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ORIGINAL RESEARCH

Role of serum sodium in severity and complications of myocardial infarction

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Abstract

Background: A myocardial infarction (MI), sometimes referred to as a heart attack, happens when blood flow is cut off to a portion of the heart for an extended period of time, causing damage or even death to a portion of the heart muscle. The present study evaluated role of serum sodium in severity and complications of myocardial infarction

Materials & Methods: 86 patients of acute myocardial infarction of both genders were divided into two groups. Group I had a mean serum sodium level >135 mmol/l and group II had a mean serum sodium level ≤135 mmol/lbased on the mean serum sodium value.

Results: In group I, 2 cases had RVF in AWMI and 2 had biventricular failure in AWMI. 1 case each in IWMI had RVF and biventricular failure. In group II, 5 RVF included AWMI, 7 IWMI and 2 biventricular failures in AWMI and 7 RVF and 1 biventricular failure in IWMI. The difference was significant (P< 0.05). There were 20 patients in group I and 18 patients in group II, class II had 14 patients in group I and 13 patients in group II, class III had 6 patients in group I and 7 patients in group II and class IV had 3 patients in group I and 5 patients in group II according to Killip's classification. There were 2 mortalities of male and 1 female in group I and 6 males and 2 females in group II. The difference was significant (P< 0.05).

Conclusion: The severity, after effects, and prognosis of myocardial infarction are all favorably connected with serum sodium levels. As a result, monitoring blood sodium levels may help with the rapid assessment of myocardial infarction severity and the prognosis of consequences for early intervention.

Keywords: Serum sodium, biventricular failures, Myocardial infarction

Introduction

A myocardial infarction (MI), sometimes referred to as a heart attack, happens when blood flow is cut off to a portion of the heart for an extended period of time, causing damage or even death to a portion of the heart muscle.[1] This is usually brought on by a build-up of plaque, which is a mixture of fat, cholesterol, and other substances that obstructs one or more coronary arteries.Maintaining fluid equilibrium, neuronal transmission, and muscle contractions—including those of the heart muscle—all depend on sodium ions.[2] Both the regulation of extracellular fluid volume and general cellular function depend on sodium homeostasis. Poor blood sodium levels have been linked to worse outcomes for MI patients.

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It is frequently an indication of heart failure, which is a frequent MI consequence in which the body retains water and lowers salt levels.[3]

Potassium ions are necessary to keep the heart's electrical activity functioning normally. They are essential for the repolarization phase of the cardiac cycle and aid in heartbeat regulation. Maintaining a balanced potassium level is crucial for avoiding arrhythmias and guaranteeing healthy heart function.[4] In the setting of a MI, high potassium levels can result in severe arrhythmias such ventricular fibrillation, which can be fatal. Arrhythmias such as ventricular tachycardia and premature ventricular contractions can also be predisposed to by low potassium levels.[5] Concentrations of potassium and sodium in the serum have several important consequences on myocardial infarction cases, including several potentially fatal sequelae. Sodium imbalance may arise from pre-existing diseases such as low-sodium diet, history of diuretics, overt or incipient renal failure, or slowly progressing heart failure prior to the myocardial infarction in an individual experiencing an acute myocardial infarction.[6]The present study evaluated role of serum sodium in severity and complications of myocardial infarction

Materials & Methods

The present study was conducted on 86 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. An ECG was taken at admission, twice daily thereafter, and as needed. Serum potassium and salt concentrations were checked at admission, 12, 24, and 48 hours later. Based on the mean serum sodium value, the cases were split into two groups: Group I had a mean serum sodium level greater than 135 mmol/l, and group II had a mean serum sodium level less than 135 mmol/l. Among the biochemical markers taken into consideration were blood sugar, blood urea, serum cholesterol, serum aspartate amino transferase, and serum alanine transferase. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table: I Type of failure

Type of failure	Group I (43)		Group II (43)		P value
	AWMI	IWMI	AWMI	IWMI	0.05
RVF	2	1	5	7	
LVF	0	1	1	0	
Biventricular failure	2	1	2	1	

Table I shows that in group I, 2 cases had RVF in AWMI and 2 had biventricular failure in AWMI. 1 case each in IWMI had RVF and biventricular failure. In group II, 5 RVF included AWMI, 7 IWMI and 2 biventricular failures in AWMI and 7 RVF and 1 biventricular failure in IWMI.The difference was significant (P< 0.05).

Table: II Assessment of parameters

Parameters	Variables	Group I	Group II	P value
Killip's classification	I	20	18	0.05
	II	14	13	
	III	6	7	
	IV	3	5	
Gender	Male	2	6	0.01
	Female	1	2	

Table II, graph I shows that there were 20 patients in group I and 18 patients in group II, class II had 14 patients in group I and 13 patients in group II, class III had 6 patients in group I and

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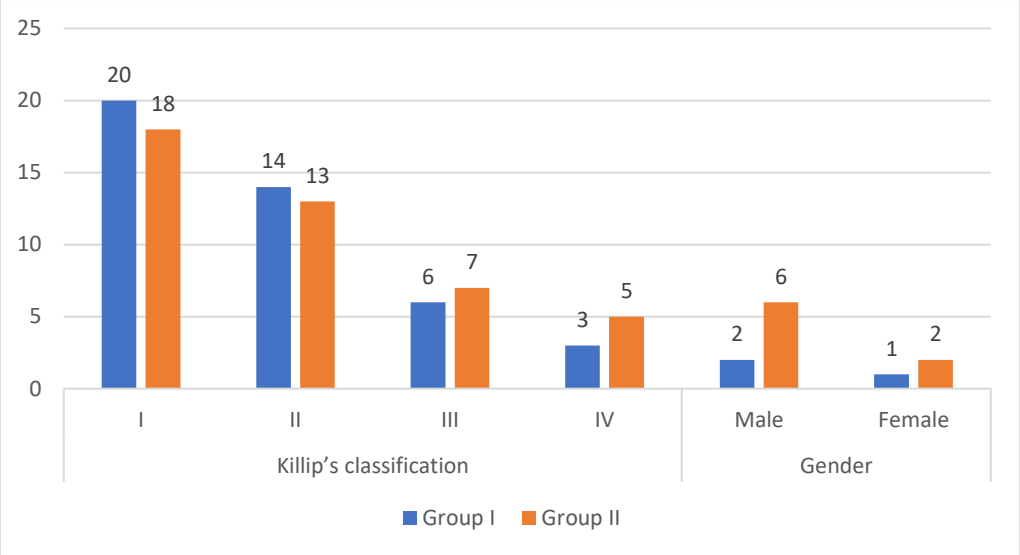
7 patients in group II and class IV had 3 patients in group I and 5 patients in group IIaccording to Killip's classification. There were 2 mortalities of male and 1 female in group I and 6 males and 2 females in group II. The difference was significant (P< 0.05).

Graph I: Assessment of parameters



Discussion

Coronary artery disease is one of the world's most deadly health conditions, and it continues unchecked in rapidly developing countries like India.[7] Although less often, high sodium levels can happen, especially in individuals who are dehydrated or who are getting excessive salt through intravenous fluids.[8,9] Serum sodium levels should be closely monitored in MI patients since hypo- and hypernatremia can both have major effects on heart function and overall prognosis.[10,11]The present study evaluated role of serum sodium in severity and complications of myocardial infarction.

We found that in group I, 2 cases had RVF in AWMI and 2 had biventricular failure in AWMI. 1 case each in IWMI had RVF and biventricular failure. In group II, 5 RVF included AWMI, 7 IWMI and 2 biventricular failures in AWMI and 7 RVF and 1 biventricular failure in IWMI. Jha et al[12] included 60 patients with recent onset of acute myocardial infarction in accordance with the European Society of Cardiology (ESC), the American College of Cardiology (ACC), the American Heart Association (AHA), and the World Heart Federation (WHF) jointly. A comparison of serum and potassium levels was performed between the control category and AMI, patients and AMI patients with and without a history of smoking, hypertension, and diabetes mellitus, as well as a study to evaluate the variations in serum electrolyte levels in AMI patients aged less than 52 years and more than 52 years. A significantly lower amount of potassium was detected in AMI patients 52 years of age than in normal healthy control categories, although a greater level of potassium was identified in AMI cases > 52 years of age. Both sexes saw a statistically significant drop in serum electrolyte levels. Serum sodium levels were significantly higher in smokers than in nonsmokers in AMI. There was no significant difference in serum potassium levels in AMI between smokers and nonsmokers.

We observed that there were 20 patients in group I and 18 patients in group II, class II had 14 patients in group I and 13 patients in group II, class III had 6 patients in group I and 7 patients in group II and class IV had 3 patients in group I and 5 patients in group II according to Killip's classification. There were 2 mortalities of male and 1 female in group I and 6 males and 2 females in group II.One hundred patients with acute myocardial infarction were

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included in study by Patel et al.[13] Upon admission, the patients underwent a comprehensive physical examination and a clinical assessment that included a review of their whole medical history, with special attention to any symptoms and past risk factors related to the development of acute myocardial infarction. Serum sodium concentrations were determined in all patients upon arrival and compared to normonatremia and hyponatremia. Acute myocardial infarction was found to be more common in men and to be most common in those between the ages of 50 and 60. It was associated with modifiable risk factors such dyslipidemia, diabetes, hypertension, and cigarette addiction. Patients with acute myocardial infarction had low serum sodium levels, and those with myocardial infarction combined with heart failure also had lower values.
The shortcoming of the study is small sample size.

Conclusion

Authors found that the severity, aftereffects, and prognosis of myocardial infarction are all favorably connected with serum sodium levels. As a result, monitoring blood sodium levels may help with the rapid assessment of myocardial infarction severity and the prognosis of consequences for early intervention.

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