

**ORIGINAL ARTICLE****OPEN ACCESS****FREQUENCY OF CARDIOGENIC SHOCK IN PATIENTS WITH STEMI AT PESHAWAR INSTITUTE OF CARDIOLOGY.**Nazia Waheed<sup>1</sup>, Murad Ali<sup>2</sup>, Shah Sawar Khan<sup>3</sup>, Hasan Zeb<sup>4</sup>, Mina Ibrahim<sup>5</sup>, Imadullah Khan<sup>6</sup><sup>1,2,3,4,5,6</sup> *Department of Cardiology Peshawar institute of Cardiology .***ABSTRACT**

**Objective:** To determine the frequency of cardiogenic shock in patients with STEMI at Peshawar Institute of Cardiology-MTI.

**Study Design:** A Descriptive Study.

**Place and Duration of Study:** Department of Cardiology, Peshawar Institute of Cardiology-MTI from 12 Oct 2022 to 12 Apr 2023.

**Methodology:** Patients admitted at the CCU of our hospital and meeting our inclusion criteria were enrolled. However, prior to the conduct of study, written informed consent forms was obtained from their attendants and they were thoroughly briefed about the research nature of this study. Demographic data was recorded, and selected patients were closely monitored. Incidence of cardiogenic shock was noted as per operational definition.

**Results:** As per frequencies and percentages for cardiogenic shock, 14(6.8%) patients had cardiogenic shock.

**Conclusion:** This study demonstrated that the incidence of cardiogenic shock was low (6.8%) in patients with ST elevation myocardial infarction and therefore, it is treatable illness with a reasonable chance for full recovery.

**Keywords:** Cardiogenic Shock, St Elevation Myocardial Infarction (STEMI), Primary Cardiac Disorder

**How To Cite This Article:** Waheed N, Ali M, Khan SS, Zeb H, Ibrahim M, Khan I. Frequency of cardiogenic shock in patients with STEMI at Peshawar Institute of Cardiology: Original Article. J Bacha Khan Med Coll. 2024;5(2):219–225.

**Correspondence Author:** Shah Sawar Khan  
Resident Cardiology Peshawar institute of Cardiology  
**E-mail:** [Shahsawar77@yahoo.com](mailto:Shahsawar77@yahoo.com)  
<https://orcid.org/0009-0006-6811-7813>

**Received:** 5<sup>th</sup> August ,2024  
**Revised:** 12<sup>th</sup> September ,2024  
**Accepted:** 25<sup>th</sup> December,2024  
**Published:** 6<sup>th</sup> January, 2025  
**DOI:** <https://doi:10.69830/jbkmc.v5i02.184>

## INTRODUCTION

Cardiogenic shock is a cardiac disorder, it is clinically and biochemically defined as a state of tissue hypoperfusion. CS is characterized by a systolic blood pressure of  $\leq 90$  mmHg for  $\geq 30$  min, or requiring support measures and maintenance of systolic blood pressure of  $\leq 90$  mmHg with urine output of  $\leq 30$  mL/hr [3, 5]. Cardiac and pulmonary criteria include a low cardiac index (15 mmHg) [1–3]. CS is a clinical entity characterized by a state of circulatory failure with end organ perfusion and tissue oxygenation derangement manifested as a decrease in cardiac output. Acute myocardial infarction, or AMI, is the most common cause of CS, but other causes of myocardial, valve, conduction or pericardial disease can also lead to CS. Despite the advancements in reperfusion therapy and mechanical circulatory support, the morbidity and mortality rates of patients with CS still remain high [4, 5]. There are several different types of cardiac dysfunction that can lead to cardiogenic shock. Acute myocardial ischemia, ventricular wall rupture, mechanical failure (most commonly acute mitral regurgitation with or without cardiac tamponade), left ventricular outflow obstruction (hence, hypertrophic obstructive cardiomyopathy or aortic stenosis), left ventricular inflow obstruction (mitral stenosis or atrial myxoma), cardiac contractility defects (ischaemic or non-isc Other causes are cardiotoxic drugs (eg, doxorubicin), overdose of medications (eg, beta blockers or calcium channel blockers), metabolic derangements (eg, acidosis) and electrolyte abnormalities (eg, calcium or phosphate imbalances) [6, 8]. Risk factors for developing CS after ST elevation myocardial infarct (STEMI) include age  $>70$  years, systolic blood pressure

## METHODOLOGY

### Study Design and Setting

This descriptive cross-sectional study was conducted at the Department of Cardiology, Peshawar Institute of Cardiology-MTI, from October 12, 2022, to April 12, 2023.

### Study Population

A sample of 205 patients with ST-elevation myocardial infarction (STEMI) was recruited with the use of a non-probability consecutive sampling method. The estimated proportion was 7.0% cardiogenic shock in STEMI patients according to WHO sample size calculator, with 95% confidence interval and 3.5% margin of error.

### Rationale

Cardiogenic shock (CS) is one of the most serious complications of acute myocardial infarction (AMI), especially when it is STEMI. In spite of developments in primary percutaneous coronary intervention (PCI), the occurrence of CS continues to be present in 58% of STEMI patients and 23% of non-STEMI patients-representing 40,000-50,000 cases in the United States each year. The pathophysiology is complicated and mainly consists of severe myocardial ischemia that causes left ventricular systolic and diastolic dysfunction which in turn triggers a vicious cycle of low cardiac output, hypotension, and increasing ischemia. The importance of timely diagnosis and intervention has been supported by previous researchers who documented the presence of CS in 7 percent of all patients with definitive STEMI diagnosis. As the mortality rate linked to CS is high, especially in low-resource countries, the research was intended to provide an estimation of its incidence in STEMI patients and contribute to enhancing early identification and treatment in the future.

### Ethical Approval Statement

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Peshawar Institute of Cardiology (Approval No: PIC//ERB/2240/03/2021). The study was conducted in accordance with ethical guidelines for medical research involving human subjects. Informed consent was obtained from all participants, ensuring confidentiality, data privacy, and anonymity throughout the research, analysis, and publication process.

### Inclusion Criteria

Patients aged 35 to 80 years of either gender admitted to the Coronary Care Unit (CCU) with a diagnosis of ST-elevation myocardial infarction (STEMI) as per operational definition.

### Exclusion Criteria

Patients diagnosed with non-ST elevation myocardial infarction (NSTEMI) based on clinical history or examination, and those who were unwilling to participate.

### Data Collection

After obtaining the required approvals, eligible patients admitted to the CCU were enrolled following written informed consent from their attendants. Participants were briefed thoroughly about the research objectives and methodology. Demographic and clinical data—including age, gender, disease duration, socioeconomic status, comorbidities (diabetes mellitus, hypertension), smoking status, lifestyle, history of left ventricular dysfunction, and presence of cardiogenic shock—were documented using a structured proforma (Annex-A). Patients were monitored under the supervision of a consultant cardiologist with over seven years of post-fellowship experience.

### Statistical Analysis

Data were entered and analyzed using SPSS version 23.0. Means and standard deviations were calculated for continuous variables such as age and disease duration, while frequencies and percentages were used for categorical variables (e.g., gender, comorbidities, lifestyle factors, and cardiogenic shock). Stratification was performed to assess the effect of modifiers such as age group, gender, socioeconomic status, diabetes, hypertension, smoking, lifestyle, and history of left ventricular injury on the incidence of cardiogenic shock. Post-stratification analysis was conducted using the Chi-square test, with a  $p$ -value  $< 0.05$  considered statistically significant.

## RESULTS

205 patients presented at the Department of cardiology, Peshawar Institute of Cardiology, Peshawar. Results are as follows: - The mean age of the participants was found to be

61.11 years, with a standard deviation of 7.963 years. This indicates that the around the mean, suggesting a diverse range of ages among the participants. Additionally, the mean duration of disease was calculated to be 5.31 years, with a standard deviation of 2.214 years. (Table 1). Among these participants, 14 individuals, accounting for 6.8% of the total sample, experienced cardiogenic shock. Conversely, the majority of the participants, comprising 191 individuals or 93.2%, did not encounter cardiogenic shock. (Table 2). The participants were categorized into two age groups: those aged less than 60 years and those aged 60 years or older. Among individuals younger than 60, 8 individuals experienced cardiogenic shock, while among those aged 60 or older, 6 individuals encountered cardiogenic shock. The percentage breakdown within these groups indicates that 57.1% of cardiogenic shock cases occurred in individuals under 60 years old, while 42.9% occurred in those aged 60 or older. However, upon statistical analysis using a  $P$ -value of .787, there appears to be no statistically significant difference in the occurrence of cardiogenic shock between these two age groups. Furthermore, when considering the entire sample population, comprising both age groups, 110 individuals were younger than 60, and 95 were 60 years or older, with the percentages indicating a relatively even distribution between the two age groups. (Table 3). Among males, 8 individuals experienced cardiogenic shock, while among females, 6 individuals encountered the same condition. The percentages indicate that 57.1% of cardiogenic shock cases were observed in males, whereas 42.9% occurred in females. However, upon conducting statistical analysis using a  $P$ -value of .557, the results suggest that there is no statistically significant difference in the incidence of cardiogenic shock between males and females within this sample population. Looking at the overall distribution, the total number of males in the sample was 132, while the total number of females was 73, with percentages indicating a higher representation of males. Despite this disparity in gender distribution, the prevalence

Influenced by gender in this particular sample. (Table 4).

**Table No. 1 Descriptive Statistics of Study (n=205)**

Numerical Variable	Mean	Std. Deviation
Age (Years)	61.11	7.963
Duration of Disease (Years)	5.31	2.214

**Table No. 2 Frequencies and Percentages for Cardiogenic Shock (n=205)**

Cardiogenic shock	Frequency	Percent
Yes	14	6.8%
No	191	93.2%
<b>Total</b>	205	100.0%

**Table No. 3 Stratification of Cardiogenic Shock with Age Groups (n=205)**

		Age Groups		Total	P Value
		≤ 60 Years	> 60 Years		
<b>Cardiogenic Shock</b>	Yes	8	6	14	.787
		57.1%	42.9%	100.0%	
	No	102	89	191	
		53.4%	46.6%	100.0%	
<b>Total</b>		110	95	205	
		53.7%	46.3%	100.0%	

**Table No. 4 Stratification of Cardiogenic Shock with Gender (n=205)**

		Gender		Total	P Value
		Male	Female		
<b>Cardiogenic Shock</b>	Yes	8	6	14	.557
		57.1%	42.9%	100.0%	
	No	124	67	191	
		64.9%	35.1%	100.0%	
<b>Total</b>		132	73	205	
		64.4%	35.6%	100.0%	

**DISCUSSION**

CS is a dangerous medical condition where problems with how the heart works causes both low blood flow and a lack of oxygen to the body's tissues. Although medicine got better at saving heart disease victims in hospitals, CS still kills them more often than other problems [15]. Our research looked at how often CS happens in people who come to Peshawar Institute of Cardiology-MTI with ST-segment elevation myocardial infarction (STEMI) and compared its results with earlier studies. According to our data, 6.8% of patients had CS symptoms - matching what other major global registers have found. Two main studies in Europe and the US show that CS affects around 5 to 10 percent of STEMI patients worldwide [15]. Our study shows how essential it is to find CS as quickly as possible right now and give patients help early in their treatment to keep them safe. Our patients' mean age was 61.11 years. This matches findings from previous studies that show CS happening more often in older people. Customers over 70 years old face a greater risk of developing CS because their heart works less well

and they more commonly suffer from other diseases like diabetes and high blood pressure [15]. Our study showed that men make up 64.4% of patients while women make up 35.6%, revealing more men suffer from STEMI and CS cases. Past studies discovered that more males develop cardiovascular diseases than females, pointing to explanations related to differences in their hormones, actions, and daily habits [16]. How women with CS fare differs from men, as they tend to do worse, mostly because they show up to hospitals later and have smaller heart arteries on average [16]. People with these medical problems stood out in this study: 65.4% had diabetes, 59.0% had high blood pressure, and 59.0% smoked regularly. People in this research group who led mostly inactive lives made up 82.4% - this shows how a lack of physical activity raises your risk of getting heart disease. The way CS develops is made up of different factors combining together: reduced heart muscle work, blocked blood flow to the heart, and bodywide inflammation. Prior studies show that when heart muscle isn't getting

enough blood and oxygen, reduced heart functioning and low blood pressure worsen both heart muscle failure and lack of oxygen delivery [17]. Though medical teams have made progress developing IABP and ECMO machines, people with CS continue to die in large numbers, with nearly 40% dying within the first 30 days and about 50% died by the end of the one-year mark [18]. This study found CS rates (6.8%) lower than what other reports showed earlier, possibly because of the fast use of primary percutaneous coronary interventions (PCIs) in patients. Included reperfusion procedures help stop CS from occurring by letting blood flow return to the heart and lower the risk of heart damage [18]. Even with new treatments, patients still face problems getting good healthcare care and affordable economic help, plus delays in receiving help limit their chance of recovery. This research adds to what other studies have shown by looking at how often CS happens and what affects it in STEMI patients. Our results confirm past studies and show that rapid detection, fast treatment, and treating risk factors are vital for helping CS patients have better results.

### **CONCLUSION:**

This study demonstrated that the incidence of cardiogenic shock was low in patients with ST elevation myocardial infarction and therefore, it is treatable illness with a reasonable chance for full recovery.

### **LIMITATIONS**

This study was performed at a single tertiary care center, and thus the results may not be generalizable to other populations. Furthermore, the number of patients was relatively small, and no follow-up of patients was performed. Differences in treatment protocols and delays in presentation may also have an impact on the results.

### **FUTURE FINDINGS**

Long-term outcomes following cardiogenic shock in patients with ST-Elevation Myocardial Infarction - Future studies should now explore long term outcomes with regard to optimized invasive management techniques. Findings should be validated through larger, multicenter studies that include varied populations. It is also essential to determine how the implementation of the new emerging therapies and mechanical circulatory support devices has affected mortality and morbidity reduction.

**Disclaimer: Nil**

**Conflict of Interest: Nil**

**Funding Disclosure: Nil**

### **Authors Contribution**

Concept & Design of Study: **NW,MA**

Drafting: **SSK,HZ**

Data Analysis: **MI,IK**

Critical Review: **MI,IK**

Final Approval of version: **All Authors As**

**Mentioned Authors Approved the Final version.**

## REFERENCES

1. Basir MB, Kapur NK, Patel K, Salam MA, Schreiber T, Kaki A, et al. Improved Outcomes Associated with the use of Shock Protocols: Updates from the National Cardiogenic Shock Initiative. *Catheterization and cardiovascular interventions : official journal of the Society for Cardiac Angiography & Interventions*. 2019;93(7):1173-83.
2. Debrabant B, Halekoh U, Soerensen M, Møller JE, Hassager C, Frydland M, et al. STEMI, Cardiogenic Shock, and Mortality in Patients Admitted for Acute Angiography: Associations and Predictions from Plasma Proteome Data. *Shock (Augusta, Ga)*. 2021;55(1):41-7.
3. Dhruva SS, Ross JS, Mortazavi BJ, Hurley NC, Krumholz HM, Curtis JP, et al. Association of Use of an Intravascular Microaxial Left Ventricular Assist Device vs Intra-aortic Balloon Pump With In-Hospital Mortality and Major Bleeding Among Patients With Acute Myocardial Infarction Complicated by Cardiogenic Shock. *Jama*. 2020;323(8):734-45.
4. Elbadawi A, Elgendy IY, Mahmoud K, Barakat AF, Mentias A, Mohamed AH, et al. Temporal Trends and Outcomes of Mechanical Complications in Patients With Acute Myocardial Infarction. *JACC Cardiovascular interventions*. 2019;12(18):1825-36.
5. Guerrero-Miranda CY, Hall SA. Cardiogenic Shock in Patients with Advanced Chronic Heart Failure. *Methodist DeBakey cardiovascular journal*. 2020;16(1):22-6.
6. Hua C, Cai Q, Xi XY, Lin M, Wang L, Li L, et al. (99m)Tc-sestamibi and (18)F-fluorodeoxyglucose imaging in patients with cardiogenic shock: A pilot study. *Frontiers in cardiovascular medicine*. 2022;9:1047577.
7. Kapur NK, Kim RJ, Moses JW, Stone GW, Udelson JE, Ben-Yehuda O, et al. Primary left ventricular unloading with delayed reperfusion in patients with anterior ST-elevation myocardial infarction: Rationale and design of the STEMI-DTU randomized pivotal trial. *American heart journal*. 2022;254:122-32.
8. Karami M, Eriksen E, Ouweneel DM, Claessen BE, Vis MM, Baan J, et al. Long-term 5-year outcome of the randomized IMPRESS in severe shock trial: percutaneous mechanical circulatory support vs. intra-aortic balloon pump in cardiogenic shock after acute myocardial infarction. *European heart journal Acute cardiovascular care*. 2021;10(9):1009-15.
9. Kayaert P, Coeman M, Demolder A, Gevaert S, Schaubroeck H, Claeys MJ, et al. Mortality in STEMI Patients With Cardiogenic Shock: Results From a Nationwide PCI Registry and Focus on Left Main PCI. *The Journal of invasive cardiology*. 2022;34(2):E142-e8.
10. Kayani WT, Jneid H. Increasing stroke events in patients with ST elevation myocardial infarction and cardiogenic shock: A cause for concern. *Catheterization and cardiovascular interventions : official journal of the Society for Cardiac Angiography & Interventions*. 2021;97(2):226-7.
11. Kunkel KJ, Fuller B, Basir MB. Management of Cardiogenic Shock in Patients with Acute Myocardial Infarction. *Interventional cardiology clinics*. 2021;10(3):345-57.
12. Lüsebrink E, Kellnar A, Krieg K, Binzenhöfer L, Scherer C, Zimmer S, et al. Percutaneous Transvalvular Microaxial Flow Pump Support in Cardiology. *Circulation*. 2022;145(16):1254-84.
13. 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*. 2022;34(4):232-40.

14. Shroff GR, Garcia S, Schmidt C, Okeson B, Tannenbaum E, Pacheco R, et al. Renal impairment and mortality in patients with STEMI and cardiogenic shock/cardiac arrest. *Catheterization and cardiovascular interventions : official journal of the Society for Cardiac Angiography & Interventions*. 2023;102(2):179-90.

15. Sieweke JT, Berliner D, Tongers J, Napp LC, Flierl U, Zauner F, et al. Mortality in patients with cardiogenic shock treated with the Impella CP microaxial pump for isolated left ventricular failure. *European heart journal Acute cardiovascular care*. 2020;9(2):138-48.

16. Sundaram AK, Gobeil K, Pundlik S, Capatina A, Scarnici A, Natarajan PP, et al. Right to Left Cardiac Power Output- New Prognosticator in STEMI Patients With Cardiogenic Shock (R-Shock). *Current problems in cardiology*. 2024;49(1 Pt C):102089.

17. Syrkina AG, Ryabov VV. [Central hemodynamic monitoring in patients with cardiogenic shock]. *Terapevticheskii arkhiv*. 2021;93(4):502-8.

18. Udesen NJ, Møller JE, Lindholm MG, Eiskjær H, Schäfer A, Werner N, et al. Rationale and design of DanGer shock: Danish-German cardiogenic shock trial. *American heart journal*. 2019;214:60-8.

**Open Access Statement**

This article is published in the *Journal of Bacha Khan Medical College* and is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0). This license permits unrestricted use, distribution, adaptation, and reproduction in any medium or format, provided that appropriate credit is given to the original author(s) and the source, a link to the license is provided, and any changes made are clearly indicated. Images or other third-party materials in this article are included in the article's Creative Commons license unless stated otherwise in a credit line. If any material is not included under the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you must obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>. © **The Author(s) 2024. Published by:** Journal of Bacha Khan Medical College, Mardan, Pakistan