

## Clinical Profile and Outcome of Patients Admitted with STEMI Managed with Pharmacoinvasive Strategy at Tertiary Care Center

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### Abstract

#### Background

STEMI is a catastrophic event due to total occlusion of an epicardial coronary artery. Time taken to open the infarct related artery is directly proportional to adverse outcome. Due to many reasons pharmacoinvasive approach is preferred in many peripheral hospitals in India.

#### Aim

The aim was to study the impact of Door to Needle time (D-N time), time for revascularization after thrombolysis in patients of STEMI managed with pharmacoinvasive strategy.

#### Material and Methods

It was a prospective observational study carried out at the Department of Medicine at a Tertiary Care Hospital for the period of Oct-17 to March-19. In total, 55 patients having STEMI were included in the study. Focused clinical examination, 12 lead electrocardiogram and echocardiography were performed on all the patients. All 55 patients were thrombolysed (with streptokinase/urokinase). Post thrombolysis patient underwent coronary angiography (CAG), so PTCA to culprit vessel. Patients were followed up to 6 months at 1<sup>st</sup> month & 6<sup>th</sup> month interval. H/o heart failure, admission due to cardiovascular cause, repeat MI, stroke and all cause death were enquired. Data was analysed using SPSS-25 at the end of 6 months follow up.

#### Observations & Results

The mean age of the patients was 53±3 years, with 43 male and 12 female patients. The mean chest pain duration was 4.85 hours, the mean D-N time was 54.45 mins and mean thrombolysis to revascularization time was 1.98 days. 35 patients were diagnosed with AWMI, 19 with IWMI and 1 had both. The mean CAG duration was 3±14 days. Patients with AWMI had poor Killip Score(p<0.05) and patients with IWMI had good Killip Score(p<0.05). Out of 42 patients who underwent angiography, 41 were revascularized and no mortality was associated with revascularized patients. 11 patients who did not undergo angiography could not survive and one patient died after angiography due to hemodynamic instability and had poor killip score.

#### Conclusion

From this study we concluded that:

Primary PCI was found to be more beneficial than Pharmacoinvasive therapy in the initial treatment of STEMI patients as assessed by mortality rates. But, on comparing the outcomes and quality of life in the survivors, the benefits of both the modalities of treatments have been found to be similar.

However patients who were hemodynamically unstable had higher mortality rates after thrombolysis when rescue PCI was not done.

D-N time and thrombolysis to revascularization time was found to be high which suggests that there was significant patient delay as well as system delay. So the cause behind this patient and system delay needs to be probed and minimized to improve the outcome.

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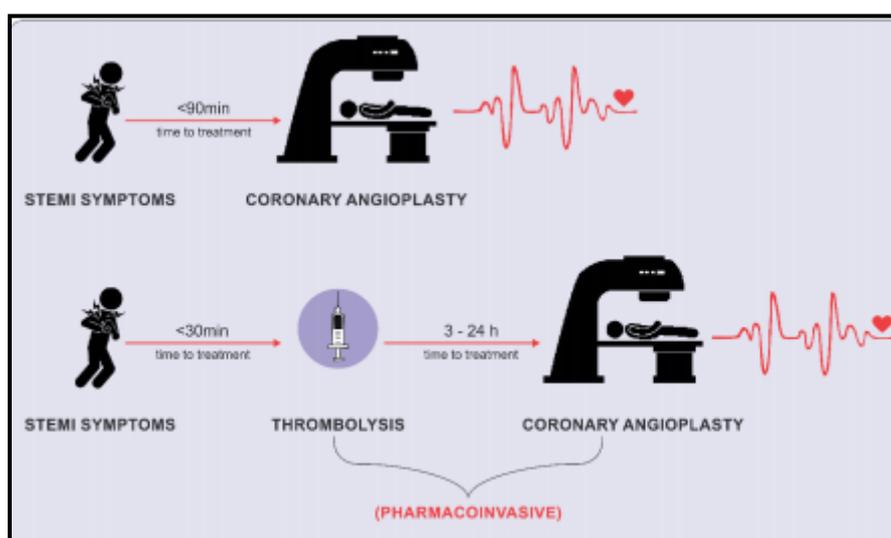
## I. Introduction

Coronary artery disease is ranked among the most common cause of mortality and morbidity around the world. Furthermore, ST-elevation myocardial infarction (STEMI), non-STEMI and unstable angina, forms the entire spectrum of acute coronary syndrome (ACS)<sup>1</sup>. STEMI is a catastrophic event due to total occlusion of an epicardial coronary artery. Time taken to open the infarct-related artery is directly proportional to adverse outcome. Due to financial restraints and lack of access to primary angioplasty capable hospital, pharmacoinvasive approach is preferred in many peripheral hospitals in India.

Coronary reperfusion in the background of STEMI is established mainly by the following two modalities:

1. Pharmacological - Fibrinolysis
2. Mechanical - Primary percutaneous coronary intervention (PCI)<sup>2</sup>.

Pharmacoinvasive strategy (PIs) exploits the widespread availability of fibrinolysis and its early administration to restore some degree of myocardial blood flow, coupled with the complete restoration of the culprit coronary artery patency that can be obtained with subsequent angioplasty. Therefore, it is a known fact that pharmaco-invasive therapy proves to be a better approach in managing the patients of STEMI especially when Percutaneous Coronary Intervention (PCI)<sup>3</sup> is not available



**Figure no 1:** Pharmaco-invasive approach of STEMI care<sup>3</sup>

## II. Aim

The aim was to study the impact of Door to Needle time (D-N time), time for revascularization after thrombolysis in patients of STEMI managed with pharmacoinvasive strategy.

## III. Material and Methods

It was a prospective observational study carried out at the Department of Medicine at a Tertiary Care Hospital for the period of Oct-2017 to March-2019. In total, 55 patients having STEMI were included in the study. Each patient gave written, informed consent to participate in the study.

### Inclusion and exclusion criteria

Patient admitted to the ICCU with history of chest pain, breathlessness, electrocardiogram taken immediately, and those patients with acute changes of MI in ECG were included in the study. Those patients with angina pectoris and unstable angina (with atypical ECG changes) or chest pain due to any other cause excluded from the study. Also patient not giving consent were excluded from the study.

Data was collected by taking a detailed history, clinical examination, thorough cardiovascular and other systemic examination and necessary investigations. A 12 lead electrocardiogram was recorded at the earliest and echocardiography (2d echo) was performed on all the patients. All 55 patients were thrombolysed with either streptokinase or urokinase. Post thrombolysis patient underwent coronary angiography (CAG), so PTCA to culprit vessel done in same settings. Patients were followed upto 6 months at 1<sup>st</sup> month & 6<sup>th</sup>-month interval. H/o heart failure, admission due to cardiovascular cause, repeat MI, stroke and all-cause death were enquired.

All patients were evaluated for risk factors like diabetes mellitus, hypercholesterolemia, hypertension and smoking. Patients were kept in ICCU for a period of a maximum of two days post-PTCA and more in complicated cases.

**Statistical analysis**

Data were analysed using SPSS-25 at the end of 6 months follow up. For the analysis of the data descriptive analysis, frequency analysis and Chi-square test were used.

**IV. Results**

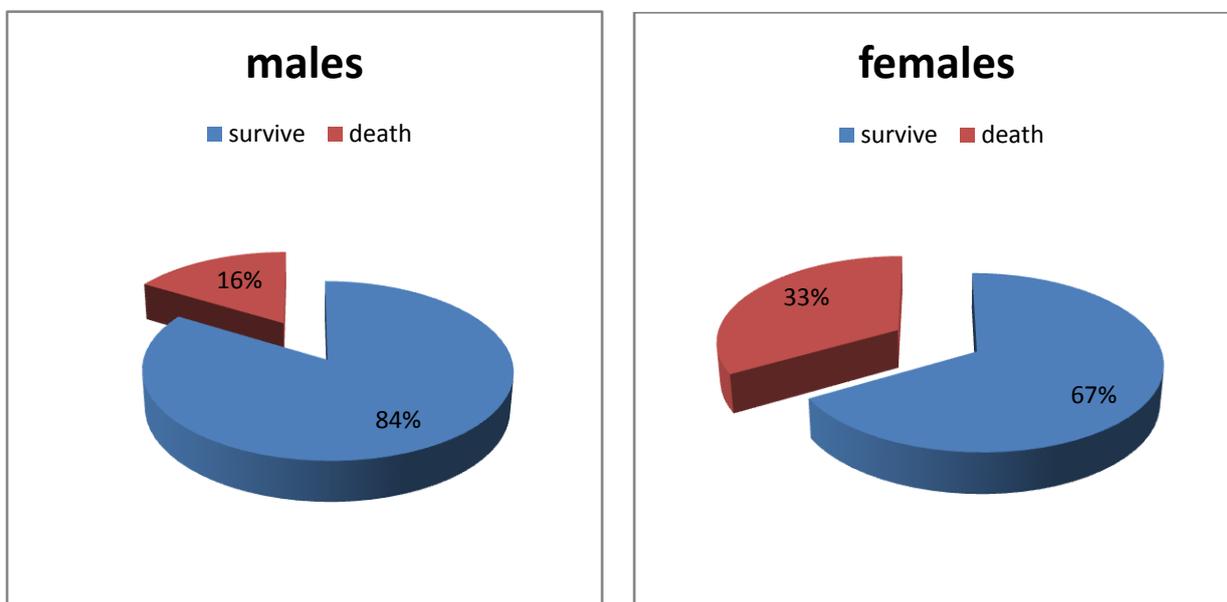
The following result was obtained after analysis of data gathered from 55 patients admitted at the Department of Medicine at a Tertiary Care Hospital for the period of Oct-2017 to March-2019.

**Table no 1: Association between Gender and Death**

Gender	No. of patients	Survive	Death
Male	43 (78.18%)	36 (65.45%)	7 (12.72%)
Female	12 (21.81%)	8 (14.54%)	4(7.27.4%)
<b>Total</b>	55 (100%)	44 (80%)	11 (20%)

The mean age of the patients was 53±3 years, with 43 male and 12 female patients. Out of total 43 male patients, 36 patients survived and 7 patients died. Similarly, out of 12 female patients, 8 patients survived and 4 patients died.

**Figure no 2: Gender specific mortality**



**Table no 2: Mean time intervals**

Mean chest pain duration	4.85 hours
Mean D-N time	54.45 min
Mean Thrombolysis to Revascularisation time	1.98 days

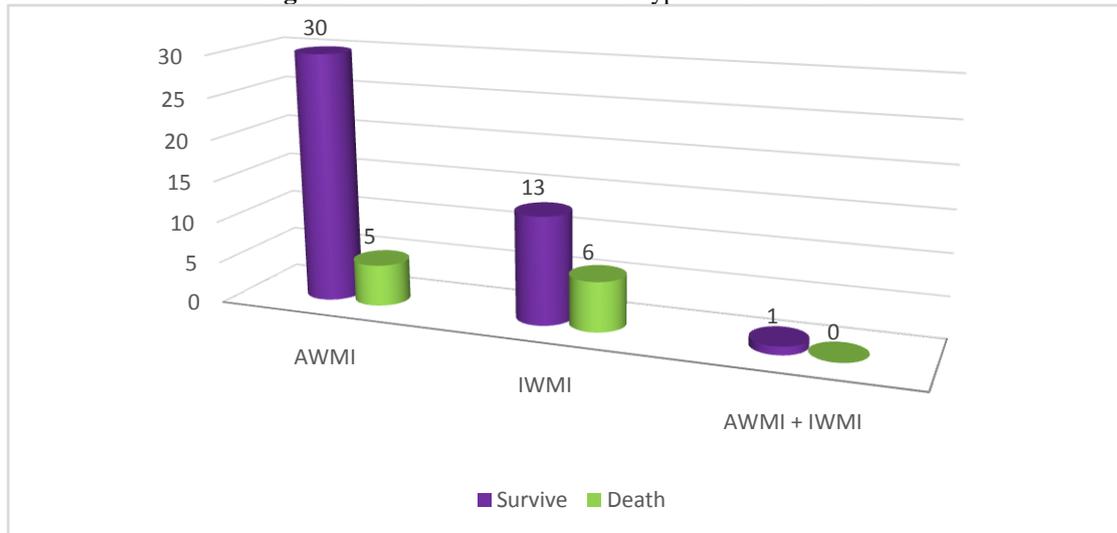
The mean chest pain duration on presentation was 4.85 hours, the mean D-N time was 54.45 mins and mean duration between thrombolysis and revascularisation time was 1.98 days.

**Table no 3: Association between Type of MI and Death**

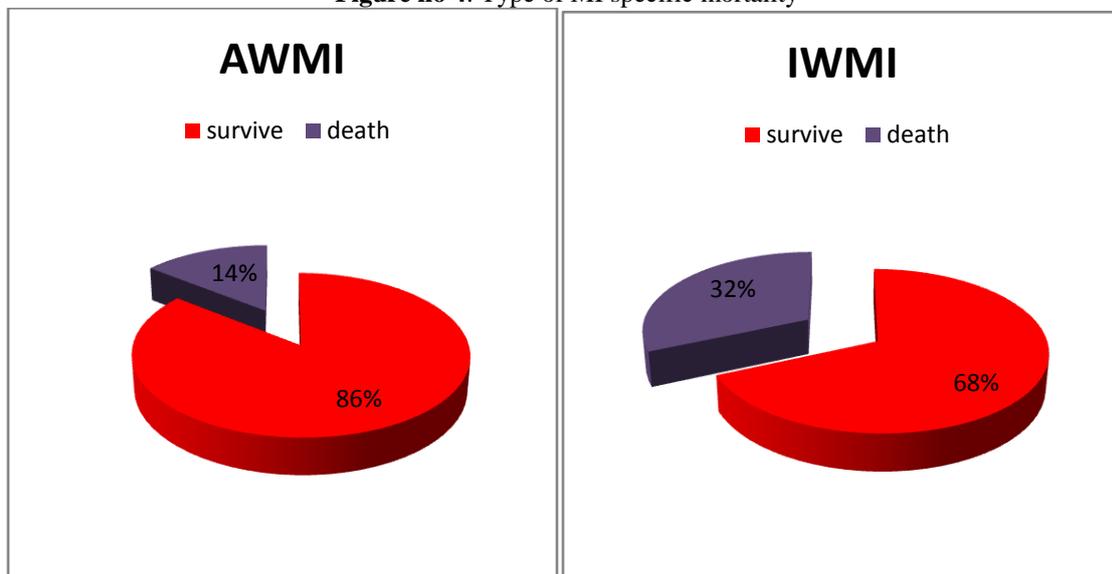
	No. of patients	Survive	Death
AWMI	35 (63.63%)	30 (54.54%)	5 (9.09%)
IWMI	19 (34.54%)	13 (23.63%)	6 (10.90%)
AWMI + IWMI	1 (1.81%)	1 (1.81%)	0 (0%)
<b>TOTAL</b>	55 (100%)	44 (80%)	11 (20%)

Total 35 patients were diagnosed with AWTMI, 19 with IWMI and 1 had both. Patients with AWTMI had poor Killip Score ( $p < 0.05$ ) and patients with IWMI had good Killip Score ( $p < 0.05$ ). Out of 35 patients having AWTMI, 30 patients survived and 5 patients died. Similarly, out of 19 patients having IWMI, 13 patients survived and 6 patients died.

**Figure no 3: Association between Type of MI and Death**



**Figure no 4: Type of MI specific mortality**

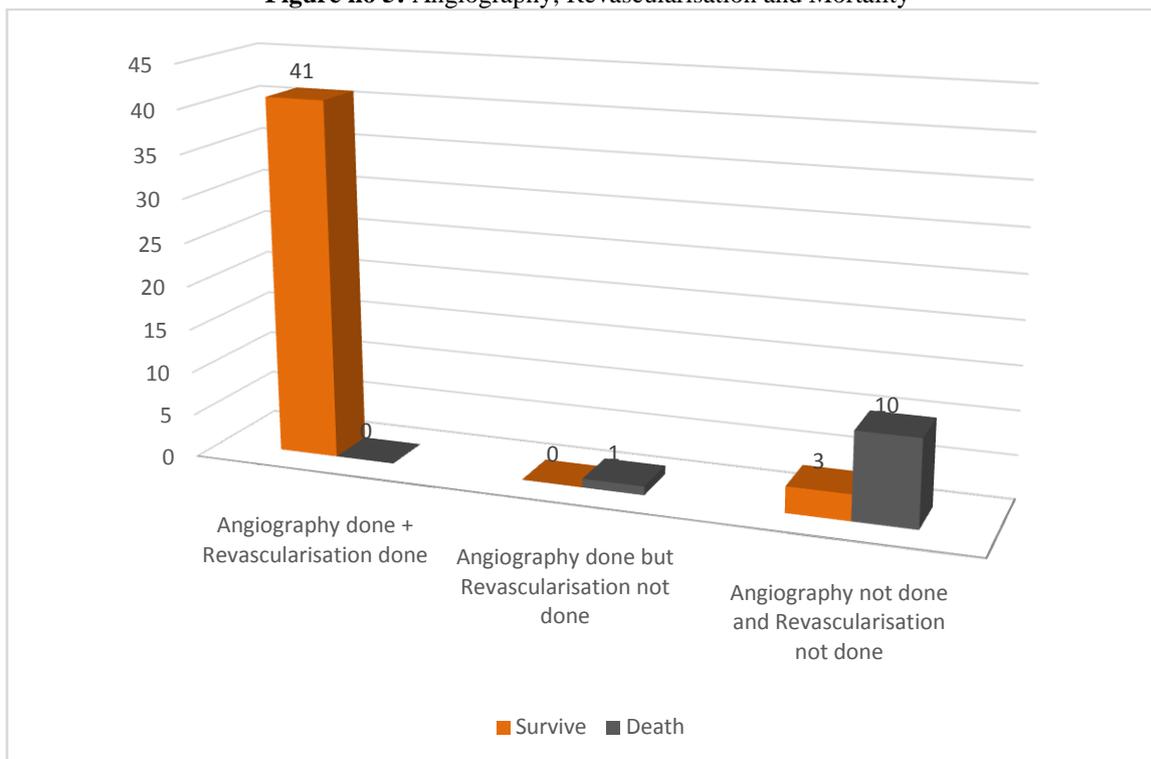


From above Fig No.4 it is observed that mortality rate is higher in patients with IWMI as compared to AWTMI.

**Table no 4 : Angiography, Revascularization and Mortality**

	No. of patients	Survive	Death
Angiography done +Revascularization done	41 (74.54%)	41 (74.54%)	0 (0%)
Angiography done but Revascularization not done	1 (1.81%)	0 (0%)	1 (1.81%)
Angiography not done and Revascularization not done	13 (23.63%)	3 (5.45%)	10 (18.18%)
<b>Total</b>	<b>55 (100%)</b>	<b>44 (80%)</b>	<b>11 (20%)</b>

Figure no 5: Angiography, Revascularisation and Mortality



Total 42 patients underwent angiography, out of which 41 were revascularized, and no mortality was associated with them; and 1 patient died after angiography due to hemodynamic instability and had poor Killip score. 13 patients did not undergo angiography, out of which 3 patients did not give consent for angiography and hence kept on conservative management, and 10 could not survive post thrombolysis.

In the current study, 9.09% of the patients were having DM, 32.72% of the patients were having HTN, and 16.36% of the patients were having both. As per the study of Gupta et al., (2019)<sup>1</sup> 25.5% of the patients had DM, 24.8% had hypertension, 24.5% smoking, and 4.8% had family history of CAD as a risk factors.

## V. Discussion

In the current study there was 20% total 30 day mortality including in-hospital death. Subban et al., (2001)<sup>4</sup> studied the outcome of primary PCI in 672 Indian patients, they observed 5.2% total 30 day mortality. Thus, the current study contrasts the study of Subban et al., (2001) and there is a significant statistical difference between 30 day mortality associated with primary PCI and Pharmacoinvasive therapy.

However, in terms of outcome, Alex et al., (2018)<sup>2</sup> found that the Pharmacoinvasive strategy as compared to the PCI was statistically equivalent in terms of outcome.

In the current study, mortality was highest in hemodynamically unstable patients who did not undergo rescue PCI.

In the current study mean chest pain duration was 4.85 hours, which clearly states that there was significant patient delay which means that these patients reached the hospital at the end of the golden period of reperfusion. Most probable cause for this could be lack of awareness and lack of emergency transport services.

In the current study the D-N time was found to be 54.45 min. Contrastingly, as per the study of Gupta et al., (2019)<sup>1</sup> the D-N time was 47 min and as per the study of Alex et al., (2018)<sup>2</sup> the D-N time was 80 min. Which implies that very few patients received thrombolysis within ideal D-N time which is < 30 mins. So this suggests that there is significant system delay and the most probable cause for this could be heavy casualty load, less doctor-patient ratio, delay in shifting the patient from casualty to cardiac unit.

In the current study the thrombolysis to revascularisation time was found to be 1.98 days which was greater than the ideal standard time. As per the study of Victor et al., (2016)<sup>5</sup> the thrombolysis to revascularisation time was 24 hours. And as per the study of Alex et al., (2018) the thrombolysis to revascularisation time was also 24 hours. So again this suggests that there is significant system delay with probable causes like patient's economic restraints and less accessibility to PCI centre. Here, we compare the data of our study with other Indian and western studies (Table no 5).

**Table no. 5**

Factors	Victor et al., (2016) <sup>5</sup>	Jordan and Caesar, (2016) <sup>6</sup>	Alex et al., (2018) <sup>2</sup>	Gupta et al., (2019) <sup>1</sup>	Present Study
<b>Duration of study</b>	2 years	2 years	5years	-	2 years
<b>Type of study</b>	Observational	Observational	Observational	Retrospective	Observational
<b>No. Of patients</b>	45	200	138	310	55
<b>Mean age</b>	-	-	-	57.2±12.6 years	53±3 years
<b>Male: female</b>	-	12 males and 13 females	125 males and 13 females	265 males and 45 females	43 males and 12 females
<b>Mean chest pain</b>	-	-	-	230.3±186.2 minutes	4.85 hours
<b>Type of MI</b>	-	-	-	-	AWMI and IWMI
<b>D-N time</b>	47 min	32.36 min	80 min	47 min	54.45 min
<b>Thrombolysis to revascularization time</b>	24 hrs	30 min	24 hrs	-	1.98 days
<b>Total follow up period</b>	2 years	-	1 month	-	6 months
<b>Mortality in 30 days</b>	11.1%	-	4.7%	3.5%	20%
<b>No. Of deaths after 30 days</b>	5	-	2	11	-
<b>Total deaths</b>	5	-	2	11	11
<b>% Mortality</b>	20%	-	4.65%	3.5%	20%

### VI. Conclusion

From this study we concluded that:

1. Primary PCI was found to be more beneficial than Pharmacoinvasive therapy in the initial treatment of STEMI patients as assessed by mortality rates. But, on comparing the outcomes and quality of life in the survivors, the benefits of both the modalities of treatments have been found to be similar.
2. However patients who were hemodynamically unstable had higher mortality rates after thrombolysis when rescue PCI was not done.
3. D-N time and thrombolysis to revascularization time was found to be high which suggests that there was significant patient delay as well as system delay. So the cause behind this patient and system delay needs to be probed and minimized to improve the outcome.

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