



## **In-Hospital Outcome of Patients with Acute ST-Segment Elevation Myocardial Infarction Who Did Not Receive Reperfusion Therapy at Our Institute**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author SHM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors GFS and GHB managed the analyses of the study. Author AGM managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objective:** This study aims to determine the in-hospital outcome of patients with acute ST-segment elevation myocardial infarction who did not receive reperfusion therapy at our institute.

**Methodology:** Cohort of patients recruited from Emergency Department of Liaquat University Hospital, Hyderabad affiliated with Liaquat University of Medical & Health sciences, Jamshoro, Sindh, Pakistan from August 2<sup>nd</sup>, 2019 to 1<sup>st</sup> July 2020. All the patients who were diagnosed as a case of acute STEMI belongs to any age group of either gender and who did not receive reperfusion therapy either percutaneous or pharmacological therapy due to any cause were included in our study to assess their in-hospital outcome.

**Results:** Total of 106 patients were enrolled having mean age and SD of 51.09 ± 13.50 years in which 67.92% were males. Significantly higher proportion of patients who did not receive reperfusion therapy died during hospitalization (27.35%, N = 29). The most common risk factors

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associated with higher mortality rates were increasing age, increased mean duration of hospitalization from the onset of chest pain, raised RBS, diabetes mellitus, and smoking,  $p < 0.001$ .  
**Conclusion:** Almost one third of patients with acute STEMI who did not receive reperfusion therapy were died during hospitalization. Among those, unfortunately the higher mortality was observed having modifiable risk factors.

*Keywords: Acute STEMI; reperfusion therapy outcome; Pakistani population.*

## 1. INTRODUCTION

Coronary artery disease (CAD) is one of the most common causes of morbidity and mortality associated with cardiovascular disease worldwide involving more than 18.3 million adults between the ages of 20 years to 65 years and also responsible for around more than 3.6 million deaths in 2017 [1,2]. Ward MJ and his colleagues have shown a linear decrease in the incidence of Acute ST-Segment Elevation Myocardial Infarction (STEMI) from 2006 (10.1%) to 2011 (7.3%) in America [1]. Recent data shows, around 1.5 million people annually diagnosed and admitted due to acute myocardial infarction among them 25% were due to acute STEMI in USA [2]. While, epidemiological studies in Pakistan are still lacking but local studies with a smaller sample size claim incidence of STEMI among 1500 included patients was 40.5% [3].

Percutaneous or pharmacological coronary reperfusion therapy is class I recommendation by the current guidelines for the acute STEMI and is responsible for reducing post myocardial infarction (MI) associated complications such as heart failure, arrhythmias, and even death [4-6]. The International Registry Data shows that only 41% of patients who receive in-hospital thrombolytic agents present to hospital within two hours of symptom onset and only one third receive the treatment within two hours. But in some cases patients may not be able to receive reperfusion therapy these factors may be late arrival at the hospital, known renal or hepatic function impairment, higher risk for contrast induced nephropathy, allergies, non-stentable coronary vessels, bleeding diathesis, cerebrovascular accident, and sometimes patients do not consent for percutaneous or pharmacological reperfusion therapy.

Outcomes of such patients who do not receive reperfusion therapy are more prone to MI associated complications such as left ventricular dysfunction, acute mitral regurgitation, ventricular septal rupture, development of left ventricular aneurysm, and sometimes even death. That is

why the importance of timely reperfusion therapy is crucial in the management of acute myocardial infarction and for this reason this study aims to evaluate the in-hospital outcome of patients admitted with acute STEMI who did not receive reperfusion therapy at our institute.

## 2. PATIENTS AND METHODS

This is a prospective cross-sectional single center study conducted in the emergency department of cardiology, Liaquat university Hospital affiliated with Liaquat University of Medical & Health Sciences, Jamshoro, Sindh, Pakistan and included patients of any age group of both genders who were diagnosed as acute ST-Segment Elevation Myocardial Infarction and did not receive either percutaneous or pharmacological reperfusion therapy due to any cause were included in our study after taking informed and written consent between the periods of 11 months from August 2<sup>nd</sup>, 2019 to 1<sup>st</sup> July 2020.

Detailed history and clinical examination were done of all admitted patients and recorded by researcher himself in the prescribed data collection proforma. Data collection was started after taking approval from the ethical committee of the institute. Baseline and clinical data were recorded in a predesigned semi-structured questionnaire. Baseline data includes age, gender, contact number, date of admission, area of residence, social class, education level, marital status, addiction habit, weight, height, and body mass index (BMI). While clinical data includes type of STEMI, time duration of patients to reach hospital since chest pain, and outcome (mortality).

All the gathered data was analyzed using Statistical Package for Social Sciences (SPSS) version 21. Mean  $\pm$  standard deviation was calculated for quantitative variables and independent t-test used for association with outcome while frequency and percentages were calculated for categorical variables and chi-square test/fisher's exact test was used where

applicable. Consider  $P \leq 0.05$  as statistically significant.

### 3. RESULTS

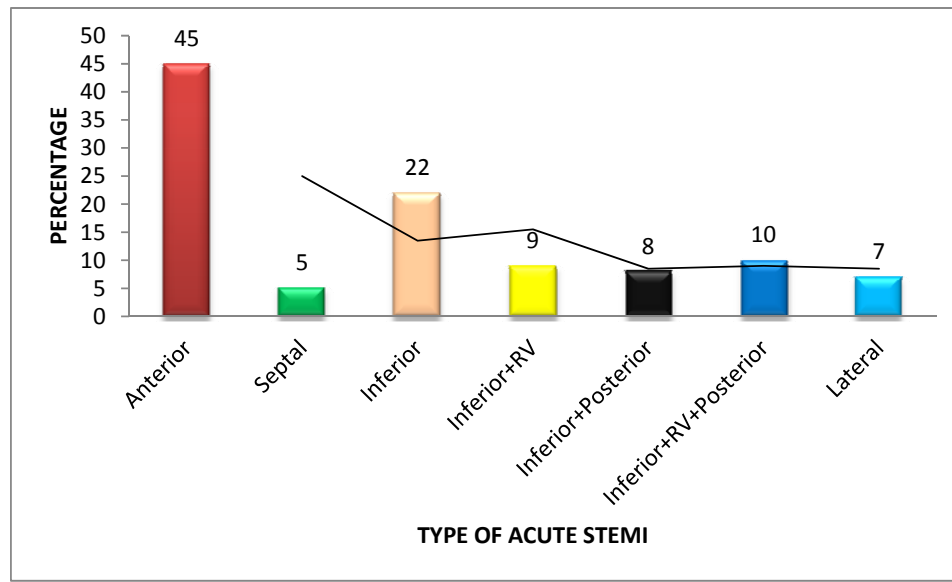
Total of 106 patients were enrolled having mean age and SD of  $51.09 \pm 13.50$  years. In our study, most of the patients were males and residents of urban area. Most of our study's population (66.03%,  $N = 70$ ) had optimal BMI. Patients with dyslipidemia (23.58%) and smoking (20.75%) were almost had same percentage while patients with diabetes mellitus were more dominant than patients with hypertension, 58.49% and 31.13%, respectively. The overall in-hospital mortality in

patients with acute STEMI who did not receive reperfusion therapy was 27.35% ( $N = 29/106$ ). All baseline and clinical descriptions are shown in Table number 1 and Graph number 1.

Table 2 shows risk factors associated with increased rates of mortality among patients with acute STEMI. Patients with increasing mean age, raised random blood sugar levels at admission, increased duration of hospitalization from onset of chest pain, cigarette smoking, and patients having underlying diabetes mellitus were significantly associated with increased rates of mortality among patients with acute STEMI,  $p$  value  $< 0.05$ .

**Table 1. Basic demographic and clinical characteristics of study subjects (N = 106)**

<b>Variables</b>		
Age (Mean $\pm$ SD) – years	51.09 $\pm$ 13.50	
<b>Gender</b>	<b>N</b>	<b>%</b>
Male	72	67.92
Female	34	32.07
<b>Area of Residence</b>		
Urban	77	72.64
Rural	29	27.35
<b>Marital Status</b>		
Single	18	16.98
Married	83	78.3
Widowed	5	4.71
<b>Education Status</b>		
Illiterate	7	6.6
Primary	28	26.41
Secondary	52	49.05
$\geq$ Graduation	19	17.92
<b>BMI</b>		
Underweight (<18.5)	8	7.54
Optimal (18.5 - 25)	70	66.03
Overweight (25 - 30)	18	16.98
Obese (>30)	10	7.54
<b>Dyslipidemia</b>		
Yes	25	23.58
No	81	76.41
<b>Smoking</b>		
Yes	22	20.75
No	84	79.24
<b>Hypertension</b>		
Yes	33	31.13
No	73	68.86
<b>Diabetes Mellitus</b>		
Yes	62	58.49
No	44	41.5
<b>In-Hospital Mortality</b>		
Yes	29	27.35
No	77	72.64



**Graph 1. Type of Acute ST-segment elevation myocardial infarction those who did not receive percutaneous thrombolytic therapy (N = 106)**

**Table 2. Risk factors associated with increased rates of mortality(N = 106)**

Continuous Variables	Survived (N = 77)	Death (N = 29)	P value
Age - years	50.17±5.07	54.11±6.10	0.03*
BMI - kg/m <sup>2</sup>	23.01±2.7	25.04±4.05	0.74
Time to Hospitalization - minutes	105.51±16.80	130.11±20.50	0.01*
RBS - mg/dL	180.±64.18	203.32±105.60	0.001*
Categorical Variables N (%)			
Gender			
Male	57 (53.77))	15 (14.15))	0.34
Female	20 (18.86)	14 (13.02)	
Area of Residence			
Urban	57 (53.77))	20 (18.86)	0.08
Rural	20 (18.86)	9 (8.49)	
Marital Status			
Single	11 (10.37)	7 (6.60)	0.33
Married	64 (60.37)	19 (17.92)	
Widowed	2 (1.88)	3 (2.83)	
Education Status			
Illiterate	6 (5.66)	1 (0.94)	0.97
Primary	19 (17.92)	9 (8.49)	
Secondary	40 (37.73)	12 (11.32)	
≥Graduation	12 (11.32)	7 (6.60)	
BMI AND RISK FACTORS			
Underweight (<18.5)	5 (4.71)	3 (2.83)	0.78
Optimal (18.5 - 25)	52 (49.05)	18 (16.98)	
Overweight (25 - 30)	13 (12.26)	5 (4.71)	
Obese (>30)	7 (6.60)	3 (2.83)	
Dyslipidemia	9 (8.49)	16 (15.09)	0.07
Smoking	8 (7.54)	14 (13.20)	0.04
Hypertension	26 (24.52)	7 (6.60)	0.77
Diabetes Mellitus	45 (42.45)	17 (16.03)	0.02

#### 4. DISCUSSION

Patients with acute myocardial infarction particularly those with STEMI are at greater risk of developing post-MI associated complications and the risk is increased when patients do not receive reperfusion therapy either percutaneous or pharmacological. Beside other complications of acute STEMI, higher rates of mortality need to be addressed in a population where data is still lacking. In our study the in-hospital mortality rate was 27.35% which is more than 3 times as compared to study conducted at America by Grzybowski M and colleagues where the in-hospital mortality rate after STEMI was 9.0% [7]. While on the other hand another study conducted in Brazil in which in-hospital mortality rate was 5.8% in patients who received pharmacologic reperfusion therapy [8]. Time is directly proportional to the rates of mortality in patients with acute STEMI, those who receive reperfusion therapy within time are more likely to get benefited as compare to those who do not [9]. While data from national hospitals is still lacking but a study conducted by Rehman S in 2019 in different cities of Punjab (a province in Pakistan) in which they have included all patients with acute myocardial infarction irrespective of STEMI and non-ST elevation myocardial infarction (NSTEMI) has shown the in-hospital mortality rate was 8.6% [10]. This difference in rates of in-hospital outcome is possibly due to eligibility criteria of patients as in our study we included high-risk patients who did not receive reperfusion therapy while their studies have included all patients with acute myocardial infarction.

There are certain risk factors which also contribute in increasing risk of in-hospital mortality in patients who did not receive reperfusion therapy. In our study patients with increased mean age (54.11±6.10 years), raised random blood sugar levels (203.32±105.60 mg/dl) at admission, increased duration of hospitalization from the onset of chest pain (130.11±20.50 minutes), cigarette smoking (13.20%), and patients having underlying diabetes mellitus (16.03%) were significantly associated with increased rates of mortality among patients with acute STEMI, p value <0.05. Multiple studies have conducted and their findings are consistent with the findings of our study [11-16]. While there are also some studies whose observations are contrary with our study findings such as hypertension and dyslipidemia were also associated with increased rates of in-hospital mortality in their studies [17,18]. The

reason behind this huge difference of higher mortality in our study could be due to lack of knowledge regarding worse outcome by the patients and their family members and religious belief in which such patients refuse to seek medical treatment.

#### 5. CONCLUSION

Almost one third of patients with acute STEMI who did not receive reperfusion therapy were died during hospitalization. Among those, unfortunately the higher mortality was observed having modifiable risk factors.

#### CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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