

Cardiac Emergency Care Related Delay and Its Factors in Seeking in Patients with Acute Myocardial Infarction in Bangladesh

Jinnat Rehana¹, Nazma², Md. Anwar Hossain³

¹National Institute of Advanced Nursing Education and Research (NIANER)

²College of Nursing, Shere-E-Bangla Nagar, Dhaka.

³National Institute of Neurosciences and Hospital

Corresponding Author:

Jinnat Rehana (RN, MSN), ¹National Institute of Advanced Nursing Education and Research (NIANER)

Email: riparaya@gmail.com

ABSTRACT

BACKGROUND: Acute myocardial infarction (AMI) which is Cardiac Emergency among cardiac diseases, is considered as the first leading cause of death and disability worldwide. So, early diagnosis and treatment of myocardial infarction can prevent life-threatening complications such as dysrhythmias and death. The aim of this study was to determine cardiac emergencies related to delay and its related factors in seeking care in patients with myocardial infarction in Bangladesh.

METHODS: In a cross-sectional design, all the patients who had referred to a general hospital (Out of Dhaka) for cardiac care of myocardial infarction from April 2019 to March 2020 were recruited and carried out by face-to-face interview. Demographic characteristics, the amount of delay, and the causes of having delay were recorded. Data were analyzed using chi-square, sample *t*-tests with confidence limit of 95%. The level of significance was considered to be $P < 0.05$.

RESULTS: Two hundred patients were recruited for this study from which 131 (69%) patients had delay in seeking cardiac emergency care. Factors such as gender, age, economical status, educational level, referring to a general physician before referring to the hospital, the severity of symptoms, residential place, and the time of the onset of the symptoms were determined to be related to having delay. The most important causes of having delay were: "hoping the symptoms to alleviate spontaneously", "attributing the symptoms to other problems other than heart problems", and "disregarding the symptoms".

CONCLUSION: Regarding the most important causes of having delay in this study, the importance of educating people about the symptoms of myocardial infarction and the importance of early referral to the hospitals is clarified.

Keywords: Pre-hospital delay, Myocardial infarction, Onset-to-door time.

Introduction

Coronary artery diseases (CAD) are one amongst the foremost current diseases in developed and developing countries.^{1,2} They are the leading cause of death in 39.4% of cases worldwide.³ Approximately 40 to 60 percent of acute myocardial infarction (AMI) deaths usually occur during the first hour after the onset of the AMI symptoms before arriving to the hospital.^{4,5} The morbidity and mortality rate drastically decrease in patients who received therapeutic modalities during the first two hours after the onset of AMI symptoms.^{6,7} Nitrates, beta-blockers, thrombolytic, anticoagulants, and interventional procedures such as percutaneous transluminal coronary angioplasty and coronary artery bypass grafting are the most important therapeutic modalities for AMI.^{5,8,9} Although such therapies have led to major improvements in patient outcomes, their full potential has not been realized because they are often performed too late.¹⁰

The quotation "time is muscle" is used to highlight the importance of saving time and starting treatments without delay.^{11,12} Although treatment for AMI should begin within 1 hour of symptom onset, unfortunately the current median time between the onset of AMI symptoms and admission to the hospital is slightly more than 2 hours¹³ and, almost 25% of AMI victims still have a longer than 5 hours delay.¹⁴ Every 30 minutes of delay increases the 1-year mortality risk by 7.5%.¹⁵ The period between the onset of symptoms and the decision to call for medical assistance remains the most important cause of total pre-hospital delay.¹⁶⁻¹⁸ In Bangladesh, about 50,708 deaths occur from AMI annually (WHO, 2014). More than 100,000 deaths occur among American population over the year.¹³

AMI patients often use denial during the first hours and even first days after chest pain initiation.¹⁹ It is an unconscious physiologic response which empowers the patient to encounter and overcome his anxiety and fear. AMI patients often have delay in seeking treatment as a result of denial, relating the symptoms to other than cardiac problems.^{17,20,21} Studies showed that patients usually do actions such as taking a break, using over-the-counter medicines, calling emergency medical services, and consulting a physician for their AMI symptoms.^{20,22,23} Many factors such as being old,²⁴ being female,^{25,26} and having low socioeconomic status,²⁷ clinical factors such as a history of hypertension or diabetes,²⁵ or prior history of angina or previous AMI, have been associated with longer delay. In Iran, however, there are a few studies on this critical subject area; the onset-to-door time and the door-to-needle time were 106 and 51 minutes respectively. They also determined that "the home-to-hospital distance", "self-therapy" or "using over-the-counter drugs", and "relating the symptoms to other than heart problems", were the main reasons of having delay.³⁰

The most important risk factors among AMI patients are smoking, obesity, diabetes, hypertension, dyslipidemia and family history of heart disease³⁹. Masoomi and Nikian also found that only "a history of diabetes" and "the severity of chest pain" had relationship with having

delay in seeking treatment after chest pain.³¹ They also found that the mean onset-to-door time was around 5 hours. However, these are local rather than national studies and hence can't provide a valid median onset-to-door time for Iranian patients. In the other hand, cultural effects make different behaviors in society and more studies were needed. Likewise, alternative countries, Cardiovascular disease (CVD) is a progressive reason for accumulated mortality and services burden in Asian nation³⁶, a developing country with concerning a hundred and sixty million of the population as a country experiencing medical specialty transition³⁷. However, the precise prevalence and risk factors of CVD is nevertheless to be known. A nationwide survey specializing in the medical specialty aspects of coronary arterial diseases during this country is nevertheless to be conducted. There is scarce analysis to find out the cardiac emergencies delay and its risk factors and implement interference ways³⁸.

Materials and Methods

This study with cross-sectional study was conducted at the National Institute of Cardiovascular Disease and Hospital (NICVD) between Data were collected from 200 patients who were hospitalized and treated due to STEMI (S-T elevation myocardial infarction) in emergency ward and CCU (cardiac care unit) from September 2019 and December 2019, which is a specialized level hospital in Dhaka with convenient sampling technique via face-to-face interviews with a structured questionnaire and analyzed by Statistical Package for the Social Science (SPSS) version 23.0 software.

The information about patients was collected by filling out a questionnaire including variations of age, sex, income, educational level, cardiac history disease and patients' lab tests. The information about the first place of referral after the pain began, delay cause and the time of starting the pain was gathered. Those who came in less than 2 hours were on time, in 2-4 hours had slight delay, and in 4-8 hours had average delay and more than 8 hours had long delay. Then the data were obtained and analyzed by descriptive statistics and chi-square, sample t-test with confidence limit of 95%. The level of significance was considered to be $P < 0.05$.

Results

Table 1. Distribution in patients with infarction with respect to related factors and in-time refer

Characteristics	Groups	In time		Referral Delay		P Value
		n	%	n	%	
Age (Years)	30-45	17	68	8	32	<0.0008
	45-60	19	30.6	43	69.4	
	>60	33	29.2	80	70.8	
Sex	Male	54	39.1	84	60.9	0.02
	Female	15	24.2	47	75.8	
Literacy	Illiterate	25	25.5	73	74.5	<0.01
	Primary	29	39.1	45	60.9	
	Secondary or More	15	53.5	13	46.5	

Income	Low	9	21	34	79	0.06
	Moderate	41	36	73	64	
	High	19	44.2	24	55.8	
Disease	Yes	52	33.7	102	66.3	0.8
	No	17	37	29	63	

Table 2. Distribution in patients with myocardial infarction with respect to patient's transfer to hospital and referral situation

Patient's referral	Quality of transferring to hospital				P Value
	Ambulance		Other Vehicle		
	n	%	n	%	
In time	6	8.7	63	91.3	0.09
With moderate delay	9	13.5	58	86.5	
Long delay	14	22	50	78	

Table 3. Distribution in patients with myocardial infarction with respect to accompanying symptoms and patients 'referral situation

Patient's referral	Accompanying symptoms				P Value
	Yes		No		
	n	%	n	%	
In time	61	88.5	8	11.5	0.05
With moderate delay	59	88.5	8	11.5	
Long delay	48	75	16	25	

Table 4. Distribution in patients with myocardial infarction with respect to education and common causes of delay

Cause of Delay	Literate		Illiterate		P Value
	n	%	n	%	
Waiting for spontaneous recovery	20	47.2	12	35.3	0.18
Non-cardiac causes	11	26.2	5	14.7	
Disapproving the pain	6	14.3	8	23.5	
Decreased in educational information	5	11.9	9	26.5	

Table 5. Relationship between clinical characteristics and medical care seeking delay time of patients

Characteristics	Groups	Mean (SD)	t(p)
-----------------	--------	-----------	------

Family heart disease	No	14.36±12.75	-1.417(.638)
	Yes	18.04± 15.39	
AMI symptoms	No chest pain	17.14±13.26	.275(.784)
	Chest pain	15.65± 13.94	
Nature of pain	No heaviness	17.14±17.14	.275(.784)
	Heaviness	15.65±15.65	
Duration of pain	<6 hours	19.41±15.33)	2.645(.009)
	≥6 hours	12.84±11.89	
Radiation of pain	No radiation	13.58±10.89	-2.443(.020)
	Radiation	23.20± 19.60	
Medical problem	Non DM	18.81±16.72	1.167(.251)
	DM	14.81±11.81	
Hospital admission	First time	15.99±13.29	.396(.693)
	Two or more		

Among 200 patients, 138 (69%) were men and 65.5% came with delay. The women had more delay and this difference was significant ($P = 0.02$). In-time refer in men was 54 (39.1%) and in women was 15 (24.2%). By increase of age, the delay increased too; and the difference was meaningful ($P = 0.0008$). Delay in people with low income was more than the ones with high income, Most of people who had low income delayed and their in-time refer was less than those who had high income (Table 1).

This study showed that the least rate of the long delay was in patients who came directly to hospital (Table 2). The survey results showed that patients who used the vehicles except for emergency ambulances had less delay. Pain location in 173 patients (86.5%) was chest and left hand which allowed the highest delay (32.4%).

The patients with myocardial infarction along with cardiac pain experienced associated symptoms such as nausea, vomiting, dyspnea (Table 3).

In time referral in patients who had concomitant symptoms was more than those who didn't have the symptoms ($P = 0.05$) (Table 3). Among 16 patients who had long delay due to attributing the pain to non-cardiac causes, 14 ones had pain in left chest among whom 9 (64.3%) had associated symptoms and 5 (35.7%) didn't. Also from 32 patients who had long delay because of waiting for spontaneous improvement, 27 ones had pain in chest among whom 21 (77.8%) didn't have accompanying symptoms and 6 (22.2%) had. Among 200 under-study patients, 113 ones were inside the city at the time of cardiac symptoms happening which allowed most to refer on-time 37 (37.2%). The most common cause of long delay 32, (42%) was to wait for improvement and in the second place was to attribute the pain to non-cardiac causes 16 (21%). Low educational information in the illiterate people is more common with respect to other causes of long delay (Table 4). Patients who had chest pain in the night had the longest delay 11 (52.4%); the patients whose pain started early night and early morning were 46.5% and 28.8% respectively.

Meanwhile the percent of in-time referral before noon was more than other times of the day. Among 200 under-study patients, 80 ones (40%) informed relatives. Regarding the medication treatment after the start of the pain, from 64 patients who came with long delay, 43.8% (28 ones) had taken no medication measure and 25% (16 ones) had taken sublingual TNG.

AMI symptoms, nature of pain, duration of pain, radiation of pain, related other medical problem and frequency of hospital admission. Patients who had suffered pain less than 6 hours showed significantly higher delay time to seek medical care ($p = 0.009$) than who had suffered from pain for 6 hours or more. On the other hand patients whose pain had radiated to other parts of body such as arms, back, jaw, epigastric region showed significantly higher delay in seeing medical care ($p = .020$) than who had no radiation of pain. (Table 5)

Discussion

In this study, from 200 patients, two thirds were men. Women had more delay comparing to men and also most of them had long delay (45.1%). According to Dracup, between 1/4-1/2 patients with MI had delay more than 6 hours from the beginning of the symptoms. 32 For every 30 minutes delay in sending the patients to hospital, the probability of decrease in human life span increases by 7.5% for one year; and 30-40% of the patients who had delay were looking for help for more than 6 hours, and doing nursing actions reduced the delay time from the average of 5.7 hours to 5.5 hours.¹⁸ Gilber has mentioned 110 minutes as the average time of the onset of symptoms till arriving to the hospital. African women had the most delay.²⁰ In a study in Scotland in 2000, showed that women had the most delay in referring to hospital. Perhaps the reason for these results is the high threshold of pain tolerance in women or more common rate of MI in men, and that women don't attribute chest pain to heart and its related diseases and so they don't act to reduce it. On the other hand, the women are influenced with heart attacks in older ages, so their sense of pain may decrease with age; and this pain may become more tolerable.³³

The findings of the table 1 show that with advancing age, the rate of delay has generally increased. The people older than 60 years old often came with slight and long delay in proportion to the previous groups. In a study by Cramlish in 2000 on patients with acute MI it was showed that as age increases, the rate of delay also increases.⁴ The most common cause of delay in patients with infarction was increasing age (more than 45 years).³⁴ The results of these findings may be due to high pain threshold in older people; or the increase in personal knowledge and experience has caused the delay for referring to hospital.³⁴ The rate of in-time referral in patients has a reverse relation with their situation of revenue; namely the patients whose income is lower have more delay and have less in-time referral in comparison with others. In a study in 2000 patients who had low income had also the longest delay.⁸ Also one of the reasons for delay was low life income.³⁵ The above findings have been coincident. Perhaps high treatment expense and patients' low income have been the reasons for the delay in patients with MI. Illiterate patients had more delay compared to those with educated ones and the plenty of long delay in this group was more; and this finding is in accordance with study in 2000,³⁵ but Rosenfeld (2004) did not introduce low education as the reason for delay but remarks the low knowledge and information from cardiac disease and the complications due to lack of in-time treatment as the most important

cause²¹. The longest delay has been in patients who had a positive history of underlying diseases (HTN, DM)¹ and the reason for in-time referral in patients with infarction along with diabetes is probably because of physician's education based on the possibility of lack of pain and taking every chest pain into consideration and the necessity of in-time referral which needs more survey. Also 84 people who had a hospitalization history because of heart problems did not have such differences with the ones who never had the former history. The reasons for delay are divided into two parts: the background causes (female sex or the older ages) and clinical (DM and Angina history) and the environmental factors (physician's consult with one of the members in the family at the time of the event) and the emotional reactions (anxiety and bothering others, fear from outcomes)¹⁸ and in a study on the patients with MI, the ones with a positive history of HTN and previous MI, had more delay.¹⁶ This point is of high importance because some attributed these symptoms to their previous disorders with respect to not having previous experiences, but the patients with cardiac disease often have personal experience and this is a factor that remarks the in-time referral and the necessity of attention to the ones who have risk factors like DM and HTN so that they can have enough education. On the other hand, some diseases such as diabetes increase the pain threshold.³⁶ The findings show that the longest delay was among the patients who had come directly to the general practitioner and those who had come to the city emergency or public health service. In a study in Scotland in 2000, one of the most common causes of pre-hospital delay was the general practitioners because of insufficient experience and wrong diagnosis which confirms the present findings.⁸ In this study the delay was on the part of the patients who used emergency service. In a study, the ones who called ambulances had a mean delay about 1/3 an hour less than the ones who had not called the ambulances directly.¹⁶ The difference between these two studies is perhaps due to the long time of decision-making to use emergency service, the patient's last action after not being well, or pain and/or the decreased speed of transferring the patient by emergency call. In-time referral was mostly in patients who had pain in chest and left hand; perhaps the previous experience about similar non-cardiac pain in chest and after that or low severity of the pain have been the reasons for this delay which is considerable. The patients who had experienced symptoms like nausea, vomiting, sweating and dyspnea and etc. with cardiac pain came sooner than the group which did not have the accompanying symptoms. Existence of concomitant symptoms can reduce patient's pain and tolerance threshold and can make the pain ambiguous from the viewpoint of the patient.²¹ The ones who have been inside the city at the time of the pain had more in-time referral comparing to those from outside the city.

Lack of access to transfer means and rural culture can be the reasons for delay in referring of patients. The most common reason for long delay in an order of abundance are as follows respectively: waiting for spontaneous improvement, attributing to non-cardiac causes and not minding the pain and low educational information. Many of patients wait for spontaneous recovery for 24 hours after the beginning of the symptoms and 60% of cardiac mortality has been before getting to hospital¹⁹ and low medical information.³⁶ Low medical knowledge in illiterate people about ischemic heart disease has been the most common cause of delay with respect to the highly educated people, and this finding is similar to the other studies.^{18, 23, 28} But Gilber has stated that the common factors in patients who delayed were being old, having low income, DM and relating the pain to non-cardiac causes and the intermittency of the symptoms.²⁰

The difference between these two groups is probably related to the patient's anticipation for recovery or lack of an experienced physician and lack of sufficient equipment during night especially personal transportation. As far as Dracup showed, the mortality rate of patients with MI in hospital had a meaningful relation with the delay of treatment, and the reasons were lack of intervention such as patient and his family's education about the causes and complications of MI at the beginning of the treatment.^{20,33} Luepker reminded alarming program of the cardiac attacks outbreak regularly and widespread comprehensive education for decrease of delay from the beginning of the symptoms till presence in hospital.³⁷ But Dracup believes that instead of using general education, a face-to-face education should be done by a nurse so that these actions can reduce the main emotional, social and perceptive obstacles which were known as the progressive factors of delay before hospital in last studies.³ The ones who used sublingual tablets to relieve pain had 25% long delay. Also the patients who took pain killer had the least percent of in-time refer. This shows that the lack of cognition of cardiac pain importance and its symptoms and waiting for recovery caused delay in in-time refer.^{18, 24}

Conclusion

Causes of delay and lack of in-time treatment in additional than half the patients embrace looking forward to spontaneous recovery, attributing the pain to non-cardiac causes, not minding the pain and diminished academic info and that they have several complications for patients with MI. concerning referral delay and high prevalence of this disease in our country and on the opposite hand, not knowing its essence for patients, it has to survey on ways of encouraging the patients with MI for in-time ask physicians beside appropriate educations regarding the symptoms.

Authors' Contribution: Concept development, data acquisition, manuscript preparation: Anwar Hossain, critical review of manuscript, final approval: all authors.

Funding/Support: It was a self-funded study.

Patient Consent: Written informed consent was taken from the respondents after describing the study objectives, methods, risks, and benefits. Confidentiality of data was ensured adequately and any unauthorized access to data was not possible.

Acknowledgements: We thank all participants in this study and ethical committee

References

1. Rosenfeld AG. Women's risk of decision delay in acute myocardial infarction: implications for research and practice. AACN Clin Issues 2001; 12(1): 29-39.
2. Braunwald E. 50th anniversary historical article. myocardial oxygen consumption: the quest for its determinants and some clinical fallout. J Am Coll Cardiol 1999; 34(5): 1365-8.
3. Dracup K, McKinley S, Riegel B, Mieschke H, Doering LV, Moser DK. A nursing intervention to reduce pre-hospital delay in acute coronary syndrome: a randomized clinical trial. J Cardiovasc Nurs 2006; 21(3): 186-93.
4. Crumlish CM, Bracken J, Hand MM, Keenan K, Ruggiero H, Simmons D. When time is muscle. American Journal of Nursing 2000; 100(1): 26-33. Cummins RO. ACLS provider manual. Dallas: American Heart Association; 2001.

5. Van de Werf, Bax CJ, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk W, et al. ESC guidelines on management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: the task force on the management of ST-segment elevation acute myocardial infarction of the European Society of cardiology. *Revista Espanola de Cardiologia* 2009; 62(3): 293.
6. Cox JL, Lee E, Langer A, Armstrong PW, Naylor CD. Time to treatment with thrombolytic therapy: determinants and effect on short-term nonfatal outcomes of acute myocardial infarction. *CMAJ* 1997; 156(4): 497-505.
7. Robert J, Mac T. Sources of delay in the treatment of acute myocardial infarction outcomes of a cardiology project. University of Aberdeen; 2000. 40-64.
8. Williams WL. Thrombolysis after acute myocardial infarction: are Canadian physicians up to the challenge? *CMAJ* 1997; 156(4): 509-11.
9. Goldberg RJ, Steg PG, Sadiq I, Granger CB, Jackson EA, Budaj A, et al. Extent of, and factors associated with, delay to hospital presentation in patients with acute coronary disease (the GRACE registry). *Am J Cardiol* 2002; 89(7): 791-6.
10. Gibson CM, De Lemos JA, Antman EM. Time is muscle in primary PCI: the strength of the evidence grows. *Eur Heart J* 2004; 25(12): 1001-2.
11. Antman EM. Time is muscle translation into practice. *J Am Coll Cardiol* 2008; 52(15): 1216-21.
12. Tullmann DF, Haugh KH, Dracup KA, Bourguignon C. A randomized controlled trial to reduce delay in older adults seeking help for symptoms of acute myocardial infarction. *Res Nurs Health* 2007; 30(5): 485-97.
13. Goff DC, Feldman HA, McGovern PG, Goldberg RJ, Simons-Morton DG, Cornell CE, et al. Pre-hospital delay in patients hospitalized with heart attack symptoms in the United States: the REACT trial. Rapid early action for coronary treatment (REACT) study Group. *Am Heart J* 1999; 138(6 Pt 1): 1046-57.
14. De Luca G, Suryapranata H, Ottervanger JP, Antman EM. Time delay to treatment and mortality in primary angioplasty for acute myocardial infarction: every minute of delay counts. *Circulation* 2004; 109(10): 1223-5.
15. Effect of time from onset to coming under care on fatality of patients with acute myocardial infarction: effect of resuscitation and thrombolytic treatment. The United Kingdom Heart Attack Study (UKHAS) Collaborative Group. *Heart* 1998; 80(2): 114-20.
16. Mumford AD, Banning AP. Minimising delays to thrombolysis in patients developing acute myocardial infarction in hospital. *Postgrad Med J* 1997; 73: 491-5.
17. Robinson AW. Getting to the heart of denial. *Am J Nurs* 1999; 99(5): 38-42.
18. Gibler WB, Armstrong PW, Ohman EM, Weaver WD, Stebbins AL, Gore JM, et al. Persistence of delays in presentation and treatment for patients with acute myocardial infarction: The GUSTO-I and GUSTO-III experience. *Ann Emerg Med* 2002; 39(2): 123-30.
19. Dempsey SJ, Dracup K, Moser DK. Women's decision to seek care for symptoms of acute myocardial infarction. *Heart Lung* 1995; 24(6): 444-56.
20. An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. The GUSTO investigators. *N Engl J Med* 1993; 329(10): 673-82.

21. Rosenfeld AG. Treatment-seeking delay among women with acute myocardial infarction: decision trajectories and their predictors. *Nursing Research* 2004; 53(4): 225-36.
22. McKinley S, Moser DK, Dracup K. Treatment seeking behavior for acute myocardial infarction symptoms in North America and Australia. *Heart Lung* 2000; 29(4): 237-47.
23. Meischke H, Eisenberg MS, Larsen MP. Pre-hospital delay interval for patients who use emergency medical services: the effect of heart-related medical conditions and demographic variables. *Ann Emerg Med* 1993; 22(10): 1597-601.
24. Lovlien M, Schei B, Hole T. Myocardial infarction: psychosocial aspects, gender differences and impact on pre-hospital delay. *J Adv Nurs* 2008; 63(2): 148-54.
25. Dracup K, Moser DK. Beyond socio-demographics: factors influencing the decision to seek treatment for symptoms of acute myocardial infarction. *Heart Lung* 1997; 26(4): 253-62.
26. Zerwic JJ, Ryan CJ, DeVon HA, Drell MJ. Treatment seeking for acute myocardial infarction symptoms: differences in delay across sex and race. *Nurs Res* 2003; 52(3): 159-67.
27. Quinn JR. Delay in seeking care for symptoms of acute myocardial infarction: applying a theoretical model. *Res Nurs Health* 2005; 28(4): 283-94.
28. Soltani MH, Desin F, A'ayan Z. determining the time interval between the onset of chest pain to administering Streptokinase. *Journal of Shahid Sadooghi Medical University* 2001; 3: 14-8.
29. Ma'soomi M, Nikian Y, Hosseini SH. The reasons of having delay in patients with acute myocardial infarction in Kerman. *Journal of Rafsanjan University of Medical Sciences* 2002; 1: 252-8.
30. Dracup K, Moser DK. Beyond socio-demographics: factors influencing the decision to seek treatment for symptoms of acute myocardial infarction. *Heart Lung* 1997; 26(4): 253-62.
31. Tullmann DF, Dracup K. Knowledge of heart attack symptoms in older men and women at risk for acute myocardial infarction. *Journal of Cardiopulmonary Rehabilitation and Prevention* 2005; 25(1): 33-9.
32. Boersma E, Mercado N, Poldermans D, Gardien M, Vos J, Simoons ML. Acute myocardial infarction. *Lancet* 2003; 361(9360): 847-58.
33. Lesneski L, Morton P. Delay in seeking treatment for acute myocardial infarction: why? *J Emerg Nurs* 2000; 26(2): 125-9.
34. Zerwic JJ, Ryan CJ. Delays in seeking MI treatment. *Am J Nurs* 2004; 104(1): 81-3.
35. Luepker R, Roczyński J, Osganian S, Goldberg R, Finnegan J, Hedges J. et al. Effect of a community intervention on patient delay and emergency medical service use in acute coronary heart disease: The Rapid Early Action for Coronary Treatment (REACT) trial. *JAMA* 2000; 284: 60-7.
36. Paul T, Mohibullah AKM, Islam AKMM. Cardiovascular disease in Bangladesh: A review. *Bangladesh Heart J.* 2017; 31(2):80–99. doi: 10.3329/bhj.v31i2.32379.
37. Islam AK, Majumder AA. Coronary artery disease in Bangladesh: A review. *Indian Heart J.* 2013; 65(4):424–35. doi: 10.1016/j.ihj.2013.06.004. [PubMed: 23993003]. [PubMed Central: PMC3861019].
38. Chowdhury MZI, Haque MA, Farhana Z, Anik AM, Chowdhury AH, Haque SM, et al. Prevalence of cardiovascular disease among Bangladeshi adult population: A systematic review and meta-analysis of the studies. *Vasc Health Risk Manag.* 2018; 14:165–81. doi: 10.2147/VHRM.S166111. [PubMed: 30174432]. [PubMed Central: PMC6110270].