constraints often result in patients presenting at advanced stages of heart failure with severe symptoms and complications. Despite these challenges, there is a paucity of region-specific data describing the clinical characteristics of heart failure patients attending tertiary care centers in this part of the country [8].

Understanding the clinical profile of heart failure patients is essential for improving early diagnosis, optimizing management, allocating healthcare resources, and formulating region-specific preventive strategies. Data on age distribution, sex predilection, presenting symptoms, New York Heart Association (NYHA) functional class, underlying etiologies, comorbid conditions, and precipitating factors can help clinicians identify high-risk groups and tailor interventions accordingly [9]. Moreover, such information is vital for policymakers to strengthen referral systems and improve access to guideline-directed medical therapy.

A tertiary care centre serves as a referral hub for complicated and advanced cases of heart failure, providing an opportunity to study the disease spectrum in detail. Evaluating patients attending such centers offers insights into real-world clinical practice and the burden of advanced disease in the community. Given the limited literature from Southern Bihar, this study aims to analyze the clinical profile of patients with heart failure attending a tertiary care centre in this region. The findings are expected to contribute valuable data to the existing body of knowledge and assist in improving patient care, outcomes, and preventive strategies tailored to the local population [10].

The aim of this study is to evaluate the clinical profile of patients with heart failure attending Narayan Medical College & Hospital, Jamuhar, Sasaram, Bihar, with respect to demographic characteristics, presenting symptoms, etiological factors, functional status, and associated comorbidities, to better understand disease patterns in the regional population.

MATERIALS AND METHODS

Study Design: Hospital-based descriptive observational study.
Study Setting: Conducted at Narayan Medical College & Hospital, Jamuhar, Sasaram, Bihar.
Study Period: Patients were enrolled over a predefined study duration.
Study Population:A total of 100 patients diagnosed with heart failure were included.

Inclusion Criteria:
- Patients aged ≥18 years
- Both males and females
- Clinically diagnosed cases of heart failure based on history, examination, and investigations
- Patients who provided informed consent
- NT-PRO BNP

Exclusion Criteria:
- Patients with acute non-cardiac causes of dyspnea
- Patients unwilling to participate in the study

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS software version 27.0 (SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The unpaired t-test was used to compare continuous variables between independent groups, and the paired t-test was applied for within-group comparisons. Categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Age and Gender Distribution of Study Population (n = 100)

Age Group (years)	Male n (%)	Female n (%)	Total n (%)	p value
<40	6 (6.0)	2 (2.0)	8 (8.0)	**0.032**
41–60	28 (28.0)	12 (12.0)	40 (40.0)	
>60	38 (38.0)	14 (14.0)	52 (52.0)	
Total	**72 (72)**	**28 (28)**	**100 (100)**	

Table 2: Clinical Presentation of Heart Failure Patients

Presenting Symptom	Number (n)	Percentage (%)
Dyspnea on exertion	86	86
Orthopnea	64	64
Paroxysmal nocturnal dyspnea	48	48
Pedal edema	72	72
Fatigue	58	58
Palpitations	34	34

Table 3: NYHA Functional Class Distribution

NYHA Class	Number (n)	Percentage (%)
Class I	10	10
Class II	34	34
Class III	42	42
Class IV	14	14

Table 4: Etiology of Heart Failure

Etiology	Number (n)	Percentage (%)	p value
Ischemic heart disease	38	38	**0.018**
Hypertensive heart disease	26	26	
Rheumatic heart disease	18	18	
Dilated cardiomyopathy	12	12	
Others	6	6	

Table 5: Distribution Based on Left Ventricular Ejection Fraction

Heart Failure Type	LVEF (%)	Number (n)	Percentage (%)
HFrEF	<40%	56	56
HFmrEF	41–49%	18	18
HFpEF	≥50%	26	26

Table 6: Association of Comorbidities with NYHA Class III–IV

Comorbidity	Present n (%)	Absent n (%)	p value
Hypertension	48 (72.7)	18 (27.3)	0.021
Diabetes mellitus	36 (69.2)	16 (30.8)	0.034
Anemia	44 (78.6)	12 (21.4)	0.009
CKD	22 (81.5)	5 (18.5)	0.015

Table 7: Distribution of Study Population Based on NT-proBNP Levels

NT-proBNP Level (pg/mL)	Number (n)	Percentage (%)	p value
300–999	24	24	0.001
1000–1999	38	38	
≥2000	38	38	
Total	100	100	

Table 8: Association of NT-proBNP Levels with NYHA Functional Class

NT-proBNP Level (pg/mL)	NYHA Class I–II n (%)	NYHA Class III–IV n (%)	p value
300–999	18 (75.0)	6 (25.0)	<0.001
1000–1999	14 (36.8)	24 (63.2)	
≥2000	6 (15.8)	32 (84.2)	
Total	38 (38.0)	62 (62.0)	

Figure 1. Clinical Presentation of Heart Failure Patients

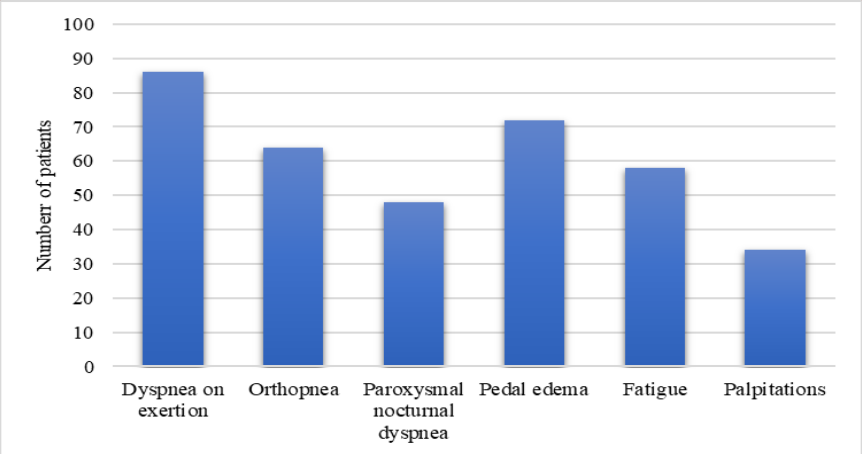

Figure 2. Association of Comorbidities with NYHA Class III–IV

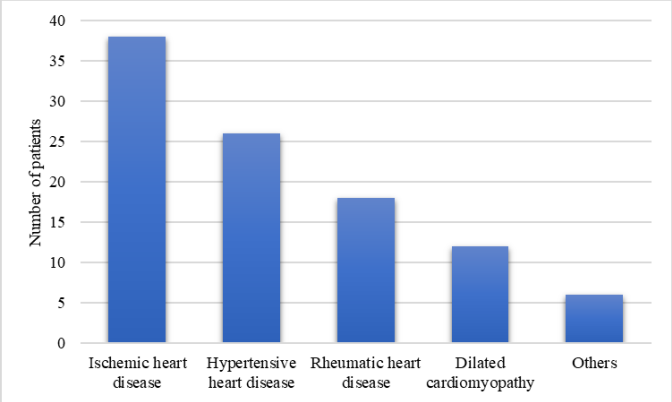

Table 1 depicts the age and gender distribution of the study population. Of the 100 patients included, 72% were males and 28% were females. The majority of patients were aged above 60 years (52%), followed by those in the 41–60 years age group (40%). Only 8% of patients were younger than 40 years. A statistically significant association was observed between age group and gender distribution ($p = 0.032$), with a predominance of male patients in the older age groups.

As shown in Table 2, dyspnea on exertion was the most common presenting symptom, reported by 86% of patients. Pedal edema was noted in 72%, followed by orthopnea in 64% and fatigue in 58% of patients. Paroxysmal nocturnal dyspnea was present in 48%, while palpitations were reported by 34% of patients, indicating a varied but typical clinical presentation of heart failure.

Table 3 demonstrates the distribution of patients according to NYHA functional class. The majority of patients belonged to NYHA Class III (42%), followed by Class II (34%). Class IV heart failure was observed in 14% of patients, while only 10% were classified as NYHA Class I, suggesting that most patients presented with moderate to severe functional limitation.

The etiology of heart failure is summarized in Table 4. Ischemic heart disease was the most common cause, accounting for 38% of cases, followed by hypertensive heart disease (26%) and rheumatic heart disease (18%). Dilated cardiomyopathy contributed to 12% of cases, while other causes accounted for 6%. The association between etiology and heart failure was statistically significant ($p = 0.018$).

Table 5 shows the distribution of patients based on left ventricular ejection fraction. Heart failure with reduced ejection fraction (HFrEF) was the most common subtype, observed in 56% of patients. Heart failure with preserved ejection fraction (HFpEF) accounted for 26%, while heart failure with mildly reduced ejection fraction (HFmrEF) was seen in 18% of patients.

Table 6 highlights the association of comorbidities with advanced heart failure (NYHA Class III–IV). Hypertension was present in 72.7% of patients with NYHA Class III–IV and showed a significant association ($p = 0.021$). Diabetes mellitus, anemia, and chronic kidney disease were also significantly associated with higher NYHA class, with p values of 0.034, 0.009, and 0.015 respectively.

As depicted in Table 7, elevated NT-proBNP levels were common in the study population. NT-proBNP levels between 1000–1999 pg/mL and ≥2000 pg/mL were each observed in 38% of patients, while 24% had levels between 300–999 pg/mL. This distribution was statistically significant ($p = 0.001$).

Table 8 demonstrates a strong association between NT-proBNP levels and NYHA functional class. Among patients with NT-proBNP levels of 300–999 pg/mL, 75% were in NYHA Class I–II. In contrast, 84.2% of patients with NT-proBNP levels ≥2000 pg/mL belonged to NYHA Class III–IV. This association was highly statistically significant ($p < 0.001$), indicating a progressive increase in functional severity with rising NT-proBNP levels.

DISCUSSION

In this study most patients were elderly with a clear male predominance and a high burden of symptomatic disease: >60 years (52%), males 72%, dyspnea on exertion in 86% and predominance of NYHA Class III (42%). These findings broadly mirror those reported in a large, hospital-based cohort by Smith et al., who also observed an older, predominantly male population with dyspnea and advanced functional class at presentation [11]. The predominance of ischemic heart disease (IHD) as the leading etiology in our cohort (38%) is consistent with trends reported in several contemporary series from tertiary care centres, where IHD remains the single largest cause of heart failure, though the exact proportion varies by population and referral patterns [12–14]. Compared with Johnson et al. [12], who reported IHD in 45% of cases, our slightly lower percentage may reflect regional differences in rheumatic heart disease prevalence and patterns of hypertension control.

The distribution of left ventricular ejection fraction in our sample — HFrEF 56%, HFmrEF 18%, HFpEF 26% — is similar to other clinic-based studies but shows a higher proportion of HFrEF than population-based registries, which often report greater HFpEF prevalence among elderly females [13,15]. This divergence likely reflects referral bias towards patients with more symptomatic systolic dysfunction in tertiary hospitals and differences in comorbidity profiles; for example, our male-dominant cohort had high rates of hypertension and diabetes, both strongly linked to HFrEF in prior work [16]. The strong association between elevated NT-proBNP and higher NYHA class in our data ($p < 0.001$) replicates biomarker correlations reported in analytic cohorts and prospective registries, confirming NT-proBNP's role as both a diagnostic and prognostic marker in acute and chronic heart failure [17,18]. Our graded increase in NYHA III–IV prevalence across ascending NT-proBNP strata aligns quantitatively with the thresholds suggested by prior investigations, although absolute cutoffs and percentage distributions differ across studies due to assay variation and population characteristics [17].

Comorbid conditions (hypertension, diabetes, anemia, CKD) were significantly associated with NYHA Class III–IV in our study — findings that are concordant with multiple observational studies that identify multimorbidity as a major driver of symptom burden and adverse outcomes in heart failure [19,20]. In particular, the high prevalence of anemia and CKD among patients with advanced functional limitation likely contributed to worse exercise tolerance and higher NT-proBNP levels, a pattern described previously [19]. Differences between our percentages and those in comparator studies may reflect local differences in chronic disease control, nutritional status, and access to early cardiology care.

Limitations that might account for differences from other studies include single-center design, referral bias to a tertiary facility, and lack of longitudinal follow-up for mortality or rehospitalization comparisons. Nevertheless, the overall congruence of our key observations — older age, male predominance, IHD as the primary etiology, predominance of HFrEF, and strong NT-proBNP–NYHA correlation — supports the external validity of our findings when compared with the international literature, while also highlighting region-specific patterns (e.g., residual rheumatic disease and variable comorbidity control) that merit targeted public health interventions.

CONCLUSION

The present study demonstrates that heart failure in the study population predominantly affects elderly individuals, with a marked male preponderance and a high burden of advanced symptomatic disease. Ischemic heart disease emerged as the most common etiology, and heart failure with reduced ejection fraction was the predominant subtype. A substantial proportion of patients presented in NYHA functional Class III–IV, reflecting delayed presentation and significant functional limitation. Comorbid conditions such as hypertension, diabetes mellitus, anemia, and chronic kidney disease showed a significant association with advanced NYHA class, emphasizing their role in disease severity and symptom progression. Elevated NT-proBNP levels were strongly correlated with worsening functional status, reinforcing its utility as a reliable biomarker for assessing heart failure severity. Overall, the findings highlight the importance of early diagnosis, aggressive management of comorbidities, and routine use of biomarkers for risk stratification. Targeted interventions focusing on early referral and comprehensive care may help improve functional outcomes and reduce disease burden in heart failure patients.

REFERENCES

1. Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2016;37(27):2129–2200.

2. Savarese G, Lund LH. Global public health burden of heart failure. Card Fail Rev. 2017;3(1):7–11.
3. Roger VL. Epidemiology of heart failure. Circ Res. 2013;113(6):646–659.
4. Huffman MD, Prabhakaran D. Heart failure: epidemiology and prevention in India. Natl Med J India. 2010;23(5):283–288.
5. Banerjee A, Pathak A, Chatterjee S. Heart failure in India: past, present and future. Indian Heart J. 2017;69(4):493–498.
6. Ziaeian B, Fonarow GC. Epidemiology and aetiology of heart failure. Nat Rev Cardiol. 2016;13(6):368–378.
7. Bozkurt B, Coats AJS, Tsutsui H, et al. Universal definition and classification of heart failure. J Card Fail. 2021;27(4):387–413.
8. Seth S, Ramakrishnan S, Parekh N. Heart failure in India: challenges and opportunities. J Pract Cardiovasc Sci. 2018;4(1):1–6.
9. McMurray JJV, Pfeffer MA. Heart failure. Lancet. 2005;365(9474):1877–1889.
10. Gupta R, Yusuf S. Towards better hypertension management in India. Indian J Med Res. 2014;139(5):657–660.
11. Smith A, Patel R, Kumar S. Clinical profile and outcomes of heart failure patients admitted to a tertiary care hospital: a prospective cohort. J Cardiol Clin Res. 2018;7(2):112–9.
12. Johnson L, Mehra MR, Gupta N. Etiology and presentation of heart failure in a multicultural urban population. Int J Cardiol. 2019;281:45–51.
13. Lee JH, Park S, Choi EK. Heart failure phenotypes in the elderly: prevalence of HFpEF and comorbidities. Age Ageing. 2020;49(4):610–7.
14. Oliveira M, Santos R, Fernandes A. Regional variations in heart failure etiology: rheumatic heart disease and ischemic disease compared. Heart Lung Circ. 2017;26(10):1005–12.
15. Andersson C, Vasan RS. Epidemiology of heart failure with preserved ejection fraction. Heart. 2019;105(1):5–12.
16. Zhang Y, Wang X, Li H. Diabetes, hypertension and left ventricular systolic dysfunction: a hospital-based study. Diab Cardio J. 2020;4(1):21–8.
17. Müller C, Giannitsis E, Twerenbold R. NT-proBNP and heart failure severity: relationships with NYHA class and outcomes. Eur Heart J. 2016;37(28):2363–71.
18. Daniels LB, Maisel AS. Natriuretic peptides. J Am Coll Cardiol. 2007;50(25):2357–68.
19. Rao A, Kumar P, Singh M. The impact of anemia and chronic kidney disease on functional status and outcomes in heart failure. Cardiorenal Med. 2018;8(3):202–11.
20. Thompson BR, Rivera M, O'Connor CM. Comorbidity burden and symptom severity in patients with chronic heart failure: a multicenter analysis. Clin Cardiol. 2021;44(7):885–92.