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**Original Article**

# Frequency of Cardiogenic Shock in Post-Myocardial Infarction Patients with Diabetes: A Descriptive Cross-Sectional Study

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## ABSTRACT

To enhance risk classification and enable more rapid and proactive surveillance and response, the study sought to ascertain the precise incidence of cardiogenic shock among this vulnerable cohort. The results would aid in addressing this potentially fatal issue, with the goal of lowering mortality and enhancing post-infarction outcomes for diabetes patients. **Objective:** To determine the frequency of cardiogenic shock in post-myocardial infarction patients with diabetes. **Methods:** This descriptive cross-sectional study was conducted at the department of cardiology, LRH Peshawar. A total of 132 post-myocardial infarction (MI) diabetic individuals aged 30 to 60 years were evaluated for the presence of cardiogenic shock. Data analysis was carried out using SPSS version 26.0. **Results:** The mean age of the participants was 47.8 ± 8.1 years, with the majority of participants in the age group 41 – 50 years, 49 (37.1%). Male participants were more frequent, 71 (53.8%). STEMI was the most common recorded MI, 73 (55.3%), and 57 (43.2%) had anterior wall MI. Cardiogenic shock was recorded in 13 patients (9.8%). **Conclusions:** Cardiogenic shock was observed in a significant number of diabetic post-myocardial infarction patients. No significant associations were found with demographic or chronic diabetes-related variables.

## INTRODUCTION

A main cardiac condition that causes tissue hypoperfusion to be evident both clinically and biochemically is known as cardiogenic shock. The diagnostic requirements include cold hands and feet, a systolic blood pressure measurement of below or equal to 90 mm Hg for more than or equal to 30 minutes, vasopressor assistance to preserve a systolic blood pressure of 90 mm Hg, and/or urine output of less than or equal to 30 mL/hr [1]. A reduced cardiac index and an increased pulmonary-capillary wedge pressure of more than 15 mm Hg are examples of hemodynamic criteria [2]. It is a medical condition marked by circulatory collapse with reduced cardiac output, which causes hypoxia in the tissues and end-organ circulatory failure [3]. Although other conditions that affect the cardiac muscle, valves, conduction network, or pericardium can also induce cardiogenic shock, acute myocardial infarction is the most frequent cause of this condition. Cardiogenic shock patients continue to have significant rates of morbidity and death despite advancements in circulatory assistance and reperfusion therapy [4]. Because more people are using first-line percutaneous coronary intervention (PCI) for acute MI, the probability of cardiogenic shock is decreasing. Recent data indicate that globally, cardiogenic shock occurs in 1.51% of acute coronary syndrome patients in large registries, with an incidence ranging from 1.1% to over 1.8% over time [5]. In


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Pakistan, among NSTEMI patients specifically, the frequency of cardiogenic shock was reported as 6.2% in a 2025 study from Lady Reading Hospital, Peshawar. These contemporary figures provide relevant benchmarks for comparing the 9.8% frequency observed in your diabetic post-MI cohort [6]. The outlook for individuals with cardiogenic shock is greatly influenced by a timely diagnosis, a successful resolution of the root cause, and the timely start of medications for sustaining cardiovascular and breathing assistance [6]. Prior myocardial infarction, size of infarct, and myocardial infarction site have been identified as the primary variables that lead to the incidence of cardiogenic shock. Diabetes mellitus is one of the upstream pathophysiological alterations that may influence the incidence of these variables [7]. Diabetes has been linked to an increased likelihood of cardiogenic shock, although there is currently little information regarding the way it affects both the incidence and prognosis of cardiogenic shock. Cardiogenic shock was 5.8% common in diabetic post-myocardial infarction patients, according to research by Shalaby *et al.* [8]. Cardiogenic shock was 7.8% common in diabetic individuals who had myocardial infarction, according to research by Sterling *et al.* [9].

There is little local evidence on the incidence of cardiogenic shock after myocardial infarction in diabetes patients, and there is a lack of research examining the burden of the complication in our region. Because of this scarcity in region-specific data, the prevalence of disease is not accurately estimated, and optimal planning of management strategies for high-risk diabetic patients with acute coronary syndrome is limited. The aim of the study was to assess the incidence of cardiogenic shock (CS) among post-myocardial infarction (MI) patients with diabetes mellitus.

## METHODS

This descriptive cross-sectional study was carried out at the Department of Cardiology, Lady Reading Hospital, Peshawar, during the period 27th December 2021 to 26th December 2025, after taking approval from the research review board vide letter no: 619/LRH/MTI, dated 4th November 2020. A total of 132 male and female diabetic patients in the age range of 30 to 60 years with myocardial infarction on medical records were enrolled and evaluated for the presence of cardiogenic shock. Patients with severe anemia (Hb less than 7 g/dl), severe cardiopulmonary compromised patients, underlying malignancy, pulmonary embolism, and patients with cardiac rhythm disorders were excluded. Myocardial infarction was diagnosed according to the Fourth Universal Definition of MI, requiring a rise and/or fall of high-sensitivity cardiac troponin with at least one value above the 99th percentile upper reference limit, accompanied by at least one of the following symptoms of myocardial ischemia (e.g., chest pain, dyspnea), new ischemic ECG changes (ST-segment elevation ≥1 mm in two contiguous leads or ST-segment depression), development of pathological Q waves, or (d) imaging evidence of new loss of viable myocardium. Chest pain severity was recorded using the Visual Analog Scale (VAS, 0-10), but VAS score alone was not used as a diagnostic criterion. Diabetes mellitus was defined as a history of antidiabetic medication use for more than six months, an HbA1c level >6.5% (48 mmol/mol) based on the American Diabetes Association (ADA) criteria, fasting plasma glucose ≥126 mg/dL on two separate occasions. Cardiogenic shock was defined using standard clinical and hemodynamic criteria. Sustained systolic blood pressure <90 mmHg for ≥30 minutes despite adequate fluid resuscitation, requirement of vasopressors or inotropic agents to maintain SBP ≥90 mmHg, accompanied by clinical evidence of end-organ hypoperfusion (cool extremities, urine output <30 mL/hour, altered mental status, or serum lactate >2 mmol/L). The sample size was calculated using the WHO sample size software with the formula $n = Z^2_{1-\alpha/2} \times p(1-p)/d^2$, where Z=1.96 (for 95% confidence interval), p=0.058 (anticipated frequency from a previous study), and d=0.04 (absolute margin of error), yielding a sample size of 132. However, the observed frequency in our cohort was 9.8%, resulting in a narrower 95% confidence interval (5.7% to 15.8%) [9]. Participants were enrolled using non-probability consecutive sampling. Informed consent was obtained from enrolled participants after explaining study risks, benefits, and purpose, ensuring safety and confidentiality. Baseline clinical and sociodemographic characteristics like age, gender, BMI, pulse rate, systolic and diastolic blood pressure, duration of diabetes, diabetes treatment type (oral hypoglycemics/insulin/combination) Hba1c level (measured from EDTA blood samples using high-performance liquid chromatography on the Bio-Rad D-10 Hemoglobin Testing System with the Bio-Rad D-10 Hemoglobin A1c Kit (Cat# 220-0101), MI type (based on electrocardiographic findings using 12-lead electrocardiograph (GE Healthcare MAC 2000, Chicago, IL, USA) taking STEMI as presence of ST-segment elevation of at least 1 mm (0.1 mV) in two or more anatomically contiguous leads and NSTEMI as the absence of diagnostic ST-segment elevation on ECG but clinical features consistent with myocardial ischemia). Killip Class, smoking status, lipid profile (measured using eight hours fasting blood sample analyzed using Mindray BS-380 automated chemistry analyzer using Mindray Cat# CH-101, TG-020, HDL-030, taking total cholesterol ≥200 mg/dL, triglycerides ≥150 mg/dL, or HDL-cholesterol <40 mg/dL (men) and <50 mg/dL (women) as cut off for dyslipidemia).


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Concurrent medical conditions like chronic kidney disease and hypertension were recorded. The blood pressure was recorded using the standard mercury sphygmomanometer. The patient was allowed to lie on a couch after 30minutes of rest. A sphygmomanometer was applied to the patient's arm at least 1 to 2 cm above the antecubital fossa after making sure the arm was at the level of the heart. Blood pressure was recorded manually by palpating the pulse and subsequently confirmed with the auscultatory method. Echocardiography was performed by a consultant cardiologist using Philips EPIQ 7C ultrasound system (Philips Healthcare, Andover, MA, USA) with an S5-1 phased array transducer (1-5 MHz). Left ventricular ejection fraction (LVEF), wall motion abnormalities, and mechanical complications (e.g., papillary muscle rupture, ventricular septal defect) were assessed. LVEF was recorded as a descriptive parameter

Data was collected on Excel spreadsheets and analyzed using SPSS v.26. Descriptive statistics included reporting continuous data as Means ± S.D and categorical data as frequencies and percentages. Contingency table analysis was performed to stratify cardiogenic shock with baseline demographic and clinical parameters.

## RESULTS

The mean age of the participants was 47.8 ± 8.1 years, with the majority of participants in the age group 41 – 50 years, 49 (37.1%). Male participants were more frequent, 71 (53.8%). The mean BMI was 28.1 ± 2.9 kg/m2, and participants with a BMI of 25-30 kg/m$^2$ were 59 (44.7%). 123 (93.2%) patients had type 2 diabetes mellitus, while 53 (40.2%) had diabetes duration between 5 and 10 years. The majority of the participants were using oral hypoglycemics 69(52.3%)(Table 1).

**Table 1:** Demographic and Clinical Characteristics of Study Participants(n=132)

| Parameters | Mean ± SD, Frequency, n (%) |
|---|---|
| Age (Years) | 47.8 ± 8.1 |
| 30-40 | 37 (28.0%) |
| 41-50 | 49 (37.1%) |
| 51-60 | 46 (34.8%) |
| **Gender** | |
| Male | 71 (53.8%) |
| Female | 61 (46.2%) |
| Diabetes Duration (Years) | 9.3 ± 4.9 |
| <5 | 47 (35.6%) |
| 5-10 | 53 (40.2%) |
| >10 | 32 (24.2%) |
| BMI (kg/m$^2$) | 28.1 ± 2.9 |
| Normal (<25) | 31 (23.5%) |
| Overweight (25-30) | 59 (44.7%) |
| Obese (>30) | 42 (31.8%) |
| **Diabetes Type** | |
| Type 1 | 9 (6.8%) |
| Type 2 | 123 (93.2%) |
| **Diabetes Treatment** | |
| Oral Hypoglycemic Agents (OHA) | 69 (52.3%) |
| Insulin | 38 (28.8%) |
| OHA + Insulin | 25 (18.9%) |
| HbA1c (%) | 8.2 ± 1.4 |
| <7.0 (Good control) | 41 (31.1%) |
| 7.0-8.5 (Moderate control) | 57 (43.2%) |
| >8.5 (Poor control) | 34 (25.8%) |
| **Hypertension** | |
| Yes | 89 (67.4%) |
| No | 43 (32.6%) |
| **Dyslipidemia** | |
| Yes | 75 (56.8%) |
| No | 57 (43.2%) |
| **Previous CAD** | |
| Yes | 39 (29.5%) |
| No | 93 (70.5%) |
| **Smoking Status** | |
| Current | 47 (35.6%) |
| Ex-smoker | 41 (31.1%) |
| Non-smoker | 44 (33.3%) |
| **Family History of CAD** | |
| Yes | 35 (26.5%) |
| No | 97 (73.5%) |
| **Chronic Kidney Disease** | |
| Yes | 17 (12.9%) |
| No | 115 (87.1%) |

The majority of patients presented with STEMI (55.3%) and anterior wall MI (43.2%). Cardiogenic shock was observed in 13 patients (9.8%), though only 8 patients (6.1%) were classified as Killip Class IV, suggesting a discrepancy between clinical shock criteria and Killip classification that warrants clarification. The predominance of anterior MI and STEMI in this diabetic cohort aligns with the known higher risk of hemodynamic compromise in these subgroups(Table 2).

**Table 2:** Patients' distribution according to MI characteristics and cardiogenic shock(n=132)

| Characteristic | Frequency, n (%) |
|---|---|
| **MI Type** | |
| STEMI | 73 (55.3%) |
| NSTEMI | 59 (44.7%) |
| **MI Location** | |
| Anterior | 57 (43.2%) |
| Inferior | 49 (37.1%) |
| Anterolateral | 19 (14.4%) |
| Lateral | 7 (5.3%) |
| **Killip Class** | |
| I | 67 (50.8%) |


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| | |
|---|---|
| II | 42 (31.8%) |
| III | 15 (11.4%) |
| IV | 8 (6.1%) |
| **Cardiogenic Shock** | |
| Yes | 13 (9.8%) |
| No | 119 (90.2%) |

A representative echocardiogram of a 51-year-old male with anterior wall MI presenting in cardiogenic shock (Figure 1).

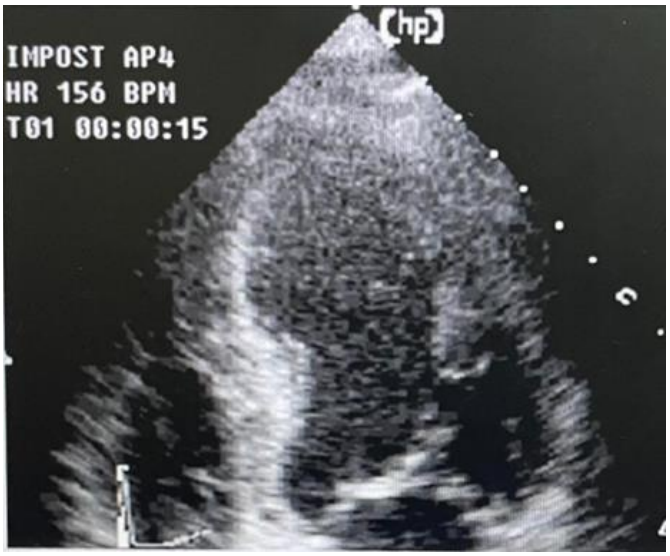



**Figure 1:** Echocardiogram of a 51-year-old male with anterior wall MI presenting in cardiogenic shock (Ejection fraction 30%, Index Cardiac output 1.8L/min/m2, E/e' 19, MAPSE 7mm, TAPSE 8mm, IVC 2.4 cm with <50% respiratory collapsibility)

Regarding the age-wise distribution of cardiogenic shock, 3 patients (23.1%) were in the age range 30-40 years, and 5 patients (38.5%) each in 41-50 years and 51-60 years, respectively. Cardiogenic shock was more frequent in male patients 8 (61.5%). Cardiogenic shock was more common in patients with BMI 25.0-30.0kg/m$^2$ 7 (53.8%) (Table 3).

**Table 3:** Demographic and Clinical Characteristics Stratified by Cardiogenic Shock Status (n=132)

| Subgroups | Cardiogenic Shock | | Total (n=132) |
|---|---|---|---|
| | Yes = 13, n (%) | No = 119, n (%) | |
| **Age Group** | | | |
| 30–40 years | 3 (23.1%) | 34 (28.6%) | 37 (28.0%) |
| 41–50 years | 5 (38.5%) | 44 (37.0%) | 49 (37.1%) |
| 51–60 years | 5 (38.5%) | 41 (34.5%) | 46 (34.8%) |
| **Gender** | | | |
| Male | 8 (61.5%) | 63 (52.9%) | 71 (53.8%) |
| Female | 5 (38.5%) | 56 (47.1%) | 61 (46.2%) |
| **Diabetes Duration** | | | |
| <5 years | 4 (30.8%) | 43 (36.1%) | 47 (35.6%) |
| 5–10 years | 5 (38.5%) | 48 (40.3%) | 53 (40.2%) |
| >10 years | 4 (30.8%) | 28 (23.5%) | 32 (24.2%) |
| **BMI (kg/m$^2$)** | | | |
| Normal (<25) | 2 (15.4%) | 29 (24.4%) | 31 (23.5%) |
| Overweight (25–30) | 7 (53.8%) | 52 (43.7%) | 59 (44.7%) |
| Obese (>30) | 4 (30.8%) | 38 (31.9%) | 42 (31.8%) |
| **Diabetes Type** | | | |
| Type 1 | 1 (7.7%) | 8 (6.7%) | 9 (6.8%) |
| Type 2 | 12 (92.3%) | 111 (93.3%) | 123 (93.2%) |
| **Diabetes Treatment** | | | |
| OHA only | 5 (38.5%) | 64 (53.8%) | 69 (52.3%) |
| Insulin only | 5 (38.5%) | 33 (27.7%) | 38 (28.8%) |
| OHA + Insulin | 3 (23.1%) | 22 (18.5%) | 25 (18.9%) |
| **HbA1c Control** | | | |
| <7.0 (Good) | 3 (23.1%) | 38 (31.9%) | 41 (31.1%) |
| 7.0–8.5 (Moderate) | 6 (46.2%) | 51 (42.9%) | 57 (43.2%) |
| >8.5 (Poor) | 4 (30.8%) | 30 (25.2%) | 34 (25.8%) |
| **Hypertension** | | | |
| Yes | 10 (76.9%) | 79 (66.4%) | 89 (67.4%) |
| No | 3 (23.1%) | 40 (33.6%) | 43 (32.6%) |
| **Dyslipidaemia** | | | |
| Yes | 9 (69.2%) | 66 (55.5%) | 75 (56.8%) |
| No | 4 (30.8%) | 53 (44.5%) | 57 (43.2%) |
| **Previous CAD** | | | |
| Yes | 5 (38.5%) | 34 (28.6%) | 39 (29.5%) |
| No | 8 (61.5%) | 85 (71.4%) | 93 (70.5%) |
| **Smoking Status** | | | |
| Current | 6 (46.2%) | 41 (34.5%) | 47 (35.6%) |
| Ex-smoker | 3 (23.1%) | 38 (31.9%) | 41 (31.1%) |
| Non-smoker | 4 (30.8%) | 40 (33.6%) | 44 (33.3%) |
| **Family History of CAD** | | | |
| Yes | 4 (30.8%) | 31 (26.1%) | 35 (26.5%) |
| No | 9 (69.2%) | 88 (73.9%) | 97 (73.5%) |
| **Chronic Kidney Disease** | | | |
| Yes | 3 (23.1%) | 14 (11.8%) | 17 (12.9%) |
| No | 10 (76.9%) | 105 (88.2%) | 115 (87.1%) |

## DISCUSSION

Diabetes mellitus contributes to cardiogenic shock through multiple pathways, including diabetic cardiomyopathy with myocardial fibrosis and stiffness, autonomic dysfunction impairing compensatory vasoconstriction, and microvascular dysfunction with reduced collateral circulation. Additionally, chronic hyperglycemia promotes endothelial dysfunction and a pro-inflammatory state, which exacerbates myocardial injury and predisposes to larger infarcts and mechanical complications following acute infarction [2]. Overall, 9.8% of post-MI diabetic patients exhibited cardiogenic shock, which falls within the range documented in earlier research but constitutes a significant health impact in this population at elevated risk [11]. Although here diabetes cohort's reported frequency is greater than Shalaby *et al.* 5.8%, it is more in line with Daoulah *et al.* findings, which showed an 8.5% incidence [8, 12]. This high prevalence


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highlights the increased susceptibility of diabetic individuals to hemodynamic problems after acute coronary events, in contrast to the overall MI group, where shock rates often fall between 5 and 8% [13]. Results from the SHOCK trial registry, which found advanced age to be a standalone predictor of death in patients with cardiogenic shock, conflict with the lack of a substantial correlation between age and cardiogenic shock [14]. However, as the largest risk usually occurs in people over 65, present study's age restriction (30–60 years) may have hampered our capacity to discover age-related variations. In a similar vein, the lack of gender differences is consistent with some recent research but contradicts previous findings that suggested a male preponderance in the incidence of cardiogenic shock [15]. Notably, when it comes to disease-specific characteristics, we found that shock onset was not substantially predicted by either diabetes duration or glycemic control (measured by HbA1c levels) [16]. This contradicts the widely held belief that inferior cardiovascular effects should be associated with longer duration of diabetes and worse glycemic control. Present findings are in line with those of the ORIGIN study, which showed that high-risk diabetic patients' cardiovascular events were not significantly decreased by strict glucose management [17]. They do, however, contradict findings from the research, which showed that patients with diabetic MI had better results while receiving rigorous insulin treatment [18]. Although not statistically significant, the tendency toward a greater shock frequency in patients receiving insulin (13.2%) as opposed to those receiving oral medications alone (7.2%) is worth considering. This conclusion is consistent with the BARI 2D experiment, which found that insulin usage was linked to poorer cardiovascular outcomes regardless of glycemic control [19]. Rather than being a direct result of insulin therapy, this might reflect more complex diabetic pathogenesis. The lack of significant associations with traditional risk variables such as smoking status, hypertension, and dyslipidemia raises the possibility that these variables might have experienced their maximum impact on coronary atherosclerosis in the wake of acute MI in diabetic patients, with acute circulatory and physical variables driving shock emergence more significantly than the impact of chronic risk factors [20]. Current observation that there was a tendency for chronic kidney disease to be linked to cardiogenic shock is consistent with a wealth of research showing the detrimental combined impact of diabetes and kidney dysfunction on cardiovascular outcomes [21]. Renal impairment dramatically raises the incidence of cardiogenic shock after acute MI [22]. Given the very small number of shock incidents included in current analysis, the absence of statistical relevance for most relationships most likely reflects insufficient statistical power. Smaller but clinically significant relationships could have gone unnoticed with this sample size. Single-center studies with very uncommon events, such as cardiogenic shock, frequently have this drawback. Present results are broadly in agreement with regional information gathered from Asian people when compared to other research from comparable contexts [23]. Cardiogenic shock rates in diabetic MI patients ranged from 8 to 12% [24]. These continuously greater incidences in Asian populations relative to Western cohorts might be caused by variations in comorbidity trends, healthcare availability, or a genetic vulnerability. From a pathophysiological viewpoint, present findings imply that acute variables such as infarct size, location, and mechanical difficulties may have a greater influence on the progression of cardiogenic shock in diabetic patients suffering from MI than chronic diabetes-associated parameters. This is consistent with current knowledge that autonomic dysfunction and diabetic cardiomyopathy produce an environment that intensifies the hemodynamic effects of acute ischemia [25].

Current study has several limitations. The single-center, cross-sectional design limits generalizability and precludes causal inference, while the small sample size and low number of shock events reduced statistical power. We did not control for potential confounders such as infarct size, timing, and success of reperfusion therapy, or concurrent medication use, which may have influenced the observed associations with cardiogenic shock. Future prospective multicenter cohort studies with larger sample sizes are recommended to validate these findings, explore temporal relationships, and identify independent predictors of cardiogenic shock in this high-risk diabetic population.

## CONCLUSIONS

In this cross-sectional study of diabetic post-myocardial infarction patients, cardiogenic shock occurred at a notable frequency. No statistically significant associations were found between cardiogenic shock and demographic or diabetes-related characteristics, suggesting that acute myocardial infarction variables may outweigh chronic diabetic factors in predicting shock onset in this population.

## Authors' Contribution

Conceptualization: AS, JA
Methodology: AS
Formal analysis: AS, SN, AJM
Writing and Drafting: AS, JA, MA
Review and Editing: AS, JA, MA, SN, AJK

All authors approved the final manuscript and take responsibility for the integrity of the work


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## Conflict of Interest

All the authors declare no conflict of interest.

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## REFERENCES

[1] Luo C, Chen F, Liu L, Ge Z, Feng C, Chen Y. Impact of Diabetes on Outcomes of Cardiogenic Shock: A Systematic Review and Meta-Analysis. Diabetes and Vascular Disease Research. 2022 Oct; 19(5): 14791641221132242. doi: 10.1177/14791641221132242.

[2] Yuan Y, Tao J, Shen X, Cheng H, Dong X, Muyesai N *et al.* Elevated Random Glucose Levels at Admission are Associated with All - Cause Mortality And Cardiogenic Shock During Hospitalisation in Patients with Acute Myocardial Infarction and Without Diabetes: A Retrospective Cohort Study. Diabetes/Metabolism Research And Reviews. 2023 May; 39(4): e3617. doi: 10.1002/dmrr.3617.

[3] Gatuz MV, Abu-Fanne R, Abramov D, Barel M, Mamas MA, Roguin A *et al.* Comparative Analysis of Cardiogenic Shock Outcomes in Acute Myocardial Infarction with Polyvascular Disease. American Heart Journal Plus: Cardiology Research and Practice. 2024 Oct; 46: 100452. doi: 10.1016/j.ahjo.2024.100452.

[4] Ashraf SJ, Ahmed T, Faisal M, Mueed A, Younus M. Frequency of Cardiogenic Shock in Acute Inferior Wall Myocardial Infarction. The Professional Medical Journal. 2022 Jan; 29(2): 199-205. doi: 10.29309/TPMJ/2022.29.02.6511.

[5] Jortveit J, Myhre PL, Andersen GØ, Halvorsen S. Cardiogenic Shock as a Complication of Acute Myocardial Infarction: A Nationwide Cohort Study. European Heart Journal: Acute Cardiovascular Care. 2026 Feb; 15(2): 107-17. doi: 10.1093/ehjacc/zuaf118.

[6] Nawaz T, Muhammad S, Quaid F, Ali H. Frequency of Cardiogenic Shock in Adult Patients with Non-ST-Elevation Myocardial Infarction. Pakistan Journal of Intensive Care Medicine. 2025 Jul; 5(2): 106. doi: 10.54112/pjicm.v5i02.106.

[7] Choi SH, Yoon GS, Lee MJ, Park SD, Ko YG, Ahn CM *et al.* Prognostic Impact of Plasma Glucose on Patients With Cardiogenic Shock with or Without Diabetes Mellitus From The SMART RESCUE Trial. The American Journal of Cardiology. 2022 Jul; 175: 145-51. doi: 10.1016/j.amjcard.2022.04.008.

[8] Shalaby G, Niazi AK, Khaled S. Cardiogenic Shock Among Patients with Acute ST-Segment Elevation Myocardial Infarction in a Middle Eastern Country: A Single-Center Experience. Journal of the Saudi Heart Association. 2023 Jan; 34(4): 232. doi: 10.37616/2212-5043.1323.

[9] Sterling LH, Fernando SM, Talarico R, Qureshi D, van Diepen S, Herridge MS *et al.* Long-term outcomes of cardiogenic shock complicating myocardial infarction. Journal of the American College of Cardiology. 2023 Sep; 82(10): 985-95. doi: 10.1016/j.jacc.2023.06.026.

[10] Wang S, Zhang Y, Yang W, Wang X, Zhu Z, Qi D *et al.* Impact of Stress Hyperglycemia Ratio on Incidence of In-Hospital Cardiogenic Shock in Patients with ST-Elevation Myocardial Infarction: A Prospective, Multicenter Study. Frontiers in Endocrinology. 2025 Dec; 16: 1677084. doi: 10.3389/fendo.2025.1677084.

[11] Sinha SS, Rosner CM, Tehrani BN, Maini A, Truesdell AG, Lee SB *et al.* Cardiogenic Shock from Heart Failure Versus Acute Myocardial Infarction: Clinical Characteristics, Hospital Course, and 1-Year Outcomes. Circulation: Heart Failure. 2022 Jun; 15(6): e009279. doi: 10.1161/CIRCHEARTFAILURE.121.009279.

[12] Daoulah A, Alshehri M, Panduranga P, Aloui HM, Yousif N, Arabi A *et al.* Clinical Outcomes of Patients with Cardiogenic Shock Complicating Acute Myocardial Infarction: The Gulf-Cardiogenic Shock Registry. Shock. 2024 Oct; 62(4): 512-21. doi: 10.1097/SHK.0000000000002433.

[13] Vallabhajosyula S, Bhopalwala HM, Sundaragiri PR, Dewaswala N, Cheungpasitporn W, Doshi R et al. Cardiogenic Shock Complicating Non-ST-Segment Elevation Myocardial Infarction: An 18-Year Study. American Heart Journal. 2022 Feb; 244: 54-65. doi: 10.1016/j.ahj.2021.11.002.

[14] Panwar R, Gibberd A, Oldmeadow C, Tiruvoipati R, Åneman A, Kansal A *et al.* REACT SHOCK Trial Protocol and Analysis Plan—A Multicenter Randomised Controlled Trial Comparing Individualised Blood Pressure Target Versus Standard Blood Pressure Target Among Critically Ill Patients With Shock. Trials. 2025 Oct; 26(1): 409. doi: 10.1186/s13063-025-09142-9.

[15] Wu L, Cao J, Ge J. Prognostic Value of Baseline Glucose Levels for Mortality in Patients with Cardiogenic Shock: A Systematic Review and Meta-Analysis. Journal of Cardiothoracic Surgery. 2025 May; 20(1): 237. doi: 10.1186/s13019-025-03483-x.

[16] Wang J, Zhao C, Yang C, Dong Y, Yang X, Sun C. Prediction of Cardiogenic Shock in Acute Myocardial Infarction Patients Using a Nomogram. Journal of Clinical Medicine. 2025 Dec; 14(24): 8789. doi: 10.3390/jcm14248789.


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[17] Riddle MC, Gerstein H, ORIGIN Trial Investigators. Response to Comment on: The ORIGIN Trial Investigators. Characteristics Associated With Maintenance of Mean A1C< 6.5% in People With Dysglycemia in the ORIGIN Trial. Diabetes Care 2013; 36: 2915–2922. Diabetes Care. 2013 Oct; 36(10): e181. doi: 10.2337/dc13-1319.

[18] Xu Q, Wang J, Lin Z, Song D, Ji K, Xiang H. The Glycemic Gap as a Prognostic Indicator in Cardiogenic Shock: A Retrospective Cohort Study. BioMed Central Cardiovascular Disorders. 2024 Sep; 24(1): 468. doi: 10.1186/s12872-024-04138-w.

[19] Rutter MK and Nesto RW. The BARI 2D Study: A Randomised Trial of Therapies for Type 2 Diabetes and Coronary Artery Disease. Diabetes and Vascular Disease Research. 2010 Jan; 7(1): 69-72. doi: 10.1177/1479164109354145.

[20] Jiang Y, Boris AF, Zhu Y, Gan H, Hu X, Xue Y *et al.* Incidence, Clinical Characteristics and Short-Term Prognosis in Patients with Cardiogenic Shock and Various Left Ventricular Ejection Fractions After Acute Myocardial Infarction. The American Journal of Cardiology. 2022 Mar; 167: 20-6. doi: 10.1016/j.amjcard.2021.11.040.

[21] Pop CF, Coadă CA, Lupu M, Ferenț IF, Hodas RI, Pintilie A *et al.* Factors Associated with Mortality Risk in Patients with Cardiogenic Shock Post-ST-Elevation Myocardial Infarction: Insights from a Regional Centre in Northwest Romania. Medicina. 2025 Apr; 61(4): 725. doi: 10.3390/medicina61040725.

[22] Nair RM, Chawla S, Mentias A, Saleem T, Vural A, Ko T *et al.* Glycemic Patterns and Impact of Early Hyperglycaemia in Patients with Cardiogenic Shock on Mechanical Circulatory Support. European Heart Journal: Acute Cardiovascular Care. 2023 May; 12(5): 328-35. doi: 10.1093/ehjacc/zuad032.

[23] Xie L, Chen J, Li Y, Huang B, Luo S. The Prognostic Impact of Stress Hyperglycemia Ratio on Mortality in Cardiogenic Shock: A MIMIC-IV Database Analysis. Diabetology and Metabolic Syndrome. 2024 Dec; 16(1): 312. doi: 10.1186/s13098-024-01562-y.

[24] Altabas V, Babić D, Grulović A, Bulum T, Babić Z. Flash Glucose Monitoring for Predicting Cardiogenic Shock Occurrence in Critically Ill Patients: A Retrospective Pilot Study. Diagnostics. 2025 Mar; 15(6): 685. doi: 10.3390/diagnostics15060685.

[25] Almutairi T, Dargham S, Jayyousi A, Al Suwaidi J, Abi Khalil C. Diabetic Ketoacidosis and Hyperglycemic Hyperosmolar State are Associated with Higher In-Hospital Mortality and Morbidity in Diabetes Patients Hospitalized with ST-Elevation Myocardial Infarction, but not Within 30 Days of Readmission. PLoS One. 2025 Feb; 20(2): e0318774. doi: 10.1371/journal.pone.0318774.


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