ORIGI NAL RESEARCH

Incidence of hypokalemia among AMI patients: An observational study

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ABSTRACT
Background: The present study was conducted for assessing the incidence of hypokalemia among AMI patients. **Materials & methods:** A total of 50 patients with presence of AMI and 50 healthy controls were enrolled. Complete demographic details of all the patients were obtained. ECG and ECHO findings were recorded in all the patients. Blood samples were obtained from all the patients. All the collected samples were sent to laboratory and serum potassium levels were evaluated using auto-analyser. Comparison of potassium levels was done between AMI patients and controls. Hypokalemia was defined as presence of serum potassium levels less than 3.5 mEq/L. **Results:** Mean potassium levels among patients of AMI group and control group was 3.9 mEq/L and 4.6 mEq/L respectively. Non-significant results were obtained while comparing the mean potassium levels among patients of AMI group and control group. Overall, hypokalemia was seen in 14 percent of the patients of the AMI group. **Conclusion:** Hypokalemia is significantly prevalent among AMI patients.
Key words: Acute myocardial infarction, Hypokalemia, Potassium

INTRODUCTION

Acute myocardial infarction is one of the leading causes of death in the developed world. The prevalence of the disease approaches three million people worldwide, with more than one million deaths in the United States annually. Acute myocardial infarction can be divided into two categories, non-ST-segment elevation MI (NSTEMI) and ST-segment elevation MI (STEMI). An MI results in irreversible damage to the heart muscle due to a lack of oxygen which can lead to impairment in diastolic and systolic function and make the patient prone to arrhythmias. In addition, MI can also lead to a number of serious complications. The key is to reperfuse the heart and restore blood flow.[1-3]Serum potassium (K) level is critical in cardiovascular diseases for the prevention of adverse events. Most of the body K is intracellularly located (98%), and a level of 3.5-5.3 mmol/L is maintained by intra and extracellular shifts and renal excretion. Hypokalemia is defined as serum potassium levels of <3.5 mmol/L and plays an important role in cardiovascular disease pathogenesis. Studies showed that at the acute phase of myocardial infarction (MI), hypokalemia occurs that as a consequence could lead to ventricular arrhythmia.[4-6] Hence; the present study was conducted for assessing the incidence of hypokalemia among AMI patients.

MATERIALS & METHODS

The present study was conducted for assessing the incidence of hypokalemia among AMI patients. A total of 50 patients with presence of AMI and 50 healthy controls were enrolled. Complete demographic details of all the patients were obtained. ECG and ECHO findings were recorded in all the patients. Blood samples were obtained from all the patients. All the collected samples were sent to laboratory and serum potassium levels were evaluated using auto-analyser. Comparison of potassium levels was done between AMI patients and controls. Hypokalemia was defined as presence of serum potassium levels less than 3.5 mEq/L. All theresults were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

Mean age of the patients of the AMI group and control group was 46.8 years and 48.7 years respectively.

Majority proportion of patients of AMI group and control group were males. Mean potassium levels among patients of AMI group and control group was 3.9 mEq/L and 4.6 mEq/L respectively. Non-significant results were obtained while comparing the mean potassium levels among patients of AMI group and control group. Overall, hypokalemia was seen in 14 percent of the patients of the AMI group.

Table 1: Comparison of serum potassium levels

Potassium levels (mEq/L)	AMI group	Control group	p-value
Mean	3.9	4.6	0.74
SD	1.3	1.6	

Table 2: Incidence of hypokalemia

Hypokalemia	Number	Percentage
Present	7	14
Absent	43	86
Total	50	100

DISCUSSION

Myocardial infarction in general can be classified from Type 1 to Type 5 MI based on the etiology and pathogenesis. Type 1 MI is due to acute coronary atherothrombotic myocardial injury with plaque rupture. Most patients with ST-segment elevation MI (STEMI) and many with non-ST-segment elevation MI (NSTEMI) comprise this category. Type 2 MI is the most common type of MI encountered in clinical settings in which is there is demand-supply mismatch resulting in myocardial ischemia. This demand supply mismatch can be due to multiple reasons including but not limited to presence of a fixed stable coronary obstruction, tachycardia, hypoxia or stress. However, the presence of fixed coronary obstruction is not necessary. Other potential etiologies include coronary vasospasm, coronary embolus, and spontaneous coronary artery dissection (SCAD).[7, 8]Potassium plays a key role in normal myocardial function, and current guidelines recommend that serum potassium levels be maintained from 4.0 to 5.0 mEq/L in patients with acute myocardial infarction (AMI). However, the impact of serum potassium levels on long-term mortality has not been evaluated.[9- 12]Hence; the present study was conducted for assessing the incidence of hypokalemia among AMI patients.

Mean age of the patients of the AMI group and control group was 46.8 years and 48.7 years respectively. Majority proportion of patients of AMI group and control group were males. Mean potassium levels among patients of AMI group and control group was 3.9 mEq/L and 4.6 mEq/L respectively. Non-significant results were obtained while comparing the mean potassium levels among patients of AMI group and control group. Choi, J. S et al, in a previous study, studied 1,924 patients diagnosed with AMI. The average serum potassium levels measured throughout the hospitalization were obtained and statistically analyzed. Patients were categorized into 5 groups to determine the relation between mean serum potassium and long-term mortality: <3.5, 3.5 to <4.0, 4.0 to <4.5, 4.5 to <5.0, and ≥5 mEq/L. The long-term mortality was lowest in the group of patients with potassium levels of 3.5 to <4.0 mEq/L, whereas mortality was higher in the patients with potassium levels≥4.5 or <3.5 mEq/L. In a multivariate Cox-proportional regression analysis, the mortality risk was greater for serum potassium levels of >4.5 mEq/L compared with patients with potassium levels of 3.5 to <4.0 mEq/L. The mortality risk was also higher for patients with potassium levels<3.5 mEq/L (HR 1.55, 95% CI 0.94 to 2.56). In contrast to the association with long-term mortality, there was no relation between serum potassium levels and the occurrence of ventricular arrhythmias.[13]

In the present study, overall, hypokalemia was seen in 14 percent of the patients of the AMI group.Uluganyan, Mahmut et al assessed the relation between admission serumpotassium level and in-hospital and long-term mortality and ventricular arrhythmias.Retrospectively, 611 patients with ST-elevation myocardial infarction (STEMI) who underwent primary percutaneous coronary intervention were recruited. Admission serum potassium levels were categorized accordingly: <3.5, 3.5-<4, 4-<4.5, 4.5-<5, and ≥5 mmol/L.The lowest in-hospital and long-term mortality occurred in patients with levels of 3.5 to <4 mmol/L. The long-term mortality risk increased for admission levels of >4.5 mmol/L [odds ratio (OR), 1.58; 95% confidence interval (CI) 0.42–5.9 and OR, 2.27; 95% CI 0.44-11.5 for sK levels of 4.5-<5 mmol/L and ≥5 mmol/L, respectively]. At K levels <3 mmol/L and ≥5 mmol/L, the incidence of ventricular arrhythmias was higher (p=0.019).Admission K level of >4.5 mmol/L was associated with increased long-term mortality in STEMI.[14]

CONCLUSION

Hypokalemia is significantly prevalent among AMI patients.

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