Original Article

Assessment of serum potassium levels in AMI patients: A case control study

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ABSTRACT:
Background: The present study was conducted for assessing serum potassium levels in AMI patients. **Materials & methods:** The present study was conducted for assessing serum potassium levels in AMI patients. A total of 50 AMI patients and 50 healthy controls were enrolled. 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. Estimation of levels of serum sodium and serum potassium was done. 2D-echo was done for further evaluation. Collection of venous blood samples was done in the study group on the day of admission within 12 hours from anticubital 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 analysed by SPSS software. **Results:** Mean serum potassium levels among the patients of the AMI group and control group was 3.81 mEq/L and 4.49 mEq/L respectively. Significant results were obtained while comparing the mean serum potassium levels among the patients of the AMI group and control group respectively. **Conclusion:** Significant alteration in serum potassium levels occur among patients with AMI.
Key words: Acute myocardial infarction, Potassium

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INTRODUCTION

Heart diseases are the most common cause of mortality among adults in developed western countries which often are associated with coronary artery diseases. Acute myocardial infarction (AMI) in patients causes early and risky complications such as ventricular fibrillation, free wall rupture, intraventricularrupture and papillary muscle rupture.[1-3]

The term acute myocardial infarction (MI) should be used when there is evidence of myocardial necrosis in a clinical setting consistent with acute myocardial ischemia.Subsequent arrhythmias and hemodynamic abnormalities in left ventricular dysfunction are the major causes of mortality along with acute myocardial infarction. The arrhythmias predisposing factors are: autonomic nervous system dysfunction, electrolyte disorders, left ventricular dysfunction, myocardial ischemia and medications.[1] Ventricular tachycardia might occur unstably (less than 30 seconds) or stably (more than 30 seconds or along with hemodynamic disorders) in patients with acute myocardial infarction, due to the underlying problems such as left ventricular dysfunction, hypoxia, electrolyte disorders or toxic effects of digoxin, quinidine or dobutamine.[4] Some studies showed that reduction in potassium level increases theprobability of ventricular tachycardia in patients. However, in most of these studies, patients were divided into two groups with normal potassium or below normal level and relative importance of different potassium levels in prevalence of arrhythmias as well as the involvement of other confounding factors such as consumption of drugs

were not evaluated.[5] Hence; the present study was conducted for assessing serum potassium levels in AMI patients.

MATERIALS & METHODS

The present study was conducted for assessing serum potassium levels in AMI patients. A total of 50 AMI patients and 50 healthy controls were enrolled. 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. The diagnosis of cardiac arrhythmias was made by observation of blood pressure, ECG and irregular heart-beat. Ventricular fibrillation was defined as irregular, rapid, non-coherent ECG activity associated with hemodynamic collapse. 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. Physical examination included height and weight measurement for calculating Body Mass Index (BMI). Estimation of levels of serum sodium and serum potassium was done. 2D-echo was done for further evaluation. Collection of venous blood samples was done in the study group on the day of admission within 12 hours from anticubital 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 analysed by SPSS software.

RESULTS

Mean age of the subjects with AMI and healthy controls was 43.8 years and 46.7 years respectively. Majority proportion of the subjects of both the AMI group and control group were males. Mean serum potassium levels among the patients of the AMI group and control group was 3.81 mEq/L and 4.49 mEq/L respectively. Significant results were obtained while comparing the mean serum potassium levels among the patients of the AMI group and control group respectively.

Group	AMI group	Control group	P- value
Mean Serum potassium levels (mEq/L)	3.81	4.49	0.001 (Significant)

DISCUSSION

The prevalence of myocardial infarction (MI) is more in the middle income world; (WHO report, 2004) and it is well known that males are more commonly affected than females. In the era of evidence based medicine, biochemical markers have become a prime factor in the diagnostic evaluation of patients with symptoms of myocardial infarction, which include myoglobin, troponins and creatine-kinases, ischsemia modified albumin (IMA), heart fatty acid-binding protein, hsCRP, brain natriuretic peptide, etc.[6-9]

Mean age of the subjects with AMI and healthy controls was 43.8 years and 46.7 years respectively. Majority proportion of the subjects of both the AMI group and control group were males.Ramasamy, Ramesh et al evaluated serum Mg+ and other electrolytes as adjuvant markers in the diagnosis of AMI. Case control study was conducted in South Indian male population with AMI within six hours of onset of symptoms. Study includes sixty patients with AMI and 100 controls. Serum electrolytes were estimated using electrolyte analyzer. Data were compared by using student't' test. ROC was drawn to find out optimum cutoff for diagnosing AMI. Pearson's correlation was done to see the association among the markers. Serum Ca, Mg, K and Na electrolytes were significantly lower ('p'<0.001) in AMI. Ca:Mg, K:Mg, and Na:K ratios were significantly higher when compared to controls ('p'<0.001). There was significant correlation of serum Mg levels with other cardiac markers (Total CK, CK–Mb, Troponin –T) of AMI ('p' <0.05).ROC analysis of Na:Mg (40.9), Ca:Mg (3.43) and K:Mg (2.74) ratios showed optimum cutoffs in diagnosis of AMI.[10]

Mean serum potassium levels among the patients of the AMI group and control group was 3.81 mEq/L and 4.49 mEq/L respectively. Significant results were obtained while comparing the mean serum potassium levels among the patients of the AMI group and control group respectively. 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.[11]

CONCLUSION
Significant alteration in serum potassium levels occur among patients with AMI.

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