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Original Article

Alteration in serum sodium and potassium levels among AMI patients

Mukesh Kumar Agrawal

Assistant Professor, Department General Medicine, Mulayam Singh Yadav Medical College & Hospital, Meerut, Uttar Pradesh, India

ABSTRACT:

Background: To assess the alteration in serum sodium and potassium levels among AMI patients. **Materials & methods:** 100 patients with confirmed diagnosis of AMI were enrolled. Complete demographic and clinical details of all the patients was obtained. A Performa was made and ECHO and ECG findings were recorded. Blood samples on admission were obtained and were sent to laboratory where auto-analyzer was used for evaluation of serum sodium and potassium levels. All the results were recorded and analyzed using SPSS software. **Results:** Mean serum potassium levels was 4.13 mEq/L while mean serum sodium levels was 140.25 mEq/L respectively. Hypokalemia and hyponatremia were seen in 18 percent and 15 percent of the patients respectively. Normokalaemia and normonatremia was seen in 71 percent 84 percent of the patients respectively. **Conclusion:** Serum sodium and serum potassium levels were significantly altered in AMI patients.

Key words: Sodium, Potassium, Acute myocardial infarction

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Corresponding Author: Mukesh kumar Agrawal, Assistant Professor, Department General Medicine, Mulayam Singh Yadav Medical College & Hospital, Meerut, Uttar Pradesh, India

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INTRODUCTION

In the early 1970s, the World Health Organization (WHO) had defined the term myocardial infarction by the presence of 2 of the 3 following characteristics: i) Symptoms of acute ischemia (chest pain), ii) development of Q waves in electrocardiogram (ECG) and iii) increase of enzymes in the blood [combination of total creatine kinase (CK), CK-myocardial band (MB), aspartate aminotransferase (AST) and lactate dehydrogenase (LDH)]. However, in 1999, the Joint European Society of Cardiology and the American College of Cardiology Committee jointly proposed the new definition for myocardial infarction, emphasizing the importance of sensitive and serological biomarkers for the diagnosis of acute myocardial infarction (AMI), and introduced cardiac troponins (cTn) as the gold standard.[1-3]

Several systemic metabolic changes occur in AMI. These changes include increased plasma concentrations of catecholamines, free fatty acids, glucose, glycerol, cortisol and cyclic-AMP. There is decreased triglycerides concentration and an initial fall in plasma insulin concentration, followed by an early return to normal value. Serum electrolytes changes in AMI have not been studied extensively and there is paucity of information in the literature in this regard.[4-6] Hence; the present study was conducted for assessing the alteration in serum sodium and potassium levels among AMI patients.

MATERIALS & METHODS

The present study was conducted for assessing the alteration in serum sodium and potassium levels among AMI patients. 100 patients with confirmed diagnosis of AMI were enrolled. Complete demographic and clinical details of all the patients was obtained. A Performa was made and ECHO and ECG findings were recorded. Blood samples on admission were obtained and were sent to laboratory where auto-analyzer was used for evaluation of serum sodium and potassium levels. All the results were recorded and analyzed using SPSS software.

RESULTS

Mean age of the patients was 48.3 years with majority of the patients being males. Mean serum potassium levels was 4.13 mEq/L while mean serum sodium levels was 140.25 mEq/L respectively. Hypokalemia and hyponatremia were seen in 18 percent and 15 percent of the patients respectively. Normokalaemia

and normonatremia was seen in 71 percent 84 percent of the patients respectively.

Table 1: Descriptive variables

Variable	Mean	SD
Serum potassium levels (mEq/L)	4.13	1.74
Serum sodium levels (mEq/L)	140.25	5.14

Table 2: Distribution of AMI subjects on the basis of serum potassium levels

Parameter	Frequency	Percentage
Hypokalemia	18	18
Normokalaemia	71	71
Hyperkalemia	11	11
Total	100	100

Table 3: Distribution of AMI subjects on the basis of serum sodium levels

Parameter	Frequency	Percentage
Hyponatremia	15	15
Normo-natremia	84	84
Hypernatremia	1	1
Total	100	100

DISCUSSION

Myocardial infarction (MI) is a term used for an event of heart attack which is due to formation of plaques in the interior walls of the arteries resulting in reduced blood flow to the heart and injuring heart muscles because of lack of oxygen supply. The symptoms of MI include chest pain, which travels from left arm to neck, shortness of breath, sweating, nausea, vomiting, abnormal heart beating, anxiety, fatigue, weakness, stress, depression, and other factors. The immediate treatment of MI include, taking aspirin, which prevents blood from clotting, and nitro-glycerin to treat chest pain and oxygen. The heart attack can be prevented by taking an earlier action to lower those risks by controlling diet, fat, cholesterol, salt, smoking, nicotine, alcohol, drugs, monitoring of blood pressure every week, doing exercise every day, and loosing body weight.[7- 10] Hence; the present study was conducted for assessing the alteration in serum sodium and potassium levels among AMI patients.

In the present study, mean age of the patients was 48.3 years with majority of the patients being males. Mean serum potassium levels was 4.13 mEq/L while mean serum sodium levels was 140.25 mEq/L respectively. Goyal A et al determined the relationship between serum potassium levels and in-hospital mortality in AMI patients in the era of β-blocker and reperfusion therapy. There was a U-shaped relationship between mean postadmission serum potassium level and in-hospital mortality that persisted after multivariable adjustment. Compared with the reference group of 3.5 to less than 4.0 mEq/L (mortality rate, 4.8%; 95% CI, 4.4%-5.2%), mortality was comparable for mean postadmission potassium of 4.0 to less than 4.5 mEq/L (5.0%; 95% CI, 4.7%-5.3%), multivariable-adjusted odds ratio (OR), 1.19 (95% CI, 1.04-1.36). Mortality was twice as great for potassium of 4.5 to less than 5.0 mEq/L (10.0%; 95% CI, 9.1%-10.9%; multivariable-adjusted OR, 1.99; 95% CI, 1.68-2.36), and even greater for higher potassium strata. Similarly, mortality rates were higher for potassium levels of less than 3.5 mEq/L. Among inpatients with AMI, the lowest mortality was observed in those with postadmission serum potassium levels between 3.5 and <4.5 mEq/L compared with those who had higher or lower potassium levels.[10] Krogager et al used Danish health registries to investigate the relationship between seven defined potassium intervals and 90-day all-cause mortality in patients following an AMI. The authors based the survival analysis on the first measured potassium, while excluding day 0 and 1 to minimize bias. Unsurprisingly, potassium levels outside the normal range were associated with increased mortality risk, with a characteristic U-shaped curve.[11]

In the present study, hypokalemia and hyponatremia were seen in 18 percent and 15 percent of the patients respectively. Normokalaemia and normonatremia was seen in 71 percent 84 percent of the patients respectively. Alexander Goldberg et al studied 978 patients with acute ST-elevation myocardial infarction and without a history of heart failure who survived the index event. During the hospital stay, sodium levels were obtained on admission and at 24, 48, and 72 hours. The median duration of follow-up after hospital discharge was 31 months (range, 9-61 months). Hyponatremia, defined as a mean serum sodium level less than 136 mEq/L, was present during admission in 108 patients (11.0%). In a multivariable Cox proportional hazards model adjusting for other potential clinical predictors of mortality and for left ventricular ejection fraction, hyponatremia during admission remained an independent predictor of post discharge death. Hyponatremia during admission was also independently associated with post discharge readmission for heart failure (HR, 1.6; 95% CI, 1.1-2.6; P = .04). When serum sodium level was used as a continuous variable, the adjusted HR for death or heart failure was 1.12 for every 1-mEq/L decrease (95% CI, 1.07-1.18; P<.001). Hyponatremia in the early phase of ST-elevation myocardial infarction is a predictor of long-term mortality and admission for heart failure after hospital discharge, independent of other clinical predictors of adverse outcome and left ventricular ejection fraction.[12]

CONCLUSION

Serum sodium and serum potassium levels were significantly altered in AMI patients.

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