

Original Article

Analysis of serum potassium levels in acute myocardial infarction patients: A case control study

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ABSTRACT:

Background: The term MI is thought to reflect death of cardiac myocytes due to prolonged ischemia. Sodium and potassium have played key roles in the development and maintenance of essential cellular functions throughout more than 2 million years of human evolution. Hence; we planned the present study to evaluate serum potassium levels in acute myocardial infarction patients. **Materials & methods:** The present study included assessment of 50 patients with acute myocardial infarction who presented to the emergency department and fulfilled the inclusion criteria of the study and matched control group of 50 healthy individuals. On admission, detailed history and thorough physical examination of the patients was done. Collection of venous blood samples was done in the study group on the day of admission within 12 hours from antecubital vein with all aseptic precautions in plain and vacutainers for the purpose of routine baseline blood investigations. For serum potassium levels, blood was allowed to clot at room temperature for half an hour and then centrifuged at 3000 rpm for five minutes. The serum separated was used for the estimation of serum potassium levels.

Results: Mean potassium levels among the patients of the AMI group and the control group was 3.8 mEq/L and 4.56 mEq/L respectively. Significant results were obtained while comparing the mean potassium levels among the patients of the AMI group and control group. **Conclusion:** Potassium plays a significant role in the pathogenesis and severity of disease progression of AMI.

Key words: Potassium, Acute myocardial infarction.

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INTRODUCTION

Chronic diseases have one or more of the following characteristics: they are persistent and leave residual disability; they are caused by non-reversible pathological conditions; and they require special training of the patient on rehabilitation, or may be expected to require prolonged medical supervision, observation or health care. An acute myocardial infarction (AMI) is a subset of a spectrum of ischemic heart disease (IHD) that includes unstable angina and AMI with or without ST elevation. IHD places a massive health burden on humanity. The term MI is thought to reflect death of cardiac myocytes due to prolonged ischemia.¹⁻³

Sodium and potassium have played key roles in the development and maintenance of essential cellular functions throughout more than 2 million years of human evolution. K⁺ is critical to the maintenance of cardio-vascular health and the normo-kalemic state is

vital to the prevention of potentially serious sequelae, especially in the at-risk cardio-vascular patient. As our understanding of the benefits of K⁺ grows, intolerance for low or low-normal K⁺ levels and greater acceptance of high to high-normal levels emerges.⁴⁻⁶ Hence; we planned the present study to evaluate serum potassium levels in acute myocardial infarction patients.

MATERIALS & METHODS

The present study included assessment of 50 patients with acute myocardial infarction who presented to the emergency department and fulfilled the inclusion criteria of the study and matched control group of 50 healthy individuals. Ethical approval was taken from institutional ethical committee in written and written consent was obtained from all the patients after explaining in detail the entire research protocol. Patients with acute myocardial infarction and who

gave written consent for participating were included in the study. For the control purpose, 50 normal non-hypertensive and non-diabetic persons with negative history of smoking, and without symptoms of AMI were carefully selected and examined in detail with age and gender matched, who were not obese, non-predisposed and physically active. All the patients of acute myocardial infarction fulfilling the inclusion and exclusion criteria were included in the present study. On admission, detailed history and thorough physical examination of the patients was done. Collection of venous blood samples was done in the study group on the day of admission within 12 hours from antecubital vein with all aseptic precautions in plain and vacutainers for the purpose of routine baseline blood investigations. For serum potassium levels, blood was allowed to clot at room temperature

for half an hour and then centrifuged at 3000 rpm for five minutes. The serum separated was used for the estimation of serum potassium levels. All the results were analyzed by SPSS software version 17.0.

RESULTS

Mean age of the patients of the AMI group and the control group was 43.5 years and 46.8 years respectively. 60 percent of the patients of the AMI group and 64 percent of the patients of the control group were males. Mean potassium levels among the patients of the AMI group and the control group was 3.8 mEq/L and 4.56 mEq/L respectively. Significant results were obtained while comparing the mean potassium levels among the patients of the AMI group and control group.

Table 1: Distribution according to age

Age group	AMI group	Control group
<40	8	5
41- 50	26	22
51- 60	12	15
61- 70	4	8
Total	50	50

Table 2: Comparison of mean serum potassium levels in between the AMI group and the control group

Group	AMI group	Control group	P- value
Mean Serum potassium levels (mEq/L)	3.88	4.56	0.000 (S)

DISCUSSION

Serum K⁺ is generally considered to be a more reflective measure of long-term dietary K⁺ intake. While prior studies have examined the U-shaped relationship between serum potassium levels and mortality following acute myocardial infarction, neither the contemporary prevalence nor prognostic importance of various degrees of hyperkalemia have been described.⁶⁻⁹ Hence; we planned the present study to evaluate serum potassium levels in acute myocardial infarction patients.

Mean age of the patients of the AMI group and the control group was 43.5 years and 46.8 years respectively. 60 percent of the patients of the AMI group and 64 percent of the patients of the control group were males. Roos M et al investigated the influence of potassium levels on infarct size measured with single photon emission computed tomography (SPECT) in patients with ST-segment elevation acute myocardial infarction (STEMI) after mechanical reperfusion. The study included 598 patients. Potassium measurements at baseline and 2 SPECT examinations, at baseline and 7-14 days after intervention, were performed. Infarct size in the 7-14 days SPECT and salvage index were the primary outcome analyses. From the results, they concluded that in patients with STEMI, higher baseline potassium levels are associated with a larger scintigraphic infarct size.¹⁰ Choudhury MBK et al

designed a study to find out the correlation between levels of serum magnesium and potassium in acute myocardial infarction (AMI), chronic ischemic heart disease (CIHD) and normal healthy volunteers. A total of 101 subjects were included in which 32 subjects were AMI, 34 CIHD and 35 normal healthy volunteers. Serum glucose and serum creatinine were estimated to exclude diabetes and renal dystrophies. Estimation of serum CK-MB and ECG tracing were done as diagnostic tools of AMI and to categories the subjects into various groups. Serum Magnesium was estimated by Atomic absorption spectrophotometer and serum potassium by Ion sensitive electrode. From the results, the authors concluded that there exists a strong positive correlation of serum Magnesium and potassium in AMI, CIHD and healthy control subjects. Therefore, the authors suggested that estimation and supplementation of both Magnesium and potassium in IHD patients is required for their better management.¹¹

In the present study, Mean potassium levels among the patients of the AMI group and the control group was 3.8 mEq/L and 4.56 mEq/L respectively. Significant results were obtained while comparing the mean potassium levels among the patients of the AMI group and control group. Su J et al evaluated the additional predictive value of serum potassium to Thrombolysis In Myocardial Infarction (TIMI) risk score for malignant ventricular arrhythmias (MVA) in

patients within 24 hours of acute myocardial infarction (AMI). This was a 6-year retrospective study. The receiver operating characteristic curve was used to evaluate the predictive value of serum potassium and TIMI risk score for MVA attack. In addition, serum potassium -modified TIMI risk score was created by incorporating serum potassium information into the usual score; the accuracy of new score was compared with that of the usual TIMI risk score by comparing the area under the receiver operating characteristic curves (AUC). Among the 468 patients enrolled, the incidence of MVA 24 hours after AMI was 9.4%, and it was higher in the hypokalemia group compared with that of the normokalemic group. A significant predictive value of serum potassium was indicated by AUC of 0.787. Serum potassium remained a predictor of MVA after being adjusted by the variables in TIMI risk score. The AUC of TIMI risk score in relation to MVA was 0.586. The incorporation of serum potassium into TIMI risk score improved its predictive value for MVA attack, with significant difference between AUC of the new score and that of the original risk score. Serum potassium on admission to the emergency department may be used as a valuable predictor and could add predictive information to some extent to TIMI risk score for MVA attack during 24-hour post-AMI.¹²

CONCLUSION

Potassium plays a significant role in the pathogenesis and severity of disease progression of AMI.

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