

Original Research

Assessment of serum potassium levels in AMI patients

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ABSTRACT:

Background: This study was conducted for the assessment of serum potassium levels in subjects having Acute Myocardial Infarction. **Material and methods:** This study comprised of overall 100 participants who were allocated into 2 different groups of 50 each. Group 1 was the control group which comprised of healthy participants. Group 2 comprised of subjects suffering from acute MI. After discussing the study's goal and protocol, study and control group individuals gave informed consent. On the day of admission, within 12 hours, blood samples were collected from the antecubital vein using all necessary aseptic precautions in plain vacutainers for serum K⁺ in both groups. After 30 minutes of at room temperature clotting, the blood was spun at 3000 rpm for 5 minutes in a centrifuge. The estimate was based on the serum that was isolated. The potassium levels in the blood were determined using flame-photometry. Statistical analysis was conducted using SPSS software. **Results:** It was observed that serum potassium levels in subjects having AMI were reduced (2.78 mmol/L) as compared to the subjects in control group (4.69 mmol/L). **Conclusion:** It was hence concluded from the results that serum potassium concentrations among subjects having AMI were reduced as compared to the controls.

Keywords: serum, potassium, AMI, hypokalemia

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INTRODUCTION

Serum K (sK) 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.¹ Hypokalemia is defined as sK levels of <3.5 mmol/L and plays an important role in cardiovascular disease pathogenesis.² Studies showed that at the acute phase of myocardial infarction (MI), hypokalemia occurs that as a consequence could lead to ventricular arrhythmia.³⁻⁵ Potassium mediates vasodilation by Na-K-ATPase pump and inwardly rectifying K channels.⁶ Acute myocardial infarction (AMI) is one of the leading causes of death in the developed world. The prevalence of the disease approaches 3 million people worldwide, with more than 1 million deaths in the United States annually. AMI can be divided into 2 categories: non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI). Unstable angina resembles an NSTEMI, but normal cardiac markers distinguish it.⁷⁻⁹

Hence, this study was conducted for the assessment of serum potassium levels in subjects having Acute Myocardial Infarction.

MATERIAL AND METHODS

This study comprised of overall 100 participants who were allocated into 2 different groups of 50 each. Group 1 was the control group which comprised of healthy participants. Group 2 comprised of subjects suffering from acute MI. After discussing the study's goal and protocol, study and control group individuals gave informed consent. On the day of admission, within 12 hours, blood samples were collected from the antecubital vein using all necessary aseptic precautions in plain vacutainers for serum K⁺ in both groups. After 30 minutes of at room temperature clotting, the blood was spun at 3000 rpm for 5 minutes in a centrifuge. The estimate was based on the serum that was isolated. The potassium levels in the blood were determined using flame-photometry. Statistical analysis was conducted using SPSS software.

RESULTS

Table 1: Gender-wise distribution of subjects.

Gender	Group 1	Group 2	Total
Males	20	45	65
Females	30	05	35
Total	50	50	100

There were total 65 males and 35 females in this study. Out of 50 subjects having AMI, 45 were males and 5 were females.

Table 2: Serum potassium concentrations in both the groups.

Parameter	Control group (Group 1)	AMI group (Group 2)
Serum K ⁺ levels (mmol/L)	4.69	2.78

It was observed that serum potassium levels in subjects having AMI were reduced (2.78 mmol/L) as compared to the subjects in control group (4.69 mmol/L).

DISCUSSION

Physiological potassium level is essential for mediating normal heart functions through the stabilization of cardiac electrical conduction. Conditions like hypo- and hyperkalemia are caused due to electrolyte imbalance and may be closely related to malignant arrhythmia and sudden death.¹⁰⁻¹² It's suggested that hypokalemia can be associated with ventricular arrhythmias in the setting of acute coronary syndrome (ACS).¹³ Consistently, recent studies have confirmed the prognostic relevance of higher serum potassium levels in ACS patient populations.¹⁴

Acute MI is accompanied by a catecholamine surge.³ Catecholamine by stimulating Na-K-ATPase pump shifts K intracellularly, thus causing redistributive hypokalemia, and as a result, non-ischemic myocardium is hyperpolarized. As a consequence, electrical inhomogeneity occurs and leads to ventricular arrhythmia.^{3,4} 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.¹⁵⁻¹⁷

Hence, this study was conducted for the assessment of serum potassium levels in subjects having Acute Myocardial Infarction.

In this study there were 45 males and 5 females with AMI. It was also discovered that serum potassium levels among subjects having AMI were reduced (2.78 mmol/L) as compared to the controls (4.69 mmol/L).

A high volume study performed by Goyal et al.¹⁸ interestingly revealed that mean sK level above 4.5 mmol/L is associated with increased mortality. They suggested that K level between 3.5 and 4.5 mmol/L is the optimal range for acute MI patients.¹⁸ This finding was a challenge against the guidelines' recommendation for sK level. A very recent study conducted by Choi et al.¹⁹ supported Goyal et al's finding. They demonstrated that mean sK level of >4.5 mmol/L is associated with increase in in-hospital and long-term mortality.¹⁹ Even though in that study, the K level of >4.5 mmol/L group was less frequently treated with beta-blockers and angiotensin-converting enzyme inhibitors, after the adjustment of

confounders, the mean sK level of >4.5 mmol/L was associated with increased long-term mortality.¹⁹

The study conducted by Wali M V et al²⁰ was undertaken to study any changes in the serum electrolytes with special reference to serum sodium and potassium in cases of AMI and study the correlation of serum sodium and potassium in the severity and outcome of AMI. Hundred people were included in study divided equally in study and control groups. Study group comprised confirmed diagnosis of recent onset of AMI. The blood samples of both the groups were analysed for Serum electrolytes (Na⁺, K⁺) by flame-photometry (Bio-Lab Diagnostic kit). There was statistically significant decrease in sodium and potassium levels in across all age groups & in both sexes of study group compared to control group. Significant high level of sodium was observed in AMI patients who are smokers and AMI patients with Diabetes whereas the level was low in AMI patients with hypertension. Potassium levels were low in AMI patients with Diabetes whereas the change was insignificant in association with smoking and hypertension. Decrease in sodium level was due to hypoxia and ischaemia, which increase the permeability of sarcolemma to sodium whereas decrease in potassium level was influenced by the catecholamine levels which are elevated in early acute myocardial infarction.

CONCLUSION

It was hence concluded from the results that serum potassium concentrations among subjects having AMI were reduced as compared to the controls.

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