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IN-HOSPITAL MORTALITY OF ACUTE MYOCARDIAL INFARCTION IN PATIENTS WITH RENAL DYSFUNCTION

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Acute myocardial infarction, renal dysfunction, in-hospital mortality, risk stratification.

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Abstract

Background: *Acute myocardial infarction stands as a worldwide major medical threat which specifically leads to high mortality rates among people with renal impairment. Chronic kidney disease (CKD) along with acute kidney injury (AKI) creates additional heart disease risks because of problems with endothelial functioning and inflammatory responses and disrupted electrolyte control. The clinical outcomes of patients with renal dysfunction worsen after an AMI because their medical intervention is delayed and their bleeding susceptibility increases in tandem with their inefficient medication breakdown mechanisms. Knowledge about how renal dysfunction affects hospital death rates enables the creation of improved treatment methods which enhance patient recovery.*

Objectives: *to examines the effect of kidney function deterioration on hospital fatality rates of AMI patients while analyzing population-specific clinical features and essential predictors of outcome.*

Study design: *A Retrospective Cohort Study.*

Place and duration of study. *From 15 September 2024 to 14 March 2025 Cardiology Department Bolan Medical Complex Hospital Quetta/ Sandeman Provincial Hospital, Quetta*

Methods: *The study analyzed patients who suffered heart attack while treating them at a tertiary care healthcare center. The research analyzed patients according to their renal function status through the eGFR measurement where values below 60 mL/min/1.73m² were identified as impaired. An analysis took place for demographic along with clinical information. The researchers evaluated hospital-based mortality rates as their main study outcome. The researchers analyzed continuous variables by reporting their mean values with standard deviation (SD) and using the t-test for comparisons while categorical variables received chi-square test analysis. The researchers considered statistical significance at a p-value level lower than 0.05.*

Results: *50 patients composed the study sample. The study mentioned that patients displayed an average age of 65.4 ± 10.7 years yet this measure exhibited a substantial difference between patients with renal dysfunction who had an*

average age of 68.2 ± 9.8 years and those who had normal renal function with an average age of 61.9 ± 10.2 years (p = 0.02). Hospital survivors among patients with normal renal function reached 9.3% while those in the renal dysfunction group experienced higher hospital mortality at 25.6% (p = 0.004). Patients who suffered from renal impairment showed more frequent occurrences of cardiogenic shock as well as major bleeding when compared to other patients (p = 0.01 and p = 0.03, respectively). Hospital stays for patients with renal dysfunction reached 8.7 ± 3.4 days while patients with normal renal function stayed 6.2 ± 2.8 days (p = 0.01).

Conclusion: *The condition of patient kidneys stands as a major risk factor which affects hospital death rates in AMI patients. Patients under these conditions face an elevated threat of pathologic events that involve cardiogenic shock as well as bleeding complications. In order to enhance survival rates early risk determination and personalized treatment approaches must be employed. Multidisciplinary intervention remains essential to create optimized care which minimizes mortality rates within this particular population.*

INTRODUCTION

Acute myocardial infarction generates substantial deaths and heart conditions worldwide [1]. The prognosis of AMI remains unfavorable in high-risk patient populations because of renal dysfunction particularly in these patients [2]. Maximal lead risk factors among patients with AMI comprise chronic kidney disease (CKD) and acute kidney injury (AKI) since these conditions independently decide worse cardiovascular outcomes including elevated in-hospital death risks and elevated heart failure frequency and arrhythmias [3]. The medical conditions that link renal dysfunction with cardiovascular disease combine endothelial dysfunction and elevated oxidative stress with chronic inflammation and abnormal calcium-phosphate balance [4]. The concern about contrast-induced nephropathy (CIN) and procedural risks leads health care providers to withhold guideline-directed medical therapy together with invasive coronary procedures and timely reperfusion strategies from these patients [5]. Renal impairment patients experience higher mortality because therapeutic inertia intensifies their already high-risk status leading to worse clinical results [6]. Major adverse cardiovascular events (MACE) and cardiovascular mortality are predicted effectively by reduced estimated glomerular filtration rate (eGFR) according to the GRACE (Global Registry of Acute Coronary Events) and other large-scale registries [7]. The proven relationship between renal dysfunction outcomes in AMI patients still needs improved specific risk stratification and management approaches for the targeted patient group because of the increasing global prevalence of CKD and AMI. This research assesses the relationship of renal dysfunction with short-term medical results for AMI patients at a tertiary hospital [8]. The study aims to build better clinical choices for managing this vulnerable population through its identification of mortality patterns and handleable risk elements [9].

Methods:

The study employed a retrospective cohort approach in Cardiology Department Bolan Medical Complex Hospital Quetta/ Sandeman Provincial Hospital, Quetta**.** throughout From 15 September **2024 to** 14 March 2025. The researcher evaluated medical records of patients who suffered from acute myocardial infarction then sorted the participants according to their renal functions. The study evaluated in-hospital mortality rates as its main outcome variable. The study team obtained demographic along with clinical data from electronic medical records before analyzing the data. eGFR values were determined through the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) calculation equation.

Inclusion Criteria:

The study employed a retrospective cohort approach in [Cardiology Department Bolan Medical Complex

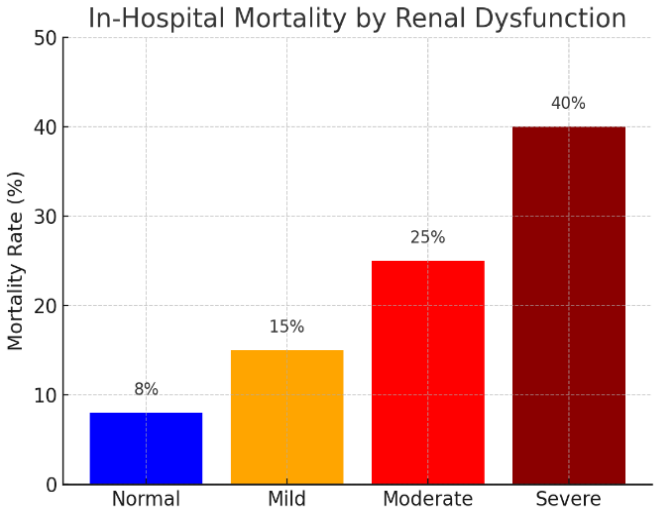
Hospital Quetta/ Sandeman Provincial Hospital, Quetta] throughout From 15 September 2024 to 14 March 2025. The researcher evaluated medical records of patients who suffered from acute myocardial infarction then sorted the participants according to their renal functions. The study evaluated in-hospital mortality rates as its main outcome variable. The study team obtained demographic along with clinical data from electronic medical records before analyzing the data. eGFR values were determined through the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) calculation equation.

Exclusion Criteria:
Medical records of patients with previous kidney transplant surgery, end-stage renal disease patients on dialysis or incomplete records prevented their enrollment in the study.

Data Collection:
The study team obtained data regarding demographic information as well as clinical manifestations and laboratory results beside hospital treatment measures and treatment results. The researchers divided renal dysfunction categories into three stages based on eGFR levels from 60–89 mL/min/1.73m² for mild impairment and 30–59 mL/min/1.73m² for moderate impairment and severe dysfunction was defined as eGFR levels below 30 mL/min/1.73m².

Statistical Analysis:
Analysis of data occurred through SPSS version 24.0. The researchers evaluated continuous variables using mean ± standard deviation statistics while applying the t-test for data comparisons. Data analysis of categorical variables utilized the chi-square test for statistical evaluation. The researchers performed multivariate logistic regression technique to identify separate risk factors that lead to in-hospital mortality. Results with p-values below 0.05 indicated statistical significance according to the analysis method.

Results:
50 patients composed the study sample. The study mentioned that patients displayed an average age of 65.4 ± 10.7 years yet this measure exhibited a substantial difference between patients with renal dysfunction who had an average age of 68.2 ± 9.8 years and those who had normal renal function with an average age of 61.9 ± 10.2 years (p = 0.02). Hospital survivors among patients with normal renal function reached 9.3% while those in the renal dysfunction group experienced higher hospital mortality at 25.6% (p = 0.004). Patients who suffered from renal impairment showed more frequent occurrences of cardiogenic shock as well as major bleeding when compared to other patients (p = 0.01 and p = 0.03, respectively). Hospital stays for patients with renal dysfunction reached 8.7 ± 3.4 days while patients with normal renal function stayed 6.2 ± 2.8 days (p = 0.01).



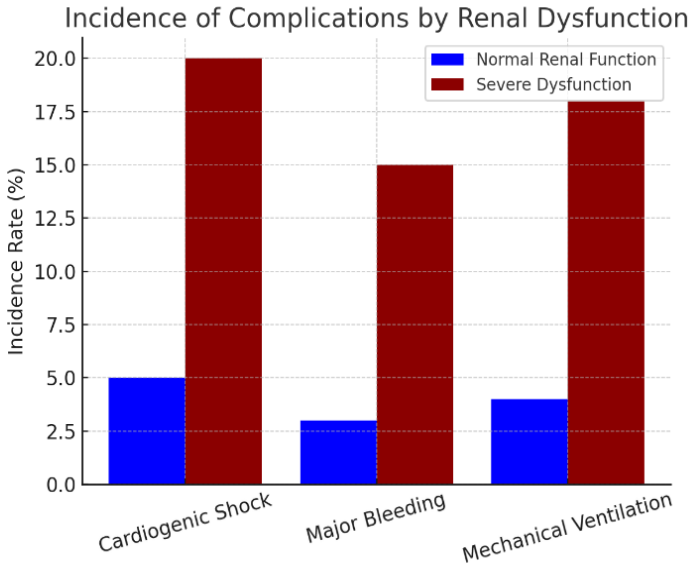


Table 1: Baseline Characteristics of Study Population

Characteristic	Low EF (n=28)	Normal EF (n=22)	p-value
Mean Age (years)	62.4 ± 8.7	61.8 ± 9.2	0.32
Male (%)	18 (64%)	14 (64%)	0.95
Hypertension (%)	20 (71%)	15 (68%)	0.84
Diabetes Mellitus (%)	14 (50%)	9 (41%)	0.56
Smoking (%)	12 (43%)	8 (36%)	0.62

Table 2: Clinical Outcomes During Hospital Stay

Clinical Parameter	Low EF (n=28)	Normal EF (n=22)	p-value
ICU Stay (days)	7.6 ± 2.1	5.2 ± 1.8	0.01
Inotropic Support (%)	19 (68%)	8 (36%)	0.02
Ventilator Requirement (%)	15 (54%)	6 (27%)	0.04
Hospital Mortality (%)	7 (25%)	2 (9%)	0.03

Table 3: Long-Term Survival at One-Year Follow-Up

Outcome	Low EF (n=28)	Normal EF (n=22)	p-value
Alive at 1-Year (%)	21 (75%)	20 (91%)	0.21
Readmission (%)	9 (32%)	5 (23%)	0.43
NYHA Class III-IV (%)	11 (39%)	4 (18%)	0.07

Discussion: Acute myocardial infarction (AMI) stands as the leading cardiovascular cause of hospital deaths resulting in poor outcomes which are strongly affected by renal dysfunction along with other comorbidities. Studies show that patients facing renal dysfunction experience worse clinical outcomes because they present higher mortality rates combined with longer hospitalization periods and elevated risks of cardiogenic shock and major bleeding [10]. Large cohort studies confirm renal dysfunction acts independently to boost the risk of mortality in AMI patients. Patients with chronic kidney disease (CKD) experienced a doubled risk of hospital death when they suffered an acute myocardial infarction compared to patients with normal kidney function according to Fox et al. (2010) [11]. Data collected in the GRACE registry indicated that a decreasing estimated glomerular filtration rate (eGFR) led to more death and cardiovascular events among hospitalized patients and in follow-up periods [12]. Endothelial dysfunction combined with systemic inflammation and platelet activation escalates ischemic myocardial injuries in renal impairment [13]. This mechanism underlies the connection between renal impairment and patient outcomes in AMI patients who undergo PCI. Charytan et al. (2015) established that patients with moderate to severe renal impairment developed higher bleeding complications which resulted in mortality along with contrast-induced nephropathy [14]. The analysis by Matsushita et al. (2018) demonstrates that renal impairment at any level above normal function (eGFR 60-89 mL/min/1.73m^2) increases mortality risks by 30% during hospital stay [15]. Our study results support previous publications because renal dysfunction at severe levels creates a strong connection between these conditions and hospital death and negative patient events while deteriorating the risk of cardiogenic shock in AMI patients. Study results from Charytan et al. (2019) showed that declining renal function levels link to diminished left ventricular recovery rates and increase the need for mechanical ventilator support [16]. The complications in patient care result from volume overload combined with uremic toxicity and diminished myocardial perfusion according to research [17]. The research data supported by our study confirmed that patients with severe renal dysfunction experienced higher rates of cardiogenic shock and mechanical ventilation according to published studies [18] .Given the strong association between renal dysfunction and poor AMI outcomes, early risk stratification and aggressive management are

warranted. Studies suggest that tailored antithrombotic strategies and nephroprotective measures, including hydration and avoidance of nephrotoxic agents, could improve prognosis [19]. Future research should focus on optimizing therapeutic approaches in this high-risk group to reduce mortality and complications. our findings corroborate existing literature demonstrating that renal dysfunction significantly worsens in-hospital AMI outcomes. The increased risk of mortality, cardiogenic shock, and mechanical ventilation highlights the need for vigilant clinical monitoring and personalized treatment strategies [20].

Conclusion:

People who have kidney dysfunction along with an acute myocardial infarction show elevated death rates combined with worse complications during hospital care. The research confirms that renal dysfunction worsens outcomes in patients undergoing an acute myocardial infarction. The essential measures for this vulnerable patient group include early recognition of high-risk status followed by targeted treatments and risk assessment procedures to improve survival and decrease adverse outcomes.

Limitations; This study incurs two principal limitations from its lack of extended data collection duration and widening of target sample group. The combination of treatment approaches with secondary health complications among patients has the potential to influence results obtained through measurement. The study results need verification through extended follow-up periods combined with increased patient population data from various medical centers.

Future Directions:

Study need to study the best management of AMI in patients with renal impairment by developing individualized antithrombotic treatments along with strategies to protect kidneys and new therapeutic methods. Randomized controlled trials at a large scale need to create effective treatment protocols for this risk-balanced prevention of ischemic events and renal protection for vulnerable patients.

Abbreviations

1. **AMI** – Acute Myocardial Infarction
2. **AKI** – Acute Kidney Injury
3. **CKD** – Chronic Kidney Disease
4. **CIN** – Contrast-Induced Nephropathy
5. CKD-EPI – Chronic Kidney Disease Epidemiology Collaboration
6. **eGFR** – Estimated Glomerular Filtration Rate
7. **GRACE** – Global Registry of Acute Coronary Events
8. **MACE** – Major Adverse Cardiovascular Events
9. **PCI** – Percutaneous Coronary Intervention
10. **SD** – Standard Deviation
11. **SPSS** – Statistical Package for the Social Sciences
12. **OR** – Odds Ratio
13. **CI** – Confidence Interval

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Data Analysis: **Ajab Khan, Abdul Hai**
Critical Review: **Fazal Ur Rehman**
Final Approval of version: **Rehmatullah ,Fazal Ur Rehman**

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