Original Research Article

FREQUENCY OF DIFFERENT PRESENTATIONS IN MYOCARDIAL INFARCTION PATIENTS WITH AND WITHOUT DIABETES

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ABSTRACT

Background: *Myocardial infarction (MI) presents with a spectrum of symptoms, and diabetic patients often exhibit atypical or less pronounced presentations, which may delay diagnosis and treatment. Understanding the variation in symptomatology between diabetic and non-diabetic patients is essential for timely intervention.* **Objective:** *To determine the frequency of various clinical presentations of myocardial infarction and compare symptom patterns between diabetic and non-diabetic patients.* **Study Design:** *Cross-sectional observational study.* **Setting:** *Cardiology Department, Rehman Medical Institute, Peshawar.* **Duration of Study:** *From February 23, 2025, to May 23, 2025.* **Methods:** *A total of 164 patients (both diabetic and non-diabetic), aged 35 to 90 years, and diagnosed with MI were included. Clinical symptoms such as chest pain, arm pain, epigastric pain, jaw pain, nausea/vomiting, anxiety, and cold sweats were recorded and compared between the diabetic and non-diabetic groups. Data were analysed using descriptive statistics and Chi-square tests, with a p-value <0.05 considered statistically significant.* **Results:** *The mean age of participants was 65.7 ± 16.47 years, with males comprising 56.7% of the cohort. Chest pain was the most commonly reported symptom (72%). Diabetic patients had a significantly higher frequency of epigastric pain (16.5%, p = 0.03), anxiety (32.9%, p = 0.01), and cold sweats (43.0%, p = 0.04) compared to non-diabetics. Other symptoms, such as arm pain, jaw pain, and nausea/vomiting, showed no statistically significant differences between the two groups.* **Conclusion:** *Chest pain remains the predominant presenting symptom in both diabetic and non-diabetic MI patients. However, diabetic patients are more likely to present with atypical symptoms such as epigastric pain, anxiety, and cold sweats. These findings underscore the need for heightened clinical suspicion and broader diagnostic criteria when assessing diabetic patients for MI.*

Keywords: Myocardial Infarction, Diabetes Mellitus, Chest Pain, Anxiety

INTRODUCTION

Myocardial Infarction (MI) represents a serious coronary event associated with sudden cardiac death, as well as being recognised as the most severe clinical manifestation of Coronary Artery Disease (CAD) (1). This pathology is classified into 2 categories: ST-elevation myocardial infarction (STE-MI) or non-ST-elevation myocardial infarction (NSTE-MI). Unstable angina acts as a precursor to MI and is classified as an acute coronary syndrome (ACS) condition (2). Every year, over 3 million individuals get diagnosed with STE-MI, while the total population impacted by STE-MI pathology exceeds 4 million. MI is primarily identified in developed nations; nevertheless, it is frequently observed in countries that are growing (3-5). A study involving 19,781 patients with CAD stated a prevalence of MI at 23.3% (6). MI is the most common cause of mortality worldwide (7). The global rate of fatalities associated with MI has fallen significantly; however, the incidence of heart failure stays elevated (8). Heart Failure has significant negative effects on healthcare systems in the United States, influencing 6 million individuals, resulting in 300,000 deaths every year, and incurring around forty billion dollars in costs (9).

Recent research carried out in the US has examined the risk of AMI in individuals with diabetes. The findings indicate that after an interval of decreased hospitalisation risk for AMI from 1990 to 2010, there has been a subsequent rise in risk among young as well as middle-aged populations. In contrast, risk has remained stable among people aged 65 and older (10). The incidence of AMI in the diabetic population continues to serve as a significant metric to assess diabetes management. However, studies examining the incidence of AMI have demonstrated substantial variations in reported rates. It remains unresolved whether these discrepancies are linked to diabetes management or if they can be partly attributed to differences in

methodology among the studies, especially concerning the study populations involved (11, 12). A study reported frequency of different presentations in MI patients with diabetes (chest pain 78%, arm pain 27%, epigastric pain 12%, jaw pain 25%, nausea/vomiting 44%, anxiety 37%, and cold sweats 49%) and without diabetes (chest pain 87%, arm pain 33%, epigastric pain 4%, jaw pain 29%, nausea/vomiting 35%, anxiety 18%, and cold sweats 37%) (13).

Diabetes is known to alter the typical presentation of MI, often leading to atypical symptoms, delayed diagnosis, and increased risk of complications. Due to the paucity of literature on this subject locally, this study aims to determine the frequency of different presentations in MI patients, and also to compare different presentations of MI in diabetic and non-diabetic patients at our hospital setup. The findings of this study will be helpful for our medical professionals in improving the understanding of the unique characteristics of MI in both diabetic and non-diabetic patients, ultimately leading to better management strategies and tailored therapeutic approaches for this high-risk group.

METHODOLOGY

We carried out this cross-sectional study at the Department of Cardiology, Rehman Medical Institute, Peshawar. The study period was (23-02-2025—23-05-2025). The sample size of our study was calculated using the expected frequency of 4% epigastric pain in non-diabetic MI patients[13], taking a margin of error of 3% and a confidence level of 95%. One hundred and sixty-four patients were selected using a non-probability consecutive sampling technique. Eligible patients were male and female, aged 35 to 90 years, diagnosed with MI. Myocardial infarction (MI) was defined as the presence of ischemic symptoms such as chest pain or shortness of breath accompanied by either characteristic changes on the ECG, like elevated ST segment elevation in two or more contiguous leads, or a new onset of LBBB.

Additionally, a rise in cardiac troponin levels above the normal threshold (greater than 16 pg/ml) supported the diagnosis. ST-Elevation Myocardial Infarction (STEMI) was identified by the presence of ST segment elevation of at least 2 mm in the precordial leads or at least 1 mm in the augmented limb leads on the ECG. Non-ST-Elevation Myocardial Infarction (NSTEMI) was diagnosed when the cardiac biomarkers, such as CK-MB or troponin, were elevated beyond institutional cutoffs without accompanying ST-segment elevation on the ECG. Diabetic status was defined as HbA1c of 6.5% or higher, fasting glucose levels above 126 mg/dL, random glucose exceeding 200 mg/dL and the use of anti-diabetic medications for more than one year.

Patients were excluded if they had received emergency treatment for MI at another facility before enrollment or if they had comorbidities such as chronic renal failure or congestive heart failure. Consent was acquired from each patient. Demographic data, including age, gender, BMI, educational status, socioeconomic status, smoking history and hypertension, were recorded.

The assessment of presentation involved pain, which was evaluated using the Visual Analogue Scale (VAS), where a score above 3 was considered clinically significant. Chest pain was defined by sensations of tightness, pressure, or squeezing lasting more than 20 minutes, while arm and jaw pain were noted as discomfort radiating from the chest to respective regions. Epigastric pain was recognised as a burning discomfort in the upper abdomen. Nausea and vomiting were assessed based on self-report of gastrointestinal distress, and cold sweats were evaluated through physical examination for the sudden onset of clammy skin. Anxiety was screened using the Generalised Anxiety Disorder 7-item (GAD-7) scale, with scores above 5 indicating clinically significant symptoms. The presentations were assessed in all patients, and then we assessed them in diabetic and non-diabetic patients. A consultant cardiologist with a minimum of post-fellowship experience evaluated the patients.

Data collection was executed using a structured proforma. For the analysis of the gathered data, we used SPSS 25. Age, weight, height and BMI were calculated as mean with standard deviation. Gender, different presentations, smoking status, education status, employment status, residence, socioeconomic status and hypertension were evaluated with frequencies and percentages. To compare different presentations between diabetic and non-diabetic groups, the Chi-square test was applied, maintaining a significance level of $P \leq 0.05$. For stratification of different presentations with demographics, the chi-square test was used with $P \leq 0.05$ as notable.

RESULTS

The mean age was 65.70 ± 16.47 years, and the mean BMI was 26.27 ± 1.21 kg/m². There were 93 (56.7%) male patients and 71 (43.3%) female patients. Hypertension was present in 77 (47.0%) patients. Smoking status was reported as yes by 46 (28.0%) (Table 1).

The frequency of different presentations showed that chest pain was the most common symptom, which was reported by 118 (72.0%) patients. Arm pain was present in 43 (26.2%). Epigastric pain was reported by 18 (11.0%). Jaw pain was experienced by 43 (26.2%).

Nausea or vomiting was reported by 64 (39.0%). Anxiety was present in 40 (24.4%), and cold sweats were reported by 58 (35.4%) (Table 2).

We compared diabetic and non-diabetic patients for differences in symptom presentation. Among people with diabetes, 54 (68.4%) reported chest pain compared to 64 (75.3%) of non-diabetics (P = 0.32). Arm pain was reported by 17 (21.5%) diabetics and 26 (30.6%) non-diabetics (P = 0.18). Epigastric pain was more frequent in people with diabetes, with 13 (16.5%) reporting it compared to 5 (5.9%) of non-diabetics (P = 0.03). Jaw pain was reported by 19 (24.1%) diabetics and 24 (28.2%) non-diabetics (P = 0.54). Nausea or vomiting was experienced by 33 (41.8%) diabetics and 31 (36.5%) non-diabetics (P = 0.48). Anxiety was reported by 26 (32.9%) diabetics and 14 (16.5%) non-diabetics (P = 0.01). Cold sweats were present in 34 (43.0%) diabetics and 24 (28.2%) non-diabetics (P = 0.04) (Table 3). Stratification of different presentations with demographics can be seen from Table No. 4 to Table No. 12.

Table 1: Demographics

Demographics		n	%
Gender	Male	93	56.7%
	Female	71	43.3%
Socioeconomic status	Low class	34	20.7%
	Middle class	83	50.6%
	High class	47	28.7%
Education status	Literate	80	48.8%
	Illiterate	84	51.2%
Employment status	Employed	68	41.5%
	Unemployed	96	58.5%
Residence	Rural	89	54.3%
	Urban	75	45.7%
Hypertension	Yes	77	47.0%
	No	87	53.0%
Smoking status	Yes	46	28.0%
	No	118	72.0%

Table 2: Frequency of different presentations

Different presentations		n	%
Chest pain	Yes	118	72.0%
	No	46	28.0%
Arm pain	Yes	43	26.2%
	No	121	73.8%
Epigastric pain	Yes	18	11.0%
	No	146	89.0%
Jaw pain	Yes	43	26.2%
	No	121	73.8%
Nausea/Vomiting	Yes	64	39.0%
	No	100	61.0%
Anxiety	Yes	40	24.4%
	No	124	75.6%
Cold sweats	Yes	58	35.4%
	No	106	64.6%

Table 3: Frequency of different presentations among diabetic and non-diabetic patients

Different presentations		Diabetes status				P value
		Diabetic		Non-diabetic		
		n	%	n	%	
Chest pain	Yes	54	68.4%	64	75.3%	0.32
	No	25	31.6%	21	24.7%	
Arm pain	Yes	17	21.5%	26	30.6%	0.18
	No	62	78.5%	59	69.4%	
Epigastric pain	Yes	13	16.5%	5	5.9%	0.03
	No	66	83.5%	80	94.1%	

Jaw pain	Yes	19	24.1%	24	28.2%		0.54
	No	60	75.9%	61	71.8%		
Nausea/Vomiting	Yes	33	41.8%	31	36.5%		0.48
	No	46	58.2%	54	63.5%		
Anxiety	Yes	26	32.9%	14	16.5%		0.01
	No	53	67.1%	71	83.5%		
Cold sweats	Yes	34	43.0%	24	28.2%		0.04
	No	45	57.0%	61	71.8%		

Table 4: Stratification of different presentations by age

Different presentations		Age distribution (Years)						P value
		35 to 55		56 to 75		76 to 90		
		n	%	n	%	n	%	
Chest pain	Yes	37	31.4%	40	33.9%	41	34.7%	P > 0.05
	No	16	34.8%	9	19.6%	21	45.7%	
Arm pain	Yes	13	30.2%	16	37.2%	14	32.6%	P > 0.05
	No	40	33.1%	33	27.3%	48	39.7%	
Epigastric pain	Yes	3	16.7%	4	22.2%	11	61.1%	P > 0.05
	No	50	34.2%	45	30.8%	51	34.9%	
Jaw pain	Yes	13	30.2%	16	37.2%	14	32.6%	P > 0.05
	No	40	33.1%	33	27.3%	48	39.7%	
Nausea/Vomiting	Yes	22	34.4%	17	26.6%	25	39.1%	P > 0.05
	No	31	31.0%	32	32.0%	37	37.0%	
Anxiety	Yes	7	17.5%	14	35.0%	19	47.5%	P > 0.05
	No	46	37.1%	35	28.2%	43	34.7%	
Cold sweats	Yes	17	29.3%	17	29.3%	24	41.4%	P > 0.05
	No	36	34.0%	32	30.2%	38	35.8%	

Table 5: Stratification of different presentations by gender

Different presentations		Gender				P value
		Male		Female		
		n	%	n	%	
Chest pain	Yes	65	55.1%	53	44.9%	P > 0.05
	No	28	60.9%	18	39.1%	
Arm pain	Yes	31	72.1%	12	27.9%	**P < 0.05**
	No	62	51.2%	59	48.8%	
Epigastric pain	Yes	9	50.0%	9	50.0%	P > 0.05
	No	84	57.5%	62	42.5%	
Jaw pain	Yes	27	62.8%	16	37.2%	P > 0.05
	No	66	54.5%	55	45.5%	
Nausea/Vomiting	Yes	38	59.4%	26	40.6%	P > 0.05
	No	55	55.0%	45	45.0%	
Anxiety	Yes	25	62.5%	15	37.5%	P > 0.05
	No	68	54.8%	56	45.2%	
Cold sweats	Yes	31	53.4%	27	46.6%	P > 0.05
	No	62	58.5%	44	41.5%	

Table 6: Stratification of different presentations with hypertension

Different presentations		Hypertension				P value
		Yes		No		
		n	%	n	%	
Chest pain	Yes	57	48.3%	61	51.7%	P > 0.05
	No	20	43.5%	26	56.5%	
Arm pain	Yes	23	53.5%	20	46.5%	P > 0.05
	No	54	44.6%	67	55.4%	
Epigastric pain	Yes	8	44.4%	10	55.6%	P > 0.05
	No	69	47.3%	77	52.7%	
Jaw pain	Yes	20	46.5%	23	53.5%	P > 0.05
	No	57	47.1%	64	52.9%	
Nausea/Vomiting	Yes	25	39.1%	39	60.9%	P > 0.05
	No	52	52.0%	48	48.0%	
Anxiety	Yes	16	40.0%	24	60.0%	P > 0.05

	No	61	49.2%	63	50.8%	
Cold sweats	Yes	29	50.0%	29	50.0%	P > 0.05
	No	48	45.3%	58	54.7%	

Table 7: Stratification of different presentations with smoking status

Different presentations		Smoking status				P value
		Yes		No		
		n	%	n	%	
Chest pain	Yes	32	27.1%	86	72.9%	P > 0.05
	No	14	30.4%	32	69.6%	
Arm pain	Yes	20	46.5%	23	53.5%	**P < 0.05**
	No	26	21.5%	95	78.5%	
Epigastric pain	Yes	4	22.2%	14	77.8%	P > 0.05
	No	42	28.8%	104	71.2%	
Jaw pain	Yes	11	25.6%	32	74.4%	P > 0.05
	No	35	28.9%	86	71.1%	
Nausea/Vomiting	Yes	17	26.6%	47	73.4%	P > 0.05
	No	29	29.0%	71	71.0%	
Anxiety	Yes	14	35.0%	26	65.0%	P > 0.05
	No	32	25.8%	92	74.2%	
Cold sweats	Yes	17	29.3%	41	70.7%	P > 0.05
	No	29	27.4%	77	72.6%	

Table 8: Stratification of different presentations by socioeconomic status

Different presentations		Socioeconomic status						P value
		Low class		Middle class		High class		
		n	%	n	%	n	%	
Chest pain	Yes	26	22.0%	61	51.7%	31	26.3%	P > 0.05
	No	8	17.4%	22	47.8%	16	34.8%	
Arm pain	Yes	6	14.0%	21	48.8%	16	37.2%	P > 0.05
	No	28	23.1%	62	51.2%	31	25.6%	
Epigastric pain	Yes	3	16.7%	10	55.6%	5	27.8%	P > 0.05
	No	31	21.2%	73	50.0%	42	28.8%	
Jaw pain	Yes	12	27.9%	22	51.2%	9	20.9%	P > 0.05
	No	22	18.2%	61	50.4%	38	31.4%	
Nausea/Vomiting	Yes	12	18.8%	35	54.7%	17	26.6%	P > 0.05
	No	22	22.0%	48	48.0%	30	30.0%	
Anxiety	Yes	3	7.5%	28	70.0%	9	22.5%	**P < 0.05**
	No	31	25.0%	55	44.4%	38	30.6%	
Cold sweats	Yes	11	19.0%	33	56.9%	14	24.1%	P > 0.05
	No	23	21.7%	50	47.2%	33	31.1%	

Table 9: Stratification of different presentations by education status

Different presentations		Education status				P value
		Literate		Illiterate		
		n	%	n	%	
Chest pain	Yes	55	46.6%	63	53.4%	P > 0.05
	No	25	54.3%	21	45.7%	
Arm pain	Yes	21	48.8%	22	51.2%	P > 0.05
	No	59	48.8%	62	51.2%	
Epigastric pain	Yes	8	44.4%	10	55.6%	P > 0.05
	No	72	49.3%	74	50.7%	
Jaw pain	Yes	24	55.8%	19	44.2%	P > 0.05
	No	56	46.3%	65	53.7%	
Nausea/Vomiting	Yes	39	60.9%	25	39.1%	**P < 0.05**
	No	41	41.0%	59	59.0%	
Anxiety	Yes	23	57.5%	17	42.5%	P > 0.05
	No	57	46.0%	67	54.0%	
Cold sweats	Yes	26	44.8%	32	55.2%	P > 0.05
	No	54	50.9%	52	49.1%	

Table 10: Stratification of different presentations with employment status

Different presentations		Employment status				P value
		Employed		**Unemployed**		
		n	%	n	%	
Chest pain	Yes	45	38.1%	73	61.9%	P > 0.05
	No	23	50.0%	23	50.0%	
Arm pain	Yes	19	44.2%	24	55.8%	P > 0.05
	No	49	40.5%	72	59.5%	
Epigastric pain	Yes	7	38.9%	11	61.1%	P > 0.05
	No	61	41.8%	85	58.2%	
Jaw pain	Yes	19	44.2%	24	55.8%	P > 0.05
	No	49	40.5%	72	59.5%	
Nausea/Vomiting	Yes	32	50.0%	32	50.0%	P > 0.05
	No	36	36.0%	64	64.0%	
Anxiety	Yes	12	30.0%	28	70.0%	P > 0.05
	No	56	45.2%	68	54.8%	
Cold sweats	Yes	25	43.1%	33	56.9%	P > 0.05
	No	43	40.6%	63	59.4%	

Table 11: Stratification of different presentations by residence

Different presentations		Residence				P value
		Rural		**Urban**		
		n	%	n	%	
Chest pain	Yes	65	55.1%	53	44.9%	P > 0.05
	No	24	52.2%	22	47.8%	
Arm pain	Yes	25	58.1%	18	41.9%	P > 0.05
	No	64	52.9%	57	47.1%	
Epigastric pain	Yes	11	61.1%	7	38.9%	P > 0.05
	No	78	53.4%	68	46.6%	
Jaw pain	Yes	21	48.8%	22	51.2%	P > 0.05
	No	68	56.2%	53	43.8%	
Nausea/Vomiting	Yes	30	46.9%	34	53.1%	P > 0.05
	No	59	59.0%	41	41.0%	
Anxiety	Yes	22	55.0%	18	45.0%	P > 0.05
	No	67	54.0%	57	46.0%	
Cold sweats	Yes	32	55.2%	26	44.8%	P > 0.05
	No	57	53.8%	49	46.2%	

Table 12: Stratification of different presentations with BMI

Different presentations		BMI (Kg/m2)				P value
		18 to 25		**> 25**		
		n	%	n	%	
Chest pain	Yes	57	48.3%	61	51.7%	P > 0.05
	No	18	39.1%	28	60.9%	
Arm pain	Yes	17	39.5%	26	60.5%	P > 0.05
	No	58	47.9%	63	52.1%	
Epigastric pain	Yes	12	66.7%	6	33.3%	**P = 0.05**
	No	63	43.2%	83	56.8%	
Jaw pain	Yes	22	51.2%	21	48.8%	P > 0.05
	No	53	43.8%	68	56.2%	
Nausea/Vomiting	Yes	33	51.6%	31	48.4%	P > 0.05
	No	42	42.0%	58	58.0%	
Anxiety	Yes	19	47.5%	21	52.5%	P > 0.05
	No	56	45.2%	68	54.8%	
Cold sweats	Yes	19	32.8%	39	67.2%	P > 0.05
	No	56	52.8%	50	47.2%	

DISCUSSION

The comparison of myocardial infarction (MI) symptom presentations in diabetic versus non-diabetic patients remains a critical area of clinical inquiry, as atypical symptomatology can obscure timely diagnosis and treatment. Our findings provide valuable evidence on a local level to enrich this discourse.

Our data showed that chest pain remains the predominant symptom in both diabetic and non-diabetic patients, albeit with a slightly lower frequency among people with diabetes. Richman et al observed a non-significant difference in chest pain presence, suggesting chest pain is still common but somewhat muted among people with diabetes (14).

Likewise, Ahmed et al. found chest pain in 78% of diabetic versus 87% of non-diabetic patients, reaching statistical significance (13).

Our observation that people with diabetes had notably more epigastric pain, anxiety and cold sweats aligns with findings from Ahmed et al, who also identified notably increased anxiety, cold sweats and epigastric pain in diabetics. Similarly, Taghipour et al. reported a higher incidence of anxiety, belching and fatigue in diabetic MI patients (15). These findings strongly indicate that clinicians must adopt a broader lens when evaluating possible MI in people with diabetes, attending not only to chest pain but also to less traditional symptoms.

In terms of pain distribution, our data showed no potential differences between groups for arm and jaw pain, echoing results from Ahmed et al, who found nearly comparable prevalence of arm and jaw pain in their study between diabetics and non-diabetics.[13] Richman et al also noted that the associated symptoms, like dyspnea, diaphoresis, and vomiting, between groups were not notably different (14). However, Fergus et al reported that diabetic patients showed a lower incidence of ST-elevation MI and a higher prevalence of non-ST elevation MI, which could be possibly due to delayed presentations (16).

One of the critical strengths of our findings is the potential difference in symptoms like epigastric pain and anxiety, which may directly influence treatment-seeking behaviour. This behaviour may demonstrate longer delays in hospital presentation, often misattributing symptoms to non-cardiac causes (13). Our data suggests that atypical presentations, such as cold sweats and anxiety, are less likely to be interpreted by patients as signs of MI. Epigastric pain can often be confused with gastric issues, which is another cause of delayed presentation in MI patients. The role of silent or unrecognised MIs further complicates the clinical situation, especially in diabetic patients (17).

Taken together, our results highlight a consistent pattern, while diabetic MI patients present more frequently with atypical symptoms, which may delay diagnosis and treatment. This highlights a dual challenge, which is to enhance provider awareness and promote public education tailored to the diabetic population.

CONCLUSION

In conclusion, our findings showed that chest pain was the most frequent presentation among diabetics and non-diabetics. Diabetic patients exhibited a notably higher frequency of presentations such as epigastric pain, anxiety and cold sweats compared to non-diabetic patients. We recommend institutionalised, broader symptom screening for the suspected MI in diabetic patients.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (RMI-REC/Ethical Approval/16)
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CONFLICT OF INTEREST

The authors declared an absence of conflict of interest.

AUTHOR CONTRIBUTION

SALMAN KHAN (*Trainee Medical Officer*)
Article drafting, Conception of Study, Data Collection, Development of Research Study Design, Data Analysis, and Manuscript revisions.
MAZHAR MAHMOOD (*Consultant Cardiologist*)
Conception of Study, Critical Input, Final Approval of Manuscript..
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Literature Search and Critical Input.

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