

## Evaluation the Outcome of Admitted Patients of Acute ST Elevation Myocardial Infarction with Renal Function

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### Abstract

**Background:** Acute kidney injury (AKI, previously known as acute renal failure) is a frequent complication that affects a substantial number of hospitalized patients annually. However, the relationship between severity of AKI and in-hospital outcomes in the setting of acute Acute ST-Elevation Myocardial Infarction (STEMI) has not been well- documented. Chronic kidney disease is a strong predictor of in-hospital mortality in the acute myocardial infarction setting. **Objective:** To evaluate the Outcome of admitted patients of acute ST elevation myocardial infarction with renal function. **Methods:** The Prospective observational study was carried out at the Cardiology Department, Bangabandhu Sheikh Mujib Medical College and Hospital, Faridpur, Bangladesh from July 2020 to June 2021. 100 patients of STEMI diagnosed by clinical, biochemical and ECG criteria were included in the study. After getting serum creatinine level from them, eGFR was calculated and patients having <60ml/min were selected for the further studies. **Results:** In the STEMI patients, the ratio of male patients 76% and females' patients (35%) was 3.34:1 with mean  $\pm$  SD of age was 52.84  $\pm$  8.40 year. Among the 101 patients, chart indicating the outcome of the study patients where cardiogenic shock was found in 10.8% patients, heart failure was found in 24.7%, arrhythmias were found in 69.3% and death occurred in 5.9% of cases. Table 5 showing Stratification of patients by in relation with eGFR where different pattern and frequency of outcome was observed in relation with level of eGFR described. After calculating levels of eGFR, all the outcomes showed statistically significant ( $P < 0.05$ ) except cardiogenic shock which didn't show significance ( $P > 0.05$ ). **Conclusion:** In concluded, that those who have renal impairment previously or develop after acute STEMI have inverse outcomes. As renal impairment is associated with an increased risk of coronary artery disease and stroke, the cardiovascular disease may develop early in the course of renal dysfunction.

**Keywords:** Acute ST-Elevation Myocardial Infarction (STEMI), impaired renal function, serum creatinine, outcomes.

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### INTRODUCTION

Acute kidney injury (AKI, previously known as acute renal failure) is a frequent complication that affects a substantial number of hospitalized patients annually. While exact numbers are not known, AKI occurs in an estimated 5% of all hospitalizations, and associated health care expenditures are more than 10 billion dollars annually [1, 2]. Chronic kidney disease (CKD) is a worldwide public health problem. Renal insufficiency (RI) has been reported to be associated with cardiovascular disease, acute coronary syndrome

[2, 3]. Most of these studies were retrospective. Myocardial infarction (MI) is a common cardiac disease caused by occlusion of atherosclerotic blood vessels by thrombus which is composed of fibrin & platelets. Acute MI is a common presentation of acute coronary syndrome [4]. Approximately 865,000 Americans suffer from an acute myocardial infarction (AMI) per year. The incidence of AMI has declined over the past two decades from 244 per 100,000 populations in 1975 to 184 per 100,000 populations in 1995. Afterwards, in-hospital mortality rate also has declined from 18 percent in 1975 to 12 percent in 1995. Even with these

improvements, AMI continues to be a serious public health problem. It has been estimated that the number of years of life lost because of an AMI is 14.2 years [5]. Acute MI is classified as ST elevation (STEMI) and Non-ST-elevation MI [6]. The utility classification of myocardial infarction as ST-elevation MI and non-ST elevation MI has difference on management and prognosis. Most of the studies demonstrated lower mortality patients in hospitals with non-ST-elevation MI [7]. Renal impairment can be easily detected and its can be severity assessed by serum creatinine, age, sex and body weight of the patient by Cockcroft- Gault formula. Long standing renal impairment may adversely influence the outcome of acute coronary events especially acute STEMI [8]. Early recognition of renal impairment in acute STEMI patients is essential for risk stratification. Those who have renal impairment previously or develop after acute STEMI have adverse outcomes. Besides, the risk factors can play an important role in the STEMI developing patients. The effects of risk factors are found multiplicative rather than additive. People with a combination of risk factors (e.g. hypertension, DM smoking, and dyslipidaemia) are at greatest risk. Thus, assessment should be based on a holistic approach that takes account of all identifiable risk factors [9]. On the other hand, impaired renal function can be manifested by decreased GFR, which can be measured by increased serum creatinine or more precisely by reduced creatinine clearance (<60ml/min). It may be an independent risk factor for CAD outcome [10, 11]. Long-term prognostic information helps to stratify patients accurately, guide management in both outpatient and acute inpatient settings and quantify long-term benefits of potentially invasive interventions.

## MATERIALS AND METHODS

The Prospective observational study was carried out at the Cardiology Department, Bangabandhu Sheikh Mujib Medical College and Hospital, Faridpur, Bangladesh from July 2020 to June 2021. 100 patients of STEMI diagnosed by clinical, biochemical and ECG criteria were included in the study. After getting serum creatinine level from them, eGFR was calculated and patients having <60ml/min were selected for the further studies.

### Inclusion Criteria

1. Patients of acute STEMI within twelve hours after the onset of chest pain who are eligible for thrombolysis;
2. eGFR<60ml/min (Cockcroft-Gault formula);
3. Voluntarily given consent to participate in the study.

A patient with diagnosed case of MI or his/her trustee was totally enlightened regarding the aims,

objectives and careful procedure of the study before examination. He/She was inspired for voluntary participation and allowed freedom to withdraw from the study whenever he/she likable even when participation. From all eligible subjects when obtaining consent clinical history was taken and clinical examination was done to elicit findings relating to MI. connected investigations like blood sugar and serum creatinine were done. Blood was collected at intervals 2 hours when admission of the patient in the hospital. All relevant information for every individual study subject was recorded once obtaining getting informed written consent on a preformed data sheet. Collected information was checked repeatedly. Information was collected by the research worker himself.

### Data Analysis

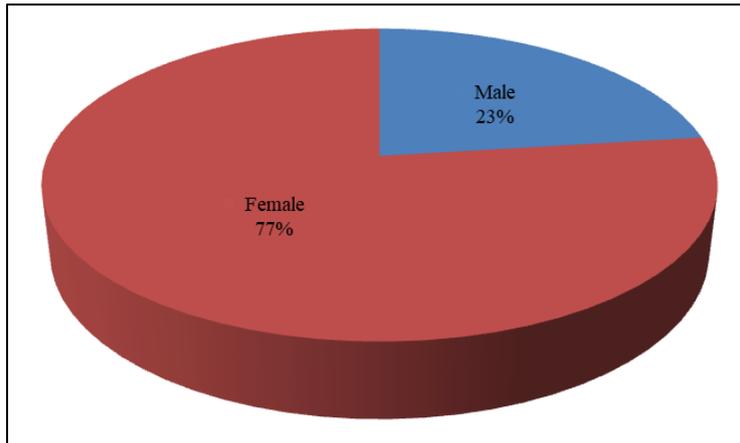
Data was processed and analyzed by using pc bases software system SPSS- 19 (Statistical Package for Social Science). Discrete or qualitative variables were analyzed by Chi-squared test and continuous variables are going to be analyzed by T-test. P value will be considered as statistically vital once it is below 0.05.

## RESULTS

In table 1, columns presenting age group distribution where among the 101 patients most of the patients were in age group 51-60 years (34.6%) next to which was 41-50 years (30.6%) (Mean  $\pm$  SD of age was 52.84  $\pm$  8.40 years). Shows that fig 1 gender distribution of the patients were among 101 patient's male was 76% and female was 24% (Male to female ratio was 3.34:1). Table 1 describing examination findings and investigations where Mean  $\pm$  SD of systolic blood pressure was found 136.75  $\pm$  20 and random blood sugar was found in 222.82  $\pm$  74mg/dl as well as gallop rhythm was found in 9% patients, those are remarkable. In table 3, displaying risk factor analysis where STEMI hypertension was found in 64.3% and dyslipidaemia was present in 79.2%. In table 4, among the 101 patients, chart indicating the outcome of the study patients where cardiogenic shock was found in 10.8% patients, heart failure was found in 24.7%, arrhythmias were found in 69.3% and death occurred in 5.9% of cases. Table 5 showing Stratification of patients by in relation with eGFR where different pattern and frequency of outcome was observed in relation with level of eGFR described.

**Table 1: Age distribution of patients sample size (N=101)**

<40 yrs.	14	13.8%
41-50 yrs.	31	30.6%
51-60 yrs.	35	34.6%
61-70 yrs.	21	20.7%
>70 yrs.	0	0.0%



**Fig. 1: Distribution of sex (n=101)**

**Table 2: Distributions of examination findings and investigations findings (n=101)**

<b>Clinical Examinations and n = 101</b>	
Investigations	Mean ± SD / n (%)
Heart Rate (per minute)	90 ± 15
Respiratory rate(bpm)	23 ± 5
Systolic BP (mmHg)	136.75 ± 20
Diastolic BP (mmHg)	87 ± 11.52
BMI (Kg/m <sup>3</sup> )	25.76 ± 4
Raised JVP	13 (12.8%)
Gallop rhythm	9 (9%)
Basal crepitations	22 (21.7%)
LVEF (%)	50.82 ± 11
RBS (mg/dl)	222.82 ± 74
LDL C	210 ± 24.5
Serum creatinine	1.62 ± 0.39

**Table 3: Distribution of risk factors (n=101)**

	<b>Number</b>	
Dyslipidaemia	80	79.2
Hypertension	65	64.3
Smoking	50	49.5
DM	33	32.6
Family History	26	25.7
Sedentary Life	25	24.7
Obesity	20	19.8

**Table 4: Distribution of outcomes (n = 101)**

Sudden cardiacarrest	6	5.9
Bradyarrh ytmias	20	19.8
Tachyarrhy thmias	50	49.5
Heart failure	25	24.7
Cardiogenic shock	11	10.8

**Table 5: Outcomes of patients stratified by eGFR with outcome (n = 101)**

<b>Outcomes</b>	<b>eGFR</b>			<b>P-value</b>
	<b>&lt;15 (n=17)</b>	<b>30-15 (n = 22)</b>	<b>60-30 (n = 72)</b>	
	<b>%</b>	<b>%</b>	<b>%</b>	
Cardiogenic Shock	7	17	7	0.136 <sup>NS</sup>
Heart Failure	17	28	17	0.023 <sup>S</sup>
Arrhythmias	70	61	70	0.002 <sup>S</sup>
Sudden cardiac arrest and Death	6	4.5	6	0.041 <sup>S</sup>

## DISCUSSION

During past years few studies have addressed the long-term mortality of patients with impaired renal function, in particular patients hospitalized with STEMI. In a secondary analysis of the Valsartan in AMI Trial, Anavekar *et al.*, [12] found an increased risk of cardiovascular events and death in patients with AMI and heart failure or left ventricular dysfunction. Patients with an eGFR <81 ml were at the highest risk. The study was conducted among 101 patients and most of STEMI patients were found between 51-60 years (34.6%) next to which was 41-50 years (30.6%) (Mean  $\pm$  SD of age was 52.84  $\pm$  8.40 years). In another study [13], STEMI occurred in 26.5% cases in age less than 55 years, in 23.1% cases in age 55-64 years, and in 27.7% cases in age 65-74 years. Therefore, the results of the present study were consistent with the previous reports [13, 14] The mean  $\pm$  SD of age was 52.84  $\pm$  8.40 years, similar to another study done in Pakistan [15] where the mean age was 55.69  $\pm$  13.45. Among the 101 patients, 76 % were male and 24 % were female (Male to female ratio was 3.34:1), which reports that ischemic heart disease has a higher prevalence in male than female, suggested in a study from England [14]. Thus the present results are in agreement that male population is more prone to STEMI linked to any genetic or hormonal differences. Finally, the present study found that the STEMI occurrence Mean  $\pm$  SD of systolic blood pressure was found 136.75  $\pm$  20 and random blood sugar was found in 222.82  $\pm$  74mg/dl as well as gallop rhythm was found in 8.9% patients, those are remarkable after the age of 40 in Bangladesh. Regarding the evaluation of risk factors of STEMI, dyslipidemia was present in 81%, hypertension was found in 64%, smoker was 50%, DM was in 33%, family h/o IHD was 26%, sedentary life style was found in 25% patients obesity was common among 20 % of total patients. The results of present study with reference to risk factors were similar to previous published papers where type 2 diabetic patients were more hypertensive than non-diabetic [16]. These findings are consistent with the earlier study [18]. Among the 100 patients, cardiogenic shock was found in 11% patients, heart failure was found in 24%, arrhythmias were found in 71% and sudden cardiac arrest death occurred in 6% of cases. These findings are as expected from the patients with STEMI. Regarding eGFR calculation, in the study creatinine clearance rates less than 60 ml/min were taken in the studies as creatinine clearance rates of 30–60 ml/min indicates moderate renal dysfunction, <30 ml/min represents severe renal dysfunction and > 60 ml/min indicates normal and minimally impaired renal function [19, 20]. The present study showed that patients admitted with STEMI and across each STEMI grouping, creatinine clearance is an important independent predictor of hospital mortality. We have information on baseline and peak serum creatinine, but not intercurrent creatinine. In addition, we do not have information on acute dialysis. Patients in whom serum creatinine was

not collected (and hence excluded from our analysis) were less healthy. We have dates but not times for the in-hospital adverse events in our analysis, limiting our ability to finely assess temporality between AKI and in-hospital adverse outcomes. We do not have information on stopping and restarting inpatient medications.

## CONCLUSION

In concluded, that those who have renal impairment previously or develop after acute STEMI have inverse outcomes. As renal impairment is associated with an increased risk of coronary artery disease and stroke, the cardiovascular disease may develop early in the course of renal dysfunction. In our country management facilities of complications of acute STEMI are limited. Early detection of renal impairment may help to avoid complications. However, if we can detect impaired renal function early, we can prevent the adverse outcomes by adequate and appropriate measures.

## CONFLICT OF INTEREST

None

## SOURCE OF FUND

None

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