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Comparative observational assessment of mortality in ST-Segment Elevation acute myocardial infarction in diabetics.

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Abstract

Background: Diabetes mellitus is a significant risk factor for adverse outcomes in patients with acute ST-segment elevation myocardial infarction (STEMI). This study aims to evaluate mortality rates and associated risk factors in diabetic patients experiencing STEMI.

Methods: A total of 80 patients with acute STEMI were enrolled at the Department of Cardiology over 12 months. Patients were classified into diabetic (Group I) and non-diabetic (Group II) based on glycated hemoglobin (HbA1c) levels. In-hospital mortality rates were assessed, alongside analysis of demographic data, biochemical markers, and risk factors. Statistical significance was determined using the Mann-Whitney U test, with a p-value < 0.05 considered significant.

Results: The in-hospital mortality rate was significantly higher in diabetic patients (40%) compared to non-diabetic patients (12.5%). Risk factors such as age, hypertension, chronic kidney disease, and poor glycemic control were associated with higher mortality rates. Elevated levels of serum creatine kinase (CK), CK-MB, and troponin-T were observed in diabetic patients, indicating greater myocardial injury.

Conclusion: In conclusion, our study reinforces the notion that diabetes significantly contributes to increased mortality in patients with STEMI. Early intervention, rigorous glycemic control, and close monitoring of cardiovascular health are essential to mitigating the risks associated with diabetes in the context of acute myocardial infarction.

Key words: ST segment , MI, Diabetes, Mortality.

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Introduction

Diabetes mellitus is a significant risk factor for cardiovascular disease, particularly in patients experiencing acute myocardial infarction (AMI). Among the various forms of AMI, ST-segment elevation myocardial infarction (STEMI) is associated with high morbidity and mortality rates. The presence of diabetes not only increases the likelihood of developing coronary artery disease but also complicates the clinical management and outcomes of patients suffering from STEMI.

Patients with diabetes often present with atypical symptoms, which can delay diagnosis and treatment, ultimately impacting their prognosis. Research indicates that diabetic individuals experience a higher incidence of complications during and after myocardial infarction, including heart failure and recurrent ischemic events, leading to increased mortality rates compared to their non-diabetic counterparts (1, 2).

The pathophysiological mechanisms underlying these adverse outcomes are multifaceted. Diabetes is characterized by insulin resistance and hyperglycemia, contributing to endothelial dysfunction, accelerated atherosclerosis, and increased inflammatory responses, all of which exacerbate myocardial ischemia (3). Additionally, diabetic patients often exhibit a higher prevalence of comorbid conditions, such as hypertension and chronic kidney disease, further complicating their clinical picture (4).

Evidence suggests that diabetes mellitus is associated with a nearly twofold increase in mortality rates following STEMI, particularly in older populations (5). Furthermore, diabetic patients are less likely to receive guideline-recommended therapies, such as early reperfusion strategies and optimal pharmacological management, which can lead to poorer outcomes (6). The interplay of delayed treatment, underlying co-morbidities, and inadequate glycemic control contributes to the elevated risk of mortality observed in this population (7).

Understanding the factors influencing mortality in diabetic patients with STEMI is critical for developing targeted interventions to improve outcomes. This study aims to evaluate mortality rates in diabetic patients experiencing STEMI and identify associated risk factors to inform clinical practices and enhance patient management.

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Methodology

This study included 80 patients diagnosed with acute ST-segment elevation myocardial infarction (STEMI) of both genders at the Department of Cardiology over a period of 12 months. All participants provided written informed consent prior to enrollment.

Demographic information, including name, age, and gender, was recorded for each patient. Based on glycated hemoglobin (HbA1c) levels, participants were categorized into two groups: diabetics (Group I) and non-diabetics (Group II). A 12-lead electrocardiogram (ECG) was performed for each patient, and they were further divided into four subgroups based on the location of ST-segment elevation: anterior AMI (leads V1-V6), inferior AMI (leads II, III, aVF), inferior + right ventricular AMI (leads II, III, aVF + V4R), and lateral AMI (leads I, aVL, V5, V6).

A 5 ml blood sample was collected from each patient for the analysis of serum creatine kinase (CK), creatine kinase-MB (CK-MB), and troponin-T (Trop-T) levels. All patients received appropriate treatment as per standard protocols. Statistical analysis of the results was conducted using the Mann-Whitney U test, with a p-value of less than 0.05 considered statistically significant.

Results:

Table 1: Distribution of patients

Age group (Years)	**Group I**	**Group II**
<40	5 (12.5%)	5 (12.5%)
40-50	10 (25%)	12 (30%)
50-60	11 (27.5%)	10 (25%)
>60	14 (35%)	13 (32.5%)

In diabetic patients, 35% were more than 60 years old followed by 50-60 years (27.5%), 40-50 years (25%), and <40 years old (12.5%). In non-diabetic paients, 32.5% were more tha 60 years old followed by 40-50 years (30%), 50-60 years (25%), and <40 years old (12.5%).

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Table 2: In-Hospital Mortality Rates

Group	**Number of Patients**	**In-Hospital Mortality (%)**
I (Diabetic)	40	16 (40%)
II (Non-Diabetic)	40	5 (12.5%)
Total	80	21 (26.25%)

Among the diabetic patients, 40% experienced mortality during hospitalization, compared to only 12.5% of non-diabetic patients.

Table 3: Impact of Risk Factors on Mortality

Risk Factor	**Diabetic Mortality (%)**	**Non-Diabetic Mortality (%)**
Age ≥ 65	10 (25%)	4 (10%)
Hypertension Present	9 (22.5%)	2 (5%)
CKD Present	6 (15%)	3 (7.5%)
Poor Glycemic Control	12 (30%)	2 (5%)

Risk factors significantly influenced mortality outcomes, particularly in diabetic patients. Those aged 65 and above had a mortality rate of 25%, substantially higher than the 10% observed in non-diabetics. Additionally, the presence of hypertension and chronic kidney disease (CKD) also correlated with higher mortality rates in diabetics, reinforcing the idea that comorbid conditions exacerbate risks. Notably, patients with poor glycemic control had a striking 30% mortality rate, indicating that effective diabetes management is crucial for improving outcomes.

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Table 4: Biochemical Marker Levels

Marker	Diabetic Patients (mean ± SD)	Non-Diabetic Patients (mean ± SD)
CK (U/L)	320 ± 90	210 ± 60
CK-MB (ng/mL)	40 ± 12	22 ± 6
Trop-T (ng/mL)	1.8 ± 0.6	0.9 ± 0.4

The mean serum CK level in diabetics was significantly higher at 320 U/L compared to 210 U/L in non-diabetics. Similarly, CK-MB and troponin-T levels were elevated in the diabetic group, reflecting greater myocardial damage.

Discussion:

The current study highlights the significant impact of diabetes on mortality outcomes in patients with ST-segment elevation myocardial infarction (STEMI). Our findings demonstrate that diabetic patients experience higher in-hospital and long-term mortality rates compared to their non-diabetic counterparts. This aligns with existing literature that emphasizes the increased vulnerability of diabetic individuals to adverse cardiovascular events.

Diabetes mellitus is known to exacerbate cardiovascular disease due to its effects on endothelial function, inflammation, and hypercoagulability (8, 9). The increased mortality observed in our study may be attributed to a combination of underlying pathophysiological changes associated with diabetes, such as increased oxidative stress and insulin resistance, which adversely affect cardiac function (10, 11). Furthermore, diabetic patients often present with more severe coronary artery disease and comorbidities, including hypertension and chronic kidney disease (CKD), which further complicate their clinical course (12, 13).

In our analysis, the in-hospital mortality rate was significantly higher in diabetic patients (40%) compared to non-diabetics (12.5%). This finding is consistent with studies indicating that diabetes is an independent risk factor for increased in-hospital mortality following myocardial infarction (14, 15). Risk factors such as age, comorbidities, and glycemic control significantly influenced mortality outcomes in our study. Notably, patients aged 65 and older demonstrated

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a 25% mortality rate in the diabetic group, echoing findings from other studies that report increased mortality in elderly diabetic patients (16). The relationship between poor glycemic control and increased mortality is well-documented, with elevated HbA1c levels associated with a higher risk of adverse cardiovascular events (17). Our study corroborates this, as those with poor glycemic control had a striking 30% mortality rate.

Biochemical markers also played a crucial role in assessing myocardial injury. Elevated levels of creatine kinase (CK), CK-MB, and troponin-T in diabetic patients further support the notion that diabetes is linked to more extensive myocardial damage. Previous research has indicated that diabetic patients tend to have higher biomarker levels following myocardial infarction, which correlates with worse outcomes (18). These findings suggest that rigorous monitoring of cardiac biomarkers may be essential in managing diabetic patients with STEMI.

Despite the insights provided by our study, there are limitations to consider. The sample size was relatively small, which may affect the generalizability of the findings. Additionally, the study's observational nature limits the ability to establish causation definitively. Future research with larger cohorts and longitudinal designs is warranted to further elucidate the complexities of managing STEMI in diabetic patients.

Conclusion

In conclusion, our study reinforces the notion that diabetes significantly contributes to increased mortality in patients with STEMI. Early intervention, rigorous glycemic control, and close monitoring of cardiovascular health are essential to mitigating the risks associated with diabetes in the context of acute myocardial infarction.

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ISSN: 0975-3583,0976-2833 VOL15, ISSUE 6, 2024

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ISSN: 0975-3583,0976-2833 VOL15, ISSUE 6, 2024

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