Prehospital Events in ST- Elevation Myocardial Infarction Undergoing Primary Angioplasty

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ABSTRACT

Introduction: Pre-hospital delay includes time from onset of symptoms of myocardial infarction till arrival to emergency room of the hospital. This defines time from symptom onset to first medical contact and first medical contact to emergency room. This study aims to study the prehospital events and determining factors in patients undergoing primary angioplasty.

Methods: This was a cross sectional study in Shahid Gangalal National Heart Centre for three months. Timings of chest pain, first medical contact time, transfer time to hospital and overall pre-hospital time for PCI and risk factors were analysed.

Results: There were 79 cases with 66 (83.5%) males and 13 (16.5%) females with mean age 56±11.2 years. Risk factors were 60 (75.9%), smoking, 47 (59.5%) hypertension, 25 (31.6%) diabetes, 22 (27.8%) dyslipidaemia and 16 (20.3%) heart failure. Chest pain was maximum in 5 to 9 AM. The median prehospital delay was 300 minutes (5.0 hours) of which symptom to first medical contact was 165 minutes and first medical contact to hospital was 80 minutes. The longer median prehospital delay for hypertension, diabetes, female and age ≥50 years and the shorter for male, age less than 50 years, dyslipidemia and heart failure, though not statistically significant. Private transport was the preferred from symptom to first medical contact and ambulance for first medical contact to emergency room. Patients received in ER had aspirin 72 (91.1%), atorvastatin 54 (68.4%) and double anti-platelets 45 (57%).

Conclusions: Chest pain was common in morning and the prehospital delay can be minimized by improving time from symptom to first medical contact and first medical contact to Emergency room.

Keywords: *cicardian pattern; prehospital delay; ST myocardial infarction.*

INTRODUCTION

Pre-hospital time includes the time from onset of symptoms of myocardial infarction till arrival to the emergency room of hospital.[1] The time can be further divided into the time from the chest pain symptoms to the first medical contact (FMC) and the first medical contact (FMC) to the emergency room (ER).

Myocardial infarction has varying symptoms of which chest pain, shortness of breath, syncope and epigastric pain.[2] The delay in receiving the revascularization therapy in MI may occur because of various reasons.[3] Revascularization therapy includes fibrinolysis or Primary angioplasty.[1] We are studying the prehospital events of the patients who had undergone Primary PCI

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in Shahid Gangalal National Heart Center (SGNHC).

This study aims to study the circadian patterns of myocardial infarction and to calculate the prehospital delay and its determining factors in patients attending to hospital for Primary percutaneous coronary intervention (PPCI).

METHODS

This was a hospital based descriptive cross sectional study in Shahid Gangalal National Heart Centre done from July 2017 to October 2017. The data were collected according to structured performa. Ethical approval from the institution review committee of the institution was taken. All patients with chest pain and ST elevation in ECG who had undergone Primary Angioplasty done were included. Non ST elevation Myocardial infarction (NSTMI) and unstable angina were excluded. Timings of chest pain, first medical contact time, transfer time to hospital and overall prehospital time were studied. First medical contact (FMC) was time where the ECG diagnosis of STMI was first done. The varying parameters like mode of transport, age, gender and risk factors including smoking, diabetes, hypertension, dyslipidemia and heart failure were studied. The data were tabulated in Excel and analysed in SPSS Version 20. Categorical data were studied comparing with chi square. Non parametric data were compared using Mann Whitney U test. Statistically significant was considered when $P < 0.05$.

RESULTS

There were 79 cases with 66 (83.5%) males and 13 (16.5%) females. The mean age was 56 ± 11.2 years. The risk factors studied were smoking 60 (75.9%), hypertension 47 (59.5%), diabetes 25 (31.6%), dyslipidemia 22 (27.8%) and heart failure 16 (20.3%).

The chest pain occurred mostly in the early morning. The highest frequency of chest pain was in period 5 to 9 AM. The trough occurred in 5 PM-9PM. There was a second peak in 9 PM to 1 PM. The First Medical Contact was done in the morning at 5 AM to 9 AM. The frequency of patients visiting the FMC is almost similar in other periods of the day. The least time was in 1 AM to 5 AM period. ER Visit was mostly at 9 AM to 1 PM. The lowest ER Visit was at 9 pm to 1 PM.
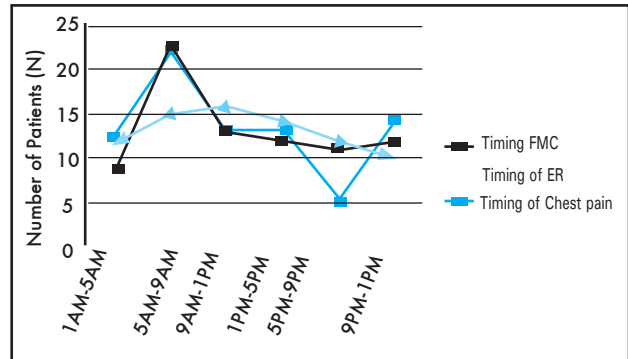

Figure 1. Timings of chest pain, First Medical Contact (FMC) and ER visit.

The median prehospital delay was 300 minutes (5.0 hours). The median time for first medical contact was 165 minutes (IQR 275). The median time to visit ER after First medical contact was 80 minutes (IQR 102). 48.1% of patients with chest pain did not visit the emergency even after 3 hours while only 11% of patients visit the FMC within 1 hour of chest pain.
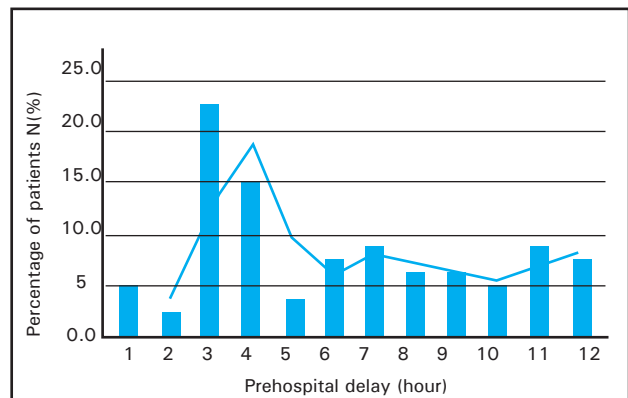

Figure 2. Median time of ER Visit after chest pain onset.

The median time of symptom to FMC and FMC to ER according to age and gender were enlisted in following Table 1. The median time for female exceeds to male and older patients to younger though not statistically different.

Table 1. Median time for FMC and ER visit according to risk factors.

		Median Symptoms to FMC (mins)	Median FMC to ER (mins)
Gender			P >0.05
	Male	165	77.5
	Female	180	80
Age			P >0.05

| < 50 | 150 | 62.5 |
| >= 50 | 180 | 80 |

No statistical differences occurred in age (P = 0.062), gender (P = 0.443), smoking (P = 0.886), diabetes (P = 0.732), dyslipidemia (P = 0.208), and heart failure (P = 0.992) in overall prehospital delay (Table 3).
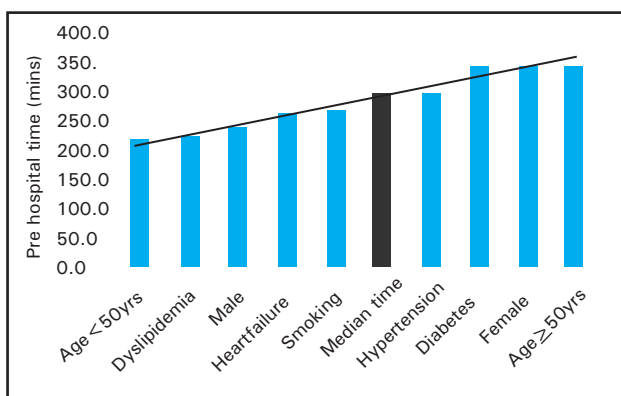

Figure 3. Median prehospital delay according to risk factors.

The private transport was the preferred during chest pain to FMC. Motorbike and private cars were the preferred transport method to First medical Contact. However Ambulance was the preferred method during transfer to ER of hospital (Table 2).

Table 2. Mode of transport to FMC and ER of SGNHC.

	Public (%)	Private (%)	Ambulance (%)	Helicopter (%)
Transport to FMC	15 (19.7)	63 (79.7)	1 (1.3)	0
Transport to ER from FMC	2 (2.5)	14 (17.7)	62 (78.5)	1 (1.3)

Patients coming to ER had already received aspirin 72 (91.1%), atorvastatin 54 (68.4%) and double anti-platelet in 45 (57%) cases. Common misdiagnosis were acid peptic disease and musculoskeletal pain (Table 3). None of the patients had received thrombolysis.

Table 3. Prescribing patterns before reaching Emergency room of SGNHC.

Prescribing patterns	n (%)
Aspirin	72 (91.1)
Atorvastatin	54 (68.4)
Use of 2 anti-platelets	45 (57)
Prescription for acid-peptic disease	2 (2.5)
Prescription for musculoskeletal pain	1 (1.8)

DISCUSSION

The timings of chest pain peaked at morning (5 AM to 9 AM) and troughed in late evening (5 PM to 9 PM). The peaking of the chest pain in the early morning has been described in different literatures.[4] Blunting of such Cicardian response in diabetes, smoking, elderly and prior infarction is described.[5] Several reasons are hypothesized for early peak. In the morning, increase in sympathetic activity, platelet aggregability, heart rate, sympathetic tone, cortisol, epinephrine, norepinephrine and angiotensin II level occurs while plasma fibrinolytic activity decreases. These cause rupture of vulnerable coronary atherosclerotic plaques in the morning.[6]

The median prehospital delay was 300 minutes (5.0 hours) of which the median delay for symptom to first medical contact was 165 minutes and the FMC to hospital was 80 minutes. The median prehospital delay described ranged from 3 hours to 6 hours in acute myocardial infarction.[7-12] The transfer time described in other study was 82 minutes.[13] The peak chest pain timings occurred in 5 AM to 9 AM and the median prehospital delay of 5 hours had caused the most ER visit around 9 AM to 1 PM. The MI incidence had trough around 5 PM to 9 PM peaking up again at 9 PM to 1 AM. Such dipping and peaking has been explained.[6,14] Muller et al had hypothesized the presence of the secondary peak as indicative of population wide synchronization of additional triggers for AMI.[6]

The median prehospital delay for hypertension, diabetes, female and age ≥50 years exceeded the median time overall though not statistically significant. The shorter prehospital delay was seen in male, age less than 50 years, dyslipidemic and heart failure patients. Different studies had described the prolonged pre-hospital delay in females as they are older with atypical symptoms and associated with other co-morbidities like hypertension, heart failure and diabetes.[15-18] In this study the median time for the first medical contact and ER travel was longer in female compared to male although statistically not different. Such indifferences have also been shown in different studies.[3,19-21] Older people had higher pre-hospital delay as they had reduced physical functions and decrease pain perception, have atypical symptoms and have multiple co-morbidities.[22-23] Other studies did not show statistically significance differences with age.[24,16]

Falcone et al had concluded the increase pain threshold in patients with hypertension which may explain longer pre-hospital delays in hypertensive patients

with STEMI.[25] Patients with diabetes had longer pre-hospital delay[26] while some explained no such differences.[26] Smokers had shorter pre-hospital time than non-smokers. The reason for this was that the risk of myocardial infarction among smokers has been well publicized by the media.[27]

Thrombolysis should have been started in less than or equal to10 minutes after diagnosis of STMI in First medical Contact. If the maximum delay for STMI diagnosis and wire crossings of ≥120 minutes is expected, thrombolysis is suggested as the target time does not met.[1] As the median time is 80 minutes for our patients to reach the hospital for PCI after first medical contact, thrombolysis first followed by referring the patient in PCI centre would have been better choice. The use of aspirin in pre hospital time varying from 19 to 91.3% has also been described.[28,29] The updated knowledge of the importance of the initial medical management of ST- myocardial infarction among the practising doctors can improve prescription patterns in patients attending ER with the diagnosis.

There were different reasons given for prehospital delay. Different reasons were that patients not considering symptoms as serious, taking help means giving burden attitude or feeling oneself embarrass, lack of equipment, distant hospital and transportation fascilities.[10,30-31] Patients went to first medical contact themselves preferably in own or accompanying friends or neighbour's private vehicles while they were transferred from the first medical contact place to the emergency room of PCI capable hospital in ambulance. Farshidi had described no differences in prehospital

delay on using routes of transport while Fathi confirmed betterment with Emergency medical system (EMS).[3,26]

More patients enrolled for longer duration of study could have given more accurate results in assessing timings as well as various reasons of prehospital delays. Patients with primary angioplasty were only included leaving out the thrombolysed. NonST-Myocardial Infarction (NSTMI) and Unstable angina patients could also be added in the study to give complete picture in prehospital epidemiology. Ambulance drivers should be trained as they are responsible for diagnose, triage and treatment.

CONCLUSIONS

Chest pain was common in morning and the prehospital delay can be minimized by improving time from symptom to first medical contact and first medical contact to Emergency room. Extensive campaigning for increasing knowledge of chest pain symptoms among patients can improve the pre-hospital time and subsequently timely revascularization.

ACKNOWLEDGMENTS

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