*Pakistan Journal of Intensive Care Medicine*
*eISSN: 2708-2261; pISSN: 2958-4728*
www.pjicm.com
DOI: https://doi.org/10.54112/pjicm.v5i02.106
*Pak. J. Inten. Care Med., volume 5(2), **2025**: 106*
***Original Research Article***

# FREQUENCY OF CARDIOGENIC SHOCK IN ADULT PATIENTS WITH NON-ST-ELEVATION MYOCARDIAL INFARCTION

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*(Received, 10th May 2025, Revised 10th June 2025, Accepted 30th June, Published 18th July 2025)*

## ABSTRACT

***Background:*** *Cardiogenic shock (CS) is a serious and potentially fatal complication of acute coronary syndromes, including non-ST-elevation myocardial infarction (NSTEMI). Identifying its frequency and associated risk factors is essential for prompt risk stratification and management.* ***Objective:*** *To determine the frequency of cardiogenic shock in adult patients presenting with NSTEMI.* ***Study Design:*** *Cross-sectional.* ***Setting:*** *Department of Cardiology, Lady Reading Hospital, Peshawar, Pakistan.* ***Duration of Study:*** *From November 8, 2024, to May 8, 2025.* ***Methods:*** *A total of 146 patients aged 30 to 70 years diagnosed with NSTEMI were enrolled consecutively. Cardiogenic shock was defined as a systolic blood pressure <90 mmHg for ≥30 minutes, a cardiac index <1.8 L/min/m², or pulmonary capillary wedge pressure >18 mmHg. Clinical variables, including diabetes, hypertension, and smoking status, were recorded. Data were analyzed using appropriate statistical methods to determine associations (p<0.05 considered significant).* ***Results:*** *The mean age of the study population was 57.91 ± 10.38 years. Among the patients, 92 (63.0%) were male and 54 (37.0%) were female. Cardiogenic shock was diagnosed in 9 patients (6.2%). A statistically significant association was found between cardiogenic shock and diabetes (p=0.04), hypertension (p=0.009), and smoking (p=0.0001).* ***Conclusion:*** *Cardiogenic shock occurred in 6.2% of patients with NSTEMI in this study. Diabetes, hypertension, and smoking were significantly associated with the development of cardiogenic shock, underscoring the need for careful monitoring and early intervention in high-risk individuals.*

**Keywords:** Cardiogenic Shock, Non-ST-Elevation Myocardial Infarction, Adult Patients

## INTRODUCTION

Acute coronary syndrome (ACS) can be divided into three subgroups: STEMI, NSTEMI, as well as unstable angina. ACS is linked with considerable death and disability; thus, timely diagnosis as well as suitable treatment are crucial (1, 2). The identification and treatment of STEMI are addressed in other sources. NSTEMI, along with unstable angina, exhibits noteworthy similarities, with the key difference that NSTEMI has characteristics defined by positive cardiac biomarkers. The diagnosis of NSTEMI is completely addressed in the current literature (3-5). NSTEMI may present based on a depressed ST-segment or as T-wave inversion, while STEMI is marked by persistent ST-segment elevation that lasts more than 20 minutes. Cardiovascular troponin testing, in addition to an ECG, is an important tool for the precise diagnosis of MI and is required for patients exhibiting NSTEMI features on ECG.1, 3 The Cardiac troponin test distinguishes between NSTEMI and unstable angina, assisting as a crucial tool for risk stratification and therapeutic decisions (6-8).

Cardiogenic shock is referred to as a clinical condition characterized by reduced cardiac output, which results in circulatory failure, end-organ hypoperfusion, as well as tissue hypoxia. Acute MI is the primary cause of cardiogenic shock; nevertheless, other conditions affecting the myocardium or pericardium may also lead to this situation. Despite advancements within reperfusion therapy along with mechanical circulatory support, mortality and morbidity rates among individuals with cardiogenic shock continue to increase (9-11). The incidence of cardiogenic shock has decreased due to the rising utilization of PCI for acute MI. Around 5% of STEMI cases, as well as 2% of NSTEMI instances, can give rise to cardiogenic shock. This corresponds to an annual incidence of 40,000 cases in the US (12, 13). A study recorded the frequency of cardiogenic shock in adult patients with NSTEMI as 8.4% (14). Despite advances in treatment for NSTEMI, the development of cardiogenic shock remains a challenging complication that exacerbates the clinical outcome, leading to increased hospitalizations and healthcare costs. As there is a paucity of literature on this subject at the local level, the goal of this study is to determine the frequency of cardiogenic shock in adult patients with non-ST-elevation myocardial infarction at our health setup. The findings of this study will help elucidate the relationship between NSTEMI and subsequent cardiogenic shock. We seek to enhance early intervention strategies, refine treatment approaches, and ultimately reduce the burden of this severe complication.

## METHODOLOGY

The study was conducted in the Department of Cardiology at Lady Reading Hospital, Peshawar, employing a cross-sectional design from 08/11/2024 to 08/05/2025. Ethical approval was obtained from the hospital. The sample was calculated with an assumed frequency of cardiogenic shock at 8.4%[14] based on prior research, 95% confidence level, and an absolute precision of 4.5%. This calculation yielded a required sample size of 146 patients who were selected through consecutive non-probability sampling.

Patients aged between 30 and 70 years diagnosed with NSTEMI, which was defined as chest pain lasting more than 30 minutes, specific electrocardiographic changes (ST-segment depression >0.5 mm or T-wave inversion >2 mm), and elevated troponin levels, were enrolled in the study. Patients with recurrent NSTEMI, valvular heart disease, neurological impairments, or renal failure were not enrolled. Patients gave their consent to take part in the study. Demographic and clinical data, including age, body mass index (BMI), gender, socioeconomic status, residence, education level, and employment status, along with comorbidities such as smoking, diabetes, and hypertension, were

taken. Cardiogenic shock was diagnosed if systolic blood pressure persistently below 90 mmHg for at least 30 minutes without hypovolemia, a cardiac index <1.8 L/min/m² (or 2–2.2 L/min/m² with support) or elevated pulmonary capillary wedge pressure (>18 mmHg) measured via pulmonary artery catheterization. All assessments were conducted under the supervision of an experienced cardiologist with over five years of post-fellowship practice.

Data were entered and analyzed with SPSS 25. Continuous variables were presented as mean ± standard deviation. Categorical variables were assessed as frequencies and percentages. Stratified analyses were performed to examine associations of cardiogenic shock with demographic and comorbidities. Chi-square tests were applied with statistical significance set at $p < 0.05$.

## RESULTS

The mean age of 146 patients was 57.91±10.384 years. The mean body mass index (BMI) was 25.55±2.01 kg/m². Among the participants, there were 92 (63.0%) males and 54 (37.0%) females. There were 39 (26.7%) patients having diabetes and 54 (37.0%) diagnosed with hypertension. Smoking was reported by 30 (20.5%) patients (Table 1). The overall frequency of cardiogenic shock was 9 (6.2%) (Table 2).

Age distribution showed that patients (46 to 60 years) had a higher proportion of cardiogenic shock at 5 (55.6%) (p=0.04). Males accounted for 7 (77.8%) of the shock cases, though the gender difference was notable (p=0.34). Diabetes was present in 5 (55.6%) of the shock cases (p=0.04). Hypertension was even more strongly linked with 7 (77.8%) of shock patients being hypertensive (p=0.009). Smoking also showed a potential relationship, as 6 (66.7%) of shock patients were smokers (p=0.0001). BMI did not differ between groups, though a higher proportion of shock cases had a BMI above 25.9 kg/m² (p=0.15) (Table 3).

**Table 1: Demographics & comorbidities**

| Demographics & comorbidities | | n | % |
|---|---|---|---|
| Gender | Male | 92 | 63.0% |
| | Female | 54 | 37.0% |
| Socioeconomic status | Lower class | 40 | 27.4% |
| | Middle class | 64 | 43.8% |
| | Upper class | 42 | 28.8% |
| Education status | Educated | 66 | 45.2% |
| | Uneducated | 80 | 54.8% |
| Residence | Rural | 65 | 44.5% |
| | Urban | 81 | 55.5% |
| Employment status | Employed | 68 | 46.6% |
| | Unemployed | 78 | 53.4% |
| Diabetes | Yes | 39 | 26.7% |
| | No | 107 | 73.3% |
| Hypertension | Yes | 54 | 37.0% |
| | No | 92 | 63.0% |
| Smoking | Yes | 30 | 20.5% |
| | No | 116 | 79.5% |

**Table 2: Frequency of Cardiogenic shock**

| Cardiogenic shock | n | % |
|---|---|---|
| Yes | 9 | 6.2% |
| No | 137 | 93.8% |

**Table 3: Association of cardiogenic shock with demographics & comorbidities**

| Demographics & comorbidities | | Cardiogenic shock | | | | P value |
|---|---|---|---|---|---|---|
| | | Yes | | No | | |
| | | n | % | n | % | |
| Age distribution (Years) | 30 to 45 | 3 | 33.3% | 19 | 13.9% | 0.04 |
| | 46 to 60 | 5 | 55.6% | 45 | 32.8% | |
| | 61 to 70 | 1 | 11.1% | 73 | 53.3% | |
| Gender | Male | 7 | 77.8% | 85 | 62.0% | 0.34 |
| | Female | 2 | 22.2% | 52 | 38.0% | |
| Socioeconomic status | Lower class | 2 | 22.2% | 38 | 27.7% | 0.92 |
| | Middle class | 4 | 44.4% | 60 | 43.8% | |
| | Upper class | 3 | 33.3% | 39 | 28.5% | |
| Education status | Educated | 3 | 33.3% | 63 | 46.0% | 0.46 |
| | Uneducated | 6 | 66.7% | 74 | 54.0% | |
| Residence | Rural | 5 | 55.6% | 60 | 43.8% | 0.49 |
| | Urban | 4 | 44.4% | 77 | 56.2% | |
| Employment status | Employed | 6 | 66.7% | 62 | 45.3% | 0.21 |
| | Unemployed | 3 | 33.3% | 75 | 54.7% | |
| Diabetes | Yes | 5 | 55.6% | 34 | 24.8% | 0.04 |
| | No | 4 | 44.4% | 103 | 75.2% | |
| Hypertension | Yes | 7 | 77.8% | 47 | 34.3% | 0.009 |
| | No | 2 | 22.2% | 90 | 65.7% | |
| Smoking | Yes | 6 | 66.7% | 24 | 17.5% | 0.0001 |
| | No | 3 | 33.3% | 113 | 82.5% | |
| BMI (Kg/m2) | 18 to 25.9 | 3 | 33.3% | 79 | 57.7% | 0.15 |
| | > 25.9 | 6 | 66.7% | 58 | 42.3% | |

## DISCUSSION

The present study was conducted among 146 patients with non-ST-elevation myocardial infarction (NSTEMI) revealed a cardiogenic shock (CS) frequency of 6.2% aligning closely with rates reported in similar regional studies, Kazi et al. documented a 5.9% incidence in Pakistani patients under 45 years while Salahuddin et al and Khan et al both reported 5% frequencies in broader age groups (15-17). Hussain et al. noted a slightly higher rate, 8.4% possibly reflecting their tertiary care setting where more severe cases congregate (14).

Our finding reinforces the consistent epidemiological pattern across South Asia, where cardiogenic shock complicates NSTEMI admissions, contrasting with global registries that often report lower

[Citation: Roohulamin., Nawaz, T., Muhammad, S., Asfandiyar., Quaid, F., Ali, H. (2025). Frequency of cardiogenic shock in adult patients with non-st-elevation myocardial infarction. *Pak. J. Inten. Care Med. 5(2), **2025**: 106*. doi: https://doi.org/10.54112/pjicm.v5i02.106]

rates in Western populations. This disparity may stem from delayed presentation, limited access to invasive cardiology services, or regional differences in risk factor profiles (18, 19).

A striking observation in our cohort was the potential association between cardiogenic shock and younger age (30–45 years), where 33.3% of shock cases occurred. Around 55.6% shock cases happened in the age group of 46 to 60 years. This may contrast with most literature, including Salahuddin et al and Pal et al., who identified shock predominantly in patients >70 years (16, 20).

However, our finding resonates with Kazi et al., who specifically studied patients <45 years and noted a high shock burden linked to diabetes and smoking (15). This suggests a concerning regional trend of premature aggressive coronary disease in younger South Asians, which is potentially driven by genetic susceptibility, lifestyle factors, or undiagnosed metabolic disorders. The male majority in shock cases, 77.8% in our study, mirrored global patterns observed in Hussain et al. (63.3% male) and Waheed et al. (57.1% male), underscoring gender-based disparities in disease severity (14, 21).

Comorbidities demonstrated a strong link with shock. Diabetes was present in 55.6% of shock patients versus 24.8% without shock ($p=0.04$), which resonates with Kazi et al., who identified diabetes as a notable predictor ($p<0.05$) of CS (15). This aligns with the pathophysiological understanding that hyperglycemia impairs myocardial salvage during ischemia and promotes microvascular dysfunction.

Hypertension exhibited an even stronger link with 77.8% of shock patients affected ($p=0.009$). While Hussain et al. reported high hypertension prevalence (54.7%), they did not find a notable association, possibly due to smaller shock subgroup sizes (14). The most vigorous association emerged with smoking, 66.7% of shock patients were smokers ($p=0.0001$), which is consistent with Kazi et al. and Khan et al., who identified smoking as the leading risk factor (15, 17). This emphasizes smoking's role in endothelial inflammation and plaque instability, exacerbating myocardial injury during NSTEMI.

These collective findings highlight a critical public health challenge. The convergence of traditional risk factors (diabetes, hypertension, and smoking) may be driving severe complications like cardiogenic shock in NSTEMI patients. Future research should prioritize multicenter cohorts to validate these associations.

## CONCLUSION

We conclude that the frequency of cardiogenic shock in our study was 6.2% in patients with NSTEMI. Diabetes, smoking, and hypertension were found to be notably associated with cardiogenic shock.

## DECLARATIONS

**Data Availability Statement**

All data generated or analysed during the study are included in the manuscript.

**Ethics approval and consent to participate**

Approved by the department Concerned.

**Consent for publication**

Approved

**Funding**

Not applicable

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTION

***ROOHULAMIN ((Post Graduate Resident)***
*Development of Research Methodology Design, Data Collection, Data Analysis, Review of manuscript, Manuscript drafting.*
***TARIQ NAWAZ (Assistant Professor)***
*Conception of Study, Critical input, Final approval of manuscript.*
***SOHAIL MUHAMMAD (Post Graduate Resident)***
*Review of Literature.*
***ASFANDIYAR (Post Graduate Resident)***
*Review of Literature.*
***FAZAL QUAID (Post Graduate Resident)***
*Review of Literature.*
***HASSAN ALI (Trainee Registrar)***
*Review of Literature.*

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[Citation: Roohulamin., Nawaz, T., Muhammad, S., Asfandiyar., Quaid, F., Ali, H. (2025). Frequency of cardiogenic shock in adult patients with non-st-elevation myocardial infarction. *Pak. J. Inten. Care Med. 5(2), **2025**: 106*. doi: https://doi.org/10.54112/pjicm.v5i02.106]