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# IN-HOSPITAL MORTALITY IN ST ELEVATION MYOCARDIAL INFARCTION: DIABETIC VS. NON-DIABETIC PATIENTS

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**Abstract**

**Introduction**: ST-Elevation Myocardial Infarction (STEMI) is one of the main causes of death in the world population. Diabetes mellitus is a recognised risk factor for poor cardiovascular outcomes, but its effects on in-hospital death in STEMI patients have not been well established.

**Objective**: To compare the mortality rates and complications in diabetic and non-diabetic patients with STEMI who arrived in hospital.

**Material and Method:** The study was done at the Department of Medicine, FFC Medical Centre Rahim Yar, where a comparative observational study was carried out from November, 2024 to April, 2025. It involved 320 patients with STEMI (150 diabetics and 170 non-diabetics). SPSS v25 was used to analyze clinical data, complications, and mortality rates.

**Results**: The in-hospital mortality of diabetic patients was significantly higher than that of non-diabetics (15.3 % and 5.3%, respectively). Heart failure, arrhythmias, and cardiogenic shock occurred more often in diabetics. The additional factors were late presentation and comorbidities.

**Conclusion**: Diabetes worsens the in-hospital mortality and morbidity in STEMI patients. Rapid risk stratification and individualized management are critical towards improving outcomes.

**Keywords**: *STEMI, Diabetes Mellitus, In-Hospital Mortality, Cardiovascular Complications, Risk Stratification.*

## INTRODUCTION

The cardiovascular disease burden, especially acute myocardial infarction (AMI), remains a significant contributor to morbidity and mortality globally. ST-Elevation Myocardial Infarction (STEMI) is one of the different types of AMI, and it is a more extreme form of the condition with high chances of mortality and would usually need immediate intervention. Diabetes mellitus (DM), a chronic metabolic disease characterized by hyperglycemia, has always been considered a dangerous

risk factor for coronary artery disease as well as a poor cardiovascular prognosis. Many researchers have tried to understand the intricate relationship between diabetes and mortality during hospitalisation after STEMI since diabetic and non-diabetic patients experience different pathophysiology (1). Patients with diabetes usually have more advanced stages of coronary artery disease and diffuse atherosclerosis, and earlier recognition of symptoms becomes problematic because of autonomic neuropathy, which could contribute to delayed care and outcomes of STEMI (2).

A comparative analysis has demonstrated that diabetic patients are not only more likely to have higher baseline cardiovascular risks but also show poorer clinical outcomes even after STEMI and Non-STEMI events (3). The prevalence of such hospital outcomes as left ventricular dysfunction, arrhythmias, cardiogenic shock, and death seems to be consistently more frequent in diabetic patients when compared to non-diabetic cohorts (4). The disease process involves chronic inflammation, endothelial dysfunction and pro-thrombotic states, which are more prevalent in diabetics. A recent study in the Pakistani population noted that significantly higher amounts of in-hospital deaths were found among diabetic patients who were admitted due to STEMI, and that this subgroup requires early identification and aggressive treatment. These results are consistent with the data found by other authors around the world, which indicate the prognostic implications of diabetes in acute coronary disorders. Diabetic patients had higher chances of acquiring complications like congestive heart failure, re-infarction and stroke in hospitals (5). Moreover, hospital-based studies have demonstrated stronger chances of fatality of diabetic patients with anterior wall MI, which represents a severe type of this condition (6).

Curiously, other researchers have given their focus to certain biomarkers, which can accurately predict in-hospital mortality and within patients with myocardial infarction. Hypercoagulability has been argued to contribute to worse outcomes in non-diabetic patients with non-STEMI because raising D-dimer concentrations has been related to in-hospital mortality (7). Nevertheless, glucose management combined with insulin resistance and endothelial dysfunction is linked to the factors contributing to poor prognosis in diabetic individuals rather than the clotting capacity alone (8). Hyperglycemia at admission, even among non- diabetics, has been shown to be a strong independent prognostic factor of mortality amongst cases of AMI (9). According to another study, the type and the duration of diabetes also have a strong impact on clinical outcomes. The patients who had a longer duration of diabetes or who had poorly managed blood glucose were more likely to experience complications and death after STEMI (10).

Furthermore, in systematic reviews and meta-analytic work, the association between admission hyperglycemia in diabetic or non-diabetic individuals has been confirmed to be highly associated with adverse outcomes and greater mortality (11). This brings clinical concerns on the usefulness of early glycemic control in both cohorts and whether intentional approaches can induce in-hospital complications. Moreover, it has been indicated that diabetic patients experiencing in-hospital care of STEMI may be subject to alternate treatment regimens as those of non-diabetic patients, which could bring about unequal outcomes. The aggressiveness of the therapeutic intervention is influenced by factors related to delayed percutaneous coronary intervention (PCI), increased risks of bleeding on dual antiplatelet therapy, and adverse renal function (12). These results require that in-hospital treatment algorithms must be reconsidered to avoid under-treatment of patients with diabetes.

Furthermore, other prognostic factors, including blood glucose at the time of admission, have proven to be important predictors of death events in diabetic and non-diabetic patients, even in first-time MI cases (13). Admission hyperglycemia was also observed to be particularly harmful in elderly patient populations, deteriorating myocardial damage and interfering with hemodynamic response in the acute phase of STEMI (14). These observations concerning different ages point to the necessity of patient-specific care pathways that take into account such comorbidities as diabetes and age when planning treatment. These observations are also confirmed globally by studies in Africa and Asia. A comparison between diabetic and non-diabetic STEMI patients on their hospitalisation outcomes revealed higher levels of complications (including arrhythmias and heart failures) in diabetic patients

in Senegal (15). These parts of the world confirm that the association between diabetes and STEMI is not exclusive to high-income countries, and it is a serious global health problem.

Hyperglycemia at the time of admission, independent of diabetic status, has been a matter of growing concern as well. A huge cohort study also observed that transient hyperglycemia at the time of hospital admission was a strong predictor of both immediate and late mortality in STEMI patients (16, 17). The article highlights the essence of timely monitoring of the level of blood glucose and blood glucose control in every patient with acute coronary syndromes. One more study evaluated the prognostic potential of the TyG index in patients with non-diabetic STEMI aged above 75, showing that the index was helpful to risk-stratify mortality (18). These results widen the clinical applicability of metabolic markers beyond their use in diabetes only. Lastly, a huge observational study conducted in Spain on the outcomes of patients with diabetes mellitus who were treated between 2016 and 2022 stated how diabetes mellitus was associated with refining therapeutic choices and affecting in-hospital outcomes of those with STEMI (19).

**Objective:** To compare rates of mortality in the hospital among diabetic and non-diabetic patients having an attack of ST-Elevation Myocardial Infarction (STEMI), as well as to define related clinical results and prognostic factors.

## MATERIALS AND METHODS

**Study Design:** Comparative Observational Study.

**Study setting:** The study was conducted at Department of Medicine, FFC Medical Centre Rahim Yar.

**Duration of Study:** The study was carried out over a six-month period, from November, 2024 to April, 2025.

**Inclusion Criteria:** The inclusion criteria were patients aged 30 years and above who presented to the admission facility and were confirmed to have STEMI by clinical features, ECG report, and raised cardiac biomarkers. Patients with diabetic (preexisting diagnosis of diabetes or HbA1c 6.5% or more) and non-diabetic patients were enrolled. Patients were only included if they arrived within 24 hours of the onset of symptoms and followed STEMI guidelines in obtaining treatment.

**Exclusion Criteria:** Patients presenting with non-STEMI, unstable angina, history of myocardial infarction, or chronic kidney disease were excluded. Patients leaving against medical advice or who were dead by the time of treatment were excluded.

### Methods

All patients were admitted to a comprehensive clinical examination with the evaluation of the history and physical examination, ECG recording, and cardiac markers (troponin I or T). Blood sugar was measured along with HbA1c in order to determine whether the patients were diabetic or not. Diabetic patients were established as having a history of diagnosed diabetes mellitus or an HbA1c value of 6.5% or more. The usual treatment protocols of STEMI followed were thrombolysis or primary PCI, antiplatelets, anti-coagulation, statins, and beta-blockers, according to the hospital policy. The patients were followed up during their hospital stay by checking the occurrence of complications like heart failure, arrhythmias, reinfarction, and mortality. In-hospital mortality was deemed to be the death that had occurred in the same hospital stay during which STEMI had occurred. A structured proforma was used to collect data that was analyzed using SPSS version 25. The description of the differences between the categorical and the continuous variables was analyzed using chi-square and t-tests for independent groups, respectively, with a p-value $<0.05$ being considered significant.

## RESULTS

A total of 320 patients diagnosed with ST-Elevation Myocardial Infarction (STEMI) were included in the study, of which 150 (46.9%) were diabetic and 170 (53.1%) were non-diabetic. The mean age of diabetic patients was $60.3 \pm 8.5$ years, while that of non-diabetic patients was $56.8 \pm 9.2$ years. Male patients made up 67.3% of the diabetic group and 70.6% of the non-diabetic group, showing no significant gender difference ($p=0.48$).

**Table 1: Baseline Demographic and Clinical Characteristics**

| Characteristic | Diabetic (n=150) | Non-Diabetic (n=170) | p-value |
|---|---|---|---|
| Mean Age (years) | 60.3 ± 8.5 | 56.8 ± 9.2 | 0.003* |
| Male (%) | 101 (67.3%) | 120 (70.6%) | 0.48 |
| Hypertension (%) | 92 (61.3%) | 58 (34.1%) | <0.001* |
| Smoking (%) | 48 (32.0%) | 69 (40.6%) | 0.12 |
| Dyslipidemia (%) | 84 (56.0%) | 60 (35.3%) | 0.001* |

The incidence of major in-hospital complications was notably higher among diabetic patients. Heart failure developed in 52 diabetic patients (34.7%) compared to 31 (18.2%) non-diabetic patients (p=0.001). Arrhythmias, particularly ventricular tachycardia and atrial fibrillation, occurred in 29 (19.3%) diabetic patients and 17 (10.0%) non-diabetic patients (p=0.02). Re-infarction was reported in 10 (6.7%) diabetics compared to 5 (2.9%) in the non-diabetic group (p=0.12).

**Table 2: In-Hospital Complications**

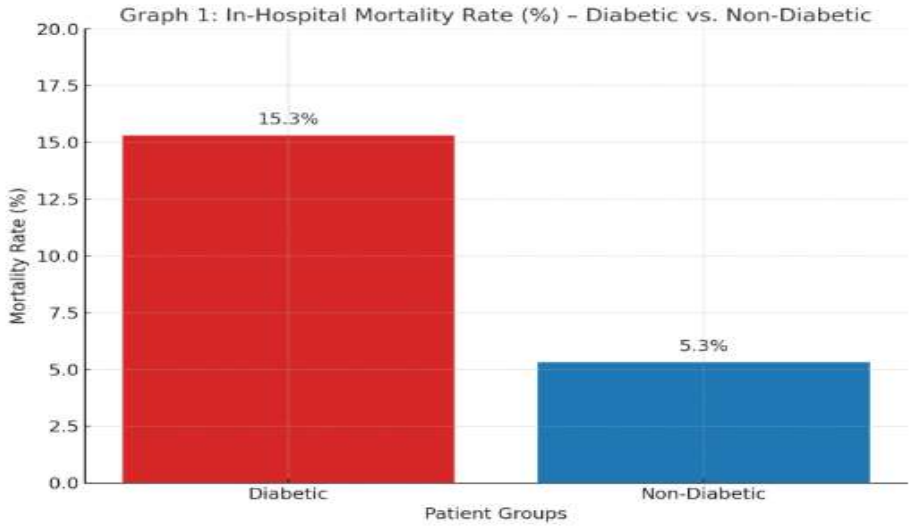
| Complication | Diabetic (n=150) | Non-Diabetic (n=170) | p-value |
|---|---|---|---|
| Heart Failure | 52 (34.7%) | 31 (18.2%) | 0.001* |
| Arrhythmias | 29 (19.3%) | 17 (10.0%) | 0.02* |
| Re-infarction | 10 (6.7%) | 5 (2.9%) | 0.12 |
| Cardiogenic Shock | 16 (10.7%) | 8 (4.7%) | 0.04* |

The overall in-hospital mortality was significantly higher in the diabetic group. Among diabetic patients, 23 (15.3%) succumbed to STEMI-related complications, while in the non-diabetic group, 9 (5.3%) deaths were recorded (p=0.002). Mortality was strongly associated with age, presence of heart failure, and cardiogenic shock in both groups.

**Table 3: In-Hospital Mortality**

| Outcome | Diabetic (n=150) | Non-Diabetic (n=170) | p-value |
|---|---|---|---|
| Mortality (%) | 23 (15.3%) | 9 (5.3%) | 0.002* |
| Survived (%) | 127 (84.7%) | 161 (94.7%) | |

**Graph 1: In-Hospital Mortality Rate (%) – Diabetic vs. Non-Diabetic**



This visual representation clearly highlights the significantly higher mortality rate among diabetic patients compared to non-diabetics. Further analysis showed that diabetic patients had a longer average hospital stay (6.2 ± 1.5 days) compared to non-diabetic patients (4.8 ± 1.3 days, $p<0.001$). Additionally, the use of primary PCI was slightly lower in diabetic patients (56.7%) compared to non-diabetics (63.5%), though this was not statistically significant ($p=0.18$). However, delayed presentation to the hospital (≥6 hours after symptom onset) was more common in diabetics (40.0%) than in non-diabetics (26.5%) ($p=0.01$), potentially contributing to poorer outcomes.

**Discussion**

The study appraised and contrasted the in-hospital death and complications between diabetic and non-diabetic individuals with ST-Elevation Myocardial Infarction (STEMI). The findings indicated that diabetic patients were more inclined to fall, with an in-hospital mortality rate, and more likely to experience complications like heart failure, arrhythmia, and cardiogenic shock. These results correspond with the increasing evidence underlining diabetes mellitus as one of the independent risks of poor outcomes in acute coronary syndromes, especially STEMI. The mortality rate in patients with diabetes in the study was 15.3%, which is almost three times more than in non-diabetic patients (5.3%). This is as reported by Khan et al. (1), who observed that the proportion of deaths that occur in-hospital among diabetic patients with STEMI is higher in a tertiary care hospital in Pakistan. The pathophysiological factors involved in this increased risk are multifactorial, detailed as endothelial dysfunction, fibrinolytic dysfunction, clinically relevant chronic inflammation, and autonomic neuropathy, all of which play a role in poorly recognised and suboptimal outcomes of diabetics who encounter acute myocardial infarction (2, 3).

The existing literature has indicated a typical older age of presentation seen in diabetic patients with quite a higher number of other comorbidities like hypertension and a trend of dyslipidemia also seen in the patients in the study (4). The co-existing states probably worsen myocardial injury and impose vulnerability to heart failures and arrhythmias. According to Chavan et al. (4), diabetic patients usually present with multi-vessel coronary artery disease and functional impairment of the left ventricle that results in an unfavourable outcome. Also, Sial et al. (5) revealed that patients with diabetes were more susceptible to developing cardiogenic shock and in need of intensive care procedures. The findings revealed that there was a statistically significant correlation between the development of diabetes and heart failure during hospitalisation. This corroborates the evidence of a heavier load of in-hospital complications, such as acute pulmonary oedema and left ventricular failure, in diabetic anterior MI patients provided by Alam et al. (6).

These findings of an increased risk of arrhythmias observed in the diabetic cohort correlate with other previous findings reported by Li et al. (7), which focused on finding predictors of mortality in cases of non-STEMI and found diabetes to be a critical factor in modifying the burden and outcomes of arrhythmias. Interestingly, admission hyperglycemia has also proven to be a very strong predictor of mortality, even in non diabetic patients. Li et al. (8) and Divya and Madhuvan (9) established the value of the acute glycemic levels on the prognosis of glycemic complications, especially among patients who had no history of diabetes. These results underline the fact that the derangement of metabolism in the acute stage of myocardial infarction, caused by pre-existing diabetes or by the stress-mediated development of hyperglycemia, can have a substantial impact on prognosis.

Additionally, new reports show that the type and duration of diabetes have a critical effect on patient outcomes. Sethupathi et al. (10) found that in-hospital survival was lower in type 2 diabetes patients with a longer duration of the disease. Further confirmation of the observation that hyperglycemia at the admission time is a risk factor of in-hospital mortality among diabetic patients and non-diabetic patients was observed in a meta-analysis study conducted by Alawaji et al. (11). These findings support the assumption that the control of long-term glycemia, expressed in the values of HbA1c, is a significant aspect of having the outcomes developed in the course of STEMI. The difference in the management of patients admitted to hospitals with diabetic and non-diabetic conditions is another factor that leads to the existing discrepancies in mortality. Baviera et al. (12) have also pointed out that diabetic patients have a lower chance of receiving an evidence-based intervention, such as an

appropriate reperfusion or adequate antithrombotic therapy, and mention that it could be due to the danger of renal functioning, haemorrhagic risk issues, or the lack of hospital access. Likewise, the study indicated that the time lag between symptoms and, ultimately, the presentation of patients with diabetes was longer, which had probably contributed to the increase in the rate of diabetic complications and deaths.

The prognostic significance of blood glucose during admission, irrespective of the presence of diabetes, is also another aspect that should be studied. Eskandari et al. (13) and Gundogmus and Keskin (14) discussed the strong relationship between hyperglycemia and in-hospital mortality even in first-time MIs that are not diagnosed with diabetes. This establishes the significance of glucose assessment and control during the first phase of the STEMI care protocol that can potentially enhance outcomes in both diabetic and non-diabetic patients. The results in the present study are similar to the universe data, like those provided by Gaye et al. (15) in the city of Dakar, Senegal, indicating that diabetic STEM patients suffer higher rates of arrhythmias, heart failure, and mortalities. These findings are consistent worldwide, and they explain that diabetes is a major modifiable risk factor in the treatment of acute coronary syndromes.

Admission hyperglycemia not only predicts short-term mortality but also long-term adverse cardiovascular events. Upur et al. (16, 17) insisted that glycemic control should be better during and after AMI hospitalization to decrease immediate and delayed cardiovascular complications. Meanwhile, Shaylik et al. (18) suggested the triglycerides-glucose (TyG) index to be utilized in risk-stratifying early mortality, especially in aged, non-diabetic STEMI patients. These indices may be regarded as basic and effective measures in clinical decision-making and individual planning. Lastly, the results of a large-scale observational study by de-Miguel-Yanes et al. (19) that illustrated AMI outcomes in Spain in 2016-2022 underpinned the involvement of diabetes as the cause of a determinant approach to treatment and prognosis. The diabetic patients were at a lower chance of receiving invasive procedures, and had more chances of in-hospital complications, a finding that resembles the results of the study.

## Conclusion

The research sheds light on the issue of diabetes mellitus in the in-hospital results of patients presenting with ST-Elevation Myocardial Infarction (STEMI). The in-hospital mortality rate and the incidence of intra-hospital complications, including heart failure, arrhythmias, and cardiogenic shock, were significantly higher among diabetic patients than the non diabetic patients. The later presentation, increased comorbidities burden, and the disturbance of the metabolism of the diabetic person also play a role in having such poor outcomes. Moreover, the presence of hyperglycemia, both in patients without diabetes, demonstrated unfavourable outcomes, and this observation is an argument to pay significant attention to the early glycemic evaluation and treatment of all STEMI patients. These results explain why there is urgency in the risk stratification and clinical management routines specific to diabetic patients who develop acute myocardial infarction. Proper intervention and glycemic control optimisation with the treatment of comorbidities might notably enhance the results in-hospital. Targeted therapies and predictive instruments aimed at informing clinical choices in diabetic STEMI patients should become the subject of future research to support improved survival and recovery rates.

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