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RESEARCH ARTICLE

Determinants of Prehospital Delay among Patients Attending Cardiac Emergency with Acute Chest Pain of Cardiac Origin in Lucknow District

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Abstract

Background:
There is clear evidence that early reperfusion in acute chest pain can reduce both infarct size and subsequent disability and mortality. Despite the known importance of early intervention, delay in seeking medical care is common and constitutes a major unresolved public health problem.

Objectives:
To study the distribution of prehospital delay and the factors contributing to it in patients attending cardiac emergency with acute chest pain of cardiac origin in Lucknow district

Material and Methods:
A Descriptive Longitudinal Study was conducted in the cardiac emergency of CSMMU, a tertiary care center, following systematic random sampling technique on a sample size of 220 during study period of one year August 2010 to August 2011. Data was collected through preformed and pretested schedule and analysed using SPSS 17.0 software.

Results:
Mean and median delay time from onset of symptoms to arrival at the hospital was 18.2 hours and 3.0 hours respectively. About 40% of the subjects presented after 6 hrs of onset of pain. Time taken for decision making contributing to majority of delay in seeking health care. The factors that found significant association with delay in health seeking were rural residence (p=0.03), literacy status (p=0.033), SES class (p=0.001), having BPL card (p=0.029) and having medical reimbursement or health insurance (p=0.016). Most common reason for delay was delay in decision making (58.2%), followed by lack of awareness about the seriousness of the problem (52.3%).

Conclusions:
Public awareness campaigns to be conducted periodically to educate people about signs and symptoms of acute chest pain of cardiac origin, to create awareness about the seriousness of the problem, as these factors were the major barriers in delay in health seeking.

Introduction

India accounts for 5.24 million deaths annually due to NCD s and 20 DALY s lost per 1000 population per year due to cardiovascular diseases. They also contribute to 35.3% of total morbidity. (WHO; Global status of non communicable diseases 2010). India, having an overall prevalence of smoking 34.6% in men and 3.4% in women, having diabetes prevalence of 5.5% is also having the brunt

of risk factors .(WHO; NCD SEA region profile 2009).

The benefits of reperfusion therapy in patients with acute myocardial infarction is well known. Moreover both the use of reperfusion therapy and its efficacy are inversely correlated with the time between the onset of symptoms suggestive of acute coronary disease and patients arrival at the hospital for treatment. Concerning the association of pre-hospital delay and the benefits of thrombolytic therapy, there is clear evidence that early treatment, especially within the first "golden hour", can reduce both infarct size and subsequent disability and mortality.

Despite the known importance of early intervention, delay in seeking medical care is common and constitutes a major unresolved public health problem. Previous studies have investigated factors associated with the delay in seeking medical care and suggested that a variety of socio-demographic and medical characteristics account for this delay. However, information relating to the extent of delay and factors associated with the delay are limited, since most of the studies conducted in the past, included only patients with acute myocardial infarction and this kind of studies are done in western countries more often than in India. Therefore, the primary focus of the present study was to examine the extent of the delay and to delineate associated socio-demographic and medical factors in seeking medical care for patients hospitalized with acute chest pain of cardiac origin.

OBJECTIVES OF THE STUDY:

1) To study the distribution of delay in presenting to a health care facility of patients attending cardiac emergency with acute chest pain of cardiac origin residing in Lucknow district.
2) To study the socio-medical determinants of delay in seeking health care of patients attending cardiac emergency with acute chest pain of cardiac origin residing in Lucknow district.

Material and Methods

This Descriptive Longitudinal study was conducted at Lucknow, capital state of Uttar Pradesh. This study was carried out from August 2010 to August 2011 at Cardiology emergency, CSMMU (Tertiary care centre) with Patients attending cardiac emergency with acute chest pain of Cardiac origin in Lucknow district as Study unit. Due to lack of availability of similar studies in India and after review of studies all over the world, the range of acute chest pain patients seeking health care within 6 hours of onset of pain varies from 40% to 60%. Hence by taking 50% of the patients with acute chest pain of cardiac origin were seeking health care within 6 hours from the onset of pain, with the absolute permissible error, d=10% in the prevalence with a 95% confidence limit, the sample size was calculated with design effect (W) of 2 and 10% of cases lost to follow up, final sample size worked out to be 220. Systematic random sampling technique was used. Sampling interval was decided on the basis of analysis of baseline data obtained from the cardiac emergency for the month of July 2010.

All patients attending cardiac emergency with acute chest pain of cardiac origin (as evidenced by expert clinical opinion or ECG or cardiac enzymes) residing in Lucknow district with minimum stay in the hospital for atleast 1 hour were included in the study and patients with acute chest pain of non cardiac origin, patients with serious unrelated disease (Eg: advanced malignancy, renal failure, severe COPD, trauma, surgery) which may limit the life expectancy were excluded. A pretested structured interview schedule was used to collect necessary information. Permission to conduct this study was taken from the institutional ethical committee and Head of the department, Cardiology. Informed consent was taken from the study respondents.

Gender, place of residence, marital status, religion, type of family, have BPL card, have medical imbursement, smoking, alcohol, DM, HTN, dyslipidaemia, regular exercise, past history , family history, day of onset of pain, Age, literacy status, SES class, perception about level of seriousness, awareness of risk factors, Caste, occupation, place at the onset of pain, final diagnosis, time of onset of pain were the independent variables in the study.

Data entry and analysis was done using SPSS version 17.0. Descriptive statistics such as mean and standard deviation (SD) for continuous variables, and frequency and percentage for categorical variables were determined. The chi-square test and fisher's exact test (when appropriate) was used to show the associations between predictor and outcome variables .The level of significance was set at 0.05. Factors associated with health seeking behavior of patients were determined by multiple logistic regression analysis methods.

Results

Most of the patients attending cardiac emergency with acute chest pain of cardiac origin were in the age group of 56-65 years (34.5%) followed by 31.4% in the age group of 46-55 yrs. Males outnumbered females with 81.4 % of the total study subjects, 65% belonged to urban area, 97.3 % were married, 78.2% were Hindus, 65% belong to general caste , 66.4% living in a nuclear family. A majority of the rural

patients were shopkeeper, farmers and clerk (35.1%), while majority of the urban population were professionals or semi-professionals (30.8%). Most of the patients from rural area were literate upto high school (28.6%), with 24.7% illiterates, while most of the urban population belong to the post graduate (34.3%), with only 9.8% illiterates. Most of the rural patients belong to socio-economic class IV (46.8%), followed by class III (41.6%), while majority of urban patients belong to socio-economic class II (63.6%).

Mean delay time from onset of symptoms to arrival at the hospital was 12.8 and 30.0 hours for STEMI and NSTEMI respectively. About 40% of the subjects presented at the first consultation after 6 hrs of onset of pain. Nearly three fourth (74.1%) of patients attendants arrange money within a hour and majority (92.7 %) of patients attendants arrange transport within a hour. (Table 1)

As evident from table 2, the factors found associated with delay in health seeking were rural residence (p=0.030), lower literacy status (p=0.033), lower SES class (p=0.001), Having BPL card (p=0.029) and having medical reimbursement or health insurance (p=0.016) for ST elevation MI and lower SES class (p=0.02) for Non ST elevation MI. Other socio-demographic variables viz. Age, gender, religion, caste, marital status, type of family and occupation were not associated with the delay in health seeking from acute chest pain patients. The risk factors viz. Smoking, alcohol, DM, HTN, dyslipidaemia, lack of regular exercise, past history or family history of CAD also were not associated with the delay in health seeking (data not shown).

Patients with anterior wall MI and inferior/posterior/ RVMI were more likely to come to the health facility within 6 hrs of onset of chest pain with OR (95% CI) 2.042 (0.852-4.896) and 2.347 (0.995-5.536) respectively as compared to those patients with NSTEMI. Patients whose chest pain having its onset during 12 pm to 5:59 pm and morning hours 6 am to 11:59 am were more likely to arrive at the health facility within 6 hrs of onset of chest pain with OR (95% CI) 3.680 (1.387-9.765) and 4.233 (1.563-11.463) respectively. Patients who perceive their chest pain of low severity and who regard the seriousness as high were more likely to come to the health facility after 6 hrs of onset of chest pain with OR (95% CI) 52.737 (12.922-215.236) and 11.614 (2.953-45.686) respectively (p=0.000) as compared to the patients who perceive their chest pain as life threatening. (Table 4). The most common reason for delay in health seeking by patients with acute chest pain was delay in decision making (58.2%), followed by lack of awareness about the seriousness of the problem (52.3%). (Table 5)

Table 1: Distribution of the durations of patient related delay in patients with acute chest pain of cardiac origin (n = 220)

	STEMI (N=155)				NSTEMI (N=55)			
	No.(%)	**Mean ± SD (hrs)**	**Median (hrs)**	**Range (hrs)**	**No.(%)**	**Mean ± SD (hrs)**	**Median (hrs)**	**Range (hrs)**
Time taken in decision making to seek treatment								
<1 hr	72 (46.5)	12.2±23.4	1.8	0-120	14 (21.5)	28.3±39.9	12.0	0-168
1-6 hrs	37 (23.9)				14 (21.5)			
6-12 hrs	12 (7.7)				6 (9.2)			
>12 hrs	34 (21.9)				31 (47.7)			
Time taken in arranging money								
< 1 hr	118 (76.1)	6.27±18.7	0.0	0-168	45 (69.2)	8.6±22.1	0.0	0-96
1-2 hrs	4 (2.6)				3 (4.6)			
2-4 hrs	8 (5.2)				3 (4.6)			
>4 hrs	25 (16.1)				14 (21.5)			
Time taken in arranging transport								
< 1 hr	144 (92.9)	0.53±1.48	0.0	0-15	60 (92.3)	0.36±0.79	0.0	0-4
1-2 hrs	6 (3.9)				3 (4.6)			
2-4 hrs	2 (1.3)				2 (3.1)			

>4 hrs	3 (1.9)				0 (0.0)			
Time taken in transportation to reach appropriate health facility								
< 1 hr	93 (60.0)	1.6±1.5	0.8	0.17-8	36 (55.4)	1.82±1.59	0.9	0.16-7.0
1-2 hrs	31 (20.0)				10 (15.4)			
2-4 hrs	21 (13.5)				14 (21.5)			
>4 hrs	10 (6.5)				5 (7.7)			
Duration between the onset of chest pain and first consultation								
<1 hr	55 (35.5)	12.8±25.9	2.0	0-168	13 (20.0)	30.0±40.3	14.5	0-168
1-6 hrs	52 (33.5)				13 (20.0)			
6-12 hrs	13 (8.4)				6 (9.2)			
>12 hrs	35 (22.6)				33 (50.8)			

Table 2: Association between bio-social characteristics and delay in seeking treatment for acute chest pain

Bio-social characteristics	**STEMI (n=155)**			**NSTEMI (n=55)**		
	Time b/n onset of pain to first consultation (hrs)					
	≤ 6	**> 6**	**Mean±SD**	**≤ 6**	**> 6**	**Mean±SD**
Age (in years)						
<35	4 (80.0)	1 (20.0)	3.5±4.9	0 (0.0)	0 (0.0)	
36-45	9 (75.0)	3 (25.0)	11.9±23.0	4 (44.4)	5 (55.6)	34.7±52.0
46-55	36 (69.2)	16 (30.8)	14.3±27.5	5 (29.4)	12 (70.6)	36.6±45.3
>55	58 (67.4)	28 (32.6)	11.2±19.5	18 (45.0)	22 (55.0)	27.3±41.4
	p=0.902			p=0.698		
Gender						
Male	94 (71.2)	38 (28.8)	11.5±22.3	19 (39.6)	29 (60.4)	34.3±44.6
Female	13 (56.5)	10 (43.5)	16.4±29.2	8 (44.4)	10 (55.6)	16.7±19.8
	p=0.160			p=0.721		
Residence						
Rural	32 (58.2)	23 (41.8)	18.2±30.3	8 (36.4)	14 (63.6)	38.2±44.7
Urban	75 (75.0)	25 (25.0)	8.9±17.9	19 (43.2)	25 (56.8)	25.2±37.3
	p=0.030			p=0.595		
Literacy status						
Illiterate	19 (52.7)	17 (47.3)	15.1±20.6	2 (16.7)	10 (83.3)	47.0±46.6
Primary school			22.1±35.0	6 (54.5)	5 (45.5)	25.9±37.1
High school	38 (79.1)	10 (20.9)	6.6±14.0	3 (50.0)	3 (50.0)	25.0±29.3
Intermediate			5.5±8.5	4 (42.9)	3 (57.1)	11.8±15.4
Graduate	50 (70.4)	21 (29.6)	16.8±31.5	5 (33.0)	10 (66.7)	24.5±31.4
Post graduate			10.3±20.5	7 (46.7)	8 (53.3)	33.3±53.7
	p=0.033			p=0.381		
Socio-economic Status						
I	7 (53.8)	6 (46.2)	16.6±22.0	0 (0.0)	4 (100.0)	25.2±37.3
II	56 (83.6)	11 (16.4)	6.8±17.2	15 (48.4)	16 (51.6)	18.8±29.5
III	29 (67.4)	14 (32.6)	18.6±32.8	10 (58.8)	7 (41.2)	22.0±31.2
IV & V	15 (46.8)	17 (53.2)	13.0±18.8	2 (14.3)	12 (85.7)	53.2±48.5

	p=0.001			**p=0.02**		
Having BPL card						
Yes	9 (47.4)	10 (52.6)	14.6±24.9	4 (30.8)	9 (69.2)	43.4±48.5
No	98 (72.1)	38 (27.9)	11.9±23.3	23 (43.4)	30 (56.6)	26.1±37.5
	p=0.029			p=0.407		
Have Medical reimbursement/ Health insurance						
Yes	33 (84.6)	6 (15.4)	7.6±17.7	8 (47.1)	9 (52.9)	11.5±13.7
No	73 (63.5)	42 (36.5)	13.8±25.0	19 (38.8)	30 (61.2)	35.8±44.2
	p=0.016			p=0.549		

Table 3: Association between time of onset of chest pain, perception of seriousness, diagnosis and delay in seeking treatment for acute chest pain

Characteristic	**Time b/n onset of pain to first consultation (in hrs) (n=220)**			**P value**
	≤ 6	**> 6**	**Total**	
Day of onset of chest pain *				
Weekdays	100 (60.6)	65 (39.4)	165	0.937
Weekend	33 (60.0)	22 (40.0)	55	
Time of onset of chest pain				
6 am to 11:59 am	45 (66.2)	23 (33.9)	68	**0.003**
12 pm to 5:59 pm	43 (68.3)	20 (31.7)	63	
6 pm to 11:59 pm	20 (38.5)	32 (61.5)	52	
12 am to 5:59 am	25 (67.5)	12 (32.4)	37	
Place at the onset of chest pain				
Home	96 (60.0)	64 (38.8)	160	0.951
Work place	22 (62.9)	13 (37.1)	35	
Public Place	15 (60.0)	10 (40.0)	25	
Perception about level of seriousness				
Low	14 (22.6)	48 (77.4)	62	**0.000**
High	28 (56.0)	22 (44.0)	50	
Very High	51 (78.4)	14 (21.4)	65	
Life Threatening	40 (93.0)	3 (7.0)	43	
Final diagnosis				
AWMI	51 (68.0)	24 (32.0)	75	**0.000**
IWMI/PWMI	56 (70.0)	24 (30.1)	80	
NSTEMI	26 (40.0)	39 (60.0)	65	
Awareness of risk factors*				
0	32 (48.5)	34 (51.5)	66	**0.047**
1-4	36 (62.1)	22 (37.9)	58	
5-8	65 (67.7)	31 (32.3)	96	
Number of health visits before reaching appropriate center				
0	30 (83.3)	6 (16.7)	36	**0.004**
1	78 (58.6)	55 (41.4)	143	
≥ 2	25 (49.0)	26 (51.0)	51	

* Risk factors include age ,smoking, alcohol, hypertension ,diabetes mellitus, obesity, dyslipidaemia and lack of exercise .

Table 4: Independent predictors of early arrival to the hospital ≤ 6 hrs by Multiple logistic regression analysis

Predictor variables	β Co-efficient	AOR (95% C.I.)	P value
Socio-economic status			
I	19.046	10.868 (10.287-20.712)	0.000
II	20.228	60.094 (10.494-240.862)	0.000
III	19.646	30.406 (10.134-100.239)	0.000
IV	18.221	8.190 (7.123-12.343)	0.000
V	Reference category		
Have medical reimbursement /health insurance			
Yes	0.970	2.638 (1.066-6.530)	0.036
No	Reference category		
Time of onset of chest pain			
12 am to 5:59 am	1.013	2.755 (0.880-8.628)	0.082
6 am to 11:59 am	1.303	3.680 (1.387-9.765)	0.009
12 pm to 5:59 pm	1.443	4.233 (1.563-11.463)	0.005
6 pm to 11:59 pm	Reference category		
Perception about level of seriousness			
Low	-3.965	0.019 (12.922-215.236)	0.000
High	-2.452	0.086 (2.953-45.686)	0.000
Very High	-1.274	0.280 (0.917-13.954)	0.067
Life Threatening	Reference category		
Final diagnosis			
AWMI	0.714	2.042 (0.852-4.896)	0.110
IW,PW,RV AMI	0.853	2.347 (0.995-5.536)	0.05
NSTEMI	Reference category		

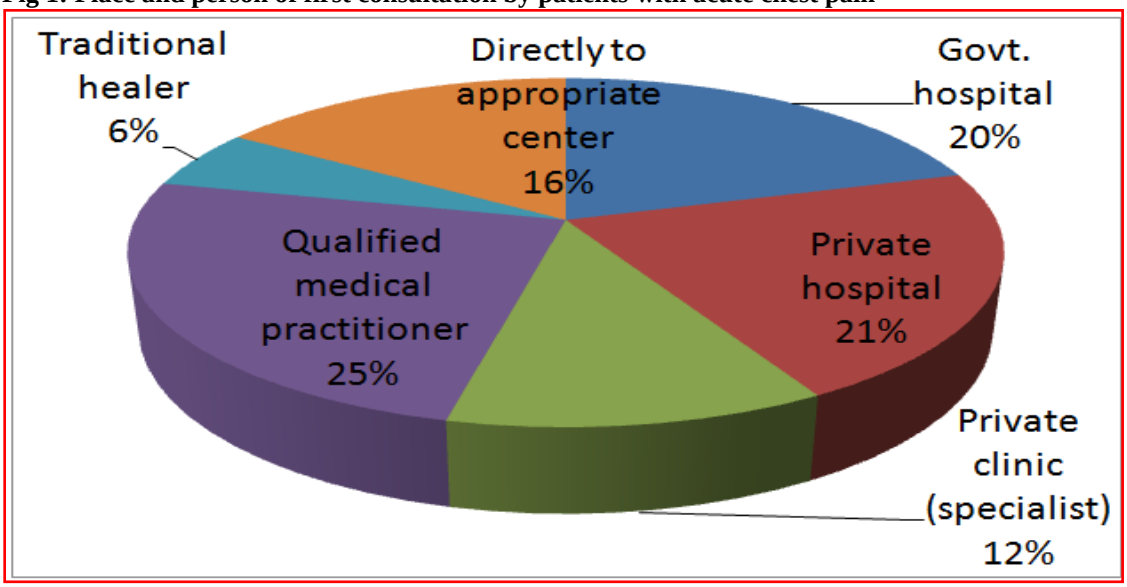
Table 5: Reasons for delay in seeking health care by patients with acute chest pain of cardiac origin (n = 220)

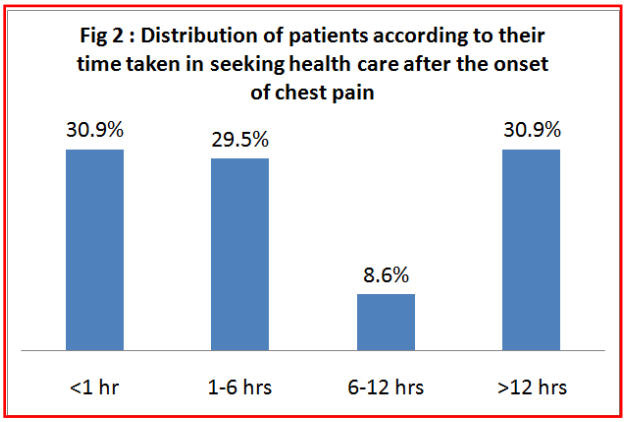
Reasons For Delay*	No.	Percent
Delay in decision making	128	58.2
Lack of awareness about seriousness	115	52.3
Delay in arranging transport	26	11.8
Non availability of attender	33	15.0
Shortage of money	48	21.3
Instistution far away	69	31.4
Home remedies	11	5.0
Self medication	39	17.7
Waiting for the symptoms to subside on its own	72	32.7
Thought to be caused by some other cause.	52	23.6

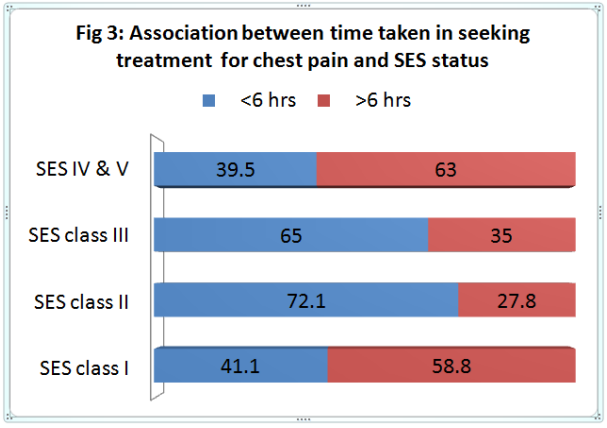
Fear of diagnosis	35	15.9
Others	14	6.3

*multiple responses

Fig 1: Place and person of first consultation by patients with acute chest pain







Discussion

In the present study mean delay time from onset of symptoms to arrival at the hospital was 12.8±25.9 and 30.0±40.3 hours for STEMI and NSTEMI respectively. Mean health seeking times for the STEMI were lower in the studies conducted by İbrahim S.,*et.al.*, (2008)[4] 3.08±5.58 hrs, Alidoosti M.,*et.al.*,(2004)[1] 7.1±9.1 hrs, however similar pattern was reported by Khan M.S., *et.al.*,(2007)[9] 12.3 hrs, Angela D. B. *et.al.*, (2006)[2] 13.51±19.51 hrs and relatively higher in the studies conducted by Kyungeh R.N., *et.al.*,(2001)[10] 17.42 hrs and Reilly A, *et.al.*,[13] 25.4 hrs. Median delay from onset of symptoms to arrival at the hospital was 2.0 for STEMI. This finding was reported lower by İbrahim S., *et.al.*, (2008)[4] 1.16 hrs and similar by Khan M.S., *et.al.*, (2007)[9] 3.04 hrs, Christos P, *et.al.*,(2006)[3] 3.5 hrs, Alidoosti M., *et.al.*, (2004)[1] 3.8 hrs, Yoshimi F., *et.al.*,(2005)[15] 3 hr 34 min and relatively higher times reported by Angela D. B. *et.al.*, (2006)[2] median 4.25 hrs and Reilly A, *et.al.*, [13] 5 hrs.

About one third of patients (30.9%) reported to the hospital within 1 hour. This is well supported by İbrahim S ., *et.al.*, (2008)[4] who reported 31% of patients arriving within 1 hr of onset of pain and higher when compared to the study conducted by Yoshimi F.,*et.al.*,(2005)[15] <1 hr: 12.2%. About three fifth (60.4%) of patients arriving at the health

care facility within 6 hours from the onset of pain. The similar findings were reported by others [9,3,7,1,15] who showed that 66%, 62%, 60%, 66.4% and 64.6% were arriving within 6 hrs of onset of pain respectively.

In the present study mean and median time taken for decision to seek medical care for acute chest pain were 12.2 hrs and 1.8 hrs respectively for STEMI, contributing to majority of delay in seeking treatment for acute chest pain. These findings were similar to studies Kathleen E, *et.al*.,[8] who showed that mean, median for the same were 9.14 hours, 1.90 hours respectively; with decision taking time accounts for largest proportion of health seeking behaviour and [10]showed that mean decision taking delay was 17.02 hrs.

About three fourth (74.1 %) of patients attendants arrange money within a hour and 92.7% of patients attendants arrange transport within a hour, indicating that arranging money and transport were not a major cause of delay in most of the cases, as acute chest pain was an emergency situation. Mean time taken for transportation to reach the appropriate health facility was 1.68 hours, whereas other studies [8,10,16] showed that mean time taken for the travel logistic phase after decision making was 5.74 hrs, 0.84 hrs and 46.35 min respectively.

In the present study, the socio-demographic variables which associated with the delay in health seeking for acute chest pain patients were rural residence, illiteracy and low SES. These findings were similar to other studies, who showed that illiteracy [1,4] and rural residents [3,14] were associated with a longer delay in reaching hospital. This is in contrast to the findings of various studies who showed that advanced age [1,3,4,7,12,13], female sex [1,3,4,7,14] as a determinant for delay in health seeking in acute chest pain patients and [10,15] who concluded that none of the socio-demographic factors were associated with the prehospital delay.

The risk factors viz. Smoking, alcohol, DM, HTN , dyslipidaemia, lack of regular exercise , past history or family history of CAD were not associated with the delay in health seeking . These findings were in contrast to various other studies who observed that past history of CAD [3,14] , DM [1,2,3,4] , HTN [3,7], smoking [3,4], family history of CAD [3] were associated with the delay in health seeking in acute chest pain patients. The present study findings were supported by [10] who showed that none of the risk factors were associated with the delay in health seeking.

The present study findings were similar to Khan M.S., *et.al*., (2007)[9] who showed that mild chest pain and lack of knowledge of symptoms of heart attack were associated with the delay in health seeking with AMI patients. Pérez J.L, *et. al*., (2007)[12] showed that pain onset during night ($p<0.001$), low severity of the pain ($p<0.001$) and at home during the onset of chest pain ($p=0.021$) were associated with the delay. Jerry H.G., *et.al*.,(2006)[7] observed that pain onset during 6 to 12 pm and 12 am to 6 am were at the greatest risk of delay in health seeking. Jafari H., *et.al*.,(2009)[6] showed that onset time ($p=0.001$) and work place ($p<0.002$) were associated with the prehospital delay in acute chest pain. Vavouranakis I, *et.al*.,(2010)[14] showed that anterior MI was negatively associated with the delay ($p=0.01$) and Christos P, *et.al*.,(2006)[3] found out that median delay was higher for NSTEMI (4 hrs) compared to STEMI (3 hrs). Alidoosti M ., *et.al*.,(2004)[1] and Ingarfield S.L. *et.al*.,(2005)[5] showed that symptom onset during night was positively associated with the prolonged delay in AMI patients.

Present study found out that the most common reason for delay in health seeking by patients with acute chest pain was delay in decision making (58.2%), followed by lack of awareness about the seriousness of the problem (52.3%). These findings were well supported by other studies such as [14] who showed that 84% waited for the symptoms to subside on its own and 52% were not aware of the seriousness of the problem. [6,13] observed that lack of knowledge about the symptoms was the most common reason followed by specifying self recovery. [15] found out that most common reason for delay was lack of severity of the symptoms. [2,11] also found out that most common reasons for delay were patient thought symptoms would go away, symptoms not severe enough and thought to be caused by another illness.

Conclusion

Public awareness campaigns to be conducted periodically to educate people about signs and symptoms of acute chest pain of cardiac origin, to create awareness about the seriousness of the problem and risk factors, as these factors were the major barriers in delay in health seeking. Calling for help (emergency helpline numbers) and ambulance services should be made available to the people with acute chest pain. As fear of diagnosis, waiting for the symptoms to subside on its own were the reasons for delay, any community intervention planned should be focused at social, emotional and cognitive planes and involve the family members also in persuading and promoting preventive care

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Limitations of the study

The present study does not represent the patients with acute chest pain of cardiac origin who die at home or on the way to the hospital or those

who died within the first hour of admission to the hospital.

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