

## ORIGINAL ARTICLE

## Frequency of Left Ventricular Failure after Non-ST Elevation Myocardial Infarction

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## ABSTRACT

**Objective:** To determine the frequency of left ventricular failure after Non-ST elevation myocardial infarction.**Patients and Methods:** This was a cross sectional study that was conducted in Cardiology department, Gulab Devi Hospital, Lahore. 100 Patients presented in medical O.P.D of either gender with pre diagnosed NSTEMI (as per operational definition), NSTEMI confirmed clinically and by laboratory investigations were selected for study. Thorough history and written consent regarding study was signed by patients as well as the attendants. All the patients of LVF were labeled as per operational definition.**Results:** Out of 100 patients, 25 were in age group of 30-40 years whereas 75 were in age group of 41-54 years, mean age was calculated 44.06±5.63 years. There were 77% male whereas 23% of the subjects were females. Frequency of left ventricular failure was 37% after Non-ST elevation myocardial infarction.**Conclusion:** In this new study, we found that 37% of patients went into left ventricular failure after Non ST elevation Myocardial Infarction. The major associations of left ventricular failure were age, gender, BMI, hypertension, diabetes mellitus, smoking and dyslipidemia.**Keywords:** Non-ST Elevation Myocardial Infarction, Heart Failure

## INTRODUCTION

Being a common complication of Myocardial Infarction heart failure it is associated with morbidity and mortality.<sup>1</sup>In the last few decades complications of myocardial infarction with ST elevation is a topic of great debate and a matter of considerable interest and has been reviewed multiple times. In this case heart failure implies to worse long-term and short term outcome and increased mortality.<sup>2</sup>After ST elevation myocardial infarction heart failure and its management has been widely discussed in guidelines of ESC and ACC/AHA.<sup>3</sup> However, the number of data and guidance regarding heart failure is limited in the case of non-ST elevation acute myocardial infarction (NSTEMI). ACC/AHA and ESC Guidelines that refer to treatment of heart failure with mild symptoms give less information and further evidence is desirable. People suffer from heart failure all around the globe. It appears about 2-3% in European population, and jumps to 10–20% in elderly.<sup>4</sup> It is estimated that in the coming few years the universality of heart failure is going to increase due to better prevention and early recognition regarding coronary events, improved survival and increased life expectancy.<sup>5</sup>

Although recent data of developed nations suggests a decreasing trend of occurrence of premature coronary disease, acute myocardial infarction remains a common and life-threatening entity.<sup>6</sup> Advancements of knowledge regarding treatment in failure patients resulted in increased number of “AMI survivors” with decreased Left Ventricular functions, conditions that individually are associated with significant mortality and morbidity.<sup>7</sup>

Prognostic variables were studied by Wylie et al. for both Non ST Elevation Myocardial Infarction and unstable angina, There was an observation regarding huge difference in indicators used within the hospital that suggest heart failure, as mentioned recently by Saejueng et al. from NSTEMI to Unstable Angina. This was seen in years 2002 to 2005 in coronary care units found in Thailand where 9373 patients admitted were studied<sup>8</sup>. As per the study, NSTEMI patients ended up more with heart failure (56%) than unstable angina (27%). According to this high-incidence study, risk factors like shock or diabetes mellitus indicated chance of heart failure only for NSTEMI, and no impact in unstable angina. Moreover, in-house deaths were observed more with heart failure in NSTEMI only. According to Franco et al., after myocardial infarction the chance of developing heart failure is high likely (to a level of 15% in NSTEMI).<sup>9</sup>

An increase from 14.2% to 59.1% in years 1990 to 2006 in the United States of America was seen in patients with non-ST-elevation myocardial infarction (NSTEMI).<sup>10</sup> On the other hand, regarding the Incidence of left ventricular failure in patients with Non-ST elevation myocardial infarction limited literature review is present. In view of above mentioned considerations, the aim of this study was to observe and define Prognostic importance of left ventricular failure in patients having NSTEMI.

## Operational Definitions

1) **Left Ventricular Failure:** Left ventricular function will be assessed by echocardiography findings that would demonstrate dilated left ventricle with a reduced ejection i.e. below 55 %.

2) **Non-ST Elevation Myocardial Infarction:** Diagnosis will be based on either history suggestive of at least half hour of chest pain which has no relief with sublingual nitrates or changes at the minimum two contiguous leads (ST depression > 0.1 MV or T wave inversion) in ECG and rise in cardiac biomarkers i.e Troponin-I > 0.05 ng/mL (normal range 0-0.04 ng/mL); and CKMB > 25 IU/L (normal range 5-25 IU/L)

## MATERIALS AND METHOD

**Study Design & Setting:** A cross sectional study was conducted at department of Cardiology, Gulab Devi Hospital, Lahore. Duration of study was 6 months after the approval of synopsis.

**Sample Selection:** Using non-probability sampling, 100 cases were enrolled using 95% confidence interval, 10% margin of error and expected percentage of heart failure in patients with NSTEMI as 56%.<sup>9</sup>

Diagnosis of NSTEMI was based on either history suggestive of chest pain lasting for at least 30 minutes not relieved by sublingual nitrates or ECG changes in at least two contiguous leads (ST depression > 0.1 MV or T wave inversion) and rise in cardiac biomarkers i.e. Troponin I > 0.05 ng/mL (normal range 0-0.04 ng/mL); and CKMB > 25 IU/L (normal range 5-25 IU/L)

Pre-diagnosed patients of NSTEMI presented in outdoor patient department irrespective of gender with age 30-54 years, and those with time from the initiation of symptoms admission in intensive care unit of less than 48 hours were included. Patients having STEMI, known case of valvular heart diseases, restrictive cardiomyopathy and cardiac tumor like myxoma were excluded.

**Data Collection:** 100 patients presented in outdoor patient department of either gender of age >30 years with pre-diagnosed

NSTEMI; confirmed clinically and supported by Troponin measurements were included. Informed written consent and detailed history were taken from patients and their attendants. LVF was confirmed on the basis of ECHO (E.F<55%) Variables of interest were obtained from history. Control of confounders was assured by excluding all those patients who have secondary causes of heart failure.

**Data Analysis:** All the collected data was entered and analyzed through SPSS version 22. Quantitative variables; age, BMI and LVEF were presented by mean±SD while categorical variables; Gender, Hypertension, DM, Dyslipidemia, Smoking (> 5 pack per years), and Left Ventricular Failure were presented by percentage and frequency. Data was stratified for gender, age, BMI, hypertension, DM, dyslipidemia and smoking (5 pack per years). Post stratification chi-square test was used taking p-value <0.05 as significant.

**RESULTS**

A total of 100 cases fulfilling the inclusion/exclusion criteria were enrolled in this study. Table.01 show demographic profile of study participants. Age distribution of the patients showed that out of 100 patients, 25% were in age group of 30-40 years whereas 75% were in age group of 41-54 years of age, mean age was calculated 44.06±5.63 years. Gender distribution showed that there was an overall male predominance (77%). Mean BMI was calculated as 22.8±1.91kg/m<sup>2</sup>

Table 1: Descriptive Statistics of Socio-demographic Profile

Age (mean ± SD)	44.06±5.6
30-40 years	25
41-54years	75
Gender n(%)	
Male	77 (77%)
Female	23 (23%)
BMI (mean ± SD)	22.8±1.91kg/m <sup>2</sup>
18-20kg/m <sup>2</sup>	14 (77%)
>20kg/m <sup>2</sup>	86 (14%)

Mean ejection fraction was calculated as 57.66±13.28%. Frequency of leftventricular failure was37%after NSTEMI as shown in Figure.01.



Figure1: Frequency of Left Ventricular Failure

The data was stratified for age, gender, BMI, hypertension, DM, dyslipidemia and smoking (5 pack per years) of the patients with respect to LVF to find the association between these variables.

Table 2: Association of LVF with Patients Variables

	Left Ventricular Failure		p-value
	Yes	No	
Age group			
30-40years	04	21	0.01*
41-54years	33	42	
Gender			
Male	33	44	0.026*
Female	04	19	
BMI			
>20kg/m <sup>2</sup>	36	50	0.013*
18-20kg/m <sup>2</sup>	01	13	
Risk Factors			
Smoking	33	26	0.001*
Hypertension	28	12	0.001*
Diabetes	25	13	0.001*
Dyslipidemia	10	10	0.178

\*p-value < 0.05 (Significant)

**DISCUSSION**

Heart failure is associated with other complications and increased mortality by complicating on-going Myocardial Ischemia.<sup>1</sup>In the last few decades heart failure as a complication of ST elevation myocardial infarction has been a matter of considerable interest and reviewed multiple times. In this case heart failure implies to worse long-term and short-term outcome and increased mortality.<sup>2</sup> Heart failure is a worldwide health problem. Its occurrence in European population is about 2–3%,and jumps to 10–20% in elderly.<sup>4</sup> It is estimated that in the coming few years the prevalence of heart failure will rise owing to better prevention of coronary events, improved survival and increased life expectancy.<sup>5</sup>

In this study, frequency of left ventricular failure after Non-ST Elevation Myocardial Infarction was 37% which is very common. In this study, frequency of hypertension was (40%), DM (38%), dyslipidemia (20%) and smoking(59%). We also found that Age, gender, BMI, hypertension, DM, dyslipidemia and smoking were significantly associated with left ventricular failure.

Referring to another study it was found that heart failure occurred more in NSTEMI. According to Franco Eet.al., the incidence of HF is common after a myocardial infarction (up to 15% for NSTEMI).<sup>9</sup>

The number of patients with non ST-elevation myocardial infarction have heightened significantly from 1990 to 2006 in the United States of America.<sup>10</sup> The occurrence of Heart Failure differs according to definition and region, but over all it has been estimated to be approximately 1% to 2% in developed countries. The prevalence rate tends to increase with age, and it is > 10%amongpeople >70years old<sup>(19)</sup>.The epidemiological and etiological analysis showed that HFpEF and HFrEF have different profiles. Patients with HFpEF tend to be older having female predominance and have risk factors like hypertension and atrial fibrillation and decreased incidence of myocardial infarction<sup>[20]</sup>According to National Health Insurance Service in Korea, the incidence of heart failure in 2013 was 1.53%.The increasing trend of HF with age in Korea is in correspondent with the worldwide trend, and the rate was reported to be 1.0% for individuals below 60 years old, 5.5% for those aged 60 years or older, and 12.6%forthoseaged 80years or older.<sup>[21]</sup>

HF is becoming a disease that is primarily being found as a disease of the elderly population (>60 years) and is reported to distress about 2%–3% of people in the United States. These include 8% of females and 10%ofmales. Regrettably, these numbers are on a gradual rise due to increased incidence of HF with increasing age. In 2013, the total number of HF patients was about 5.1 million, that charged almost \$32 billion; and this cost is being projected to increase three-fold by2030<sup>[35]</sup>.

The main goals of treatment in heart failure are to improve prognosis, decrease morbidity and mortality by reversing or slowing down the cardiac and peripheral dysfunction. In addition to the above goals, other goals of therapy in in-hospital patients are to reduce the length of stay, minimize subsequent readmission and prevent end-organdamage.

## CONCLUSION

We study Frequency of left ventricular failure after Non-ST Elevation Myocardial Infarction. We found that the frequency of left ventricular failure was 37% after Non-ST Elevation Myocardial infarction. In this study, Frequency of hypertension was (40%), DM (38%), dyslipidemia (20%) and smoking (59%). We also found that gender, Age, BMI, DM, hypertension, smoking and dyslipidemia were significantly associated with left ventricular failure.

**Limitations of Study:** This is a single center study. Large scale studies are required before a firm final conclusion is achieved.

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