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ORIGINAL ARTICLE

Assessment of serum potassium levels in acute myocardial infarction patients

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ABSTRACT:

Background: The present study was conducted for assessing serum potassium levels in acute myocardial infarction patients. **Materials & methods:**The present study was planned for evaluating 50 patients with acute myocardial infarction and matched control group of 50 healthy individuals. A comprehensive physical examination and a full history were taken of each patient upon admission. Serum CK-MB, blood urea, serum creatinine, lipid profile, Hb, TLC, DLC, PBF, FBS/RBS, and other standard baseline investigations were performed. The serum potassium and sodium levels were estimated. **Results:**Mean serum potassium levels among the patients of study group and control group were 3.89 mEq/L and 4.46 mEq/L respectively. While comparing the results, significant results were obtained. Out of 50 AMI patients, hypokalemia was seen in 20 percent of the patients. **Conclusion:**Significant alteration in potassium levels occur in AMI patients highlighting their role as important diagnostic and prognostic indicator.

Key words: Acute myocardial infarction, Potassium

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INTRODUCTION

Ischaemic heart disease remains the commonest cause of death worldwide. Among its various manifestations, acute myocardial infarction continues to present a particular challenge to emergency health services. 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.[1, 2] 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.[3, 4]Rapid identification of AMI is mandatory to initiate effective treatment for better prognosis. The newer concept of diagnosis of AMI emphasizes the importance of the 12-lead ECG and the assessment of early cardiac biomarkers since ECG by itself is often inadequate to diagnose AMI.[5, 6]Hence; the present study was conducted for assessing serum potassium levels in acute myocardial infarction patients.

MATERIALS & METHODS

The present study was planned for evaluating 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. 50 healthy, non-diabetic, non-hypertensive, non-hypertensive individuals without a history of smoking, free of AMI symptoms, age and gender matched, non-obese, and physically active were chosen and thoroughly screened for the control group. The current study included all acute myocardial infarction patients who met the inclusion and exclusion criteria. A comprehensive physical examination and a full history were taken of each patient upon admission. Serum CK-MB, blood urea, serum creatinine, lipid profile, Hb, TLC, DLC, PBF, FBS/RBS, and other standard baseline investigations were performed. The serum potassium and sodium levels were estimated. SPSS software was used to examine every outcome. Chi- square test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

Mean age of the study group and control group was 46.8 years and 47.1 years respectively. Majority proportion of subjects of both the study groups were males. Mean serum potassium levels among the patients of study group and control group were 3.89 mEq/L and 4.46 mEq/L respectively. While comparing the results, significant results were obtained. Out of 50 AMI patients, hypokalemia was seen in 20 percent of the patients.

Table 1: Comparison of mean serum potassium levels in between the AMI group and the control group

Group	Study group	Control group	P- value
Mean Serum potassium levels (mEq/L)	3.89	4.46	0.000 (S)

S: Significant

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

Parameter	Frequency	Percentage
Hypokalemia	10	20
Normo-kalemia	38	76
Hyperkalemia	2	4
Total	50	100

DISCUSSION

The Third Universal Definition of myocardial infarction (MI) expert consensus document was published in October 2012 by the global Myocardial Infarction Task Force[1]. The definition of MI requires cardiac myocyte necrosis with an increase and/or a decrease in plasma of cardiac troponin (cTn). At least one cTn measurement should be greater than the 99th percentile normal reference limit during: (1) symptoms of myocardial ischemia; (2) new (or presumably new) significant ECG ST-segment/T-wave changes or left bundle branch block; (3) the development of pathological electrocardiographic (ECG) Q waves; (4) new loss of viable myocardium or regional wall motion abnormality identified by an imaging procedure; or (5) identification of intracoronary thrombus by angiography or autopsy.Cardiac troponin (I or T) has high myocardial tissue specificity as well as high clinical sensitivity because cTn T and I are essential contractile components of myocardial cells and are expressed almost exclusively in the myocardium. Release of cardiac troponin from the myocardium can result from normal turnover of myocardial cells, myocyte apoptosis, myocyte release of troponin degradation products, increased myocyte wall permeability and bleb formation, or myocyte necrosis.[7- 9]Hence; the present study was conducted for assessing serum potassium levels in acute myocardial infarction patients.

Mean age of the study group and control group was 46.8 years and 47.1 years respectively. Majority proportion of subjects of both the study groups were males. Mean serum potassium levels among the patients of study group and control group were 3.89 mEq/L and 4.46 mEq/L respectively. While comparing the results, significant results were obtained. 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, out of 50 AMI patients, hypokalemia was seen in 20 percent of the patients. 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). 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]Pourmoghaddas A et al determined the relationship between serum potassium level and frequency of ventricular tachycardia in early stages of AMI. In a cross-sectional study on 162 patients with AMI in the coronary care unit (CCU) of Nour Hospital (Isfahan, Iran), the patients' serum potassium level was classified into three groups: 1) $K<3.8$ mEq/l, 2) $3.8\leq K<4.5$ mEq/l and 3) $K\geq 4.5$ mEq/l. The

incidence of ventricular tachycardia in the first 24 hours after AMI was determined in each group by chi-square statistical method. The frequency of ventricular tachycardia in the first 24 hours after AMI in K< 3.8 mEq/l, 3.8≤K<4.5 mEq/l and K≥4.5 mEq/l groups were 19.0%, 9.6% and 9.9% respectively. The high frequency of this arrhythmia in the first group as compared with the second and the third group was statistically significant. Hypokalemia increased the probability of ventricular tachycardia in patients with AMI. Thus, the follow up and treatment of hypokalemia in these patients is of special importance.[13]

CONCLUSION

Significant alteration in potassium levels occur in AMI patients highlighting their role as important diagnostic and prognostic indicator.

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