

**ORIGINAL RESEARCH**

# Assessment of serum sodium in acute myocardial infarction and its correlation with severity and complications of myocardial infarction

<sup>1</sup>Dr. Ashwini Kumar, <sup>2</sup>Dr. Rahul Shekhar, <sup>3</sup>Dr. Kaushal Kishore

<sup>1,2</sup>Senior Resident, <sup>3</sup>Professor and Head, Department of General Medicine, Patna Medical College and Hospital, Patna, Bihar, India

**Corresponding Author**

Dr. Rahul Shekhar

Senior Resident, Department of General Medicine, Patna Medical College and Hospital, Patna, Bihar, India

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**ABSTRACT**

**Background:** Myocardial infarction (MI), commonly known as a heart attack, occurs when blood flow to a part of the heart is blocked for a long enough time that part of the heart muscle is damaged or dies. The present study was conducted to assess serum sodium in acute myocardial infarction and its correlation with severity and complications of myocardial infarction. **Materials & Methods:** The study was conducted at Department of Medicine, Patna Medical College and Hospital, Patna during March 2023 - August 2023. 56 patients of acute myocardial infarction of both genders were divided into two groups based on the mean serum sodium value: Group I had a mean serum sodium level  $>135$  mmol/l and group II had a mean serum sodium level  $\leq 135$  mmol/l. **Results:** Out of 56 patients, males were 36 and females were 20. Out of 18 patients in group I, 1 case had RVF in AAMI and 2 had biventricular failure in AAMI. Out of 38 cases in group II, 6 RVF included AAMI, 5 IWMI and 3 biventricular failures in AAMI. The difference was significant ( $P < 0.05$ ). According to Killip's classification, there were 12 patients in group I and 21 patients in group II, class II had 3 patients in group I and 8 patients in group II, class III had 1 patient in group I and 5 patients in group II and class IV had 2 patients in group I and 4 patients in group II. The difference was significant ( $P < 0.05$ ). There were 1 mortality of male in group I and 7 males and 3 females in group II. The difference was significant ( $P < 0.05$ ). **Conclusion:** Serum sodium levels are positively correlated with myocardial infarction severity, sequelae, and prognosis. Therefore, measuring blood sodium may aid in the quick evaluation of myocardial infarction severity and in the prediction of sequelae for prompt treatment.

**Keywords:** Myocardial infarction, serum sodium, biventricular failures

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**INTRODUCTION**

Myocardial infarction (MI), commonly known as a heart attack, occurs when blood flow to a part of the heart is blocked for a long enough time that part of the heart muscle is damaged or dies. This is typically caused by a blockage in one or more of the coronary arteries due to a buildup of plaque (a combination of fat, cholesterol, and other substances).<sup>1</sup> Sodium ions are essential for maintaining fluid balance, nerve function, and muscle contractions, including the heart muscle. Sodium homeostasis is critical for overall cellular function and extracellular fluid volume regulation. Low sodium levels in the blood can be associated with poor outcomes in MI patients. It is often a sign of heart failure, a common complication of MI, where the body retains water and dilutes sodium levels.<sup>2</sup>

Potassium ions are vital for maintaining normal electrical activity in the heart. They help regulate heartbeat and are crucial for the repolarization phase of the cardiac cycle.<sup>3</sup> Potassium balance is essential for preventing arrhythmias and ensuring proper cardiac function. High potassium levels can cause dangerous arrhythmias, including ventricular fibrillation, which can be life-threatening in the context of MI. Low potassium levels can also predispose to arrhythmias, such as ventricular tachycardia and premature ventricular contractions.<sup>4</sup>

Serum potassium and sodium concentrations have a number of significant effects in myocardial infarction instances, including many complications that can be deadly.<sup>5</sup> When a person has an acute myocardial infarction, sodium imbalance may result from pre-existing conditions such as a diet low in salt, a history

of diuretics, the presence of overt or incipient renal failure, or slowly developing cardiac failure before the infarction.<sup>6</sup>The present study was conducted to assess serum sodium in acute myocardial infarction and its correlation with severity and complications of myocardial infarction.

**MATERIALS & METHODS**

The study was conducted at Department of Medicine, Patna Medical College and Hospital, Patna during March 2023 - August 2023. The present study was conducted on 56 patients of acute myocardial infarction of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. At the time of admission, twice a day after that, and whenever needed, an ECG was taken. Serum potassium and sodium levels were measured upon admission, as well as after 12, 24, and 48 hours. Cases were divided into two groups based on the mean serum sodium value: Group I had a mean serum sodium level >135 mmol/l and group II had a mean serum sodium level ≤135 mmol/l. Blood sugar, blood urea, serum aspartate amino transferase, serum alanine transferase, serum cholesterol, and other biochemical markers were considered. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Total- 56		
Gender	Male	Female
Number	36	20

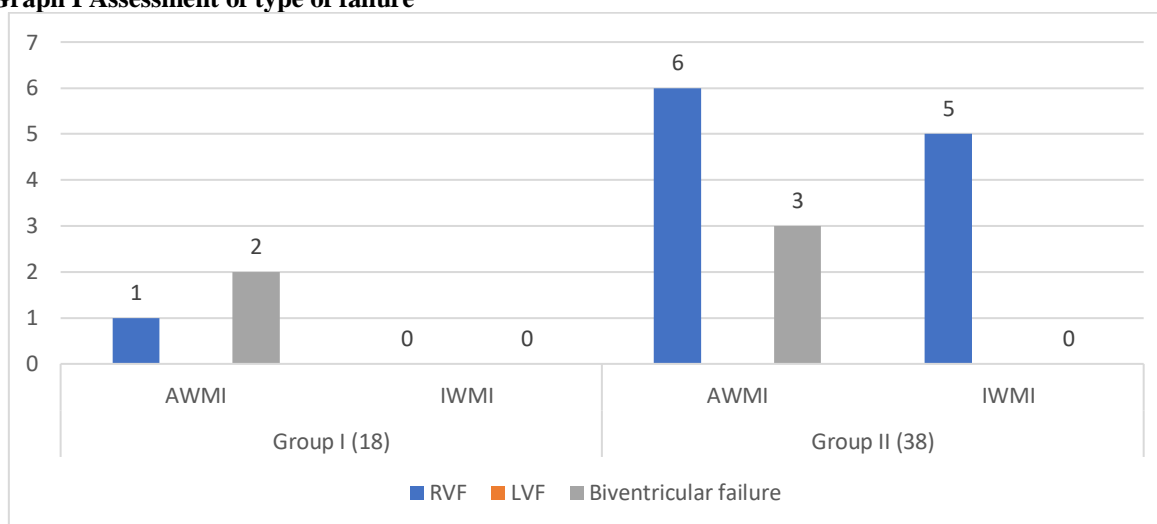
Table I shows that out of 56 patients, males were 36 and females were 20.

**Table II Assessment of type of failure**

Type of failure	Group I (18)		Group II (38)		P value
	AWMI	IWMI	AWMI	IWMI	
RVF	1	0	6	5	0.05
LVF	0	0	0	0	
Biventricular failure	2	0	3	0	

Table II shows that out of 18 patients in group I, 1 case had RVF in AWMI and 2 had biventricular failure in AWMI. Out of 38 cases in group II, 6 RVF included AWMI, 5 IWMI and 3 biventricular failures in AWMI. The difference was significant (P< 0.05).

**Graph I Assessment of type of failure**



**Table III Heart failure in Killip’s classification in both groups**

Killip’s classification	Group I (18)	Group II (38)	P value
I	12	21	0.04
II	3	8	
III	1	5	
IV	2	4	

Table III shows that according to Killip’s classification, there were 12 patients in group I and 21 patients in group II, class II had 3 patients in group I and 8 patients in group II, class III had 1 patient in group I and 5

patients in group II and class IV had 2 patients in group I and 4 patients in group II. The difference was significant ( $P < 0.05$ ).

**Table IV Mortality rate in both groups**

Gender	Group I (18)	Group II (38)	P value
Male	1	7	0.01
Female	0	3	

Table IV shows that there were 1 mortality of male in group I and 7 males and 3 females in group II. The difference was significant ( $P < 0.05$ ).

## DISCUSSION

One of the most dangerous health issues in the globe, and one that is unabated in fast developing nations like India, is coronary artery disease.<sup>7</sup> High sodium levels are less common but can occur, particularly in dehydrated patients or those receiving excessive sodium through intravenous fluids.<sup>8,9</sup> It is crucial to monitor serum sodium levels in patients with MI, as both hyponatremia and hypernatremia can have significant impacts on cardiac function and overall prognosis.<sup>10,11</sup> The present study was conducted to assess serum sodium in acute myocardial infarction and its correlation with severity and complications of myocardial infarction.

We found that out of 56 patients, males were 36 and females were 20. Kori et al<sup>12</sup> evaluated serum and potassium estimation on admission, then after 12, 24 and 48 hrs of cases of acute myocardial infarction. Acute myocardial infarction was associated with modifiable risk factors like tobacco addiction, dyslipidemia, diabetes mellitus and hypertension. Acute anterior wall myocardial infarction was more commonly associated with hyperglycemia at admission and with poor prognosis ( $p < 0.05$ ).

We found that out of 18 patients in group I, 1 case had RVF in AAMI and 2 had biventricular failure in AAMI. Out of 38 cases in group II, 6 RVF included AAMI, 5 IWMI and 3 biventricular failures in AAMI. We found that according to Killip's classification, there were 12 patients in group I and 21 patients in group II, class II had 3 patients in group I and 8 patients in group II, class III had 1 patient in group I and 5 patients in group II and class IV had 2 patients in group I and 4 patients in group II. We found that there were 1 mortality of male in group I and 7 males and 3 females in group II. Patel et al<sup>13</sup> comprised 100 individuals with acute myocardial infarction. On admission, the patients were clinically assessed with a full history, particularly the symptoms and history of risk factors for the occurrence of acute myocardial infarction, and a thorough physical examination was performed. On admission, all patients' serum sodium concentrations were measured and compared to hyponatremia against normonatremia. Acute myocardial infarction was most prevalent in those aged 50 to 60 years old, and it was shown to be more common in men. It was linked to modifiable risk factors such as cigarette addiction, diabetes, hypertension, and dyslipidemia. Serum sodium levels were low in patients with acute

myocardial infarction, and lower values were reported in patients with myocardial infarction accompanied with heart failure.

The shortcoming of the study is small sample size.

## CONCLUSION

Authors found that serum sodium levels are positively correlated with myocardial infarction severity, sequelae, and prognosis. Therefore, measuring blood sodium may aid in the quick evaluation of myocardial infarction severity and in the prediction of sequelae for prompt treatment.

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