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Original Research Article

CLINICAL PROFILE AND ETIOLOGICAL DISTRIBUTION OF PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION (≤40%) IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Heart failure (HF) is a major global health problem associated with high morbidity and mortality. In India, HF presents at a relatively younger age with varying clinical profiles and etiologies. There is limited data regarding the clinical characteristics of patients with heart failure with reduced ejection fraction (HFrEF ≤40%), particularly in Northern India. The objective is to study the clinical profile and etiological distribution of patients with heart failure with reduced ejection fraction (≤40%) in a tertiary care hospital. **Materials and Methods:** This observational descriptive cross-sectional study was conducted in the Department of Medicine, R.B.M. Hospital & Shri Jagannath Pahadiya Medical College, Bharatpur. A total of 50 patients with HFrEF (≤40%) were included. Detailed clinical history, physical examination, and relevant investigations including 2D echocardiography were performed. Data were analyzed using SPSS version 21.0. **Result:** The mean age of patients was 59.26 ± 13.2 years, with the majority (50%) in the 60–79 years age group. There was a male predominance (84%). The most common symptoms were dyspnea, orthopnea, paroxysmal nocturnal dyspnea, cough, and easy fatigability (100% each), followed by chest pain (96%) and syncope (60%). Basal crackles (84%) were the most common clinical finding, followed by apex displacement (50%) and raised jugular venous pressure (36%). The mean systolic and diastolic blood pressures were 115.92 ± 19.06 mmHg and 72.98 ± 10.46 mmHg, respectively. Tachycardia (26%) and pulsus alternans (16%) were notable pulse abnormalities. **Conclusion:** Heart failure with reduced ejection fraction predominantly affects middle-aged to elderly males and presents with classical symptoms of dyspnea and fatigue. Early recognition of clinical features and management of underlying risk factors are essential to reduce disease burden and improve patient outcomes.

INTRODUCTION

Heart failure (HF) is a major global public health problem and is increasingly becoming a significant concern in India.[1] It is a complex clinical syndrome characterized by typical symptoms such as breathlessness, fatigue, and pedal edema, which may be accompanied by signs like elevated jugular venous pressure, pulmonary crackles, and peripheral edema. These manifestations result from structural and/or functional cardiac abnormalities leading to reduced cardiac output and/or elevated intracardiac pressures at rest or during stress.[2]

Globally, heart failure affects over 23 million people, with more than 5.8 million cases in the United States alone.[3] The prevalence of HF increases with age, ranging from less than 1% in individuals aged 20–39 years to more than 20% in those aged 80 years or older.[4] The lifetime risk of developing heart failure is approximately 20% in both men and women, with over 500,000 new cases diagnosed annually.[5] Despite advances in management, HF remains associated with high morbidity and mortality, with 30–40% of patients dying within one year of diagnosis.[6]

Coronary artery disease (CAD) is the most common cause of heart failure in industrialized nations, often associated with hypertension and diabetes mellitus, which further accelerate disease progression.[7] In developing countries like India, additional etiologies

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such as rheumatic heart disease continue to contribute significantly, particularly among younger populations.[7] Other causes include cardiomyopathies, congenital heart disease, myocarditis, and endocarditis.[6]

The European Society of Cardiology (ESC) classifies heart failure into three categories based on left ventricular ejection fraction (LVEF):

- Heart failure with preserved ejection fraction (HFpEF ≥50%)
- Heart failure with mid-range ejection fraction (HFmrEF 41–49%)
- Heart failure with reduced ejection fraction (HFrEF ≤40%)²

Heart failure with reduced ejection fraction (HFrEF) is characterized by impaired ventricular contractility, leading to reduced ejection of blood and symptoms such as dyspnea, exercise intolerance, and fluid retention.[8] The pathophysiology involves ventricular dilatation, increased wall stress, and neurohormonal activation, ultimately resulting in progressive cardiac remodeling.[9]

Numerous risk factors have been identified for the development and progression of heart failure, including age, hypertension, diabetes mellitus, coronary artery disease, anemia, renal dysfunction, and pulmonary disease.[10] These factors contribute to worsening cardiac function and influence long-term prognosis.

In India, heart failure presents a unique challenge due to differences in demographic and etiological patterns compared to Western populations. Patients tend to develop HF at a younger age and often present with more advanced disease. Despite the growing burden, there is a paucity of data regarding the clinical profile and etiological factors of heart failure, particularly in Northern India.[11]

Therefore, the present study was undertaken to assess the clinical profile and etiological distribution of patients with heart failure with reduced ejection fraction (≤40%) in a tertiary care hospital. This study aims to contribute to the existing knowledge and help improve early diagnosis, risk stratification, and management of heart failure in the Indian population.

MATERIALS AND METHODS

This study was designed as an observational descriptive cross-sectional study conducted in the Department of Medicine, R.B.M. Hospital & Shri Jagannath Pahadiya Medical College, Bharatpur

Study Population and Sample Size: A total of 50 patients diagnosed with heart failure with reduced ejection fraction (≤40%) were included in the study. The sample size was calculated based on a previous study, which reported a prevalence of systolic heart failure of 3.12%. Using a margin of error of 5% and a 5% level of significance, the minimum required sample size was calculated to be 47, which was rounded to 50 to improve accuracy.

Inclusion Criteria

- Patients diagnosed with heart failure with ejection fraction <40%
- Patients admitted in the medicine ward or attending outpatient department

Exclusion Criteria

- Patients with ejection fraction ≥40%
- Age less than 18 years
- Patients unwilling to provide informed consent

Case Definition: Heart failure was defined according to the European Society of Cardiology (ESC) criteria as a clinical syndrome characterized by symptoms such as breathlessness, pedal edema, and fatigue, along with signs like elevated jugular venous pressure and pulmonary crackles, resulting from structural and/or functional cardiac abnormality with reduced cardiac output.

Patients with heart failure with reduced ejection fraction (HFrEF <40%) were included in the study.

Methodology: All eligible patients were enrolled after obtaining informed consent. Detailed clinical history, including associated risk factors, was recorded. Each patient underwent:

- General physical examination
- Cardiovascular and respiratory system examination

A 2D echocardiography was performed to assess cardiac function and confirm ejection fraction. Patients fulfilling the criteria of HFrEF were further evaluated for clinical profile.

Investigations

All patients were subjected to routine investigations, including:

- Hemoglobin
- Total leukocyte count
- Random blood sugar
- Blood urea and serum creatinine
- Serum electrolytes (sodium and potassium)
- Electrocardiogram (ECG)
- Chest X-ray

Further investigations were carried out as per clinical requirement. No additional investigations were performed solely for research purposes.

Outcome Variables

- Etiological distribution of heart failure
- Clinical presentation (symptoms and signs) in patients with EF <40%

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 21.0.

- Categorical variables were expressed as frequency and percentage
- Continuous variables were expressed as mean ± standard deviation and median (IQR)
- A p-value <0.05 was considered statistically significant.

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RESULTS

A total of 50 patients with heart failure with reduced ejection fraction (≤40%) were included in the study. The mean age was 59.26 ± 13.2 years, with the majority (50%) in the 60–79 years age group. There was a marked male predominance (84%). Alcohol consumption was reported in 20% of patients. The most common presenting symptoms were dyspnea, paroxysmal nocturnal dyspnea, orthopnea, cough, and easy fatigability, all observed in 100% of patients, followed by chest pain (96%) and syncope (60%). On examination, basal crackles were the most frequent finding (84%), followed by apex displacement (50%) and raised jugular venous pressure (36%). The mean systolic and diastolic blood pressures were 115.92 ± 19.06 mmHg and 72.98 ± 10.46 mmHg, respectively, with a mean pulse rate of 86.36 ± 26.77 beats per minute. Tachycardia (26%) and pulsus alternans (16%) were the most common peripheral pulse abnormalities.

Table 1: Age Distribution

Age Group (years)	Frequency	Percentage (%)
<20	1	2
20–39	1	2
40–59	20	40
60–79	25	50
>80	3	6
Mean ± SD	59.26 ± 13.2	
Median (IQR)	60 (50–68)	

Table 2: Gender Distribution

Gender	Frequency	Percentage (%)
Male	42	84
Female	8	16

Table 3: Alcohol Consumption Pattern

Alcohol Habit	Frequency	Percentage (%)
Occasional	3	6
Daily (Non-cirrhogenic)	7	14
Daily (Cirrhogenic)	0	0

Table 4: Distribution of Symptoms

Symptom	Frequency	Percentage (%)
Dyspnea	50	100
PND	50	100
Orthopnea	50	100
Cough	50	100
Easy fatigability	50	100
Chest pain	48	96
Syncope	30	60
Palpitation	22	44
Pedal edema	18	36

Table 5: Physical Examination Findings

Sign	Frequency	Percentage (%)
Basal crackles	42	84
Apex displaced	25	50
Raised JVP	18	36
Hepatomegaly	18	36
Pedal edema	18	36
S3	8	16
S1/S2 abnormal	3	6
Pan-systolic murmur	2	4
Mid-diastolic murmur	1	2
Focal neurological deficit	2	4
SBP <101 mmHg	12	24

Table 6: Vital Parameters

Parameter	Mean ± SD	Median (IQR)
Systolic BP (mmHg)	115.92 ± 19.06	120 (104–120)
Diastolic BP (mmHg)	72.98 ± 10.46	72 (70–80)
Pulse Rate (bpm)	86.36 ± 26.77	84 (76–104)

Table 7: Peripheral Pulse Characteristics

Pulse Characteristic	Frequency	Percentage (%)

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Tachycardia	13	26
Pulsus alternans	8	16
Irregular pulse	3	6
Bradycardia	1	2

DISCUSSION

The present study evaluated the clinical profile of patients with heart failure with reduced ejection fraction (HFrEF ≤40%) in a tertiary care setting. The mean age of patients was 59.26 ± 13.2 years, with the majority in the 60–79 years age group, indicating that heart failure predominantly affects the elderly population. Similar findings were reported in the Trivandrum Heart Failure Registry, where the mean age was around 61 years.[12] However, compared to Western populations, Indian patients tend to develop heart failure at a relatively younger age.[13]

A marked male predominance (84%) was observed in this study, which is consistent with findings by **Chakanalil GS et al,[14] and other studies, where males constituted a major proportion of heart failure cases. This may be attributed to increased exposure to cardiovascular risk factors such as smoking, alcohol consumption, and coronary artery disease.

In the present study, 20% of patients reported alcohol consumption. Similar observations were made by Reddy TM et al., who identified alcoholism as one of the contributing risk factors for heart failure³. However, hypertension and ischemic heart disease remain the leading etiologies in most Indian studies.[15]

Dyspnea, paroxysmal nocturnal dyspnea, orthopnea, cough, and easy fatigability were present in all patients (100%), making them the most consistent presenting symptoms. This is in accordance with previous studies, where breathlessness was the most common symptom.[3] Chest pain was present in 96% of patients, suggesting a strong association with ischemic etiology, which is the most common cause of heart failure globally.[6]

On physical examination, basal crackles were the most common finding (84%), followed by raised jugular venous pressure and pedal edema. Similar findings were reported by Reddy TM et al., where basal crepitations were seen in approximately 80% of patients³. These findings reflect pulmonary congestion and volume overload, which are hallmarks of heart failure.

The mean systolic and diastolic blood pressures in this study were within near-normal ranges, which is comparable to other studies where patients with chronic heart failure often present with relatively stable hemodynamic parameters.[13] Tachycardia (26%) and pulsus alternans (16%) were notable peripheral pulse findings, with pulsus alternans being a classical indicator of severe left ventricular dysfunction.

Overall, the findings of this study are consistent with previously published Indian and international data, demonstrating that heart failure with reduced ejection fraction commonly affects middle-aged to elderly males and presents with classical symptoms of dyspnea and fatigue. The clinical findings emphasize the importance of early recognition and management of cardiovascular risk factors to reduce disease burden.

CONCLUSION

The present study highlights that heart failure with reduced ejection fraction (≤40%) predominantly affects middle-aged to elderly individuals, with a significant male predominance. The most common clinical presentation included dyspnea, orthopnea, paroxysmal nocturnal dyspnea, cough, and easy fatigability, which were observed in all patients, emphasizing their importance as key diagnostic symptoms.

Clinical examination revealed that basal crackles, raised jugular venous pressure, and pedal edema were the most frequent findings, reflecting underlying pulmonary congestion and volume overload. Peripheral pulse abnormalities such as tachycardia and pulsus alternans further indicated the severity of left ventricular dysfunction.

The study reinforces that heart failure in the Indian population tends to occur at a relatively younger age compared to Western populations and is commonly associated with cardiovascular risk factors, particularly ischemic heart disease.

Overall, early identification of symptoms, thorough clinical evaluation, and timely management of underlying risk factors are essential to reduce morbidity and improve outcomes in patients with heart failure.

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