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A Study on the Clinical Features and Short-Term Prognosis of Individuals with Heart Failure with Preserved Ejection Fraction (HFpEF)

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Abstract

Background:

Heart Failure with Preserved Ejection Fraction (HFpEF) is a growing clinical challenge globally, especially among elderly patients with multiple comorbidities. Indian data on its clinical profile and outcomes remain limited.

Aim: To evaluate the clinical characteristics and short-term outcomes of patients diagnosed with HFpEF in a tertiary care hospital.

Methods:

A prospective observational study was conducted on 100 patients with HFpEF (LVEF ≥ 50%). Clinical presentation, comorbidities, echocardiographic findings, and 30-day outcomes were recorded and analyzed using descriptive and inferential statistics.

Results:

HFpEF was more common in elderly females (mean age 66 years). Hypertension (82%), diabetes (61%), and obesity (66%) were the most prevalent comorbidities. Echocardiography showed diastolic dysfunction, left atrial enlargement (64%), and LV hypertrophy (57%). At 30 days, 84% improved symptomatically, while 11% were readmitted, and 5% died, with worse outcomes among those with diabetes, atrial fibrillation, and CKD ($p < 0.05$).

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

Conclusion: HFpEF patients frequently present with multiple comorbidities that contribute to early adverse outcomes. Targeted management of risk factors and structured follow-up are crucial for improving prognosis in these patients.

Keywords: Heart failure with preserved ejection fraction, Diastolic dysfunction, Hypertension, Comorbidities, 30-day outcomes

Introduction

Heart failure is a global epidemic with significant clinical and economic implications. Among its subtypes, Heart Failure with Preserved Ejection Fraction (HFpEF) has gained increasing recognition as a distinct clinical entity, representing approximately 50% of all heart failure cases worldwide [1]. Unlike Heart Failure with Reduced Ejection Fraction (HFrEF), which is primarily systolic in nature, HFpEF is characterized by diastolic dysfunction—a condition where the ventricles lose their ability to relax and fill properly, despite having a normal or near-normal left ventricular ejection fraction (LVEF ≥ 50%) [2]. This makes diagnosis and treatment particularly challenging, as conventional therapies targeting systolic dysfunction offer limited benefit in this group. The pathophysiology of HFpEF is complex and multifactorial, involving not only myocardial stiffness but also systemic inflammation, endothelial dysfunction, microvascular disease, and myocardial fibrosis [3]. These are often driven or worsened by comorbidities such as hypertension, diabetes mellitus, obesity, atrial fibrillation, anemia, and chronic kidney disease, all of which are common in HFpEF patients [4]. The disease is particularly prevalent among the elderly, females, and individuals with metabolic syndrome. Several studies suggest that HFpEF should not be viewed as merely a milder form of heart failure but rather a heterogeneous syndrome with unique structural, functional, and biomarker profiles [5]. From a global health perspective, HFpEF has become

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

a major cause of hospital admissions, especially in developed countries with aging populations. It is associated with high morbidity, frequent readmissions, and poor quality of life, despite relatively preserved systolic function [6]. The situation is compounded in developing nations like India, where the dual burden of communicable and non-communicable diseases strains healthcare systems. In India, the epidemiological transition—marked by increasing urbanization, sedentary lifestyle, dietary changes, and longevity—has contributed to a rising incidence of hypertension, type 2 diabetes, and obesity, all of which are strong precursors to HFpEF [7]. However, HFpEF remains under-recognized and underdiagnosed in many Indian healthcare settings. This may be due to limitations in diagnostic modalities such as echocardiography and natriuretic peptide testing at the primary care level, as well as a lack of awareness regarding its diagnostic criteria. There is also a paucity of Indian data on the clinical spectrum, comorbidity burden, treatment patterns, and outcomes of HFpEF patients. As a result, management remains largely symptomatic, with few targeted therapies currently proven to improve mortality in these patients.

Given this background, it becomes essential to study the clinical profile, demographic characteristics, comorbidities, and short-term outcomes of patients with HFpEF in Indian settings. Such data are crucial for developing region-specific diagnostic approaches, optimizing treatment protocols, and informing policy-level decisions regarding heart failure care in India. This study aims to bridge this knowledge gap by systematically evaluating patients diagnosed with HFpEF in a tertiary care hospital, with particular emphasis on their presenting features, echocardiographic parameters, coexisting illnesses, in-hospital outcomes, and 30-day follow-up.

Objective

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1. To identify the common comorbidities and risk factors associated with HFpEF.

Methodology

Study Design: A prospective observational study.

Study Population: All patients diagnosed with Heart Failure with Preserved Ejection Fraction (HFpEF), based on clinical and echocardiographic criteria, who are admitted or attending the outpatient department during the study period.

Inclusion Criteria

- Age 18 years and above.
- Clinical features of heart failure (based on Framingham criteria).
- Left Ventricular Ejection Fraction (LVEF ≥ 50%) on echocardiography.
- Willing to provide informed consent and available for 30-day follow-up.

Exclusion Criteria

- LVEF < 50%.
- Recent acute coronary syndrome (within the past 4 weeks).
- Significant valvular or congenital heart disease.
- Unwilling or unable to participate in follow-up.

Data Collection Procedure

After obtaining informed consent, each patient will be evaluated for:

- Demographic details (age, sex, BMI)
- Comorbid conditions (hypertension, diabetes, CKD, etc.)

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

- Presenting symptoms (dyspnea, fatigue, edema, etc.)
- Vital signs and clinical examination findings
- Investigations:
    - Hemogram, renal function tests, electrolytes, BNP (if available)
    - Chest X-ray, ECG
    - 2D Echocardiography (LVEF, LV diastolic function, LA size, RVSP)

Patients will be managed as per standard treatment guidelines. Follow-up will be done at 30 days via OPD visit or telephone to assess:

- Symptom improvement
- Readmission
- Mortality

Data Analysis

- Data will be entered into Microsoft Excel and analyzed using SPSS. Descriptive statistics (mean, standard deviation, percentages) will be used to describe the population. Chi-square test for categorical variables and t-test for continuous variables. A p-value < 0.05 will be considered statistically significant.

Results

Table 1: Demographic and Clinical Characteristics of Patients with HFpEF (n = 100)

Variable	Value

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

Mean Age (years)	66.2 ± 9.4
Gender	Male: 42 (42%), Female: 58 (58%)
BMI (kg/m²)	27.8 ± 3.5
NYHA Class at Presentation	II – 34%, III – 46%, IV – 20%
Mean Systolic BP (mmHg)	148.5 ± 15.2
Mean Diastolic BP (mmHg)	84.7 ± 9.6

Interpretation:

HFpEF was more common in elderly females, and the majority presented with NYHA Class III symptoms. Elevated systolic blood pressure was a common feature, suggesting uncontrolled hypertension as a contributing factor.

Table 2: Comorbidities Observed in Patients with HFpEF

Comorbidity	**Number of Patients (%)**
Hypertension	82 (82%)
Type 2 Diabetes Mellitus	61 (61%)
Obesity (BMI >25)	66 (66%)
Atrial Fibrillation	21 (21%)
Chronic Kidney Disease (CKD)	17 (17%)
Dyslipidemia	45 (45%)

Interpretation:

Hypertension, diabetes, and obesity were the most prevalent comorbidities in HFpEF

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

patients, consistent with the metabolic syndrome phenotype. Atrial fibrillation was present in about one-fifth of patients.

Table 3: Echocardiographic Findings in HFpEF Patients

Echocardiographic Parameter	Mean ± SD / Frequency (%)
LVEF (%)	58.4 ± 4.2
Left Atrial Enlargement	64 (64%)
Grade of Diastolic Dysfunction	Grade I – 38%, Grade II – 45%, Grade III – 17%
Left Ventricular Hypertrophy	57 (57%)
Pulmonary Artery Systolic Pressure (PASP, mmHg)	42.6 ± 8.9

Interpretation:

Most patients had grade II diastolic dysfunction, left atrial enlargement, and LV hypertrophy, indicating chronic pressure overload. All had LVEF ≥ 50%, fulfilling HFpEF criteria.

Table 4: Short-Term (30-Day) Outcomes in HFpEF Patients

Outcome	Frequency (%)
Symptomatic Improvement	84 (84%)
Readmission within 30 days	11 (11%)
Mortality	5 (5%)

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

Interpretation:

The majority of HFpEF patients showed clinical improvement at 30 days. However, 11% were readmitted, and 5% mortality was observed, highlighting the burden of early adverse outcomes despite preserved ejection fraction.

Table 5 – Association Between Selected Comorbidities and 30-Day Outcomes in HFpEF Patients

Comorbidity	Readmission (%)	Mortality (%)	p-value (Chi-square)
Diabetes (n=61)	8 (13.1%)	4 (6.6%)	0.048*
Atrial Fibrillation (n=21)	5 (23.8%)	2 (9.5%)	0.031*
CKD (n=17)	4 (23.5%)	2 (11.8%)	0.027*
Non-comorbid group	1 (2.9%)	0	—

Interpretation:

Patients with diabetes, atrial fibrillation, and CKD had significantly higher readmission and mortality rates within 30 days. This underscores the impact of comorbidities on prognosis in HFpEF.

Discussion

Heart failure with preserved ejection fraction (HFpEF) is increasingly recognized as a heterogeneous syndrome with a complex interplay of comorbidities and pathophysiological mechanisms. In the present study, we observed that HFpEF was more prevalent in elderly females, with a mean age of 66 years and 58% female population, which is consistent with findings from previous epidemiological studies [8]. The predominance of women is attributed

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

to age-related changes in diastolic compliance and increased prevalence of hypertension and obesity in this subgroup [9]. Hypertension (82%), diabetes mellitus (61%), and obesity (66%) were the most common comorbid conditions in our cohort. These findings align with global HFpEF registries, which show a strong association between cardiometabolic risk factors and HFpEF development [10]. The I-PRESERVE and CHARM-Preserved trials also highlighted the burden of these risk factors in HFpEF patients [11]. The high frequency of atrial fibrillation (21%) in our study further supports the link between atrial remodeling, diastolic dysfunction, and left atrial enlargement [12]. Our echocardiographic analysis showed that a majority of patients had grade II diastolic dysfunction, left atrial enlargement (64%), and LV hypertrophy (57%)—findings that reflect chronic pressure overload and stiff ventricles. These parameters are important prognostic indicators, as structural changes in the heart, even with preserved systolic function, contribute to exercise intolerance and symptom burden in HFpEF [13].

Short-term outcomes at 30 days revealed an 11% readmission rate and 5% mortality, which aligns with reports from similar studies in India and abroad [14]. While these rates are lower than those observed in HFrEF, they are still significant, given the limited therapeutic options in HFpEF. The subgroup analysis in our study showed that readmission and mortality were significantly higher among patients with diabetes, CKD, and atrial fibrillation—a pattern supported by evidence from the TOPCAT trial, which demonstrated worse outcomes in HFpEF patients with multiple comorbidities [15]. Another notable observation in our study was the improvement in NYHA class at 30-day follow-up, indicating that symptom-based medical management, especially diuretics and rate control drugs, plays a beneficial role in short-term recovery. However, long-term mortality remains largely unaltered, as no specific pharmacologic agent has yet shown clear mortality benefit in HFpEF [16].

ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

Thus, the results of our study highlight the importance of early identification, individualized risk stratification, and comorbidity management in HFpEF patients. In Indian clinical settings, especially where BNP and advanced imaging may not be routinely available, a combination of clinical profile and basic echocardiographic markers can guide effective management strategies.

Conclusion

In this study, Heart Failure with Preserved Ejection Fraction (HFpEF) was observed predominantly in elderly females with a high prevalence of comorbid conditions such as hypertension, diabetes, obesity, and atrial fibrillation. The majority of patients presented with NYHA class III symptoms, and echocardiography frequently revealed left atrial enlargement, diastolic dysfunction, and left ventricular hypertrophy, despite a normal ejection fraction. Short-term outcomes demonstrated a considerable rate of readmission (11%) and 30-day mortality (5%), especially among patients with multiple comorbidities. The findings emphasize that while short-term symptom improvement is achievable through standard medical therapy, the presence of underlying comorbidities significantly influences prognosis. The study highlights the need for early diagnosis, aggressive management of comorbidities, and individualized follow-up strategies in patients with HFpEF, particularly in resource-limited settings like India where diagnostic and therapeutic tools may be limited.

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ISSN: 0975-3583,0976-2833 VOL 10, ISSUE 4, 2019

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