



## Heart Failure with Preserved Ejection Fraction: Is this Relevant?

Authors

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### Abstract

*Heart failure with preserved ejection fraction (HFpEF) is more common in people of old age. In Indian population, HFpEF has been unified with hypertension, diabetes mellitus and atherosclerosis in most of the cases. In this study we examined risk factors, clinical features and prognosis of patients with HF. We compared outcomes based on LV functional status and risk factor of HF. This study includes participants with incident HF occurring between January 2017 to June 2017 with evaluation of LV systolic function at the time of their initial episode of heart failure.*

**Keywords:** Diastolic dysfunction, Ejection fraction, Risk factor, Echocardiogram.

### Introduction

Epidemiological studies have showed that 1.5% to 2% of the total population suffer from heart failure (HF) and it is the main cause for hospitalisation of elderly patients. It has been reported that the prevalence increases to 6%-10% in patients of old age. The survival after HF has improved due to advances in treatment. However, HF has remained an important cause of death worldwide.

Recent articles have stipulated that more than half of the patients diagnosed to have HF are found to have ejection fraction (EF) to be normal or near normal. This clinical condition is termed as “heart failure with preserved ejection fraction” (HFpEF) or “diastolic heart failure” (DHF). It is distinguished by the evidence of diastolic dysfunction.

The mortality rate due to HFpEF is 8% to 9% per year which is about the half of the HFrEF but the

morbidity and hospitalisation rates of patients are similar to those of HFrEF.

The risk factors commonly associated with HFpEF such as systemic hypertension, diabetes and coronary artery diseases are more wide spread in India. Due to higher proneness for these risk factors, there is a likelihood that the burden of HFpEF is probably to be higher in India. As the exact prevalence and incidence of HFpEF are not known, it stipulates a need to carry out the study that would give us an idea regarding the prevalence, aetiology, and mortality pattern of this study

This study will provide comprehensive data on prevalence, clinical profile, risk factors and prognosis of patients with new onset HFpEF.

**Review**

Heart failure is a clinical condition which occurs in patients, because of an inherited or acquired deformity of cardiac structure and/or function, that would impair the ventricular filling and ejection of blood, developing a cluster of clinical symptoms (dyspnea and fatigue) and signs (edema and rales) which leads to a poor quality of life and its shortening. It is of two types

- Heart failure with reduced Ejection Fraction: EF<40% (HFrEF)
- Heart failure with normal Ejection Fraction: EF>40-50% (HFnEF)
- Heart failure with preserved Ejection Fraction: EF>50% (HFpEF)

The condition of clinical heart failure with normal systolic function of left ventricle in the absence of any cardiac valvular lesion is referred to as heart failure with preserved ejection fraction or diastolic heart failure.

**Why is this Significant?**

- Nearly 50 % of the patients with HF are found to have Ejection Fraction to be normal or near normal.
- The Incidence of HF is higher in older age group and hence half of the elderly people with heart failure may have isolated diastolic dysfunction.
- Prevalence is highest in patients over the age of 75.
- With prompt diagnosis and treatment, the outcome is more favourable in Diastolic dysfunction than Systolic dysfunction.

**Aims and Objectives**

- To study the demographic, clinical and risk factor profile of heart failure patients with preserved ejection fraction.
- To study in-hospital mortality, risk and prognostic factors in this group of patients.

**Materials and Methodology**

**Study Design-** Observational study

**Study Period-** January 2017 to June 2017 (6 months)

The study was conducted in all patients presenting with heart failure, admitted in the Intensive care units, outpatient departments and other wards of RMMCH.

**Inclusion Criteria**

All heart failure patients who match the diagnostic criteria given by European Society of Cardiology:<sup>1</sup>

**Diagnostic Criteria**

1. Signs and symptoms consistent with a diagnosis of heart failure.
2. Presence of LV diastolic dysfunction demonstrated by ECHO parameters like,
  - E/A ratio
  - TDI E septal (cm/sec)
  - TDI E lateral (cm/sec)
3. E/E septal The presence of EF> 50% (as measured by echo)
4. LV end diastolic volume index <97ml/m (as measured by echo)

**Exclusion Criteria**

1. Patients with age less than 18
2. Pregnancy
3. Not willing for consent
4. Patient with poor echo window (COPD, Emphysema, Obese)
5. Severe anemia (Hb<8gm/dl)
6. Hemodynamically significant valvular heart disease
7. Prosthetic valve replacement
8. Ventricular pacemaker

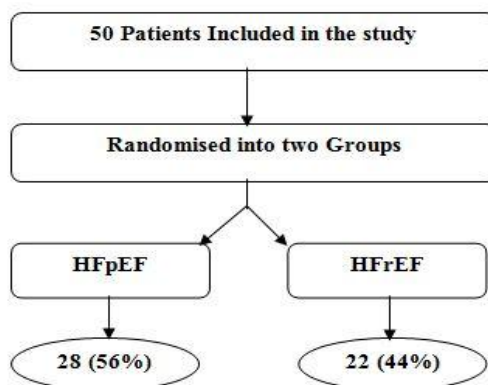
**Our Study**

- 50 patients were enrolled in this randomized study.
- Out of 50, 28 patients were diagnosed to have Heart failure with Preserved Ejection Fraction and 20 patients were diagnosed to have Heart failure with Reduced Ejection Fraction.

**Discussion**

**Demographic Profile**

**1. Distribution of Cases**



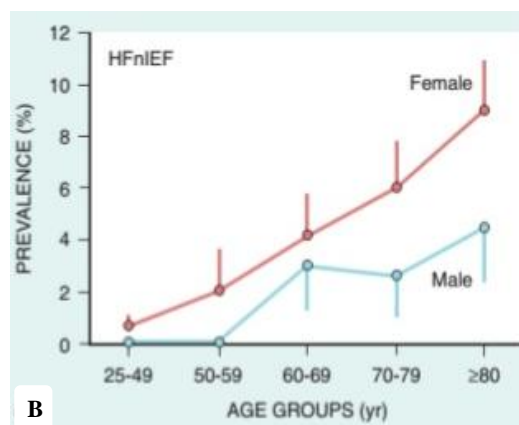
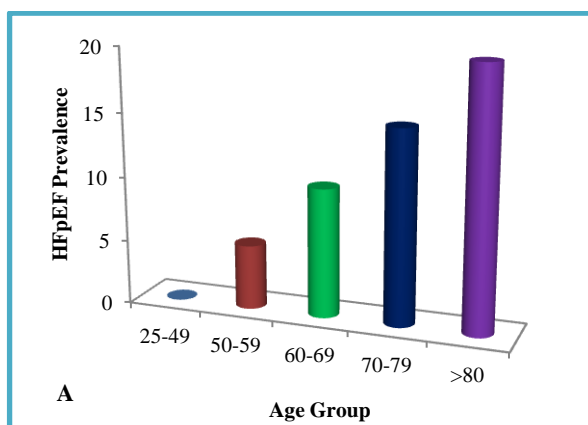
**Prevalence**

- Among the population with heart failure, the prevalence of HFpEF was lower than HFrEF.
- The high prevalence of clinical heart failure is probably due to high prevalence of

cardiovascular risk factors in patients with HFrEF.

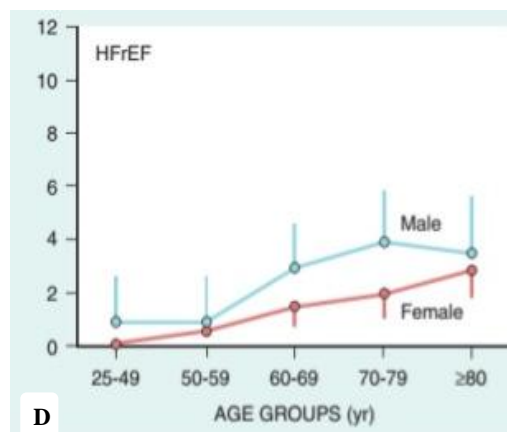
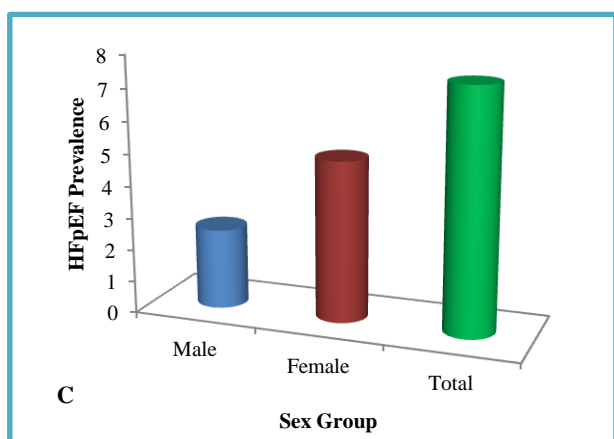
- Owing to the aging population, it is anticipated that the prevalence of heart failure will increase exponentially in the next decade<sup>2</sup>

**2. Age wise Distribution of Cases**



Most patients diagnosed with HFpEF were found to be in the age group of 70 -80 years

**2. Sex wise Distribution of Cases**

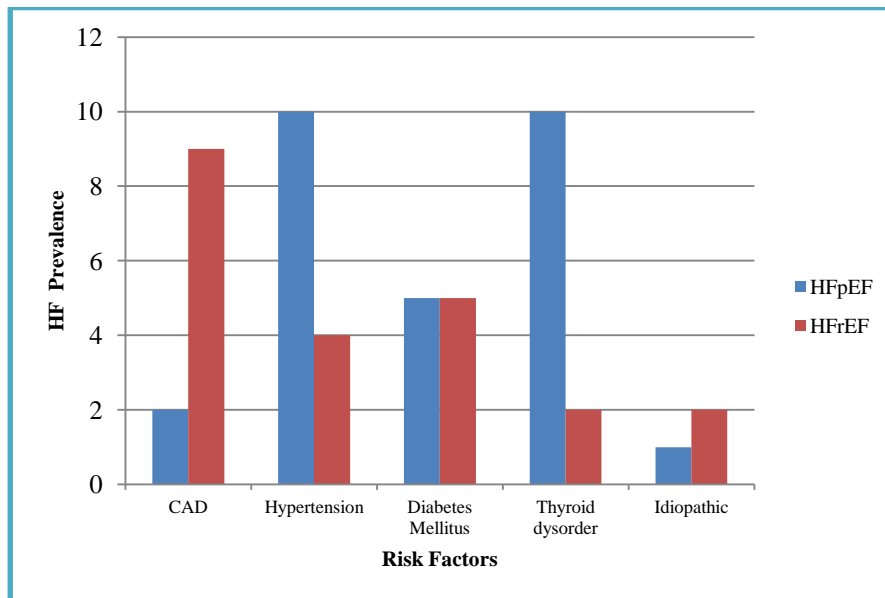


There was an increasing female preponderance among the patients of HFpEF in our study.

**3. Risk Factors**

- Knowledge of the risk factors helps in preventing new onset heart failure.<sup>3,4</sup>
- Predictors of HFpEF Vs HFrEF included CAD, high systolic blood pressure, Diabetes mellitus, Thyroid disorder, Idiopathic.<sup>5</sup>

RISK FACTOR	HFpEF (28)	HFrEF (22)
Coronary Artery Disease	2	8
Systemic Hypertension	12	4
Diabetes Mellitus	4	6
Thyroid Disorder	9	2
Idiopathic	1	2



HFpEF is most commonly due to systemic hypertension and thyroid disorders.  
 HFrEF is most commonly due to CAD.

**5. Stratification by Electrocardiogram<sup>6,7</sup>**

All ECGs from the date of onset of first episode of HF were examined

ECG parameter	HFpEF (n=28)	HFrEF (n=22)	Total (n=50)
LAE (%)	7 (25)	20 (90)	27 (54)
LVH (%)	20 (71)	14 (63)	34 (68)
Poor progression of R Wave (%)	4 (14)	14 (63)	18 (36)
LAD (%)	17 (60)	20 (90)	42 (84)
LBBB (%)	15 (53)	14 (63)	29 (58)
RAD (%)	-	4 (18)	4 (8)
Q Wave (%)	10 (35)	20 (90)	30 (60)
Wide QRS (%) <sup>6</sup>	8(28)	17(77)	4 (8)
ST and T wave changes (%)	1(3)	2(9)	3(6)

- Electrocardiographic features were significantly different across etiologic groups, with normal sinus rhythm frequently seen among patients with CAD and atrial fibrillation present more commonly in patients with non- CAD etiologies.
- LBBB morphology was more common in those with Hypertension.

### 6. Echo Based Distribution of Cases:<sup>7</sup>

Few echocardiogram pictures of our patients are displayed below

**Patient No: 1 Mrs. Nayaki AGE : 78 IP.No: 756331**



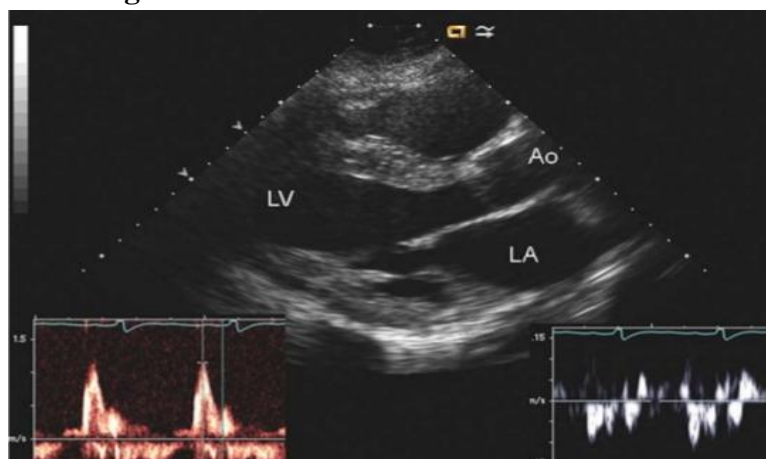
- Mitral valve inflow velocity reveals E/A ratio of 0.9, consistent with grade 1 diastolic dysfunction.

**Patient No: 2 Name: Janaki Age : 73 IP No: 73314**



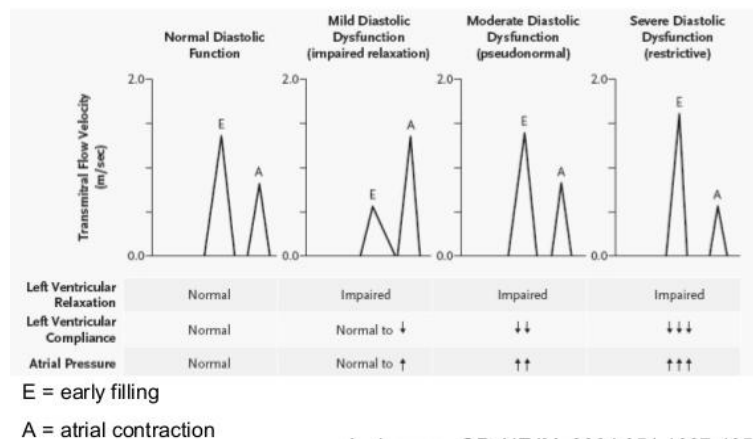
- "Normal" mitral valve E/A ratio but the reversed pattern of the annular velocities suggesting pseudonormal filling or grade 2 diastolic dysfunction.

**Patient No: 3 Name: Rani Age: 57 IP No :756774**



- Poorly managed hypertension with systolic dysfunction. Mitral valve inflow velocity pattern reveals a short deceleration time of 110 ms consistent with grade 3 diastolic dysfunction.

### Schematic Diagram of Echocardiogram in our Study



### Mortality

- Heart failure is a progressive syndrome with increased mortality and morbidity despite the newer trends in the management.<sup>8,9</sup>
- Mortality for HF<sub>n</sub>EF is similar to that of HF with a reduced Ejection Fraction.<sup>10</sup> Deaths in HF patients with normal Ejection Fraction were more often due to non cardiovascular causes, and deaths due to arteriosclerosis were less frequent

### Conclusion

- Among 50 participants, HF<sub>r</sub>EF was found in 22 individuals and HF<sub>p</sub>EF was found in 28 individuals.
- We found that modifiable cardiovascular disease risk factors, such as diabetes, hypertension, smoking commonly paved the way for the occurrence of both HF<sub>r</sub>EF and HF<sub>p</sub>EF.
- Patients of HF<sub>p</sub>EF are of old age, more likely to be women, having causes like hypertension, thyroid disorder and atrial fibrillation, less likely to have coronary artery disease. Etiological classification may minimize the syndromic heterogeneity, providing a disease oriented approach to HF patients.
- Blood pressure, previous history of coronary disease and clinical factors including electrocardiographic features may provide information about the pathogenesis and cardiac function at the time of onset of HF.

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