Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6623

FREQUENCY OF PATIENTS UNDERGOING PRIMARY PERCUTANEOUS CORONARY INTERVENTION FOR ACUTE ST ELEVATION MYOCARDIAL INFARCTION WITHIN 3 HOURS OF SYMPTOM ONSET

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Abstract
It is crucial to thoroughly inspect the total ischemia period, which is the duration from the beginning of symptoms to the administration of reperfusion therapy when evaluating the time to reperfusion in a STEMI patient. The proposed study aimed to ascertain the number of patients who underwent a primary percutaneous coronary intervention (PCI) for the acute coronary syndrome (STEMI) at a tertiary coronary care center in Pakistan within three hours of the beginning of symptoms. Additionally, the research was to evaluate the in-hospital death rate among patients who underwent primary PCI in three hours and those who did so after three hours of symptom onset. There were 92 patients in total. The duration of total ischemic time was noted. Death rates within the hospital were noted. The hospital mortality was assessed between patients receiving primary PCI within three hours and after three hours of the onset of symptoms. In our sample, the most prevalent form of myocardial infarction was anterior wall MI (37 %), while other common conditions included 57.6 percent of individuals with hypertension, 51.8 percent with diabetes, 36.9 percent with smoking, 18.4 percent with a family history of coronary artery disease and 18.4 percent with obesity. Of the 92 patients, 34.8 percent had SVD, 30.4 percent had 2VD, and 34.8 percent had 3VD. We discovered that 3.3 percent had LAD, 44.6 percent had LCX, 48.9 percent had RCX, and 77.2 percent had LM. In our study, the entire ischemia time for 56.5 percent of the participants was shown to be within three hours, and for 53.5 percent of patients, it was determined to be after three hours. The in-hospital death rate was 19.6 percent. While every person with total ischemia time ≥ 3 hours showed mortality, the majority of those studied had total ischemic duration within 3 hours and no mortality was noted.

Keywords: 3-hour in-hospital death rate, acute ST elevation myocardial infarction, primary PCI (percutaneous coronary intervention)

Introduction

Coronary artery disease (CAD) is a major global cause of death that is becoming more common in developing nations such as Pakistan and India. According to Dubey et al. (2017), acute STEMI is among the deadliest forms of coronary artery disease with rates of death in the general population varying from fifteen to twenty percent. According to Nepper-Christensen et al. (2018), primary percutaneous coronary intervention (PCI) is now the recommended course of medical therapy for those who report acute ST elevation myocardial infarction (STEMI). However, in different nations, the accessibility and cost-effectiveness of primary PCI remain crucial factors (Boersma, 2006). According to the most recent data, only 12.9 percent of STEMI patients had initial PCI and 19.6 percent had coronary angioplasty (Shiomi et al., 2012). Of all the people on the planet, the people of Pakistan belong to an ethnic community that has highest rates of heart disease. In this nation, CAD manifests at earlier ages, has an increasingly severe course, and has an increased death rate (Thiele et al., 2011). The expected death rate in Pakistan from coronary artery disease (CAD) is 410/10,0000. Major indicators of risk for cardiovascular disease (CVD) include high blood pressure, diabetes mellitus (DM), high cholesterol levels, along with other chronic medical conditions (Song et al., 2016). Among the most significant risk factors for assessing risk is diabetes mellitus, which is linked to a high incidence of coronary artery disease (Ki et al., 2021; Tokarek et al., 2021). Furthermore, a number of studies have shown that high in-hospital blood sugar levels are predictive of increased mortality among individuals with acute myocardial infarction (AMI), regardless of whether they have diabetes or not. Not just patients receiving fibrinolysis are at risk for worsening effects from late therapy for STEMI (Lindholm et al., 2015; Helve et al., 2014). Armstrong (2006) reported a correlation between ischemia time and mortality after one year in over eighteen hundred individuals after primary angioplasty. According to Tadel-Kocjancic et al. (2008), there was a 7.5 percent rise in the proportional risk of mortality for each 30-minute delay prior to reperfusion. In a cohort of twenty-seven thousand patients, Parikh et al. (2008) predicted that the door-to-balloon time was more closely linked to death compared to the symptom-onset-to-balloon time. It is important to acknowledge, nonetheless, that over 50% of the participants in a Mehta et al. (2003) trial had extremely long door-to-balloon timings of more than two hours, that would translate into longer symptom onset-to-balloon periods of three to four hours (Guptill et al., 2013; Danchin et al., 2008). The average duration from door to balloon was 1 hour 56 minutes (symptoms onset to balloon time ~3 to 4 hours), and the 6.1 percent fatality rate fits well with the Mahmoud et al. (2015) curve. To enhance clinical outcomes, current methods of therapy strive to give patients the best care possible while reducing waiting times. In order to properly inform patients about the significance of ischemia time and its impact on in-hospital mortality, the study's goal was to ascertain the total number of patients who underwent primary percutaneous intervention within three hours of the onset of symptoms.

Materials and Methods

The research was carried out at the National Institute of Cardiovascular Diseases (NICVD), Karachi, in the Adult Cardiology Department.

Sampling technique

The study employed non-probability random sampling.

Selection of Samples

Criteria for Inclusion

- Patients who met the specified criteria were added to the trial;
- Men and women alike
- Patients who fall between the ages of 18 and 80
- Individuals having a STEMI diagnosis (within 24 hours)

Criteria for Exclusion

- Patients who did not meet the following conditions were not included in the present research:
- individuals who have previously undergone any kind of heart surgery.
- Patients decline to provide permission.
- individuals experiencing cardiogenic shock or cardiac shock.

Data Analysis Procedure

SPSS version-21 was used for data entry and analysis. Version 21.0 of IBM SPSS Statistics for Windows. The frequency method was used to ascertain whether the patient's age (in years), weight (in kg), height (in cm), BMI (in kilograms/m2), and total ischemic time (in minutes) were normal. The data was quantified using the proper descriptive statistics. For specific variables including gender, age group, education, residency, obesity, smoking status, diabetes mellitus, hypertension, family history of coronary artery disease Total Ischemic Time categories, and in-hospital mortality, frequency and percentages were computed. Descriptive statistics were used for assessing the in-hospital death rates of patients receiving primary PCI within three hours and those receiving it after three hours of symptoms onset.

Results

A total of 92 patients, ranging in age from 18 to 80 years, who met the study's inclusion criteria were assessed in order to compare the in-hospital death rates among those who underwent primary percutaneous coronary intervention (PCI) within three hours of the onset of symptoms and that group of patients who underwent PCI after three hours. SPSS version 21 was used to enter and analyse the data. For categorical variables, proportions as well as frequencies were determined. Patients receiving primary PCI within three hours of the onset of symptoms and those receiving it after three hours were compared for in-hospital mortality. There were 92 patients, with 78.3 percent males and 21.7 percent females. When normalcy was examined, it was discovered that the patients' age (in years), weight (in kg), height (in cm), BMI (in kg/m2), and total ischemia duration (in minutes) did not follow a normal distribution, as shown in the table below. The body mass index, weight, and height are given in full descriptive statistics. The entire ischemic time's median and interquartile range. The table below displays the comprehensive descriptive information for total ischemic time. Of the 92 patients, 95.7 percent came from metropolitan areas and 4.3 percent from rural ones. The majority of the patients (38 percent) had only completed their primary school. In our sample, the most prevalent form of myocardial infarction was anterior wall MI (37 percent), while other common conditions included 57.6 percent of patients with high blood pressure, 51.8 percent with diabetes mellitus, 36.9 percent with smoking, 18.4 percent with a family history of coronary artery disease and 18.4 percent with obesity. The table below displays the frequency distributions in detail. Of the 92 patients, 34.8 percent had SVD, 30.4 percent had 2VD, and 34.8 percent had 3VD. We discovered that 3.3% had LAD, 44.6 percent had LCX, 48.9 percent had RCX, and 77.2 percent had LM. The table below displays detailed frequency distributions. The study revealed that 56.5 percent of patients had total ischemia time within three hours, and 53.5 percent had total ischemic time beyond three hours. The table below shows the in-hospital death rate, which was 19.6 percent.

Gender				
			Frequency	Percent
Gender	**Valid**	Female	20	21.7
		Male	72	78.3
		Total	92	100.0
Age (years)				
			Frequency	Percent
Age in Years	Valid	35-45	5	5.4
		46-55	28	35.9

		56-65	42	81.5
		66-75	17	100.0
		Total	92	100.0
BMI (kg/m2)				
			Frequency	Percent
Body Mass Index	Valid	20-23	5	5.4
		24-27	78	90.2
		28-32	7	97.8
		28.70	2	100.0
		Total	92	100.0
Height				
			Frequency	Percent
Height in Centimeters	Valid	161-170	75	81.5
		171-180	15	16.3
		180-190	2	2.2
		Total	92	100.0
Weight				
Weight in KGs	Valid		Frequency	Percent
		55-65	7	7.6
		66-75	71	77.2
		76-85	9	9.8
		86-100	5	5.4
		Total	92	100.0
Residence				
			Frequency	Percent
Residence	Valid	Rural	4	4.3
		Urban	88	95.7
		Total	92	100.0
Education				
			Frequency	Percent
Educational Status	Valid	Graduate level education	7	7.6
		No formal education	14	15.2
		Primary level education	35	38.0
		Professional level education	2	2.2
		Secondary level education	34	37.0
		Total	92	100.0
HTN				
			Frequency	Percent
Hypertension	Valid	No	39	42.4
		Yes	53	57.6
		Total	92	100.0
DM				
			Frequency	Percent
Diabetes Mellitus	Valid	No	41	48.2
		Yes	51	51.8
		Total	92	100.0
SMK				
			Frequency	Percent
Smoking	Valid	No	57	61.9

		Yes	34	36.9
		Total	92	100.0
Risk Factors [Family History of CAD:]				
			Frequency	Percent
CAD	Valid	No	75	81.5
		Yes	17	18.4
		Total	92	100.0
Obesity				
			Frequency	Percent
Obesity	Valid	No	77	83.6
		Yes	15	16.3
		Total	92	100.0
Type of Myocardial Infarctions				
			Frequency	Percent
Male	Valid	Anterior Wall MI	1	1.1
		Anterior Lateral Wall MI	1	1.1
		Anteriolateral Wall MI	1	1.1
		Anterior Wall	4	4.3
		Anterior Wall MI	34	37.0
		Anterior Wall Myocardial Infarction	1	1.1
		Anterolateral Wall MI	10	10.9
		Inferior Wall MI	1	1.1
		Inferioposterior Wall MI	2	2.2
		Inferioposterior Wall MI with FV infarct	1	1.1
		Inferioppsterior Wall MI	1	1.1
		Inferior Wall	2	2.2
		Inferior Wall Mi	1	1.1
		Inferior Wall MI	19	20.7
		Inferior Wall MI with complete heart block	1	1.1
		Inferior wall MI with RV infarct	1	1.1
		Inferior Wall MI. Asystole cpr for 10 mins	1	1.1
		Inferiorlateral Wall MI	1	1.1
		Inferiorposterior Wall MI	1	1.1
		Inferoposterior Wall MI	1	1.1
		IWMI with RV infarct	1	1.1
		Lateral Wall MI	5	5.4
		Posterior Wall	1	1.1
		Total	92	100.0
Number of diseased vessels				
			Frequency	Percent
Number of diseased vessels	Valid	2VD	28	30.4
		3VD	32	34.8
		SVD	32	34.8
		Total	92	100.0
Localization of disease				
			Frequency	Percent
Localization of disease	Valid	LAD	3	3.3
		LCX	1	1.1
		No	6	6.5

		RCA	11	11.9
		Yes	71	77.2
		Total	92	100.0
		LAD	3	3.3
Total Ischemic Time: (minutes)				
			Frequency	Percent
Total Ischemic Time: (minutes)	Valid	90-200	52	56.5
		201-400	27	29.3
		401-600	9	9.8
		801-950	4	4.3
		Total	92	100.0
TIT Group				
			Frequency	Percent
TIT Group	Valid	After 3 hours (>180 minutes)	40	43.5
		Within 3 hours (â‰¤180 minutes)	52	56.5
		Total	92	100.0
In-hospital Mortality				
			Frequency	Percent
Male	Valid	No	74	80.4
		Yes	18	19.6
		Total	92	100.0

Discussion

The current study found that 53.5 percent of those diagnosed with acute ST-elevation myocardial infarction (STEMI) had a primary percutaneous coronary intervention (PCI) within three hours of the beginning of symptoms. Of the 92 individuals, 95.7 percent came from metropolitan areas and 4.3 percent from rural ones. The majority of those being examined (38 percent) had only completed their primary school. In our sample, the most prevalent form of myocardial infarction was anterior wall MI (37 percent), while other common conditions included 57.6 percent of those surveyed with high blood pressure, 51.8 percent with diabetes mellitus, 36.9 percent with smoking, 18.4 percent with a family history of CAD, and 18.4 percent with obesity. thorough frequency distributions. Of the 92 patients, 34.8 percent had SVD, thirty-four percent had 2VD, and 34.8 percent had 3VD. We discovered that 3.3 percent had LAD, 44.6 percent had LCX, 48.9 percent had RCX, and 77.2 percent had LM. In our study, the entire ischemia time for 56.5 percent of patients was estimated to be within three hours, and for 53.5 percent of individuals, it was determined to be after three hours. The in-hospital death rate was 19.6 percent. Patients with STEMI experienced delays in the catheterization process, including the patient's delay, pre-hospital treatment, in-hospital conveyance to the cath laboratory, as well as time spent in the lab until the first balloon inflation. Individuals with STEMI who presented on weekends, days off, and, to a lesser degree, at night, showed longer total ischemic time and greater duration of puts off than those who presented during the week or during office hours. These results are consistent with a recent Japanese research from 2017, which found that off-hours presentations contributed to delays in the primary coronary intervention in multicenter registry. The results of our study nevertheless demonstrate that even in tertiary centers with extensive experience, current actual-world procedures must be further improved. In fact, patient delays could have been shorter with a greater awareness of the clinical signs and symptoms of infarction in the population, as eighty-five percent of patients they treated experienced the first infarction. Overall, delay times were just in a minority of individuals longer compared to the duration periods proposed in the most recent guidelines. On the other hand, eighty percent of them had one or more cardiovascular-related risk factors. In order to significantly reduce door-to-balloon time, in-hospital complications necessitate organizational improvements in the catheterization laboratory, emergency department, and transportation systems (Dilip et al., 2019). Previous research has mostly focused on the delays between symptoms and PCI. For instance, data collected in two small German research studies with a total of just 264 individuals showed that primary PCI did not reduce the size of the infarct whereas the period between symptoms and PCI decreased (Eitel et al., 2010). Nevertheless, thrombolytic treatment had been used to treat half of those involved in those investigations. Reductions in symptom-to-PCI delays have also been linked to lower death rates, according to other research (Ikemura et al., 2017; Brodie et al., 2001; Brodie et al., 2006). Some research, however, has found that shorter symptom-to-PCI delays had little to no impact on mortality (Roth et al., 2017; Song et al., 2016; Prasad et al., 2015).

Door-to-balloon time, however, merely addresses the last link in the medical chain, excluding important components of care where advances may be made with the right policies. Therefore, these findings support the current recommendations on STEMI from the European Society of Cardiology, which indicate that a time window of 90 minutes should be regarded as the maximum duration and that a gap of no more than sixty minutes from the first clinical contact to PCI is recommended (Müller et al., 2011). Furthermore, in tertiary centers with a high case load like the current department, there are still some circumstances that contribute to lags in door-to-balloon time, despite the continuous improvement in the time to primary PCI over the past few years. Significantly, we demonstrate that the length of the delay is also correlated with the day and time of the presentation, especially on public holidays and weekends, highlighting the necessity of improving logistics, especially during these times (Hahn et al., 2008). Public education campaigns should be launched to further mitigate delays for patients in order to decrease the onset of symptoms to arrival times. Moreover, organizational measures should be taken into consideration to minimize delay times in the hospital and catheterization laboratory, particularly on weekends and at night.

Conclusion

According to the research's findings, the majority of the participants had total ischemia times of less than three hours, and none of them died. However, individuals with total ischemic times greater than three hours did have all deaths. It can be inferred that mortality was increased in patients with STEMI whose PCI was postponed for longer than three hours. The longevity effect was substantially correlated with time within three hours. As a result, every attempt ought to be made to reduce the overall ischemia time for both primary angioplasty and thrombolytic therapy. Public awareness efforts seem to be a key component in reducing patient delays and symptoms appearing at the point of arrival. Organizational strategies must additionally be taken into consideration to minimize hospital and catheterization lab wait times, particularly on weekends and at night.

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