

Assessment of Time of Treatment Initiation, Related Factors and Outcome among Patients with Myocardial Infarction Admitted in Coronary Care Unit of Selected Hospitals, Kolkata

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Abstract: *Background of the study:* Any delay in hospital presentation is an obstacle in achieving the optimal clinical outcome of recent treatment modalities of myocardial infarction (MI). *Objectives of the study:* to identify the time of treatment initiation, to find out the related factors to time of treatment initiation, to determine the outcome related to time of treatment initiation and to find out the association between total time of treatment initiation and related factors and association between total time of treatment initiation among patients with MI. *Material and method:* A descriptive survey was conducted on 100 MI patients who were selected through non-purposive convenience sampling. *Results:* The study showed that maximum of the participants admitted with MI belonged in between 31-55 years of age group. Majority 87% of them were male. Maximum 56% of the participants were from urban area. Only 6% of the participants arrived within 2 hours of symptom onset and (36%) of the participants arrived within 2-6 hours of symptoms onset. The study findings highlights that there were several related factors which impact the time of treatment initiation among MI patients. The study concluded that majority (96%) of the participants recovered from illness had no prevailing signs and symptoms after treatment initiation and only (4%) of the participants complained of mild chest pain during discharge. *Conclusion:* The median total time of treatment initiation was 8hour. Only 6% of the participants arrived within 2 hours of symptom onset and (36%) of the participants arrived within 2-6 hours of symptoms onset.

Keywords: Assessment, time of treatment initiation, related factors, outcome, myocardial infarction, cardiac patients, coronary care unit

1. Introduction

Cardiovascular diseases are one of the main causes of mortality and morbidity worldwide. Among the non-communicable diseases, it's the leading cause for death among Indian adults, and approximately 50th percentile of deaths usually occurs within the first hour after onset of symptoms before reaching the hospital.^{1,2,5} Acute Myocardial Infarction, also known as Heart attack, is a medical emergency. An attack usually occurs when a blood clot blocks blood flow to the arteries of the heart. Chest pain or discomfort is the most common clinical manifestation to occur which may radiate to the shoulders, arms, back, neck or jaw. Often it occurs in the center on left side of the chest and lasts for more than a few minutes. The discomfort may occasionally feel like heartburn. Other symptoms may include shortness of breath, nausea, feeling faint, a chilly sweat or fatigue.

As per World Health Organization (WHO) data, the coronary artery disease (CAD) prevalence continues to rise in India with rapid 'epidemiological transition'. It has already surpassed communicable diseases to become the major cause of mortality in India. In a study of ethnic differences in patients with Myocardial infarction (MI) in England, it had been observed that young Indians had ten times more risk of developing MI.³

Both old and recent data, especially the registries from different regions of India viz. Himachal Pradesh from North,

Assam from North East (NE), Kerala and Chennai from south and multi city, multi hospital CREATE Registry. The inferences are of great concern; patients of ACS in India have higher proportion of STEMI as compared to developed countries.^{1,3} Most of these patients are from poor socio-economic status, have delayed presentation, are less likely to get evidence-based treatments and have greater 30 day mortality. Reducing the time to arrive at the hospital and offering affordable optimal therapy could reduce morbidity and mortality. There are estimated 40 million patients suffering from heart diseases in India. 17.5 million die each year in India from cardiovascular diseases. 80% of cardiovascular deaths occur because of heart attacks and strokes. 74% of Urban Indians are at risk of cardiovascular diseases. Out of which 19 million reside in urban areas and 21 million in rural areas. 62.5 million deaths occur due to cardiovascular diseases in India.³

The annual number of deaths from cardiovascular disorder in India is projected to rise from 2.26 million (1990) to 4.77 million (2020).¹ By 2030, it is projected that an estimated 23.6 million people will die from CVD, mainly from heart disease and stroke.³ The first hour after an attack is understood as "the golden hour." The golden hour provides a window of opportunity to the patients, their families, and doctors to initiate appropriate and fast actions to save their lives. The reason is heart muscles start to die within 80-90 minutes after it stops receiving blood, and within 6 hours, nearly all areas of the myocardium that are affected due to decrease blood flow could be completely damaged. If a

patient receives treatment within 2 or 4 hours, surgeons can prevent damage for many of the permanent muscles. However, if there is a delay of more than 5 or 6 hours in the treatment, a significant large part of the heart muscles may be damaged.⁴ Patient's uncertainty about their symptoms, age, gender, distance, transport facilities, prior visit to general/local physician, use of drugs to minimize the symptoms, ignoring the signs and symptoms thinking it to be gastritis, appear to associated with longer delays in seeking treatment.^{6,7,8,9,10}

Globally, India has the largest burden of acute coronary syndrome (ACS) patients. While managing these patients, especially those with acute ST elevation myocardial infarction (STEMI), time plays a vital role in determining the morbidity and mortality.

Objectives of the study:

- 1) To identify the time of treatment initiation among patients admitted with myocardial infarction.
- 2) To find out the related factors to time of treatment initiation.
- 3) To determine the outcome related to time of treatment initiation.
- 4) To find out the association between total time of treatment initiation and related factors.

2. Review of Literature

A cross sectional study conducted by Abdur Rafi, Zahidus Sayeed et al. in December 2019 on 377 MI patients selected using convenience sampling technique to investigate the significant factors associated with prolonged prehospital delay and the impact of this delay on in-hospital mortality showed that the median (IQR) pre-hospital delay was 9.0 (13.0) hours. 39.5% patients admitted in the specialized hospital within 6 h. They also found that determinants of pre-hospital delay were patients age, family income, distance from primary care centre ≤ 5 km, predominant chest pain, considering symptoms as non-significant, referral from primary care centre and not having family history of MI. Risk of in-hospital mortality was almost four times higher who admitted after 6 h compared to their counterpart (R 2 = 0.303).¹¹

Jeet Ram Kashyap, Ishita Sood, Rashmi Kashyap conducted an observational prospective study to assess the pre-hospital and in-hospital factors leading to delays in initiation of treatment among 100 patients selected using non-randomized sampling technique admitted with symptomatic STEMI during the period from August, 2018 to July, 2019 showed that majority 80% were males and females constituted 20% and mean age was found to be 55.38 years. Sedentary lifestyle was considered as the major risk factor in 60% of the patients. The median time from symptoms to hospital was 420 min. While only 17% patients reached the hospital within 2 hours of symptoms; 37% arrived between 2 to 6 hours and 46% of the patients arrived after 6 hours. 35% thought it to be a heart attack. Hospital delay was recorded in 50% patients with ECG done in more than 10 minutes. Outcomes at 30 days depicted as mortality in 3 patients with loss to follow in 18 and angina in 6 out of 81 patients.⁵

3. Research Methodology

Research approach: Quantitative Research Approach

Research design: Descriptive survey design.

Setting of the Study: RG Kar Medical College & Hospital, Kolkata.

Research variables –

- Time of treatment initiation,
- Factors related to time of treatment initiation,
- Outcome related to treatment initiation.

Demographic variables-Age, Gender, Education, Habitat, Patient's clinical profile

Target Population: Patients admitted with MI in coronary care unit of hospitals, Kolkata.

4. Data Analysis and Interpretation

Section I: Findings related to background information of the patients admitted with myocardial infarction

Table 1: Frequency and percentage distribution of MI patients according to their socio-demographic profile, n =100

Variables	Fr and %
Age (in years)	
• ≤ 55	55
• > 55	45
Gender	
• Male	87
• Female	13
Education	
• Illiterate	29
• Primary	28
• Secondary	29
• Higher Secondary	10
Graduate	4
• Occupation	
• Employed	10
• Self-employed	54
• Unemployed	24
• Retired	12
Habitat	
• Urban	56
• Rural	44

Data presented in Table 1 shows that 55 % of participants were between 55 years of age and below and 45 % of the participants were above 55 years of age. Out of 100 participants 87 % were male while remaining 13 % of the participants were female. The education status depicts that 29 % of the participants were illiterate, 28 % were from primary educational background, 29 % were from secondary educational background and the remaining 10 % and 4 % were from higher secondary and graduate level, respectively.

Data presented in Table 1 also reveals that majority (54%) of the participants were self-employed, 24 % of the participants were unemployed and 10 % were employed & 12 % were

retired. Data presented in table 1 shows that majority (56%) of the participants were from urban area and 44 % participants were from rural area.

Table 2: Frequency and percentage distribution of MI patients according to patient’s clinical profile, n=100

Variables	Fr and %
History of HTN	
• Yes	39
• No	61
History of Diabetes	
• Yes	22
• No	78
Family history of CAD	
• Yes	13
• No	87
Trop I	
• Positive	98
• Negative	2
Type of MI	
• AWMI	46
• IWMI	49
• ASWMI	2
• LWMI	3

Data presented in Table 2 reveals that majority (61%) of the participants had no history of HTN and only 39 % of the participants were hypertensive. Majority (78%) of the participants had no history of Diabetes Mellitus and only 22 % of the participants were diabetic. Data presented in Table 2 also reveals that majority (87%) of the participants had no family history of CAD and only 13 % had family history of CAD. Majority (98%) of the participants had positive Troponin I test and only 2% Troponin I test was negative. Most (49%) of the participants were diagnosed with IWMI, 46% with AWMI, 2% with ASWMI and 3% were diagnosed with LWMI.

Table 3: Frequency and percentage distribution of time of treatment initiation among MI patients, n= 100

Variables	Fr. and %
Onset of symptoms	
6am-6pm (Day)	50
6:01 pm-5:59 am (Night)	50
Arrival at hospital (in hours)	
≤2	6
2-6	36
6-12	21
12-48	26
>48	11
Examination by the physician	
Immediately	59
Within 5-15 min of arrival	41
Investigation done	
Within 5 min of arrival	72
Within 10 min of arrival	28
Door to diagnosis time	
≤20 min	59
>20 min	41
Door to treatment time (Medical therapy)	
≤30 min	22
>30 min	78

Data presented in table 3 shows that 50% of the participant’s symptoms occurred by day time in between 6 am – 6 pm and

50% between 6:01 pm-5:59 am (night). Most (36%) of the participants arrived within 2-6 hours of symptom onset, 26% of the participants arrived in between 12-48 hours of symptom onset. 21% arrived between 6-12 hours of symptom onset, 11% arrived after 48 hours of symptom onset to the hospital and only 6% of the participants arrived within 2 hours of symptom onset. 59% of the participants were examined immediately after their arrival to the hospital while 41% were examined within 5-15 minutes of arrival. Majority (62%) of the participants had their investigation done within 5 minutes of their arrival at the hospital and 28% within 10 minutes.

Data presented in table 3 also reveals that the door to diagnosis time for most (59%) of the participants was within 20 minutes and (41%) of the participants had their diagnosis done after 20 minutes. The door to treatment time for majority (78%) of the participants took above 30 minutes while another 22% of the participants took less than 30 minutes to initiate treatment.

Table 4: Mean, Median and Standard Deviation of time of treatment initiation, n= 100

Variables	Mean ± SD	Median
Total treatment time (hour)	15.15 ± 17.60	8

*Total treatment time is defined as the time of symptom onset to initiation of treatment at the hospital.

Data presented in Table 4 shows the mean, median and SD value of total time taken for treatment initiation 15.15 hour, 8hour, 17.60 hour in MI patients. Data presented in Table 4 shows that there is a vast difference in time taken for treatment initiation among the patients of myocardial infarction.

Section III: Findings regarding the related factors to time of treatment initiation.

Table 5: Frequency and percentage distribution of related factors to time of treatment initiation, n=100

Related factors	Fr. and %
Distance from home to hospital	
≤12km	52
>12km	48
First medical contact	
Local physician	53
Self-referred to hospital	47
Transport type	
Ambulance	28
Others	72
Known severity of disease condition	
Yes	44
No	56
Ignored the signs and symptoms	
Yes	54
No	46
Use of drug to minimize symptoms	
Yes	73
No	27
Influential person in the family from medical background	
Yes	3
No	97
Was able to interpret the signs and symptoms of MI	
Yes	23
No	77

Data presented in Table 5 shows that most (52%) of the participants were from area with distance of more than 12 km from hospital and rest (48%) of the participants distance from home to hospital was less than 12 km. For first medical contact, 53% of the participants visited local physician and 47% self-referred to the hospital for management of symptoms. Majority (72%) of the participants arrived at the hospital in private transport and only (28%) availed ambulance service for transport. Majority (56%) of the participants had no idea of severity of disease condition while 44% of the participants had known the severity of disease condition.

Data presented in Table 5 also shows that majority (54%) of the participants ignored the signs and symptoms thinking it

to be gastritis while 46% of the participants thought the symptoms might be of heart attack. Majority (73%) of the participants used over the counter drugs to minimize the symptoms while (27%) of the participants did not use over the counter drugs to minimize symptoms. Majority (97%) of the participants had no influential person in the family from medical background and only (3%) had influential person from medical background in the family. Majority (77%) of the participants were not able to interpret the signs and symptoms of MI and only (23%) of the participants were able to interpret the signs and symptoms of MI. Majority (86%) of the participants did not show any prodromal signs and symptoms and only (14%) of the participants showed prodromal signs and symptoms.

Table 6: Findings related to outcome of time of treatment initiation of MI patients, n=100

Variables	Fr. and %
Recovered without prevailing symptoms	96
Mild Chest pain	4
Death	Nil

Data in Table 6 shows that Majority (96%) of the participants who recovered had no prevailing signs and symptoms and only (4) % of the participants complained of mild chest pain during discharge. None of the MI patients died during in hospital treatment initiation.

Section V-A: Findings related to association between total time of treatment initiation and related factors of time of treatment initiation.

Table 7: Chi-square test of association and their significance between total time of treatment initiation and related factors, n = 100

Variables	Total time of treatment initiation		χ^2	Significance level at $p \leq 0.05$
	$\leq 6h$	$> 6h$		
Distance				
≤ 12 km	28	24	10.03	Significant
> 12 km	11	37		
First medical contact				
Local physician	14	39	12.68	Significant
Self-referred to hospital	27	20		
Ignored signs and symptoms				
Yes	15	39	6.21	Significant
No	24	22		
Known severity of condition				
Yes	24	20	7.98	Significant
No	15	41		
Use of drugs				
Yes	22	51	8.92	Significant
No	17	10		
Ability to interpret signs and symptoms				
Yes	14	9	6	Significant
No	25	52		

$\chi^2 df (1) = 3.84, p \leq 0.05$

Data presented in Table 8 shows that the chi-square test association between total time of treatment initiation and related factors in terms of distance ($\chi^2 = 10.03$), first medical contact ($\chi^2 = 12.68$) and known severity of condition ($\chi^2 = 7.98$) ignored signs and symptoms ($\chi^2 = 6.21$), use of drugs

($\chi^2 = 8.92$) and ability to interpret signs and symptoms ($\chi^2 = 6.00$) was found statistically significant as evident from the calculated value which was greater than the table value at 0.05 level of significance. So, the researcher concluded that total time of treatment initiation was dependent on the

related factors.

5. Discussion

In the present study, maximum 55% of the participants admitted with MI belonged in between 31-55 years of age group. Majority 87% of the participants were male and only 13% were female. Maximum 56% of the participants were from urban area. Only 6% of the participants arrived within 2 hours of symptom onset. (36%) of the participants arrived within 2-6 hours of symptoms onset. 21% of the participants arrived between 6-12 hours of symptom onset, 26% of the participants arrived in between 12-48 hours of symptom onset and 11% of the participants arrived after 48 hours of symptom onset.

The door to treatment time for majority (78%) of the participants took above 30 minutes while another 22% of the participants took less than 30 minutes to initiate treatment. The median total time of treatment initiation was 8hour.

In the present study, most (52%) of the participants were from area with distance of more than 12 km from hospital. For first medical contact, 53% of the participants visited local physician and 47% self-referred to the hospital for management of symptoms. Majority (72%) of the participants arrived at the hospital in private transport and only (28%) availed ambulance service for transport. Majority (56%) of the participants had no idea of severity of disease condition. 77% of the participants were not able to interpret the signs and symptoms of MI. Most (54%) of the participants ignored the signs and symptoms thinking it to be gastritis. In the present study, majority (96%) of the participants who recovered had no prevailing signs and symptoms after treatment initiation and only (4%) of the participants complained of mild chest pain during discharge. None of the 100 patients died during in hospital treatment initiation.

The findings are in concordance with an observational prospective study conducted by **Jeet Ram Kashyap, Ishita Sood, Rashmi Kashyap** conducted an observational prospective study to assess the pre-hospital and in-hospital factors leading to delays in initiation of treatment among 100 patients selected using non-randomized sampling technique admitted with symptomatic STEMI during the period from August, 2018 to July, 2019 showed that majority 80% were males and females constituted 20% and mean age was found to be 55.38 years. Sedentary lifestyle was considered as the major risk factor in 60% of the patients. The median time from symptoms to hospital was 420 min. While only 17% patients reached the hospital within 2 hours of symptoms; 37% arrived between 2 to 6 hours and 46% of the patients arrived after 6 hours. 35% thought it to be a heart attack. Hospital delay was recorded in 50% patients with ECG done in more than 10 minutes. Outcomes at 30 days depicted as mortality in 3 patients with loss to follow in 18 and angina in 6 out of 81 patients.⁵

6. Conclusion

The study findings revealed that maximum of the participants admitted with MI belonged in between 31-55

years of age group. Majority 87% of them were male. Maximum 56% of the participants were from urban area. Only 6% of the participants arrived within 2 hours of symptom onset and (36%) of the participants arrived within 2-6 hours of symptoms onset. Majority (96%) of the participants had no prevailing signs and symptoms after treatment initiation and only (4%) of the participants complained of mild chest pain during discharge. The study findings highlights that there were several related factors which impact the time of treatment initiation among MI patients. The chi square test shows significant association between total time of treatment initiation and distance from home to hospital, first medical contact, known severity of disease condition, ignored signs and symptoms, use of drugs to minimize symptoms, and ability to interpret signs and symptoms.

7. Limitation

- Due to Covid situation and time constrain the study was confined to small sample size (100) and conducted in one selected hospital. So, scope of generalization of the findings were limited.
- Study is limited to subjectivity with self-report of the patients regarding time of symptom onset and arrival to hospital.
- Patients who were unstable, had comorbid conditions were not included in the study. This data could pose an impact on time of treatment initiation and outcome.

8. Recommendation

- Similar studies can be conducted with larger samples on a long term and periodic basis to validate the findings
- In depth qualitative research can be employed to explore the time of treatment initiation and outcome among MI patients admitted in hospitals.
- Studies can be done to compare the mortality and morbidity rate of patients undergoing thrombolytic therapy and coronary angioplasty.
- Comparative studies to assess treatment time and outcome can be done in public sector and private sector.

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