

*Original article*

# Causes of Late Referral to the Emergency Department in Patients with Myocardial Infarction in Iran

Mojtaba Rad<sup>1</sup>, Akram Bidi<sup>2</sup>, Gholam Reza Khaligh<sup>2</sup>, Mostafa Rad<sup>3</sup>

<sup>1</sup>Nursing Department, School of Nursing and Midwifery, Sabzevar University of Medical Sciences, Sabzevar, Iran

<sup>2</sup>Sabzevar University of Medical Sciences, Sabzevar, Iran

<sup>3</sup>Nursing Department, School of Nursing and Midwifery, Iranian Research Center on Healthy Aging, Sabzevar University of Medical Sciences, Sabzevar, Iran

## SUMMARY

Late referral of patients with myocardial infarction is one of the main causes of morbidity or mortality in these patients. Therefore, this study aimed to investigate the factors involved in the late referral of patients with heart attacks to the emergency department.

A descriptive cross-sectional study was conducted on 148 patients with myocardial infarction referred to the emergency department. They were chosen using a census method. A researcher-made questionnaire was developed and assessed in terms of validity and reliability for data collection. Inclusion criteria included suffering from chest pain or other symptoms indicative of acute myocardial infarction, age above 18 years, tendency to take part in this study, patients with acute myocardial infarction who had late referral and were admitted to cardiac care unit for at least 48 hours. Data was analyzed using descriptive and inferential statistics via SPSS software.  $P < 0.05$  denoted statistical significance.

Pain improvement with rest (85.8%), severity of chest pain and lack of familiarity with the symptoms of heart diseases and abnormal cardiac symptoms (87.8%), confusion of heart problems with musculoskeletal problems (70.2%), and the presence of concomitant diabetes were important factors influencing late referral to the emergency department. The average time to reach the emergency department after the onset of the heart problem was  $24 \pm 3$  hours.

A lack of patients' familiarity with cardiovascular symptoms and acute myocardial infarction calls the need to educate the society about symptoms and the need for an early referral to healthcare settings.

**Key words:** late referral, myocardial infarction, emergency

Corresponding author:

**Mostafa Rad**

Email: mostafarad633@yahoo.com

## INTRODUCTION

Acute myocardial infarction is one of the most commonly diagnosed diseases worldwide and the first cause of death in Iran (1, 2). Despite many advances that have been made in the treatment of heart diseases, the high mortality rate is still high due to late referral to the emergency department (3). Most patient's delays in referral to hospital are due to late understanding of the importance of the problem and making decisions to visit the doctor. The length of time that passes to coming to hospital influences the diagnosis and thrombolytic therapy (4). The onset of symptoms in acute myocardial infarction increases the mortality rate and increases the size of the infarction area until the patient is referred to hospital (5). Reasons for this late referral are not fully understood. However, in the Iranian culture and context, it includes less information about heart diseases and its symptoms. Also, patients' beliefs about traditional and herbal treatments and a possible elimination of pain by rest can lead to late referrals. However, more studies are needed to assess the reasons behind patients' late referral to healthcare settings (6, 7).

If patients are referred to the treatment center as soon as possible and receive thrombolytic therapy, the mortality rate will decrease because of blood reperfusion to the heart (8). In other studies, factors such as age over 65 years, gender, and low economic status were the major risk factors for late referral to hospital (9). Reilly et al. did not find any relationship between the age and late referral to hospital (10). Other factors such as the history of acute myocardial infarction, diabetes mellitus or high blood pressure were other sources of late referral to the emergency department (11). Other studies, however, reported that patients with a history of acute myocardial infarction had a lower referral delay (12). Gurwitz et al. did not find any relationship between the history of acute myocardial syndrome and late arrival to hospital (13). One of the most common causes of late referral is that patients do not associate these symptoms with the heart and say that other non-cardiac causes may lead to these symptoms. The classic symptom of acute myocardial infarction is chest pain that lasts for more than 20 minutes (14). In many cases, pain does not exist and symptoms such as weakness, shortness of breath, anxiety, boredom or syncope may occur with acute myocardial infarction. These factors cause late referral to hospital because some

patients may attribute them to other causes rather than the heart. Understanding the causes of patients' late referral to the emergency department helps in identifying the methods to prevent late referral and reduce the mortality and disability of patients with heart attacks. For this purpose, this study aimed to investigate the causes of late referral to the emergency department in Iran.

## PATIENTS AND METHODS

This descriptive cross-sectional study included 148 patients with myocardial infarction referred to the emergency department of Heshmatiee hospital in Iran in 2016. They had delay in referral to the emergency department and were chosen using a census sampling method.

The data collection instrument was a demographic form with questions about age, gender, history of heart disease, history of underlying illness, education, how to refer to the heart emergency (by ambulance or family members), history of diabetes and high blood pressure, and time of chest pain, time to notify the emergency or family members, time spent for patient's transfer to hospital, referral hours to hospital, economic status, residence, education level, marital status, patient occupation, history of addiction, history of depression, health insurance, history of heart disease in the family, self-treatment with herbal medicines, duration of onset of pain and referral to the treatment center.

The other research tool was a researcher-made questionnaire with a three-point Likert scale from "I disagree" to "I agree". Possible causes of heart attack and myocardial infarction in patients with chronic myocardial infarction were classified into four categories including patients' beliefs and attitudes to the disease with questions such as self-relieving symptoms, restlessness, lack of confidence to drug therapy and relieving symptoms using traditional or herbal medicines. Other questions were related to the patient's fear of late referral after cardiac symptoms including fear of medical expenses, fear of being hospitalized, having or not having insurance. The third category of questions was about the underlying diseases such as respiratory and cardiac diseases, diabetes, chronic fatigue and other causes of chest pain. The fourth category of questions was about the patient's lack of familiarity with the symptoms of coronary artery diseases including typical and non-typical symptoms. All questionnaires were filled in by a researcher who did an interview with the patient. Patients responded to all the questions completely. Inclusion criteria were chest pain or other symptoms indicating acute myocardial infarction, age over 18 years, tendency to take part in this study, and positive troponin I enzyme. Also, they should be admitted for at

least 48 hours in the cardiac care unit (CCU).

### Ethical considerations

This study was approved by Sabzevar University of Medical Sciences (decree code: 391060223) that corroborated its ethical considerations. Verbal and written consent of the patients participating in the study was obtained. The patients had stable hemodynamic conditions at the time of filling out the questionnaire. The questions were developed using literature review and opinions of physicians and nurse practitioners who worked in the CCU. The questionnaire consisted of 32 multiple-choice questions. For content validity of the questionnaire, 10 patients were asked to read the questionnaire and answer questions, which led to resolving misunderstandings and correcting questions. Also, 10 cardiologists evaluated and approved the questionnaire. Reliability of the questionnaire was also examined by using internal consistency method and calculation of the Cronbach's alpha coefficient that was reported as 0.83.

The samples were recruited using a census method from March to September 2016. After a definite diagnosis of myocardial infarction, a specialist physician residing in the emergency department started therapeutic interventions. After that, the patient's hemodynamic status was stabilized, the patients were hospitalized in the CCU, and the questionnaire was filled out by the researcher. The patients had their myocardial infarction symptoms in their electrocardiogram, and their serum troponin I enzyme levels were high. Data were analyzed using descriptive and correlation analysis, t-test, and Chi-Square. The significance level was considered less than 0.05. SPSS11 v.5 was used for the data analysis.

### RESULTS

The mean age of the patients was  $50 \pm 2.5$  years with an age range of 33-80 years. In this study, 56.8% were male and 43.2% were female. The patients were mostly housewives (42.6%) and illiterate people (54.7%). Eighty-five percent of the patients were married. Most of the patients were natives (52%). Regarding the economic situation, none of the patients referred to the emergency department were ill-equipped and 48% had a low-income. Sixty percent had no history of heart diseases. Regarding depression, 93% of the patients did not have depression and 68.2% did not report a family history of

heart disease. Also, 71% of them did not report addiction.

In most people, the onset of pain was from 12 to 18 hours (64.9%). Among the patients, 42.6% of them used herbal medicines to relieve their symptoms, of which 31 were women. The type of health insurance was rural nomadic (41.2%). Frequency of the causes of late referral to the emergency department is presented in Table 1.

The average time to reach the emergency department after the onset of the heart problem was  $24 \pm 3$  hours. After making a decision to go to hospital, the time of referral to hospital was 15-30 minutes (6.8%). Also, in 27% of the patients it was 31-60 minutes, and in 64.2% of them it was 61-120 minutes. In addition, 2% of the patients spent over 120 minutes to get to hospital. The average time of arriving in coronary unit was 100 minutes.

Chi-square test showed that patients at the age of 41-60 years had the latest referral to the hospital ( $p = 0.001$ ). Also, 34 women were scared of being hospitalized due to late referral to emergency department. A statistically significant relationship was found between gender and fear of being hospitalized ( $p = 0.001$ ). The absence of one of the family members was one of the reasons for late referral (95% CI confidence interval = 3,306-0.296, OR = 1.2) indicating that the absence of a family member at the time of myocardial infarction increased the probability of late referral up to 20%. The history of diabetes mellitus also was related to late referral to the emergency department (95% CI = (-0.454) - 10.45, OR = 6.88) indicating that diabetes increases the chance of late delivery to the emergency room by six times.

### DISCUSSION

This study showed that age was a factor influencing the late referral of patients to the emergency department. Patients under the age of 65 years had later referral to the emergency department. Conversely, Horne et al. found that age had no major impact on late referral (15). Brophy reported similar results (16). The reason for the late arrival of middle-aged patients could be a lack of consideration of heart problems and the problems associated with chest diseases such as musculoskeletal or pulmonary problems.

Table 1. The causes of late referral to the emergency department

Category	Cause	Agree		Disagree	
		N	%	N	%
Patients' beliefs and attitudes to the disease	Spontaneous relieving the symptoms	127	85.8	21	14.2
	Lack of confidence to medication regime	68	45.9	80	54.1
	Reliving symptoms using traditional interventions	64	37.2	84	56.8
	Reliving symptoms using herbal medicine	63	42.6	85	57.4
Patients' fears	Fear of therapeutic costs	78	52.7	70	47.3
	Fear of hospitalization	49	33.1	99	66.9
Underlying diseases	Addiction	43	29	105	71
	Depression	10	7	138	93
	Cardiac diseases	59	39.8	89	60.2
	Respiratory symptoms	16	10.8	132	89.2
	Diabetes	7	4.7	141	95.3
	Chronic diseases	77	52	71	48
Lack of familiarity with symptoms	Musculoskeletal diseases	119	80.4	29	19.6
	Lack of familiarity with cardiac typical symptoms	104	70.2	44	29.8
Lack of familiarity with symptoms	Lack of familiarity with atypical cardiac symptoms	130	87.8	18	12.2
	Loneliness	Lack of patient's companion	46	31.1	102

N: Number

In addition, we found that female patients with acute myocardial infarction were referred to hospital later than men. Davis observed that this difference may

be due to the fact that the incidence of heart diseases in women is lower than that of men. As we know, the incidence of heart attacks in men before the age of 65 is

higher in men than in women. For this reason, acute myocardial infarction is considered a male disorder, and cardiac symptoms are not taken seriously in women. Other factors such as excessive responsibility of Iranian women in life can make them to have less concerns about being hospitalized and therefore have late referral to hospital. Recent studies have shown that women have a long history of heart failure (17). Other studies have shown that women are more likely to delay their care for heart problems, because most of their symptoms are atypical and they have no belief in having cardiac disorders and do not disclose them (5, 17). In a study, widowed women had heart diseases, diabetes mellitus and high blood pressure, and were referred to hospital late (18). It has been shown that women (65-74) are referred to the treatment center with more delay than men (25-50 years) (19, 20). In another study, no statistically significant difference in late referral between men and women was reported (20).

Diabetes mellitus was one of the causes of late referral to the Emergency Department, which was similar to the McKinley's study indicating a link between the patient's delay and known risk factors for acute myocardial infarction such as hypertension, history of angina and diabetes mellitus (21). These results may be due to the effects of diabetes on the neuromuscular system, which reduces the feeling of pain or obscures its symptoms and leads to late referral to hospital.

Spontaneous relief of symptoms with rest was a major factor influencing patients' late referral to the healthcare system. This finding was similar to the findings of Johansson's study, in which most people think that chest pain symptoms associated with stable angina can be relieved with rest (22). Another explanation for late referral to hospital is that patients consider their symptoms a chronic heart disease and cannot differentiate between angina attack and acute myocardial infarction. Therefore, they take rest and use sublingual nitrates to address their symptoms. Self-treatment with nitrates is very common. Nearly 70% of patients already diagnosed with coronary artery diseases have nitrates and use them to relieve their pain.

Musculoskeletal disorders were other causes of late referral to the hospitals, which have been reported by previous studies (23). This confirms the low level of knowledge about the symptoms of myocardial infarction, which has been emphasized by the patients.

In this study, after making a decision to go to hospital, 81% of patients reported that access to the emergency department took 1-2 hours. The time to visit the emergency department varies from country to country (24). In Australia and New Zealand, the average time is 2.2 hours, while in Argentina and Brazil the average visit time to the treatment center is 4 hours (25). In a study in China on factors affecting delay in referral, an average delay was reported to be 130 minutes in patients with acute myocardial infarction. Eight predicted factors to reduce prehospital delay included high levels of education, history of myocardial infarction, onset of symptoms with headache, ambulance transfer, beginning of pain during the day (6 AM-18 PM), onset of pain in the house, anterior and posterior cardiac attack (23), which are in keeping with the findings of the present study.

In the present study, the use of herbal medicine and lack of trust in medication were the reasons for late referral to hospital, which was in line with the findings of other studies. It is believed that medication use, visit to the family doctor, and indefinite symptoms were predicting factors of delayed referral to hospital. The gradual onset of symptoms and the lack of use of ambulance were other factors influencing delays to healthcare settings (26).

## Limitations

Construct validity of the questionnaire was not assessed in this study. However, in this study, its content validity was confirmed by experts. Since data was collected 48 hours after being admitted to the CCU, memory bias was possible. It is also possible to find other factors affecting the late referral to the hospital that may have not been considered in this study. The sample size was low, but this study helped with identifying the causes of late referral to the emergency department in an urban area of Iran.

## CONCLUSION

More than half of the people with heart problems were referred to the emergency department late. The most important factors contributing to the delay in reaching the emergency department were waiting for spontaneous improvement of pain by rest, confusion of heart problems with musculoskeletal problems, and lack of

familiarity with atypical cardiac symptoms as well as the presence of concomitant diabetes. Familiarizing patients with the signs and symptoms of a heart problem, especially with atypical symptoms, is very important for early referral to hospital.

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## Razlozi kasnijeg upućivanja bolesnika sa infarktom miokarda u urgentni centar u Iranu

Mojtaba Rad<sup>1</sup>, Akram Bidi<sup>2</sup>, Gholam Reza Khaligh<sup>2</sup>, Mostafa Rad<sup>3</sup>

<sup>1</sup>Departman za sestrinstvo, fakultet za sestrinstvo i akušertstvo, Univerzitet medicinskih nauka Sabzevar, Sabzevar, Iran

<sup>2</sup>Univerzitet medicinskih nauka Sabzevar, Sabzevar, Iran

<sup>3</sup>Departman za sestrinstvo, fakultet za sestrinstvo i akušertstvo, Iranski istraživački centar za zdrav život, Univerzitet medicinskih nauka Sabzevar, Sabzevar, Iran

### SAŽETAK

Kasnije upućivanje pacijenata sa infarktom miokarda jedan je od glavnih uzroka morbiditeta i mortaliteta kod ovih bolesnika. Cilj ove studije bio je utvrđivanje faktora koji utiču na kasno upućivanje bolesnika sa srčanim udarom lekaru Urgentnog centra.

Ova deskriptivna studija preseka uključila je 148 bolesnika sa infarktom miokarda koji su upućeni u urgentni centar. Učesnici studije birani su primenom metode cenzusa. Upitnik koji su sačinili istraživači osmišljen je i analiziran u smislu validnosti i pouzdanosti prikupljenih podataka. Kriterijumi za učestvovanje u studiji su uključili: prisustvo bola u grudima ili pojavu drugih simptoma koji su ukazivali na akutni infarkt miokarda, starost bolesnika iznad 18 godina, spremnost za učestvovanje u studiji, i na kraju bolesnike sa akutnim infarktom miokarda koji su bili kasno upućeni i primljeni u koronarnu jedinicu u okviru od najmanje 48 sati. Podaci su analizirani korišćenjem deskriptivne i inferencijalne statistike primenom SPSS softvera. Vrednost  $P < 0.05$  uzeta je kao statistička značajnost.

Kao važni faktori koji su uticali na kasno upućivanje pacijenata lekaru urgentnog centra navedeni su: smanjenje bola nakon odmora (85,8%), jak bol u grudima i nepoznavanje simptoma srčane bolesti i abnormalnih srčanih simptoma (87,8%), zamena srčanih tegoba sa muskuloskeletalnim problemima (70,2%), kao i prisustvo dijabetesa melitusa. Prosečno vreme dolaska u urgentni centar od pojave srčanih tegoba bilo je  $24 \pm 3$  sata.

Nepoznavanje kardiovaskularnih simptoma, kao i simptoma akutnog infarkta miokarda, upućuje na neophodnost edukacije društva o ovim simptomima i rano upućivanje u zdravstvene centre.

*Ključne reči:* kasnije upućivanje, infarkt miokarda, urgentnost