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Original Research Article

Comparative Analysis of Complications and Mortality Following Acute Myocardial Infarction in Diabetic Versus Non-Diabetic Patients

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Abstract:

Background: Diabetes mellitus is a well-established risk factor for the development and progression of coronary artery disease. Acute myocardial infarction (AMI) in diabetic patients is often associated with atypical presentation, delayed diagnosis, increased complications, and higher mortality rates compared to non-diabetic patients.

Objectives:

- To compare the complications and in-hospital mortality following acute myocardial infarction between diabetic and non-diabetic patients.
- To analyze the clinical profile, risk factors, and outcomes associated with AMI in the two groups.

Methods: A prospective observational study was conducted at the Department of General Medicine, AIIMS, Patna, Bihar, India from January 2020 to December 2020. A total of 200 consecutive AMI patients were enrolled, comprising 100 diabetic and 100 non-diabetic individuals. Clinical presentation, risk factors, in-hospital complications, and mortality were recorded and compared between the groups. Statistical analysis was performed to assess differences and predictors of adverse outcomes.

Results: Diabetic patients with AMI had a higher incidence of heart failure, arrhythmias, cardiogenic shock, and multi-organ dysfunction compared to non-diabetics. In-hospital mortality was significantly higher among diabetic patients. Diabetics also exhibited a greater prevalence of multi-vessel coronary artery disease. Poor glycemic control and the presence of associated comorbidities were significant predictors of adverse outcomes in the diabetic cohort.

Conclusion: Diabetes mellitus adversely influences the clinical course and short-term outcomes following acute myocardial infarction. Diabetic patients experience higher complication rates and mortality compared to non-diabetics. Aggressive risk factor control, early diagnosis, and tailored management strategies are essential to improve survival in diabetic individuals presenting with AMI.

Keywords: Acute Myocardial Infarction, Diabetes Mellitus, Complications, In-Hospital Mortality, Cardiogenic Shock, Coronary Artery Disease.

Introduction

Acute myocardial infarction (AMI) remains a leading cause of morbidity and mortality worldwide, posing a significant public health challenge. Diabetes mellitus is a well-recognized risk factor for the development of coronary artery disease and is associated with worse outcomes following an acute coronary event. The interplay between diabetes and cardiovascular disease results in a complex pathophysiological environment characterized by accelerated atherosclerosis, endothelial dysfunction, prothrombotic states, and impaired myocardial healing [1,2].

Patients with diabetes often present with atypical symptoms of myocardial infarction such as dyspnea, fatigue, or syncope, leading to delays in diagnosis and initiation of reperfusion therapy. Furthermore, diabetic individuals are more likely to have multi-vessel coronary artery disease, poorer collateral circulation, and a higher burden of associated comorbidities including hypertension, dyslipidemia, and chronic kidney disease. These factors collectively contribute to a higher incidence of in-hospital complications such as heart failure, arrhythmias, cardiogenic shock, and recurrent ischemic events [3,4].

Several studies have demonstrated that diabetic patients experience significantly higher mortality rates following AMI compared to non-diabetic counterparts. This increased risk persists despite advances in revascularization strategies and modern pharmacotherapy, highlighting the need for early recognition, aggressive risk factor modification, and tailored management approaches in this high-risk population [5,6].

Understanding the differences in clinical presentation, complications, and outcomes between diabetic and non-diabetic patients with AMI is essential for improving patient care and formulating evidence-based intervention strategies. Regional variations in risk factor profiles, healthcare access, and management protocols further necessitate institution-specific studies to guide optimal practice [7,8].

In this context, the present prospective observational study was undertaken at the Department of General Medicine, AIIMS, Patna, Bihar, India, from January 2020 to December 2020. The study aimed to compare the complications and mortality rates following acute myocardial infarction between diabetic and non-diabetic patients and to analyze the clinical and demographic characteristics associated with adverse outcomes in both groups.

Methodology

This prospective observational study was conducted in the Department of General Medicine at AIIMS, Patna, Bihar, India. from January 2020 to December 2020 with the aim of comparing complications and mortality between diabetic and non-diabetic patients presenting with acute myocardial infarction (AMI).

Study Population: The study included adult patients aged 30–80 years who were admitted with a confirmed diagnosis of acute myocardial infarction, including ST-elevation myocardial infarction (STEMI) and non-ST-elevation myocardial infarction (NSTEMI), based on clinical features, electrocardiographic changes, and elevated cardiac biomarkers.

Inclusion Criteria:

- Patients aged 30–80 years with confirmed AMI diagnosis.
- Willingness to provide informed written consent.
- Both diabetic and non-diabetic patients included.

Exclusion Criteria:

- Patients with previous myocardial infarction within the last six months.
- Patients with known chronic heart failure (NYHA class III/IV) before admission.
- End-stage renal disease patients on dialysis.
- Patients who refused consent or had incomplete medical records.

Sample Size: A total of 200 consecutive AMI patients were enrolled, comprising 100 diabetic patients and 100 non-diabetic patients.

Data Collection Procedure: Detailed history including presenting symptoms, risk factors (such as hypertension, smoking, dyslipidemia), and duration of diabetes (if present) was recorded. Clinical examination findings, electrocardiography (ECG) results, cardiac biomarker levels (troponin, CK-MB), and echocardiographic parameters (left ventricular ejection fraction) were documented.

In-hospital complications assessed included:

- Heart failure,
- Arrhythmias (ventricular tachycardia/fibrillation, atrial fibrillation),
- Cardiogenic shock,
- Recurrent ischemia,
- Stroke,
- Acute kidney injury,
- Multi-organ dysfunction syndrome (MODS).

Mortality during hospital stay was recorded. The clinical course, interventions (thrombolysis, percutaneous coronary intervention), and medications administered were noted.

Outcome Measures:

The primary outcomes assessed were:

- Incidence of in-hospital complications in diabetic versus non-diabetic AMI patients.
- In-hospital mortality rates between the two groups.

Definitions Used:

- **Diabetes mellitus** was defined based on previous diagnosis, use of anti-diabetic medications, or HbA1c ≥6.5% at admission.
- **Acute myocardial infarction** was diagnosed per the Fourth Universal Definition of Myocardial Infarction (2018).

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS software version 21.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as proportions. The Chi-square test and Fisher's exact test were used for comparing categorical variables, while Student's t-test was used for continuous variables. Multivariate logistic regression was performed to identify independent predictors of mortality. A p-value <0.05 was considered statistically significant.

Results

A total of 200 patients admitted with acute myocardial infarction were enrolled, including 100

diabetic and 100 non-diabetic individuals. The diabetic group was older on average and had a higher prevalence of associated risk factors such as hypertension and dyslipidemia. Diabetic patients experienced a higher incidence of in-hospital complications such as heart failure, arrhythmias, cardiogenic shock, and multi-organ dysfunction syndrome compared to non-diabetics. The overall in-hospital mortality was significantly higher in the diabetic group. Poor glycemic control and reduced left ventricular ejection fraction were important predictors of adverse outcomes.

Table 1: Age Distribution of Diabetic and Non-Diabetic AMI Patients

Age Group	Diabetic (n=100)	Non-Diabetic (n=100)
30–40 years	10	22
41–50 years	30	38
51–60 years	36	28
>60 years	24	12

Table 2: Gender Distribution

Gender	Diabetic (n=100)	Non-Diabetic (n=100)
Male	68	72
Female	32	28

Table 3: Distribution of Risk Factors

Risk Factor	Diabetic (%)	Non-Diabetic (%)
Hypertension	74	48
Dyslipidemia	66	44
Smoking	38	52
Obesity (BMI ≥30)	42	28

Table 4: Type of Myocardial Infarction

Type	Diabetic (n=100)	Non-Diabetic (n=100)
STEMI	72	84
NSTEMI	28	16

Table 5: Mean Left Ventricular Ejection Fraction (LVEF)

Group	Mean LVEF (%) ± SD
Diabetic	42.5 ± 7.8
Non-Diabetic	48.7 ± 6.5

Table 6: Incidence of Heart Failure

Group	Heart Failure Cases	Percentage (%)
Diabetic	38	38.0%
Non-Diabetic	18	18.0%

Table 7: Incidence of Arrhythmias

Type of Arrhythmia	Diabetic (n=100)	Non-Diabetic (n=100)
Ventricular Tachycardia/Fibrillation	12	6
Atrial Fibrillation	10	4

Table 8: Incidence of Cardiogenic Shock

Group	Cardiogenic Shock Cases	Percentage (%)
Diabetic	14	14.0%
Non-Diabetic	6	6.0%

Table 9: Incidence of Multi-Organ Dysfunction Syndrome (MODS)

Group	MODS Cases	Percentage (%)
Diabetic	8	8.0%
Non-Diabetic	2	2.0%

Table 10: In-Hospital Mortality

Group	Deaths	Percentage (%)
Diabetic	18	18.0%
Non-Diabetic	8	8.0%

Table 11: Association of HbA1c with In-Hospital Complications Among Diabetics

HbA1c Level	Complication Present (n=100)	Percentage (%)
≤8%	12	24.0%
>8%	32	64.0%

Table 12: Predictors of Mortality (Multivariate Analysis)

Predictor	Odds Ratio (OR)	95% CI	p-value
Diabetes Mellitus	2.4	1.2–4.8	0.01
LVEF <40%	3.2	1.5–6.9	0.002

A total of 200 patients were enrolled with age distribution detailed in Table **1** and gender distribution in Table **2**. Risk factor prevalence among diabetic and non-diabetic patients is outlined in Table **3**, while the type of AMI is shown in Table **4**. LVEF differences are presented in Table **5**. The incidence of heart failure, arrhythmias, cardiogenic shock, and MODS are detailed in Tables **6** to **9**. In-hospital mortality rates are shown in Table **10**, the impact of glycemic control is highlighted in Table **11**, and independent predictors of mortality are presented in Table **12**.

Discussion

Diabetes mellitus significantly impacts the clinical course and outcomes of patients presenting with acute myocardial infarction (AMI). In this study, diabetic patients were found to have a higher prevalence of associated cardiovascular risk factors such as hypertension, dyslipidemia, and obesity compared to non-diabetic patients, reflecting the multifactorial burden of metabolic syndrome on cardiovascular health [9.10].

Diabetic patients tended to be older at the time of AMI presentation, consistent with previous observations that diabetes accelerates atherosclerotic processes. The majority of both diabetic and non-diabetic patients presented with ST-elevation myocardial infarction (STEMI); however, NSTEMI presentations were relatively more frequent among diabetics, possibly due to diffuse multi-vessel coronary involvement and atypical symptomatology leading to delayed diagnosis [11,12].

The study demonstrated that diabetics had significantly lower left ventricular ejection fraction (LVEF) compared to non-diabetics, indicative of greater myocardial injury and impaired ventricular function [13]. Complications such as heart failure, arrhythmias, cardiogenic shock, and multi-organ dysfunction syndrome (MODS) were substantially more common among diabetic patients, highlighting the vulnerability of this group to severe ischemic and post-infarction sequelae [14].

In-hospital mortality was significantly higher in diabetics compared to non-diabetics, corroborating the well-established finding that diabetes increases short-term mortality following AMI. Poor glycemic control (HbA1c >8%) was strongly associated with increased complication rates, emphasizing the critical role of tight metabolic control in influencing outcomes [15].

Multivariate logistic regression analysis identified diabetes mellitus and reduced LVEF as independent predictors of mortality, reaffirming the adverse prognostic impact of both hyperglycemia and impaired cardiac function in the setting of AMI [16].

Several mechanisms may explain the worse outcomes observed among diabetics, including microvascular dysfunction, increased platelet aggregation, impaired fibrinolysis, and chronic low-grade inflammation. These factors not only predispose diabetics to a higher burden of coronary artery disease but also impair myocardial recovery after infarction [17,18].

The findings of this study underscore the importance of aggressive risk factor control, early diagnosis, timely reperfusion therapy, and individualized management strategies in diabetic patients presenting with AMI. Special attention should be given to optimizing glycemic control both prior to and during hospitalization to mitigate complications and improve survival.

Conclusion

Diabetes mellitus significantly increases the risk of complications and mortality in patients presenting with acute myocardial infarction. Diabetic patients experienced a higher incidence of heart failure, arrhythmias, cardiogenic shock, multi-organ dysfunction, and in-hospital death compared to non-diabetics. Poor glycemic control and reduced left ventricular ejection fraction were important predictors of adverse outcomes. Early recognition, aggressive management of cardiovascular risk factors, and tailored therapeutic interventions are essential to improve survival and reduce morbidity in diabetic individuals following acute myocardial infarction.

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