Vol. 5 No. 2 (2026)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Ajmal, et al - 2026

Association of Myocardial Infarction with Type I and Type II Diabetic patients at Rehman Medical Institute.

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Keywords: Myocardial infarction, Type I diabetes mellitus, Type II diabetes mellitus, Coronary artery disease, Cardiovascular risk, Cross-sectional study, Pakistan.

Received on 18 May 2026
Accepted on 27 June 2026
Published on 30 June 2026

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Abstract

Background: Diabetes mellitus is a major risk factor for cardiovascular disease and significantly increases the risk of myocardial infarction (MI). While both Type I and Type II diabetes predispose patients to coronary artery disease, differences in their association with MI remain inadequately explored in the local population. This study aimed to determine the association of myocardial infarction with Type I and Type II diabetes mellitus among patients presenting to Rehman Medical Institute, Peshawar.

Methods: A hospital-based cross-sectional study was conducted in the Department of Cardiology at Rehman Medical Institute, Peshawar, from May to September 2021. A total of 194 diabetic patients with myocardial infarction were enrolled using a convenience sampling technique. Data were collected through a structured questionnaire after obtaining informed consent and ethical approval. Statistical analysis was performed using IBM SPSS version 22. Descriptive statistics were used to summarize demographic and clinical characteristics, while the Chi-square test was applied to assess associations. A *p*-value of <0.05 was considered statistically significant.

Results: Among the 194 participants, 131 (67.5%) were males and 63 (32.5%) were females. The age of participants ranged from 27 to 85 years, with the highest frequency of MI observed in the 60–69 years age group (28.4%), followed by the 50–59 years age group (27.8%). Type II diabetes mellitus was present in 189 (97.4%) patients, whereas only 5 (2.6%) patients had Type I diabetes mellitus. Among male participants, 128 had Type II diabetes and 3 had Type I diabetes, while among females, 61 had Type II diabetes and 2 had Type I diabetes. No statistically significant association was found between age groups and the type of diabetes among MI patients ($\chi^2 = 3.487$, $p = 0.480$). Similarly, no significant association was observed between gender and the type of diabetes in patients with MI ($\chi^2 = 0.133$, $p = 0.716$).

Conclusion: Myocardial infarction was predominantly associated with Type II diabetes mellitus, whereas its occurrence among patients with Type I diabetes mellitus was uncommon. MI was more frequently observed in male patients and was most prevalent in individuals aged 50–69 years. These findings emphasize the importance of early

screening, optimal glycemic control, and aggressive cardiovascular risk reduction strategies in patients with Type II diabetes to reduce the burden of myocardial infarction.

INTRODUCTION

Myocardial infarction (MI) remains one of the leading causes of morbidity and mortality worldwide and represents a major public health challenge despite substantial advances in preventive cardiology and acute coronary care. MI occurs when prolonged myocardial ischemia leads to irreversible necrosis of cardiac muscle, most commonly due to rupture of an atherosclerotic plaque followed by thrombotic occlusion of a coronary artery (1). According to the Global Burden of Disease Study, ischemic heart disease continues to be the leading cause of death globally, with an increasing burden in low- and middle-income countries, including Pakistan, where the prevalence of cardiovascular risk factors is steadily rising (2).

Diabetes mellitus (DM) is one of the strongest independent risk factors for coronary artery disease and myocardial infarction. Chronic hyperglycemia promotes endothelial dysfunction, oxidative stress, inflammation, platelet activation, and accelerated atherosclerosis, thereby increasing the likelihood of coronary artery obstruction and adverse cardiovascular events (3,4). Patients with diabetes are two to four times more likely to develop myocardial infarction than the general population and experience higher rates of recurrent ischemic events, heart failure, and cardiovascular mortality following MI (5,6).

Type I and Type II diabetes mellitus differ considerably in their pathophysiology and cardiovascular risk profiles. Type I diabetes results from autoimmune destruction of

pancreatic β-cells leading to absolute insulin deficiency, whereas Type II diabetes is characterized by insulin resistance and progressive β-cell dysfunction (7). Although Type II diabetes accounts for approximately 90–95% of all diabetes cases and is frequently associated with obesity, hypertension, and dyslipidemia, individuals with Type I diabetes also experience a substantially elevated lifetime risk of cardiovascular disease due to prolonged exposure to hyperglycemia and vascular injury (8,9).

The relationship between diabetes and myocardial infarction has been extensively documented. Diabetic patients often present with more diffuse coronary artery disease, silent myocardial ischemia, multivessel involvement, and poorer outcomes following acute coronary syndromes compared with non-diabetic individuals (10). Hyperglycemia at the time of infarction has also been associated with larger infarct size, impaired myocardial reperfusion, increased incidence of cardiogenic shock, arrhythmias, and higher short- and long-term mortality (11,12). Furthermore, diabetic patients frequently exhibit impaired collateral circulation, delayed healing, and adverse ventricular remodeling after myocardial infarction (13).

Several epidemiological studies have demonstrated that cardiovascular disease is the leading cause of death among diabetic patients. Individuals with Type II diabetes have a markedly increased prevalence of traditional cardiovascular risk factors such as hypertension, obesity, and dyslipidemia, whereas patients with Type I diabetes experience accelerated atherosclerosis due to chronic metabolic abnormalities despite often being diagnosed at a younger age (14,15). Understanding whether the pattern and frequency of myocardial infarction differ between Type I and Type II diabetes is essential for improving risk stratification, preventive strategies, and clinical management.

In Pakistan, the prevalence of diabetes mellitus continues to rise rapidly, making it one of the countries with the highest diabetes burden worldwide (16). Consequently, the incidence of cardiovascular complications, particularly myocardial infarction, is expected to increase substantially. Despite this growing burden, limited local data are available comparing myocardial infarction among patients with Type I and Type II diabetes. Such information is essential for identifying high-risk populations and implementing targeted preventive measures.

Therefore, the present study aimed to determine the **association of myocardial infarction with Type I and Type II diabetic patients at Rehman Medical Institute, Peshawar**. The findings of this study may provide valuable local evidence regarding the burden of myocardial infarction among diabetic patients and contribute to improved cardiovascular risk assessment, early diagnosis, and effective management strategies.

METHODOLOGY

This was a hospital-based cross-sectional study conducted in the Department of Cardiology at Rehman Medical Institute, Peshawar, Pakistan. The study was completed over a period of five months from May to September 2021. Based on a previously reported prevalence of 14.9%, the calculated sample size was 194 participants (16). A convenience sampling technique, a non-probability method, was used to recruit participants who were readily available in the study setting.

All cooperative patients diagnosed with myocardial infarction and diabetes mellitus and aged between 25 and 95 years were included in the study. Patients with other cardiac conditions that could mimic myocardial infarction, such as aortic diseases, cardiomyopathies, congenital heart diseases, and pericardial diseases, were excluded.

The data collection tool was developed in consultation with the research supervisor. The study was conducted after obtaining approval from the Institutional Ethics Review Committee and written permission from the Head of the Cardiology Department. Informed consent was obtained from all participants prior to enrollment. Data were collected through direct interviews and recorded on a pre-designed structured questionnaire.

The collected data were entered and analyzed using IBM SPSS version 22. Descriptive statistics were used to summarize the findings, and the association of myocardial infarction with Type I and Type II diabetes mellitus was assessed using appropriate statistical tests. A p-value of <0.05 was considered statistically significant.

RESULTS

After collecting data from the participants through pre-formed questionnaire. Statistical SPSS Analysis. Various statistical tools and tests were applied for calculation of frequencies and percentage of study within variables.

A total of 194 participants participated in this study in which 131(67.5%) were male and 63(32.5) were female. Among which 03 males having MI had Type 1 diabetes mellitus and 128 males had Type 2 diabetes mellitus with MI. Among females 02 had Type 1 diabetes mellitus and 61 females had Type 2 diabetes mellitus

Their age ranging from less than 50 to above 80 years. Ages were subdivided into groups, Group 1 (less than 50 years), Group 2(50-59 years), Group 3(60-69 years), Group 4(70-79 years), Group 5 (80 and above years). The minimum cases of MI among DM were above 80 years while maximum cases were in age group 2 (50-59 years).

Frequency of MI in different age groups

Table 3 Age categories

Age Groups	Frequency	Percent	Valid Percent	Cumulative Percent
less than 50 Years	48	24.7	24.7	24.7
50-59 Years	54	27.8	27.8	52.6
60-69 Years	55	28.4	28.4	80.9
70-79 Years	23	11.9	11.9	92.8
80 and above	14	7.2	7.2	100.0
Total	194	100.0	100.0	

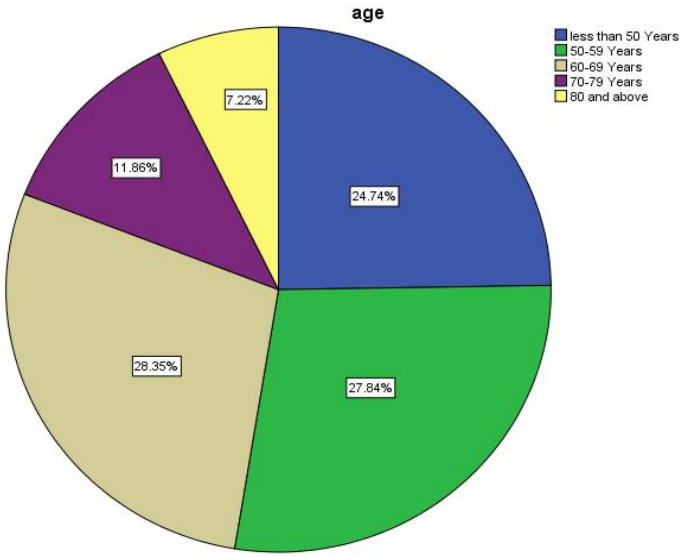

Figure 1 Frequency of MI in different age groups

A total of 194 participants of MI both male and female were selected.

Minimum age was 27 years while maximum age was 85 years. Ages were subdivided into groups, Group 1 (less than 50 years), Group 2(50-59 years), Group 3(60-69 years), Group 4(70-79 years), Group 5 (80 and above years). Highest frequency of MI is in age group of 50-59 while lowest frequency is in age group of 80 and above.

Association of DM with different age groups of MI patients

Table 4 Cross tabulation of Age with types of diabetes

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.487[a]	4	.480
Likelihood Ratio	4.398	4	.355
Linear-by-Linear Association	.347	1	.556
N of Valid Cases	194		

a. 5 cells (50.0%) have expected count less than 5. The minimum expected count is .36.

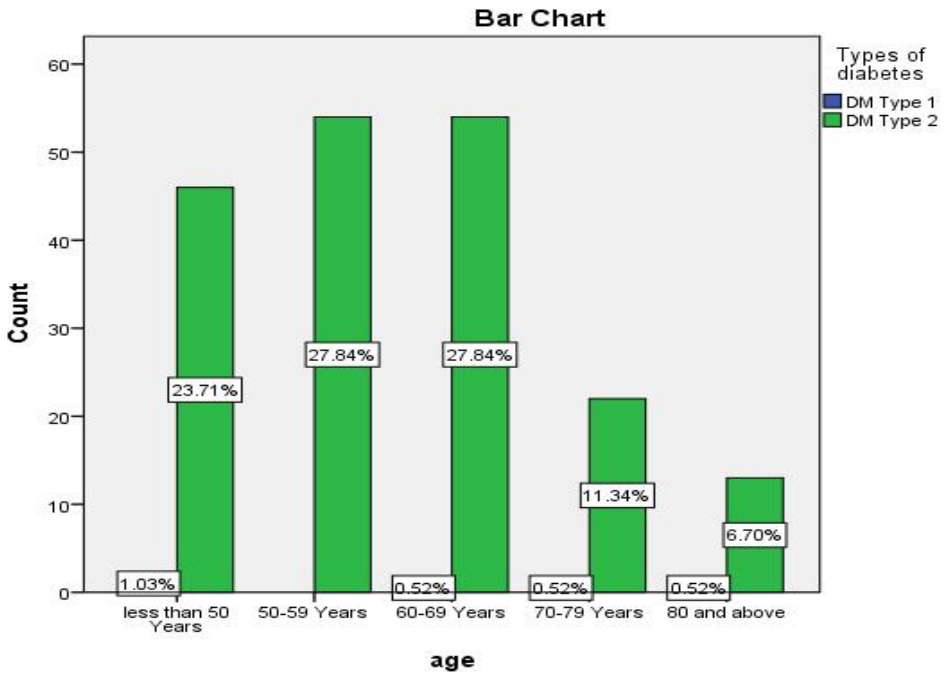

Figure 2 Frequency of DM in Different Age Groups

Highest cases of type I DM is among age group less than 50 while type II DM is among age group above 50.Lowest cases of type I DM is among age group above 50 and type II DM is among age group above 80.

Gender wise association of DM with MI patients

Table 5 Gender Types of diabetes Cross tabulation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.133[a]	1	.716		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.128	1	.720		
Fisher's Exact Test				.660	.524
Linear-by-Linear Association	.132	1	.716		
N of Valid Cases	194				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.62.

b. Computed only for a 2x2 table

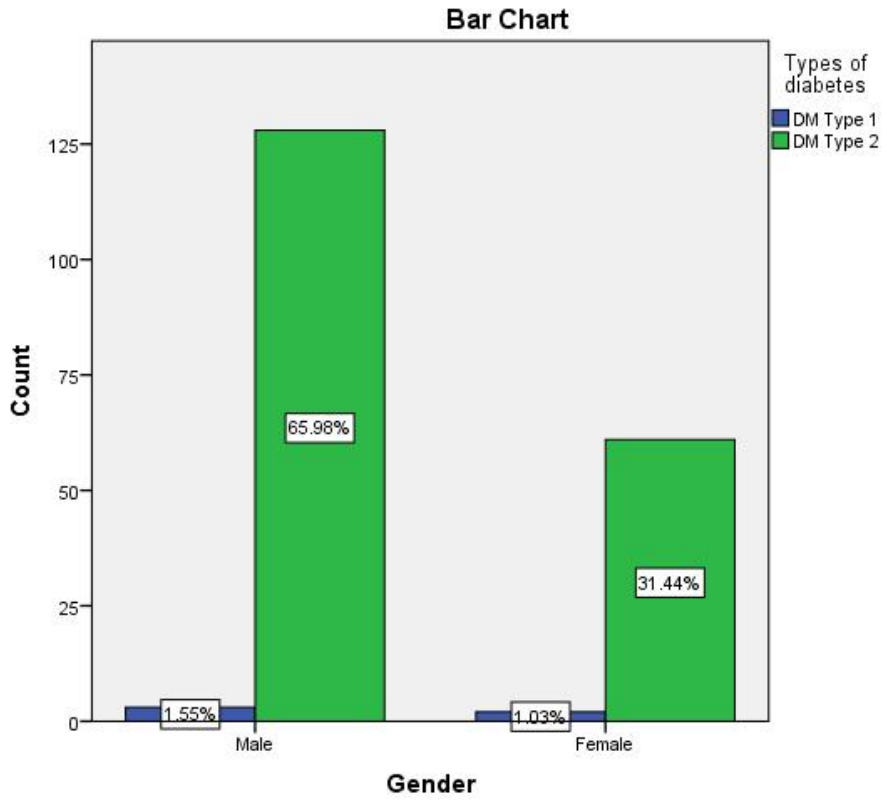

Figure 3 Gender Wise Distribution of Diabetic Patients

Pearson Chi-square test was used to check for significance where p value was 0.716 which the test was insignificant and we assumed that there is no relationship of male and female MI patients with type I DM.

5 cases of type 1 DM in MI were obtained out of them 3 were male and 2 females. 189 cases of type 2 DM in MI were found maximum 128 cases were male and remaining 61 were females

DISCUSSION

Myocardial infarction is the leading cause of death all around the world. It is caused by necrosis of cardiac muscles due to perfusion imbalance of oxygen supply. Globally morbidity in 2015 was about 15.9 million. Prevalence is increasing in all countries including Pakistan due to contact with different risk factors (2).

K.Malmberg *et al* in 1988 in US concluded that most diabetic patients were female and of higher age having MI (18) while according to our research in Pakistan MI is more common among people with diabetes and male patients. Out of 194 diabetic patient having MI 131 was male and of age group 50-59 years and only 63 were female.

Relevant issue arises in 1993 in Scotland indicated that younger individual had four-fold increase in acute MI rate in those with type 2 DM and age less than 60 years (19) on the other hand in our study only 27.8% type 2 DM was observed having age less than 60 years.

Type 1 DM was found to cause 10 fold increases in cardiovascular disease in previous research (16) but they didn't mention about the sample size of their research compare to our study out of 194 patients there were rarely 5 patients of type 1 DM in association with MI.

CONCLUSION

According to our result we concluded that MI is associated with Type 2 diabetes mellitus and very rarely occurs in Type 1 diabetes mellitus. Male gender was more common in association with MI as compared to female gender. The maximum age group having the disease is between 50-59 years.

RECOMMENDATIONS

Although the immediate priority in managing myocardial infarction is thrombolysis and reperfusion of myocardium, variety of other drug therapies such as heparin, beta adrenoceptor blockers and magnesium might also be considered in early hours. Aspirin is also used in MI.

Nutrition and physical activity are important parts of healthy lifestyle when you have diabetes and also for keeping blood glucose level in your target range. To manage your blood glucose level you need to balance what you eat, how much you eat and drink along with physical activity and diabetes medicine if taking any. Keep your blood glucose level, cholesterol and blood pressure at normal range along with maintaining a healthy weight.

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