Delay in Presentation in Patients with Acute Myocardial Infarction

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Many patients of acute myocardial infarction (AMI) delay in seeking medical care, therefore miss the benefits of thrombolytic therapy. The cause of delay in presentation is influenced by age, sex, socio-economic factors, severity of symptoms, site of infarction and presence of complications. Both late presentation and treatment delay result in increased mortality. This study was designed to know the impact of different patient related parameters causing an significant delay in presentation to hospital. One hundred consecutive patients (79 males, 21 females) with AMI, presenting to Emergency Department were included and a questionnaire was filled in to evaluate the cause of delay in presentation. The mean hospital presentation time was 7 hours and 20 minutes. Younger patients reached earlier, male patients took less time, uneducated patients took more time. Public awareness in Lahore is 72%. Fifteen percent patients came late as they consulted their general practitioner. Location of infarct and Killip class III and IV at presentation were significantly associated with early presentation. This delay can be reduced by education and introduction of mobile coronary care units available on emergency phone call.
Key words: Presentation delay, Thrombolytic Therapy, Acute Myocardial Infarction.

Acute Myocardial Infarction (AMI) continues to be a major public health problem. In 1980, it was demonstrated that occluding thrombosis of coronary arteries is the most frequent cause of AMI.[1] Thrombolysis has been described as the most important development in the treatment of AMI after the introduction of defibrillation. Defibrillation is palliative whereas thrombolysis, given early enough, corrects the underlying pathophysiology. In terms of its potential of saving the lives, early thrombolysis is as important as defibrillation and should be carried out very urgently.[2] Therefore early reperfusion of infarct related coronary artery may potentially limit the infarct size, preserve left ventricular function and ultimately reduce the morbidity and mortality[3,4,5].

The results of Gruppo Italiano Per Lo Studio Della Streptochinasi Nell Infarcto Miocardio (GISSI-I) trial suggested that the fibrinolyitc therapy might especially be effective if started within one hour after the onset of symptoms the so called **"Golden hour"**.[6,7] The magnitude of giving early thrombolyitic treatment to patients with AMI should be accorded with the same degree of urgency as the treatment of cardiac arrest.[8]

The time delay between onset of symptoms and hospital presentation is a critical factor in determining both short and long-term mortality after acute myocardial infarction (AMI).[9] Thrombolytic therapy has been shown to improve in-hospital survival and left ventricular function of patients hospitalized with AMI, therefore earlier is used, the more effective it is[10]. Patient's delay from the onset of symptoms of AMI to the receipt of medical care can affect in-hospital survival rates as well as out of hospital death rates from the disease.[11]

Unfortunately, many patients delay seeking medical care and miss the benefits associated with recent advances in medicine. The cause of delay in presentation has been studied in different group of populations and it was shown to be influenced by age, gender, socio-economic factors, severity of symptoms, and presence of complications like rhythm abnormalities, pulmonary edema and shock.[12]

Time taken from the onset of symptoms to the initiation of therapy is different in different population group. For example, it ranges from two to four hours in USA, five to six hours in Dublin and 6.19 hours in Karachi.[13,14] Late presentations and treatment delay both are associated with increased mortality rates.[15] It is important to assess the factors that significantly influence the delay and especially so to identify the patients at high risk of prolonged delay.[16]

Health care system is very much limited in Pakistan. Most of the cases of myocardial infarction come through the Accident and Emergency Department and use their personal conveyance or public transport, because of the lack of well knit mobile coronary care units and other ambulance facilities. The decision to come to the hospital is made either by patients' relatives or friends.[17] Hence ought to be delays in decision making as well as delays in transportation. Moreover, Accident and Emergency Departments are filled with patients beyond resources available, causing substantial in-hospital delays.

Purpose of Study

Very limited community based data is available to determine the time delay between the onset of symptoms and initiation of therapy. Since the timing of therapy is very important in the present day of thrombolytic era, we thought it is worthwhile to study the factors influencing the time of presentation. The purpose of this study was to know the impact of different patient related parameter which can cause an appreciable delay in the patient's presentation to the hospital.

Material and Methods

Inclusion Criteria

The study population included 100 consecutive patients presenting to the Emergency Department of Mayo Hospital during emergency hours of East Medical Unit with complaints suggestive of AMI, which was later confirmed by ECG and/or enzyme elevation as per criteria laid down by WHO for diagnosis of AMI.[18]

Exclusion Criteria

The following groups of patients were excluded from the study:

1. The patients with unstable angina.
2. The patients with Prinzmetal angina.
3. The patients who had history suggestive of myocardial infarction but expired before the conformation of diagnosis.
4. The patients who fulfilled the criteria but never regained consciousness to help in filling the questionnaire.
5. Mentally retarded people.
6. The patients who are not sure about the time of onset of symptoms.

The Study Protocol

On presentation the patients were evaluated, had cardiac monitoring and given pharmacological therapy according to their clinical condition. When the condition of the patient stabilized, questions pertaining to the present study were asked. A detailed questionnaire was prepared comprising of different questions, the answers of which could have a bearing on the delay time of the patient. The questions were asked and the patient's response was interpreted by the same observer on the spot. The time of presentation was noted from the hospital record and the time of initiation of therapy was recorded on the chart of the patient by the doctor who initiated the pharmacological therapy. The patients who were in distress were deferred to be interviewed again after 12-24 hours.

Results

Out of 100 patients studied 79 were male and 21 were females. The patients' age range between 34 years to 85 years with a mean $\pm$SD of 55.89 $\pm$ 12.55. **The mean hospital presentation time** was 7 hours 20 minutes (440 minutes SD $\pm$ 77.31) with the earliest presentation within 15 minutes to the maximum time the patients took was more than 2 days. The median time of 25th percentile to 75th percentile was 165 minutes (2 hours and 45 minutes), 26% patients presented within 1 hour, 17% within 2 hours, 15% with in 3 hours, 5% within 4 hours, and 31% within 24 hours. Younger patients reached earlier than the older group. Patients of less than 40 years took a mean of 216 minutes (3 hours and 36 minutes), 48% of which presented within 1 hour of the start of symptoms. The male patients took a mean of 384 minutes (6 hours 24 minutes) and female patients took a mean of 461 minutes (7 hours 41 minutes), 28% males while 19% females presented in less than 1 hour.

Twenty two percent patients experienced their symptoms in the early hours of the day between 5 am to 9 am, 16 % out of them had symptoms started between 5 am to 7 am, showing increased propensity of developing AMI in early morning hours. Presentation time of the patients who had onset of their symptoms during the night was 400 minutes versus 375 minutes for the patients with onset of symptoms during the day, although the patients presented about 25 minutes late during the night but the difference is not as much as anticipated.

The time to presentation also showed a relationship with type and location of infarct. Patients with left sided chest pain presented within a mean time of 59 minutes compared to central chest pain and epigastric pain, for which the corresponding figures were 197 and 934 minutes respectively. Out of 77% patients having Q-wave infarction, 53.2% patients were having antero-septal infarction 88.2% extensive anterior wall infarction, 15.6% inferior wall infarction and 13% were having antero-lateral infarction. Seven females had inferior wall myocardial infarction making this the most common form of infarction in the females (33.33%) while only 5 males (6.3%) had inferior wall myocardial infarction. The patients with non-Q-wave myocardial infarction presented later than the patients with transmural myocardial infarction. The average time to presentation of non-Q-wave infarction was 759 minutes (12 hours and 39 minutes). The patients with extensive anterior wall infarction had shown tendency to present earlier i.e. 244.6 minutes (4 hours and 4.6 minutes), followed by antero-lateral infarction 332.7 minutes (5 hours and 32.7 minutes), antero-septal infarction 352.3 minutes (5 hours and 52.3 minutes) and inferior wall myocardial infarction 529 minutes (8 hours and 49 minutes), (table 1).

Fifty percent of the patients were uneducated while 24% were educated up to primary level, 20% up to matriculation and 6% were graduates. The educated class tended to reach the hospital earlier (table 1). Twenty eight percent of the patients did not know any thing about the acute coronary event and its life threatening consequences. Twenty one percent had their first hand experience of a cardiac death either in the hospital or work place, 13 % had a family members who suffered from heart attack (MI), 4% had knowledge about cardiac ailment from a far off relative who had MI. Two patients were sensitized by the media (television) while listening to a program about health and 32% had knowledge about heart attack and its consequence from a doctor or a clinic. The time to presentation was only 15 minutes for the patients who were sensitized by the program on television, 98 minutes for the patients who had a family member or a relative having MI, rest of all had presentation times of

more than 8 hours.

Table 1 Presentation Time in Relation to Various Patient Characteristics

Character of pain	Presentation time
Crushing	315 minutes
Squeezing	173 minutes
Burning	556 minutes
Heaviness	625 minutes
Location of pain	**Presentation time**
Central chest pain	197 minutes
Left sided chest pain	59 minutes
Epigastric pain	934 minutes
Accompanying symptoms	**Presentation time**
Sweating	640 minutes
Vomiting	870 minutes
Dyspnea	400 minutes
Palpitation	219 minutes
Fainting	78 minutes
Educational Background	**Presentation time**
Graduates	205 minutes
Upto matric	329 minutes
Upto primary	441 minutes
uneducated	492 minutes
Referral	**Presentation time**
Self referral	267 minutes
Referred by GP	461 minutes
From other hospital	721 minutes
Associated illnesses	**Presentation time**
Diabetes	659 minutes
Hypertension	537 minutes
Ischemic heart disease	390 minutes
None of the above	410 minutes
Pulse rate and	**Presentation time**
60 per minute or less	321 minutes
61 to 100 per minute	517 minutes
Above 100 per minute	262 minutes
Systolic blood pressure	**Presentation time**
Less than 100 mmhg	108 minutes
Above 100 mmhg	464 minutes
Diastolic blood pressure	**Presentation time**
Less than 60 mmhg	132 minutes
Above 60 mmhg	482 minutes
Other examination finding	**Presentation time**
Raised JVP	190 minutes
Peripheral oedema	360 minutes
S3	240 minutes
Killip Class 3	30 minutes
Killip Class 2	82 minutes
Location and type of infarct	**Presentation time**
Non Q-wave infarction	759 minutes
Extensive anterior wall	244 minutes
Antrolateral	332 minutes
Antroseptal	352 minutes
Inferior wall	529 minutes

Fifty percent were self referrals while 23% were referred by G.P or local dispensary, 17% from other hospital, 5 % from tertiary care center and 5% patients were asked to contact Mayo Hospital by unqualified practitioner. Self referrals had a mean time to presentation of 267 minutes with the minimum of 15 minutes, 42% reached in less than 1 hour, 56% in less than 2 hours, 68% in less than 3 hours, 72% in less than 4 hours and 80% in less than 6 hours. Only 1% took more than 24 hours. While in patients who contacted General Practitioner or local dispensary mean time to presentation was 461 minutes with the earliest patients reaching within 60 minutes, 3.5% reached in one hour, 17.8% in 2 hours, 46% in 3 hours, 53% in 4 hours and 71% in less than 6 hours. Two patients who kept on contacting a general practitioner took more than 2 days to reach Mayo Hospital, Lahore (table 1).

Four patients came on foot and only 7% used ambulance. The patients who used ambulance were referred from tertiary care centre or other hospitals. The patients using ambulance had a mean time to presentation of 33.2 minutes although the transportation time was only 17.45 minutes, much of which was wasted in the assessment of patients. Mean transportation time was about 36 minutes with a minimum of 10 minutes to a maximum of 180 minutes. Seventy two percent patients reached hospital within half an hour and 92% reached within one hour.

Thirty two percent patients used their personal conveyance out of which 8% came on motor cycle while 38% used riskshaw/taxi and 17% came via wagon or bus. The time to presentation was almost equal for all these groups. The patients with KILLIP class III reached within 30 minutes and in KILLIP class II reached within 82.5 minutes (table 1) .

Discussion

Time to presentation has got both short term and long term bearing on the course of coronary artery disease.[19] Different strategies have been employed to reduce this time in the West.[20] In our situation very often there is delay in diagnosis due to scarcity of qualified medical personnel and lack of investigative facilities. Occasionally the patients reach the hospital on local transport like rickshaw, van and motor cycle, producing tremendous exhaustion.[21] The mean time to presentation in our study is 7.20 hours which is much more than the time reported in Western literature, in ISIS-2 the mean time was 4.9 hours.[22] It was reported to be 2.2 hours in Sweden.[25] Worcester heart attack study reported it to be 4.6 hours, while in Dublin it was 6 hours and 4.6 hours elsewhere in England.[13,24] The comparison of these studies is given in table 2. This study shows that the sample of population under consideration has got relatively longer delay. The median delay between 25th and 75th percentile is 2 hours and 44 minutes which is comparable with that reported by Roberts in 1994.[25] Twenty six percent patients in our study presented in less than one hour and 43 % in less than 2 hours which is much better than the ISIS-2 (US Component).[22] The delay was compared with the Physician Hospital Study (PHS) group which provided the minimum time delay. In PHS 30% of patients reported in

less than one hour and 56% presented in less than two hours.[26] In our study 26% patients presented in less than one hour and 43% presented in less than 2 hours. This earlier presentation may look astonishing and a bit unexpected, probably high incidence of coronary artery disease in Pakistan has let to sensitization of public. Moreover the hospital, where the study was carried out is located in the centre of the very congested inner city, caters as the first report health facility for majority of population living around. This view is strengthened by the fact that the majority of persons who presented within one hour were from the area around the hospital.

The awareness of coronary artery disease is more than that which is shown by the educational status of the community. The study carried out in Sheikh Zayed Hospital, Lahore also supports the view that there is grave concern about heart disease in the society.[17]

Our results when viewed as mean are comparable with that of Samad et al who reported a mean delay in presentation of 6.19 hours with median of 3 hours. They also showed that female patients had increased time to presentation than male patients.[14] Our study also confirmed that fact (table 3). Male patients had a time lag with mean of 6.03 and female patients had a time lag of 7.59 hours. In the present study male patients delayed for a mean of 6 hours and 20 minutes while female patients delayed for 7 hours and 41 minutes[14,30].

Table 3 Comparison of age and presentation delay among the population of two big cities of Pakistan

	NICVD Karachi*	MAYO Lahore**				
	Total	Male	Female	Total	Male	Female
Number of patients	433	390 (87%)	43 (13%)	100	79	21
Age (Years)	52.53	46.96	57.67	55.89	55.62	56.24 yrs
Presentation delay (Hours)	6.19	6.03	7.59	7.33	6.40	7.68 hrs

* Samad 1993, ** Present Study

In our study 74% of the patients presented within 6 hours, in ISIS-III 78% patients presented within 6 hours and in NICVD Karachi 73% patients reached within 6 hours.[14,28] In our study 21% of the patients were female. The reported figure from GISSI-II is 19.9% and in ISIS-3 27%. The data from NICVD Karachi shows 13 % to be female.[14,27-28]

Examining the impact of educational background on time to presentation show that the persons with better education present earlier. The mean time to presentation of those with graduation is the shortest and that with no education is the longest. Although 50% of our study population had no proper school education yet at least half of them were well aware of the prognostic importance of coronary heart disease and their response was appropriate in contacting the hospital. The level of awareness in the public of a metropolitan city of Lahore has been calculated to be 88.7%.[17] In our study it was 72% that is probably due to the difference in socioeconomic class of the two population studied. Most of the patients in our study group got the awareness about cardiac disease from the doctor or dispensary (32%) while only 2% which were graduates were sensitized by the media (television). Media probably is not that much important. The general practitioner has got bigger role to play if their technical skills can be enhanced and they can help in initiation of the therapy as well as properly referring the patients. Consultation by general practitioner usually delay the patients substantially as previously. In our study 50% of the patients did not consult any doctor because either they were convinced that the symptoms are due to cardiac disease or the symptoms were so severe that it demanded immediate rush to the hospital. The patients who contacted G.P/local dispensary delayed for more than about 3 hours. The time lag while contacting the G.P and its response was calculated to be 1.1 hours in England[16]. The relatively longer delay in our setting is probably due to the longer and slow response of the general practitioner due to its lower technical skills and investigating potential.

Since the importance of time to presentation was recognized, efforts have been underway to reduce this time by developing the proper referral system and the use of mobile coronary care ambulance system. In our setting only 9% people used ambulance and those were also referred from other hospitals for want of beds or non existent cardiac monitoring facilities. Thirty eight percent patients used rickshaw/taxi while 8% used motor cycle. This is comparable to Ahsan et al where 10% used ambulance 32% rickshaw and 4% used motor cycle.[21] Transportation time which was though initially to be a major factor was not that much big factor. It ranged from 10 minutes to 3 hours with a mean of 36.07 minutes with a median of 30.0 minutes, 72% patients presented within half an hours.

Location of infarct and KILLIP class at presentation was significantly associated with early presentation in the findings of TRACE study group.[16] Our findings also support above mentioned fact (table 1).

Conclusion

The study shows that the patients with myocardial infarction seek medical help quite late which adds to the morbidity and mortality associated with the disease. This delay is dependent upon the age, gender, type of symptoms and the level of education of the person. The in-hospital mortality and long term complications of AMI can be reduced if reaction time of the patient is decreased, which is the most important factor in the presentation delay. This delay can be reduced by imparting health education about coronary artery disease and importance of early intervention. Introduction of mobile coronary care units and an emergency telephone number to call when symptoms arise, can help in reducing this delay.

Table 2 Comparison of Mean Time of Presentation of Previous Studies with Present Study

Study	Time
PHS[26]	140 minutes
ISIS-2[22]	294 minutes
TRACE[16]	195 minutes
Perez D Perez[29]	120 minutes
Roberts 1994[25]	187 minutes
Dublin[13]	360 minutes
Worcester Heart attack study[24]	276 minutes
Present Study	440 minutes

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