ORIGINAL ARTICLE

# FREQUENCY OF HEART FAILURE AND ITS CLINICAL OUTCOME AMONG PATIENTS PRESENTING WITH ACUTE MYOCARDIAL INFARCTION

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**Background:** Cardiovascular disease has a major impact on global health. Among the cardiovascular diseases acute myocardial infarction is the leading cause of mortality and morbidity in the western world. Heart failure significantly worsens the prognosis of patients with acute myocardial infarction. **Methods:** This descriptive cross sectional study of 264 patients was conducted at Coronary Care Unit, Postgraduate Medical Institute, Hayatabad Medical Complex, Peshawar, from August 2011 to January 2012. All patients fulfilling the inclusion criteria admitted to CCU were included. Every patient was screened for the presence or absence of heart failure on history and clinical examination and stratified into different classes according to severity. Common clinical outcomes like death, ventricular tachycardia, and ventricular fibrillation were recorded. **Results:** Mean age of the patients was 60±1.28 years, 58% were male and 42% were female. Fifty-two percent patients had STEMI and 48% had NSTEMI, 37% patients had heart failure while 63% didn't have heart failure. Among 98 heart failure patients, 45% were in Killip Class II, 35% were in Killip Class III, and 15% patients were in Killip Class IV. Twenty-four percent patients died, 6% had ventricular tachycardia, and 4.5% patients had ventricular fibrillation. **Conclusion:** Quite significant proportions of patients develop heart failure after acute MI. In STEMI, Percutaneous Coronary Intervention (PCI) should be the first line management in PCI capable centres, while early thrombolysis should be employed where PCI is not available. In non-STEMI patients proper anticoagulation, anti-platelets and revascularisation are recommended.

**Keywords:** Heart Failure, Acute Myocardial Infarction, Killip Class

## INTRODUCTION

Myocardial infarction (MI) commonly triggers left ventricular (LV) remodelling, progressive deterioration of cardiac function, and ultimately, the clinical syndrome of heart failure (HF).[1] Several factors, such as recurrent myocardial ischemia, infarct size, ventricular remodelling, stunned myocardium, mechanical complications, and hibernating myocardium determine the appearance of left ventricular systolic dysfunction with or without clinical HF after MI.[2–4] Heart failure is a common complication of MI,[5] with the estimated incidence varying from 10% to 40%.[6] Post-MI HF is associated with a markedly elevated risk of death,[5] with an estimated median survival of 4 years.[7]

Considering the kind of cardiac dysfunction following MI, most patients present with systolic dysfunction. Consequences of cardiac dysfunction after MI are well established, and its presence increases the risk of death by at least 3–4 fold.[8] Compared with patients without heart failure and left ventricular systolic dysfunction after myocardial infarction, patients who have heart failure and left ventricular systolic dysfunction are at higher risk for adverse outcomes including cardiac rupture, cardiac arrest, stroke, longer hospitalisations, ventricular arrhythmias, recurrent myocardial infarction, and death, including sudden death.[9]

Killip classification[10] is commonly used to assess severity of heart failure after MI. Another method to evaluate the severity of HF is the New York Heart Association (NYHA) class.[11] Importantly, recent studies have demonstrated that the Killip classification system is a strong predictor of long-term mortality after MI.[10,12]

Ventricular dysfunction after MI is of major importance. In addition to understanding these mechanisms, clinicians should seek to determine the presence of signs and symptoms of heart failure, after which ventricular dysfunction should be confirmed. β-blockers, ACE inhibitors, aldosterone antagonists, and angiotensin-II receptor blockers improve the prognosis of patients with HF after MI and should be started in the acute phase and maintained indefinitely.[2]

We hypothesised that the incidence of HF after MI may have increased in recent times owing to a lower mortality associated with the condition. We designed this study to see the frequency of heart failure in post-MI and its clinical outcome.

## MATERIAL AND METHODS

This descriptive cross-sectional study was conducted from August 2011 to January 2012 in Coronary Care Unit (CCU), Postgraduate Medical Institute, Hayatabad Medical Complex, Peshawar. Approval was obtained from hospitals ethical and research committee.

Patients of both genders, age more than 18 years, admitted to CCU with first episode of ST Elevation Myocardial Infarction (STEMI) and non-STEMI were included in the study. Patients having prior history of heart failure, coronary artery disease, having acute pericarditis, and unstable angina were excluded from the study. Informed consent was obtained from all patients.

History was recorded and a detailed clinical examination was done in all patients for heart failure and classification according to Killip[10] classification system. Those patients in whom heart failure was detected were followed-up till their hospital stay to detect common clinical outcome of heart failure, i.e., in-hospital mortality, ventricular tachycardia (VT) and ventricular fibrillation (VF). All the patients were managed per ward protocols under supervision. Data were analysed using SPSS-15. Frequency and percentage for categorical variables and Mean±SD was calculated for numerical variables. Heart failure and its clinical outcomes were stratified among age, gender and Killip class.

## RESULTS

A total of 264 patients were included in the study. Their mean age was 60±1.28 years, age ranged from 18 to 78 years, 153 (58%) patients were male while 111 (42%) were female. One hundred and thirty-seven (52%) patients had STEMI while 127 (48%) were non-STEMI (NSTEMI). Ninety-eight (37%) patients had heart failure while 166 (63%) didn't develop heart failure. Forty-four (44.9%) patients were in Killip Class II, 35 (35.71%) were in Killip Class III, and 19 (19.39%) were in Class IV (Table-1).

**Table-1: Killip classification in cardiac failure patients**

| Killip Class | Number | Percentage |
|---|---|---|
| Killip Class II | 44 | 44.9 |
| Killip Class III | 35 | 35.71 |
| Killip Class IV | 19 | 19.39 |

Among 98 patients who developed heart failure 5 (6.12%) patients had ventricular tachycardia, and 4 (4.085%) had ventricular fibrillation while 24 (24.49%) patients died during hospitalisation. Rest of the patients recovered uneventfully (Table-2).

**Table-2: Outcome in patients with cardiac failure**

| Outcome | Number | Percentage |
|---|---|---|
| Death | 24 | 24.49 |
| Ventricular Tachycardia | 5 | 6.12 |
| Ventricular Fibrillation | 4 | 4.08 |

Among 24 deaths, 3 patients were in age range 41–50 years, 7 were in age range 51–60 years, and 14 patients were above 60 years of age. In 5 cases of ventricular tachycardia, 1 patient was in age range 41–50 years, 1 was in age range 51–60 years, and 3 patients were above 60 years of age. In 24 cases of ventricular fibrillation, 1 patient was in age range 51–60 years, and 3 were above 60 years of age.

Out of 24 death cases 15 (62.5%) were male and 9 (37.5%) were female. In 5 cases of ventricular tachycardia, 4 (80%) patients were male and 1 (20%) patient was female. In 4 cases of ventricular fibrillation, 3 (75%) patients were male and 1 (25%) patient were female.

## DISCUSSION

Our study shows that 37% patients had heart failure while 63% patients didn't have heart failure; 45% patients were in Killip Class II, 35% patients were in Killip Class III and 15% patients were in Killip Class IV. Similar results were reported in a study by El Menyar A[15]. In comparison to Killip Class I, patients with higher Killip class had greater prevalence of cardiovascular risk factors, presented late, were less likely to have angina, and were less likely to receive anti-platelet, statins, and β-blockers. Classes II, III, and IV were associated with higher adjusted odds of death in STEMI and non-ST-elevation acute coronary syndrome.[13]

In another study[15] among all patients with Acute Coronary Syndrome, those with higher Killip class had worse clinical profile and were less likely to be treated with evidence-based therapy. High Killip class was independent predictor of mortality in ST-elevation and non-ST elevation acute coronary syndrome. It highlights the importance of detailed clinical examination in ER to categorise them into high risk and low risk patients.

In our study 24% patients died, 6% patients had ventricular tachycardia and 4.5% patients had ventricular fibrillation. Similar findings were observed by Minicucci MF[16] in which sustained ventricular arrhythmias and heart failure are well-recognised complications after acute myocardial infarction and have been associated with worse outcomes and increased mortality.

In another study, use and outcome of beta-blockers in patients with acute MI complicated by sustained ventricular tachycardia or ventricular fibrillation and heart failure were investigated. Of 5,391 patients, sustained VT/VF occurred in 306 (5.7%), with an in-hospital mortality rate of 20.3%.[14] Multivariable logistic regression identified sustained VT/VF as a major predictor of in-hospital death. Of those with sustained VT/VF, 55.2% were treated with intravenous or oral beta blockade in the first 24 hours. After adjusting for baseline characteristics, propensity for acute beta-blocker use, and the interaction between Killip classification and beta-blocker therapy, beta-blocker therapy within 24 hours was associated with decreased in-hospital mortality in patients with sustained VT/VF without evidence of worsening heart failure ($p$=0.013). Patients with sustained VT/VF were

less likely to receive beta blockers within 24 hours ($p$=0.001).[14] In patients with sustained VT/VF, beta-blocker therapy in the first 24 hours after AMI was associated with decreased early mortality without worsened heart failure. Unfortunately, beta blockers were underused acutely in patients with sustained VT/VF.[14] Our results are consistent with these findings.

## CONCLUSION & RECOMMENDATIONS

Conduction defects and cardiac arrhythmias are common after acute myocardial infarction and especially when it is also accompanied by heart failure. Such patients should be closely observed and monitored as they have got higher rate of complications and mortality during hospital course. In STEMI, Percutaneous Coronary Intervention (PCI) should be the first line management in PCI capable centres, while early thrombolysis should be employed where PCI is not available. In NSTEMI patients proper anticoagulation, anti-platelets and revascularisation are recommended.

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