



Cardiovascular Original Article

Gender Differences in Heart Failure Hospitalization Post-Myocardial Infarction

Pradeep Rongali¹, Kala Jain¹, Srikanth Nakka¹, Achukatla Kumar²

¹Department of Cardiology, Nizams Institute of Medical Sciences, Hyderabad, Telangana, ²Department of Health Research, ICMR, Port Blair, Andaman and Nicobar Islands, India.

***Corresponding author:**

Pradeep Rongali,
Department of Cardiology,
Nizams Institute of Medical
Sciences, Hyderabad,
Telangana, India.

pradeep.rongali@gmail.com

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ABSTRACT

Objectives: Patients with post-myocardial infarction (MI) are more likely to die later from heart failure (HF), arrhythmic events, or reinfarction. According to recent studies, mortality rates were noticeably higher in women, than in men. This has been linked to variations in age, comorbidities, symptom presentation, and pathophysiology of the underlying coronary artery disease. There is little information on how these typical gender disparities affect post- MI survival. Studies on individuals with coronary artery disease have primarily focused on men, with women typically being left out of most series. Despite the relatively high prevalence of ischemic heart disease in women, there is a lack of information regarding the clinical course of the condition, its management, and clinical outcomes in this particular population due to the underrepresentation of women in the medical literature in this field. The gender disparities in post-MI patients who present with HF will be briefly discussed in this article.

Materials and Methods: A total of 50 patients that presented with HF and had a previous history of MI were included in this study after taking consent. After taking history and detailed physical examination, investigations that were sent were reviewed and the subjects followed up in the hospital stay to look for outcomes. The data are compiled and subjected to statistical analysis.

Results: It is observed that among the 50 subjects, 32% of them had recurrent HF (13 of the 30 females and three of the 20 males). $p = 0.04$ is statistically significant. Among the study subjects, the hospital outcomes observed showed that, out of 50 subjects, 47 subjects recovered and the other three died in hospital stay. All the three deaths are women. $p = 0.15$ is not statistically significant.

Conclusion: This study concludes that women are more likely than males to require hospitalization for recurrent HF following a MI. This study also demonstrates that, despite the higher risk of recurrent HF, women do not have a higher mortality risk than males.

Keywords: Angiotensin receptor neprilysin inhibitor, Body mass index, Chronic kidney disease, Cerebrovascular accident, Myocardial infarction

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ABSTRACT IMAGE

GENDER DIFFERENCES IN HEART FAILURE HOSPITALISATION POST MYOCARDIAL INFARCTION

BACKGROUND

- The mortality rate and the number of individuals living with and dying of cardiovascular disease have remained greater among women than men over the last 3 decades.
- Post myocardial infarction patients are at increased risk of subsequent death due to re-infarction, arrhythmic events, or heart failure. Present studies suggest significantly higher mortality was observed in females compared to males.

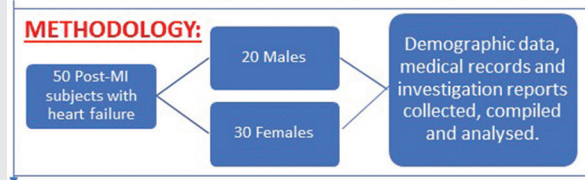
STUDY POPULATION

- Post myocardial infarction subjects aged 18 years or older, presenting with admitted for heart failure.

RESULTS:

- Among the subjects 32% women had recurrent heart failure.

METHODOLOGY:



CONCLUSION:

- Risk of recurrent heart failure hospitalisations after myocardial infarction is more in women when compared to men.
- There is no increased risk of mortality in women when compared to men.

INTRODUCTION

Cardiovascular diseases are one of the main causes of mortality, and morbidity, affecting globally.^[1] The prevalence and fatality rate of cardiac diseases was high in women than men since 30 years.^[1] Although, the gender differences are not completely understood and definitely requires further studies.

Myocardial infarction (MI) is notably an important indicator of cardiovascular diseases burden and can serve as a yardstick for studying gender differences across populations. In the old studies, numerous reports mentioned the main gender differences in the outcomes after the event of MI.^[2-8] However, there is significant heterogeneity and methodological differences among the various reports. In many of those studies, the more risk of mortality that has been observed in women has decreased after adjustment of age, risk factors, and treatment modalities. This indicates that gender differences are broadly reflected in baseline characteristics and treatments.^[9] However, some studies described that young to middle aged women were seen to have a greater risk of mortality post-MI indirectly demonstrating the gender-specific pathophysiological differences, mainly at younger age group women.^[10,11] Many of these studies mainly reported on death rates alone and mostly included the populations selected from studies or randomized trials or clinical registries, which may not

completely reflect the consensus in the general community. It is observed that data regarding the outcomes after the MI and particularly the non-fatal ones, also repeated heart failure (HF) hospitalizations among the males and females, is very limited. Furthermore, the epidemiological characteristics of MI have changed significantly over the past 30 years,^[12,13] the hospital admissions and prognosis of the MI and its complications have evolved over time, resulting in improved outcomes.

After the MI, patients having greater risk of mortality due to factors like HF, arrhythmic events, or recurrent infarction. The present studies suggest that significantly lower death rates were observed in males compared to females. It was suggested that these observed are significant for age in years, risk factors, hospital presentation, and the underlying coronary artery disease pathophysiology. Not much data exists on implications of these similar gender differences on the persons with post-MI mortality. The majority of studies regarding coronary artery disease patients mostly excluded females and focused on males in most of the series. Under representation of females in the medical literature has led to very less data availability with regard to the clinical characteristics, its management, and prognosis in the female population, in spite of the high prevalence of ischemic heart disease in females. This article will briefly study these gender differences in post-MI patients presenting with the HF in Indian population.

MATERIALS AND METHODS

It is a hospital-based observational study and conducted in the tertiary care hospital for 6 months. The informed consent was obtained from study subjects. Fifty patients with ages in years of 18 and above, having a prior history of MI, and now hospitalized with HF are recruited. A detailed medical history, physical examination, and anthropometric measurements were collected from study subjects. Patients were categorized as normal (18.5–22.9 kg/m²), overweight (23–24.5 kg/m²), or obese (>24.5 kg/m²) based on their body mass index. The previous medical records were reviewed. All relevant investigation reports were noted. All the recruited patients were categorized based on gender and then subcategorized based on age group.

The data of all of the study subjects' were gathered, organized using Microsoft Excel, and statistically analyzed using SPSS v 20.0. Chi-square test is used to compare two groups on a categorical scale and determine the significance of study characteristics. Using an independent "t" test for normal distribution, continuous variables were analyzed. $P < 0.05$ is considered as a statistically significant.

RESULTS

Overall, 50 study subjects fulfilling the inclusion criteria and after taking due consent are taken into the study. Out of 50 subjects, there is slight female preponderance with 60% being females ($n = 30$) and 40% being males ($n = 20$) [Table 1]. Among the study group, the mean age is 55.8 years (\pm SD), with minimum age of 41 years and maximum age is 70 years. Among the age distribution, the maximum number of subjects belongs to the age group of 61–70 years with 38% of total study subjects ($n = 19$ of 50) [Table 2].

We have observed that 50% of the male subjects are smokers, whereas there are no smokers among the female subjects. It is observed that 17% of the total female subjects have obesity as a risk factor ($n = 5$ of 30).

Table 1: Gender distribution among study samples.

Variable	Category	n	%
Gender	Males	20	40
	Females	30	60

Table 2: Age distribution among study samples.

Variable	Category	n	%
Age	41–50 years	18	36
	51–60 years	13	26
	61–70 years	19	38

Among the subjects, 74% are diabetics ($n = 37$ of 50); 80% of females and 65% of males are diabetics. Among the subjects, 78% are hypertensives ($n = 39$ of 50); 80% of females and 75% of males are hypertensives.

Among the subjects, 12% have associated chronic kidney disease ($n = 6$ of 50, three females and three males). Three subjects have associated peripheral artery disease.

It is observed that among the 50 subjects, 32% of them had recurrent HF (13 of the 30 females and three of the 20 males). $P = 0.04$ is statistically significant. This study data suggests that post-MI, women have higher probability of having recurrent HF than men [Table 3].

Among the study subjects, the hospital outcomes observed showed that, out of 50 subjects, 47 subjects recovered and the other three died in hospital stay. All the three deaths are women. $P = 0.15$ is not statistically significant [Table 4].

DISCUSSION

This study included 50 post-MI patients presenting with HF and got admitted in the hospital. This study has observed the gender characteristics of such patients admitted for HF.

Table 3: Gender-wise comparison of comorbidity and other medical illness among study patients using Chi-square test.

Variable	Category	Males		Females		P-value
		n	%	n	%	
Diabetes	Yes	13	65	24	80	0.24
	No	7	35	6	20	
Hypertension	Yes	15	75	24	80	0.68
	No	5	25	6	20	
H/o CVA	Yes	1	5	1	3	0.77
	No	19	95	29	97	
Chronic kidney disease	Yes	3	15	3	10	0.59
	No	17	85	27	90	
Peripheral artery disease	Yes	2	10	1	3	0.33
	No	18	90	29	97	
H/o PTCA	Yes	18	90	26	87	0.72
	No	2	10	4	13	
on ARNI	Yes	3	15	7	23	0.47
	No	17	85	23	77	
Recurrent heart failure	Yes	3	15	13	43	0.04
	No	17	85	17	57	

Table 4: Gender-wise comparison of outcomes among study patients using Chi-square test.

Variable	Category	Males		Females		P-value
		n	%	n	%	
Outcome	Recovered	20	100	27	90	0.15
	Death	0	0	3	10	

The main findings of this study are, first, women having significant risk of recurrent HF hospitalization post-MI. And second, there is no statistically significant evidence for higher risk of mortality of women in the hospital, admitted for HF hospitalization post-MI.

The incidence of HF was high in men, but overall prevalence rates are comparable in men and women since women live longer after the onset of HF. When diagnosed with HF, women are often older than men and more likely to have diastolic dysfunction. The age differences can be explained to the amount of gender differences in the treatment, hospital costs, and health-care quality.^[14]

In comparison to their male counterparts, older and younger women may undergo less aggressive invasive and pharmacological treatments after MI.^[15-18] An Austrian study of patients more than the age of 80 found that women had a lower intention to undergo coronary intervention than men, which was not accounted for by variations in risk factors for adverse outcomes.^[15] Men and women with HF have different circumstances. Men having the most challenging to accept everyday activities that are physical or social limitations, whereas women have most challenging to accept limitations on their ability to provide for their families. Women who have HF tend to interpret their condition more positively. Despite this, the overall quality of life of women is lower than men. Guidelines should emphasize the gender differences in HF patients and implement into the routine medical care.^[19]

The baseline factors, symptoms, risk factors, and mortality of acute MI differ between the sexes are well known and frequently published in numerous earlier studies.^[20,21] Prior research predominantly revealed gender disparities in short-term death; however, these differences vanished after adjusting for age, risk factors, and comorbidities.^[22,23] In this study, we found that hospitalized patients with HF following MI did not have a higher fatality risk for women than males.

Women receive the same therapeutic benefit from aspirin, beta-blockers, clopidogrel, ACE inhibitors and angiotensin receptor blockers, anticoagulants, aldosterone antagonists, and statins as men; however, earlier studies shown that during the acute phase and at discharge, women with MI received pharmacotherapies that were recommended by guidelines are less frequently than men.^[24]

These results do not comply with other studies, which indicate that the young age groups are primarily responsible for the gender differences in in-hospital mortality. Women under the age of 55 have a significantly higher risk of in-hospital mortality, and those who survive an acute MI have a higher risk of early mortality than men of the same age.^[25,26]

Cardiovascular disease between the gender differences is a subject of intense clinical and research interest. The previous studies have hypothesized that the higher risk factor burden in

females, who were often older at the time of presentation, may explain the sex disparities in the incidence of HF caused by MI.^[26] Some of the earlier research relied on administrative data sets with likely insufficient comorbidity information. On the other hand, differing approaches to therapy have never been considered as a plausible reason for the outcome differences between men and women across age groups. In addition to having greater rates of obesity and diabetes mellitus than males, females who have had a MI are at an increased risk of developing particular HF phenotypes.^[27] According to studies, there were no sex differences in the post-MI LV remodeling and ejection fraction.^[28,29] Despite these results, a recent study of 10,443 patients (30% women) with a STEMI found that women had a 34% higher risk adjusted rate of *de novo* HF during MI presentation, and this increased risk was associated with worse outcomes.^[30] Females, in our study, had a higher rate of HF following MI, which is consistent with our findings.

CONCLUSION

This study showed that the risk of recurrent HF hospitalizations after MI is more in women when compared to men. This study also showed that though the risk of recurrent HF is more, there is no increased risk of mortality in women. This study emphasizes the need for further studies regarding gender differences in post-MI patients regarding the risk of recurrent hospitalization with HF, the effect of various treatment modalities on the long-term outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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