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ORIGINAL RESEARCH

ASSESSMENT OF SERUM POTASSIUM LEVELS IN ACUTE MYOCARDIAL INFARCTION PATIENTS: A CASE CONTROL STUDY

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Abstract

Background: MI requires cardiac myocyte necrosis with an increase and/or a decrease in plasma of cardiac troponin. The present study was conducted to assess levels of serum potassium levels in acute myocardial infarction (AMI) patients.

Materials & Methods: 80 patients of AMI of both genders were enrolled.Patients with AMI were put in group I and gender matched healthy control in group II. Venous blood samples were collected for the estimation of potassium level.

Results: Age group <40 years had 35 patients in group I had 42 in group II and age group >40 years had 45 in group I and 38 in group II. The mean serum potassium level in group I was 3.52 mEq/L and in group II was 4.76 mEq/L. The difference was significant (P< 0.05).

Conclusion: Changesin potassium levelsmight act asa predictor for assessing the prognosis.

Key words: acute myocardial infarction, hypokalemia, potassium

Introduction

The definition of MI requires cardiac myocyte necrosis with an increase and/or a decrease in plasma of cardiac troponin (cTn).[1] At least one cTn measurement should be greater than the 99th percentile normal reference limit during: symptoms of myocardial ischemia; new (or presumably new) significant ECG ST-segment/T-wave changes or left bundle branch block; the development of pathological electrocardiographic (ECG) Q waves; new loss of viable myocardium or regional wall motion abnormality identified by an imaging procedure; or identification of intracoronary thrombus by angiography or autopsy.[2]

Studies showed that at the acute phase of myocardial infarction (MI), hypokalemia occurs that as a consequence could lead to ventricular arrhythmia.[3] Potassium mediates vasodilation by Na-K-ATPase pump and inwardly rectifying K channels. Also, K inhibits vasoconstriction associated with angiotensin-II. As a consequence, a low level of K further enhances infarction and ischemia.[4] Previous studies showed that hypokalemia is a fairly common finding on admission in acute MI patients. The mean admission level of sK was

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approximately 4 mmol/L. This level is not defined as hypokalemia. It was reported that after ischemic attack, during the stable phase, the sK level significantly increases with a mean value of 4.4 mmol/L.[5]The present study was conducted to assess levels of serum potassium levels in acute myocardial infarction (AMI) patients.

Materials & Methods

The present study comprised of 80 patients of AMI of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. Patients with AMI were put in group I and gender matched healthy control in group II. Physical examination included height and weight measurement for calculating Body Mass Index. Venous blood samples were collected from all the participants. Samples were collected on the day of admission within 12 hours from anti-cubital vein under aseptic precautions. All the samples were sent for analysis in laboratory for the estimation of potassium level. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Age groups (years)	Group I	Group II
<40	35	42
>40	45	38

Table I shows that age group <40 years had 35 patients in group I had 42 in group II and age group >40 years had 45 in group I and 38 in group II.

Table II Assessment of serum potassium level

Groups	Mean (mEq/L)	P value
Group I	3.52	0.02
Group II	4.76	

Table II, graph I shows that mean serum potassium level in group I was 3.52 mEq/L and in group II was 4.76 mEq/L. The difference was significant (P< 0.05).

Graph I Assessment of serum potassium level

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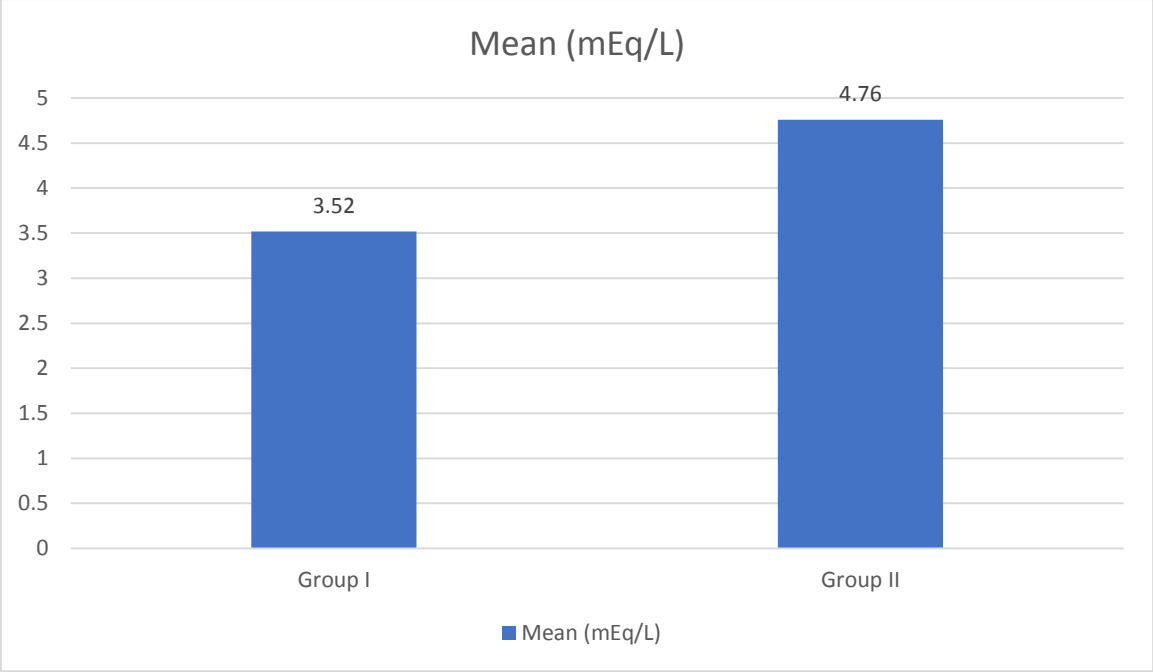

Discussion

An Acute Myocardial Infarction (AMI) is a subset of a spectrum of IHD that includes unstable angina and AMI with or without ST elevation. Potassium is critical to the maintenance of cardio-vascular health.[6] Several studies have demonstrated a relationship between low serum potassium levels and the risk of ventricular arrhythmias in patients with AMI.Acute MI is accompanied by a catecholamine surge. Catecholamine by stimulating Na-K-ATPase pump shifts K intracellularly, thus causing re-distributional hypokalemia, and as a result, non-ischemic myocardium is hyperpolarized. As a consequence, electrical inhomogeneity occurs and leads to ventricular arrhythmia.[7] Most prior studies had proposed an increased rate of ventricular arrhythmia during the acute course of MI that was found to be associated with hypokalemia. Most of these studies were conducted prior to modern treatment modalities such as beta-blocker and early reperfusion treatment. Based on these previous studies, guidelines recommended a serum level of >4-4.5 mmol/L in acute MI.[8]

We found that age group <40 years had 35 patients in group I had 42 in group II and age group >40 years had 45 in group I and 38 in group II. Singh et al[9]assessed levels of serum potassium levels in acute myocardial infarction patients. 100 patients with AMI were selected for the present study as Cases. 100 age and sex matched apparently healthy individuals were selected as Controls. Venous blood samples were collected from all the participants. Mean serum potassium levels were higher in the control group (4.52 mEq/L) in comparison to the study group (3.99mEq/L), the values of which were found to be statistically significant (P-value < 0.05)

We observed that mean serum potassium level in group I was 3.52 mEq/L and in group II was 4.76 mEq/L. Uluganyan et al[10] figured out the relation between admission sK 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 sK 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

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occurred in patients with sK levels of 3.5 to <4 mmol/L. The long-term mortality risk increased for admission sK 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 sK levels <3 mmol/L and ≥5 mmol/L, the incidence of ventricular arrhythmias was higher (p=0.019).

Friedensohn A et al[11] evaluated 11 patients presenting with AMI. Thirteen percent of the overall patients 11 studied had significant hypokalemia (serum potassium level less than 3.5 mmol/liter). The average initial level of potassium in patients who developed malignant arrhythmias was (4.10 mmol/liter) significantly lower (P less than 0.01) than those patients who did not develop such arrhythmias (4.19 mmol/liter). To determine whether the level of potassium was, in itself, the primary cause of malignant arrhythmias following MI, a subgroup analysis of factors influencing these levels was performed. It was determined that diabetics have a higher level of potassium than non-diabetics (4.2 mmol/liter versus 4.11 mmol/liter - P = 0.01) and a lower incidence of malignant arrhythmias.

The limitation the study is small sample size.

Conclusion

Authors found that changesin potassium levelsmight act asa predictor for assessing the prognosis.

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