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Original Article

Differences in symptoms and presentation delay times in myocardial infarction patients with and without diabetes: A cross-sectional study in Pakistan

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ABSTRACT

Objective: A short pre-hospital delay, from the onset of symptoms to rapid initiation of reperfusion therapy, is a crucial factor in determining prognosis of myocardial infarction (MI). The purpose of this study was to evaluate symptoms and presentation delay times in MI patients with and without diabetes.

Methods: This cross-sectional study was conducted in 3 tertiary care hospitals of Pakistan over a period of 6 months. The study sample consisted of 280 consenting individuals diagnosed with ST-elevation MI (STEMI) or Non-ST elevation MI (NSTEMI), out of which 130 were diabetic and 150 were non-diabetic. Data was collected using a standardized questionnaire, investigating MI symptoms along with causes and duration of pre-hospital delay within 72 h of admission.

Results: No significant difference was found in the intensity of chest pain between diabetics and non-diabetics. Atypical symptoms of MI such as anxiety ($p < 0.001$), cold sweats ($p = 0.034$) and epigastric pain ($p = 0.017$) were more frequently reported in diabetics. MI patients with diabetes had a significantly longer presentation delay time with 75% of the patients presenting after elapse of 3 h. Only a few patients reported to the hospital within an hour of onset of symptoms ($n = 23$, 8.2%), out of which majority were non-diabetics ($n = 18$). A majority of patients ($n = 146$, 52%) in both groups did not use emergency medical services.

Conclusion: This study provides an incentive for further research, aiming to reduce pre hospital delay along with investigating the effectiveness of emergency medical services.

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1. Introduction

Myocardial infarction (MI) remains a leading cause of morbidity and mortality worldwide.¹ More than seven million people are reportedly diagnosed with MI each year,² with the incidence being the highest in South Asia.³ Almost 90% of these cases are attributable to modifiable risk factors such as smoking, dyslipidemia, hypertension and diabetes.² Diabetes is a well-known coronary artery equivalent disease and a major cardiovascular risk factor.⁴ Studies have shown that people with diabetes have a

higher risk for MI^{5,6} and twice the short- and long-term mortality after MI^{7,8} than people without diabetes.

Presentation delay time is usually defined as time from symptom onset to arrival at hospital, and it can be divided into the patient decision phase, time to first medical contact (FMC) and the transportation phase. The time it takes for the person to decide how to interpret and respond to symptoms is considered to be the major contributor to pre-hospital delay.⁹ Despite the importance of timely care seeking, more than 50% of MI patients delay their FMC by presenting to the hospital at least 2 h after the onset of symptoms, this delay is even longer among patients in the South Asian region.^{10–12} Medical care seeking behavior has changed little over the past decades, even though numerous efforts have been made to educate the public about the detection of symptoms of MI and the benefits of immediate treatment. Literature shows that

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chest pain is a commonly experienced symptom but that several other symptoms also occur and that they vary in onset, nature, and intensity.^{13–15}

Previous studies are inconclusive in establishing differences in symptoms and presentation delay times in diabetic and non-diabetic patients. Some research shows that patients with diabetes are more likely to present with atypical symptoms of MI^{16,17} and have a longer delay time than patients without diabetes, both in ST-elevation MI (STEMI) and Non-ST elevation MI (NSTEMI).^{18–20} However, others have found no such differences between the two groups.^{21–24}

A short presentation delay, leading to prompt diagnosis and treatment of patients with MI can reduce mortality, improve prognosis, and shorten the hospital stay.^{25–27} Therefore to improve outcomes, our study focuses on differentiating between the symptoms and presentation delay times in MI patients with and without diabetes in Pakistan, South Asia.

2. Method

This cross-sectional study was conducted over a period of 6 months, starting from 1st November 2015 to 30th April 2016, in 3 tertiary care hospitals of Karachi, Pakistan after approval from the institutional review board of Dow University of Health Sciences. All 3 hospitals are located in the center of the city, easily accessible to patients from all socioeconomic backgrounds. A total of 336 patients were approached, out of which 28 refused to give consent and the rest failed to fall in the inclusion criteria set for the study. The patients who fulfilled the inclusion criteria involved those diagnosed with STEMI or NSTEMI, those who were clinically stable and could answer the questions and those willing to contribute, with or without the help of family within 72 h of admission. STEMI and NSTEMI were defined following guidelines set by Circulation, Journal of the American Heart Association (ACS). STEMI was characterized by persistent elevation of ST segment along with subsequent elevation of biomarkers of myocardial necrosis and NSTEMI was characterized by elevation of biomarkers alone. No imputation method was used, only those applicants who fulfilled the inclusion criteria and had complete data were included in the study. While interviewing, same standard protocol was used to eliminate interviewer bias.

A consent form was signed by each participant. The questionnaire was translated into Urdu, which is the local language, for better understanding of the patient and to remove any miscommunications. Cardiologists well versed in both the languages and a person who had done a Masters degree in the local language

along with a professional interpreter, sat down and translated the questionnaire with mutual consensus. In order to eradicate recall bias, frequent and recent questions were presented. The questionnaire was studied by three cardiologists of the involved hospitals to ensure it covered major aspects of patient information. Furthermore, a pilot study was conducted on 50 patients to validate the questionnaire and eliminate any ambiguity. These set of patients were ultimately included in the final sample of participants in the study. However, the pilot study has not been published anywhere.

The questionnaire had four domains; the first being background characteristics including age, sex, marital status, educational level, medical history, distance to the nearest hospital, smoking and alcohol habits. The second domain was typical and atypical symptoms, where the pain intensity was calculated using the Numeric Rating Scale (NRS-11). It is an 11-point scale ranging from zero to ten for patient self-reporting of pain, where zero is deemed as no pain and a rating of 7–10 is considered as severe disabling pain. The third included the causes of presentation delay to the nearest hospital. The presentation delay was recorded for four durations; <1 h, 1–3 h, 3–6 h and >6 h. Lastly, the fourth domain was mode of transport to the hospital. The records were collected for two groups, diabetics and non-diabetics.

Continuous data were presented as means and standard deviations while categorical data were presented as frequency and percentages. Differences in patients' demographics and clinical characteristics were compared between the two groups by applying chi-square test for categorical variables. Bar charts were used to represent continuous variables such as patient delay time. A 'p value' of less than 0.05 was considered to be significant. The data were entered and statistically analyzed using SPSS version 22.0 for Windows, developed by IBM Corporation (Armonk, New York, U.S.).

3. Results

Of the 280 patients included in the study, 130 (46.4%) were diabetic. The mean age of patients with and without diabetes was 67.3 and 66.9 years respectively. A higher proportion of diabetic patients had hypertension ($p = 0.03$) and a positive family history of coronary artery disease ($p < 0.001$). More than two thirds of the whole study group lived more than 10 km away from the hospital without a statistically significant difference between the two groups ($p = 0.60$). Majority patients ($n = 146$, 52%) in both groups did not use emergency medical services. The demographic and clinical characteristics of the patients are shown in Table 1.

Table 1
Personal and medical history of myocardial infarction patients with and without diabetes.

	Diabetic Status		p-value
	With Diabetes (n = 130)	Without Diabetes (n = 150)	
Age (years)	67 ± 9.2	67 ± 9.0	0.781
Males	88 (68%)	106 (71%)	0.590
Married	116 (89%)	132 (88%)	0.747
Hypertension	98 (75%)	95 (63%)	0.030
Smoker	30 (23%)	43 (29%)	0.288
STEMI	74 (57%)	87 (58%)	0.856
Distance to the hospital <10 km approximately	41 (32%)	43 (29%)	0.274
Education level			
Primary/No education	101 (78%)	108 (83%)	0.275
Secondary/Higher education	29 (22%)	42 (28%)	
Hyperlipidemia	64 (49%)	81 (54%)	0.426
Family history of CAD	81 (62%)	56 (37%)	<0.001
Renal failure	11 (8.5%)	7.0 (4.7%)	0.197
Alcoholic	9.0 (6.9%)	8.0 (5.3%)	0.578
Those who took an ambulance	71 (55%)	64 (43%)	0.046

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