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RESEARCH ARTICLE
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FACTORS RELATED TO POOR OUTCOMES IN ST - SEGMENT ELEVATION MYOCARDIAL INFARCTION (STEMI) PATIENTS RECEIVING TIMELY VERSUS DELAYED THERAPY

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ABSTRACT

Background: Coronary artery disease is the leading cause of death worldwide. Quick diagnosis and treatment are critical for improving outcomes in acute coronary syndrome. In cases of ST-segment elevation myocardial infarction (STEMI), prompt reperfusion is crucial since it shortens the overall length of tissue ischemia. A 30-minute delay in reperfusion can lower life expectancy by approximately one year. Despite huge attempts to assure timely treatment for STEMI over the last few decades, one-third of STEMI patients still do not receive reperfusion therapy on time.

Objective: To determine factors related to poor outcomes in STEMI patients receiving timely versus delayed therapy.

Study design: A comparative study

Place and Duration: This study was conducted in National Institutes of Cardiovascular Diseases Sukkur from February 2023 to February 2024

Methodology: It is assumed that severe adverse cardiac events occur in 22.9% of patients with early therapy (group A) and 42.9% of patients with delayed treatment (group B). About 200 patients were selected according to the selection criteria. All adult patients suspected of having a myocardial infarction (MI) underwent screening. To be eligible for the study, participants had to be between the ages of 18 and 65 years, male or female, and have a STEMI diagnosis.

Results: There were a total of 200 patients enrolled in this research. All of them were divided into 2 groups equally; Group A and Group B. There were 100 patients in each group. There were a total of 150 men and 50 women enrolled in this study. Of the total cases, 95 (47.5%) had diabetes, 60 (30.0%) smoked, and 91 (45.5%) were hypertensive. In group A worst socioeconomic status was present in

20% of cases, 50% cases were from rural areas, 9% had delayed response in emergency room, while 12% cases had history of chronic stable angina. Furthermore in group B worst socioeconomic status was present in 65% of cases, 47% cases were from rural areas, 20% had delayed response in emergency room, while 33% cases had history of chronic stable angina.
Conclusion: STEMI delays in presentation and treatment are frequently attributed to measurable reasons. This leads to lengthier hospital stays and a higher risk of in-hospital complications such re-infarction, acute heart failure, ventricular fibrillation, and mortality.

Keywords: ST-segment elevation myocardial infarction, adults, diabetes, hypertension, smoking

INTRODUCTION

Coronary artery disease is the leading cause of death worldwide [1]. Quick diagnosis and treatment are critical for improving outcomes in acute coronary syndrome [2]. Despite this, patient management delays remain unreasonably long across the globe [3]. In cases of ST-segment elevation myocardial infarction (STEMI), prompt reperfusion is crucial since it shortens the overall length of tissue ischemia [4]. Reopening the coronary artery via pharmacological measures (fibrinolysis) or percutaneous coronary intervention (PCI) lowers the size of the infarction and helps maintain left ventricular function, resulting in better results [5].
A 30-minute delay in reperfusion can lower life expectancy by approximately one year [6]. Despite huge attempts to assure timely treatment for STEMI over the last few decades, one-third of STEMI patients still do not receive reperfusion therapy on time [7]. This study look to examine if there is a difference in clinical outcomes between patients who seek medical assistance within two hours of symptom onset and those who arrive at the hospital after two hours. STEMI management facilities are not widely available in Pakistan's rural areas. There is an urgent need to educate individuals about the value of prompt medical assistance [8]. Thus, it is critical to identify and understand the factors that cause therapeutic delays after the beginning of STEMI symptoms. This study will collect local evidence and help implement appropriate facilities for the local community experiencing STEMI situations.

METHODOLOGY

The sample size was computed using 90% research power and a 5% significance level. It is assumed that severe adverse cardiac events occur in 22.9% of patients with early therapy (group A) and 42.9% of patients with delayed treatment (group B). The sample approach used was successive nonprobability sampling. About 200 patients were selected according to the selection criteria. All adult patients suspected of having a MI underwent screening. To be eligible for the study, participants had to be between the ages of 18 and 65 years, male or female, and have a STEMI diagnosis.

Exclusion criteria: The study excluded patients with any known comorbidities (excluding diabetes and hypertension) or contraindications to thrombolysis.
The major outcomes assessed were the incidence of heart failure with reduced ejection fraction and cardiogenic shock. Secondary outcomes were the number of in-hospital problems, length of stay, and mortality. Demographic information, the duration of symptoms, the presence of diabetes, smoking status, and hypertension were all documented. Patients were divided into two groups based on the time between symptom onset and decisive treatment (Group A: within 2 hours, Group B: after 2 hours). Patients were asked about the factors that contributed to treatment delays after symptom onset and evaluated for STEMI outcomes throughout their hospital stay.
The data were analyzed with SPSS version 25. Means and standard deviations for age, BMI, symptom duration, and hospital stay were determined, along with frequencies for gender, delay causes, and in-hospital complications. To compare groups, independent sample t-tests and chi-square tests were performed, with a significance level of 0.05.

RESULTS

There were a total of 200 patients enrolled in this research. All of them were divided into 2 groups equally; Group A and Group B. There were 100 patients in each group. There were a total of 150 men and 50 women enrolled in this study. Gender did not significantly differ between groups. There was no significant difference in mean body mass index (BMI) between Groups A (31.62) and Group B (32.12). Of the total cases, 95 (47.5%) had diabetes, 60 (30.0%) smoked, and 91 (45.5%) were hypertensive. However, there was no significant relationship between these risk variables and patient prognosis for immediate versus delayed treatment. Table number 1 shows the number of the participants according to gender.

Table No. 1: number of the participants according to gender

Characteristics	Group A (n=100)		Group B (n=100)	
	n	%	n	%
Gender				
● **Male**	76	76	74	74
● **Female**	24	24	26	26

Table number 2 shows the frequency of factors resulting in the delayed treatment of patients with STEMI.

Table No. 2: frequency of factors resulting in the delayed treatment of patients with STEMI.

Factors	Group A (n=100)	Group B (n=100)
	n	n
Worst socioeconomic status		
● **Yes**	20	65
● **No**	80	35
Rural residence		
● **Yes**	50	47
● **No**	50	53
Delayed response in emergency room		
● **Yes**	9	20
● **No**	91	80
History of chronic stable angina		
● **Yes**	12	33
● **No**	88	67
Delays in activation of existing STEMI Systems		
● **Yes**	10	9
● **No**	90	91

Table number 3 shows the frequency of in-hospital complications in STEMI individuals.

Table No. 3: frequency of in-hospital complications in STEMI individuals.

In-hospital complications	Group A (n=100)	Group B (n=100)
	n	n
Cardiogenic shock		
● **Yes**	16	17
● **No**	84	83
Re-infarction		
● **Yes**	7	18
● **No**	93	82

Acute recurrent ischemia		
● **Yes**	10	16
● **No**	90	84
In hospital mortality		
● **Yes**	4	12
● **No**	96	82
Acute heart failure		
● **Yes**	2	10
● **No**	98	90
Ventricular fibrillation		
● **Yes**	3	14
● **No**	97	86

DISCUSSION

STEMI is the most severe type of coronary artery disease, and the myocardial damage it produces is time-sensitive [9]. Reperfusion using thrombolysis or primary percutaneous coronary intervention (PPCI) lowers infarction size, preserves left ventricular function, and improves the short and long-term prognosis [10,11]. While PPCI is preferable in developing countries, logistical and economic restrictions frequently require thrombolysis as the primary treatment for STEMI [12]. Fibrinolytic therapy becomes less effective over time, with the greatest benefit found when taken within the first two hours of symptom onset [13]. The duration of tissue ischemia in STEMI patients influences mortality, which includes both pre-hospital and in-hospital delays [14]. The total ischemia time from symptom onset to thrombolytic treatment has a substantial impact on patient outcomes and is made up of three primary sequential components [15].

The time between the onset of chest discomfort and the first medical consultation represents the time frame during which patients seek medical assistance for their problem [16]. Timely ECG assessment is critical for detecting and commencing emergency STEMI treatment. The time between diagnosis and treatment represents how long it takes healthcare practitioners to respond to a diagnosis [17]. Delays at each stage can lead to prolonged ischemia periods, resulting in poor short- and long-term consequences.

Despite substantial attempts to reduce in-hospital delays through full-time availability of primary PCI, variables that contribute to delayed presentation before hospital entry remain [18]. Currently, therapeutic delay is a substantial barrier to attaining early reperfusion in STEMI patients worldwide [19]. In emergency cases involving chest discomfort, there is a significant relationship between early symptoms and cardiac outcomes after one year [20]. While rural healthcare systems have made strides, there is always room for improvement. Implementing health campaigns and effective public initiatives to encourage early arrival of patients experiencing signs of acute coronary syndrome is necessary and may improve prognosis.

In this study, patients who received timely treatment had better outcomes, including lower mortality rates, fewer problems, and shorter hospital stays. Furthermore, the study anticipated superior outcomes for patients undergoing Primary PCI versus those getting fibrinolysis. Future research should include a bigger and more diverse population to provide a more thorough understanding of the impact of prompt treatment on patient outcomes.

CONCLUSION

STEMI delays in presentation and treatment are frequently attributed to measurable reasons. This leads to lengthier hospital stays and a higher risk of in-hospital complications such re-infarction, acute heart failure, ventricular fibrillation, and mortality.

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Conflict in the interest
The authors had no conflict related to the interest in the execution of this study.

Permission
Prior to initiating the study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

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