

ORIGINAL ARTICLE

Serum Creatinine Levels Have Been Shown to Accurately Predict in-Hospital Mortality in Individuals who have Been Effectively Treated with PPCIIQTIDAR UD DIN¹, MUHAMMAD AHMAD RAZA BUTT², MUHAMMAD SAEED AFRIDI³, MUHAMMAD SULEMAN KHAN⁴, PARVEEN AKHTAR⁵, MUJEEBULLAH TAREEN⁶¹Associate Professor of Cardiology, Nowshera Medical College, Nowshera, KPK²Assistant Professor Department of Cardiology, Rashid Latif Medical College, Lahore³Associate Professor Cardiac Surgery, Rashid Latif Medical College Lahore⁴Senior Registrar Cardiology Punjab Institute of Cardiology Lahore⁵Associate Professor of Cardiology, NICVD Karachi, Sindh⁶Professor of cardiology, Bolan Medical College, & Head of Cardiology Department, Sandeman Provincial Hospital, QuettaCorresponding author: iqtidar_ud_din@yahoo.com**ABSTRACT****Objective:** The purpose of this study was to assess the predictive value of serum creatinine for in-hospital mortality among patients who had acute coronary syndromes.**Study Design:** An observational study**Place and Duration:** This observational study was conducted at Department of Cardiology, Rashid Latif Medical College, Lahore and Nowshera Medical College, Nowshera, KPK in the duration from 1st May, 2022 to 31 October, 2022.**Methods:** Total 198 patients had acute coronary syndromes who underwent successful primary percutaneous coronary intervention (PCI) were included. Patients were aged between 25-80 years. After receiving written consent, we recorded the subjects' ages, sexes, BMIs, and diagnoses in detail. Within 12 hours of an AMI diagnosis, serum creatinine levels were taken. Patients were split into two groups based on their serum creatinine levels upon admission. There are two categories, those with high levels of serum creatinine (over 1.3 mg/dL) and those with normal levels (below 1.3 mg/dL). Life expectancy at death was measured at one year. All of the information was analyzed with SPSS 22.0.**Results:** There were majority 140 (70.7%) males and 58 (29.3%) females in this study. Mean age of the patients was 55.18±11.24 years and had mean BMI was 24.6±14.52 kg/m². Mean serum urea level was 37.3±0.22 mg/dL. Diabetes found in 40 (20.2%) cases and frequency of hypertension was 82 (41.4%). Anterior myocardial infarction was found in 79 (39.9%) cases followed by Inferior MI in 73 (36.9%) cases and non-ST MI in 46 (23.2%) cases. Mean left ventricular ejection fraction (LVEF) was 45±7.17%. We found elevated serum creatinine in 37 (18.7%) cases and normal creatinine in 161 (81.3%) cases. Mortality in elevated group was higher found in 10 (27.02%) cases and as compared to normal group 8 (4.96%).**Conclusion:** The results of this study indicate that patients with AMI who had even slightly raised serum creatinine levels at admission have a significantly higher risk of dying within a year.**Keywords:** Myocardial Infarction, Comorbidities, Primary percutaneous coronary intervention, Mortality, Serum Creatinine**INTRODUCTION**

Reduced kidney function is linked to a higher chance of developing ischaemic heart disease [1,2]. Recent studies have confirmed the increased risk of heart disease and cardiovascular outcomes in patients with renal insufficiency. A higher prevalence of cardiovascular disease has been attributed specifically to end-stage renal failure. Few studies, however, have looked at the importance of moderate and mild renal impairment in people who have suffered an acute myocardial infarction (AMI). The effects of mild and moderate renal impairment on mortality and morbidity have not been determined by large-scale research of AMI patients, including such GUSTO I and GUSTO II and TIMI-2 [3-5]. When patients suffering from acute coronary syndrome are admitted with a history of renal dysfunction or an increased creatinine level, the prognosis is worse (ACS). Recent findings from the Globally Registry of Acute Events (Forgiveness) registry have established that serum creatinine concentrations at admission are an important predictor of hospital mortality among patients with ACS [6].

Coronary heart disease (CAD) is indeed the leading cause of death across the globe. Over seven million individuals per year, or 11.2 percent of all fatalities, can be attributed to CAD [7]. In contrast to the United States where the prevalence of acute STEMI and death rates due to CVD have decreased [8, 9], cardiovascular ailments have been on the increase as the primary cause of disability and mortality in China in recent decades [9]. Patients hospitalised with acute STEMI have a greater mortality rate for a variety of causes. Patients suffering from acute ST segment elevation myocardial injury have been demonstrated to have renal dysfunction as a key predictor of both short- and long-term mortality [10]; furthermore, age is also a strong predictor of adverse outcomes in this population [11]. It has been shown in

another study that the death rate for women with AMI is greater than that for males. [12]

Several researchers theorize that the high cardiovascular death rate among people with renal insufficiency was at least in part due to the infrequent use of established, aggressive, modern reperfusion and accompanying pharmaceutical treatment. [13] Long-term mortality of acute myocardial infarction (AMI) patients with renal impairment who have received successful primary transluminal percutaneous coronary intervention is little studied since large cardiovascular disease trials generally exclude individuals with renal dysfunction (PCI). [14] Recent reports from the semi of the V2v Abciximab and Device Investigation to Lessen Late Interventional Complications (CADILLAC) trial suggest that renal insufficiency is an independent mortality predictor in patients treated with primary angioplasty for AMI; even so, the study majority did not also include patients with renal dysfunction due to the trial's exclusion criteria. [15]

This observational study aimed to determine if there was a correlation between serum creatinine concentration and long-term mortality in patients who had undergone successful primary PCI.

MATERIAL AND METHODS

This observational study was conducted at Department of Cardiology, Rashid Latif Medical College, Lahore and Nowshera Medical College, Nowshera, KPK in the duration from 1st May, 2022 to 31 October, 2022.

and comprised of 198 patients. After receiving written consent, we recorded the subjects' ages, sexes, BMIs, and diagnoses in detail. Pregnant females, patients <20 years of age and those did not provide any written consent were excluded from this study.

All research participants who presented with MI symptoms were hospitalised and treated within 12 hours of onset. Myocardial infarction patients with ST elevation were treated with 100 mg of the anti - platelet tissue plasminogen activator (t-PA). Patients' entrance serum creatinine levels were used to divide them into two groups: those with normal levels and those with increased levels. The normal range for serum creatinine is between 0.6 and 1.3 mg/dL; therefore, those with a serum creatinine level of 1.3 mg/dL or less were classified as belonging to the normal serum creatinine group, and those with a level of 1.3 mg/dL or more were classified as belonging to the high serum creatinine group (elevated group). A diagnosis of acute myocardial infarct was made when patients complained of chest pain that wouldn't go away and had ST-segment elevation in two or more contiguous electrocardiogram (ECG) leads (AMI). The diagnosis was further aided by the examination of a creatine kinase blood level that was over 2 times the upper normal limit. Patients were excluded if they had a duration of hospitalisation in excess of 12 hours, a history of heart failure (defined as heart problems with left ventricular efficiency percentage 40%), valvular heart disease, a creatinine level in excess of 2 mg/dL, or if they were receiving dialysis.

Data on demographics and lifestyle habits were collected, including demographics like age, gender, blood pressure, diabetes, and smoking status. All patients with a fasting plasma glucose level >126 mg/dL or >200 mg/dL at any time during hospitalization were determined to have diabetes mellitus (DM). The patient's smoking and heart attack histories were gathered with the help of a medical questionnaire and record notes. Serum creatinine (Cr) was measured to evaluate renal function on admission.

The statistical analysis was done in SPSS version 22.0. For categorical variables, percentages were provided, while averages and standard deviations (SD) were provided for continuous variables. The t-test and test were used to examine the significance of the observed variations in baseline parameters.

RESULTS

There were majority 140 (70.7%) males and 58 (29.3%) females in this study. Mean age of the patients was 55.18±11.24 years and had mean BMI was 24.6±14.52 kg/m². Mean serum urea level was 37.3±0.22 mg/dL. Mean left ventricular ejection fraction (LVEF) was 45±7.17 %. Diabetes found in 40 (20.2%) cases and frequency of hypertension was 82 (41.4%). 75 (37.9%) patients had smoking history. (table 1)

Table-1: Demographics information of the included cases

Variables	Frequency	Percentage
Gender		
Male	140	70.7
Female	58	29.3
Mean age (years)	55.18±11.24	
Mean serum urea (mg/dL)	37.3±0.22	
Mean BMI (kg/m ²)	24.6±14.52	
Mean LVEF (%)	45±7.17	
Comorbidities		
Diabetes	40	20.2
Hypertension	82	41.4
Smokers	75	37.9

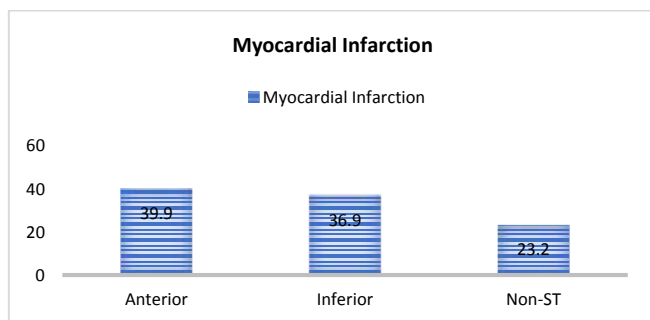


Figure-1: Types of MI among all cases

Among all cases, anterior myocardial infarction was found in 79 (39.9%) cases followed by Inferior MI in 73 (36.9%) cases and non-ST MI in 46 (23.2%) cases.(figure 1)

We found elevated serum creatinine in 37 (18.7%) cases and normal creatinine in 161 (81.3%) cases.(table 2)

Table-2: Distribution of patients with respect to serum creatinine level

Variables	Frequency	Percentage
Elevated Creatinine (>1.3 mg/dL)	37	18.7
Normal Creatinine (<1.3 mg/dL)	161 (81.3%)	81.3
Total	198	100

Mortality in elevated group was higher found in 10 (27.02%) cases and as compared to normal group 8 (4.96%).(table 3)

Table-3: Frequency of mortality among both groups of patients

Variables	Elevated Creatinine (>1.3 mg/dL) (37)	Normal Creatinine (<1.3 mg/dL) (161)
Mortality		
Yes	10 (27.02%)	8 (4.96%)
No	27 (62.98%)	153 (95.04%)

DISCUSSION

There is compelling evidence that end-stage renal disease (ESRD) is a considerable contributor to the chance of dying [16]. On the other hand, the specific processes that underlie the relationship between renal impairment and coronary artery disease are not completely understood. The concentration of serum creatinine may be an indicator of concurrent cardiovascular risk factors such as diabetes mellitus, systemic hypertension, and advanced age. In spite of this, even mild renal impairment, which may be identified by a decrease in creatinine clearance or in glomerular filtration rate (GFR) [17], has been shown to increase the risk of death in patients who have experienced acute coronary syndromes [18,19].

By combining the effects of age and gender, we found that admission serum Cr level was a substantial predictor of in-hospital death among patients with acute STEMI. In current study 198 patients of MI were included. There were majority 140 (70.7%) males and 58 (29.3%) females in this study. Mean age of the patients was 55.18±11.24 years and had mean BMI was 24.6±14.52 kg/m². Mean serum urea level was 37.3±0.22 mg/dL. Results were comparable to the previous study.[20] Diabetes found in 40 (20.2%) cases and frequency of hypertension was 82 (41.4%). Anterior myocardial infarction was found in 79 (39.9%) cases followed by Inferior MI in 73 (36.9%) cases and non-ST MI in 46 (23.2%) cases. Mean left ventricular ejection fraction (LVEF) was 45±7.17 %.[21]

Recent studies by Yamaguchi J et al. [22] have demonstrated that even a moderate rise in blood Cr level is linked to an increased risk of in-hospital and lengthy mortality among patients with AMI, even if first PCI is successful. The hypothesis that renal impairment is a key risk factor for poor outcome in heart disease patients has received a lot of attention. Many theories have been put up to try and explain why people with high serum Cr levels had a higher mortality rate, such as the following: cystatin c was a marker of specific vascular sickness; chronic overload; endothelial; reduced cardiac blood flow [23]. Nephrotoxicity from the contrast material used for primary PCI and other cardiovascular drugs, as well as hypoperfusion after an acute STEMI, have all been associated to renal impairment. Moreover, there is a correlation between renal dysfunction and unfavourable left ventricular remodeling, which points to a combination cardiac and renal dysfunction (dubbed "cardio-renal syndrome") that, when present, hastens the emergence of startling morbidity and mortality. [24,25]

Patients with mild renal impairment were also shown to have an elevated death rate at one year. None of the demographic characteristics of the normal and raised groups were significantly different from one another, including the prevalence of male gender, smoking, hypertension, diabetes, infarct location left ventricular ejection fraction (LVEF), and CK-MB level. Serum creatinine levels were statistically distinguished from other

variables such as troponin, urea, and GFR, and the results showed that those with higher serum creatinine levels had a higher risk of dying within a year. ($P = 0.004$) A similar stepwise increase in mortality was also reported in the study by Gibson et al., with the analysis limited to patients aged 65 and older [26]. Comparing our finding to that of Gibson et al. in AMI patients, we find a near-identical pattern. As a result, the creatinine level at admission may be more relevant in the elderly.

According to the research of Reinecke et al. [27], there is a statistically significant difference between 1.3 mg/dL and lower levels of creatinine and increased mortality over the long term. According to the GRACE registry, the probability of dying while in the hospital increased by 1.2 times for every 1 mg/dL increase in baseline Cr. Evidence suggests that markers of myocardial necrosis at the time of admission, such as an increase in Cr levels, are more predictive of prognosis than cardiac enzyme levels at admission [28]. Similarly in our study, mortality in elevated group was higher found in 10 (27.02%) cases and as compared to normal group 8 (4.96%). Oxidative stress, endothelial dysfunction, and the development of atherosclerosis are all thought to be linked to elevated serum creatinine levels. It's possible that these biochemical abnormalities contribute to an already high risk of cardiovascular disease. There are two potential contributors to this disease. A greater serum creatinine level has been linked to a number of adverse health outcomes, including diastolic left ventricular dysfunction, chronic volume overload, and reduced renal blood flow, all of which contribute to a drop in cardiac output and, ultimately, death. In addition, there was a higher incidence of multivessel coronary artery disease and previous MI in the raised serum creatinine group.

CONCLUSION

The results of this study indicate that patients with AMI who had even slightly raised serum creatinine levels at admission have a significantly higher risk of dying within a year.

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