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Original Research Article.

Evaluation of Hypokalemia among Patients with Acute Myocardial Infarction at a Tertiary care Teaching Hospital

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ABSTRACT

Background: Acute myocardial infarction (AMI) is a common disease with serious consequences in mortality, morbidity, and cost to the society. Past studies have also stresses on the variations occurring in the serum potassium profile of the patients with AMI. Hence; present study was planned to assess the prevalence of hypokalemia among AMI patients.

Materials & Methods: The present study included evaluation of the prevalence of hypokalemia among patients with AMI. A total of 30 AMI patients and 30 healthy controls were included in the present study. Blood samples were obtained from all the patients and were sent to the pathology laboratory for the evaluation of the serum potassium levels. All the results were recorded in Microsoft excel sheet and were subjected to analysis by SPSS software.

Results: Mean serum potassium levels of the subjects of the AMI group and the control group were 4.42 mEq/L and 4.10 mEq/L respectively. Hypokalemia was found to be present in 26.7 percent of the AMI patients.

Conclusion: Alterations in the electrolyte profile of the AMI patients do occur during the course of the diseases.

Key words: Acute Myocardial Infarction, Hypokalemia, Potassium.

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INTRODUCTION

Acute myocardial infarction (AMI) is a common disease with serious consequences in mortality, morbidity, and cost to the society. Coronary atherosclerosis plays a pivotal part as the underlying substrate in many patients. Acute myocardial infarction has traditionally been divided into ST elevation or non-ST elevation myocardial infarction; however, therapies are similar between the two.[1-3]

In most cases, an AM is caused by occlusion (blockage) of one or more coronary blood vessels by a thrombus (blood clot), and it is accompanied by severe crushing chest pain. In a minority of AMIs, but more commonly in the elderly, patients experience no pain. In some cases the reduced blood flow is caused by a blood vessel problem other than a thrombus.[4,5]

The underlying cause of most AMIs is atherosclerotic coronary artery disease, which causes progressive obstruction of the arteries in the heart, beginning in early adult life. Although substantial attention has been focused in recent years on the newer treatments of AMI, early diagnosis and management have been the focus of much research during the previous decades. Past studies have also stresses on the variations occurring in the serum potassium profile of the patients with AMI.[6-8]

Hence; present study was planned to assess the prevalence of hypokalemia among AMI patients.

MATERIALS & METHODS

The present study was conducted in the Department of General Medicine, School of Medical Sciences & Research, Sharda University, Greater Noida, Uttar Pradesh, India.

It was intended to evaluate the prevalence of hypokalemia among Patients with Acute Myocardial Infarction. Ethical approval was taken from institutional ethics committee prior to study and written consent was obtained from all the patients before the starting of the study.

Inclusion Criteria

- Patients between the age group of 25 to 65 years,
- Patients with negative history of any other underlying metabolic disorder,

- Patients with any known drug allergy

After meeting the inclusion criteria, a total of 30 AMI patients and 30 healthy controls were included in the present study. Criteria described in the previously literature was used for establishing the diagnosis of AMI.[9] Blood samples were obtained from all the patients and were sent to the pathology laboratory for the evaluation of the serum potassium levels. All the results were recorded in Microsoft excel sheet and were subjected to analysis by SPSS software. Chi- square test was used for assessment of level of significance.

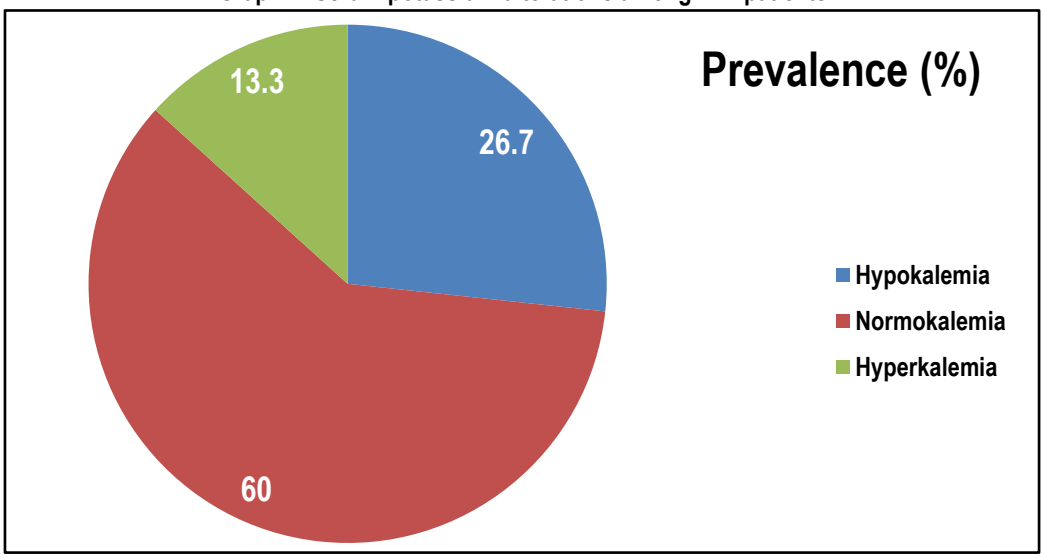
Table 1: Comparison of parameters

Parameter	AMI group	Control group	P- value
Mean age (years)	49.5	50.1	0.28
Mean serum potassium value (mEq / L)	4.42	4.10	0.65

Table 2: Prevalence of hypokalemia among patients with AMI

Parameter	Number of subjects	Prevalence (%)
Hypokalemia	8	26.7
Normokalemia	18	60
Hyperkalemia	4	13.3

Graph 1: Serum potassium alterations among AMI patients



RESULTS

Analysis of a total of 30 AMI patients and 30 healthy controls was done in the present study. Mean age of the subjects of the AMI group and the control group was 49.5 years and 50.1 years respectively. There were 23 males in the AMI group and 21 males in the control group respectively. Mean serum potassium levels of the subjects of the AMI group and the control group were 4.42 mEq/L and 4.10 mEq/L respectively. We didn't observe any significant difference while comparing the mean serum potassium levels among the subjects of the study group and the control group (P- value > 0.05). Hypokalemia was found to be present in 26.7 percent of the AMI patients as shown in Graph 1.

DISCUSSION

In the present study, mean serum potassium levels of the subjects of the AMI group and the control group were 4.42 mEq/L and 4.10 mEq/L respectively. We didn't observe any significant difference while comparing the mean serum potassium levels among the subjects of the study group and the control group (P- value > 0.05). Hypokalemia was found to be present in 26.7 percent of the AMI patients as shown in Graph 1. Goyal A et al determined the relationship between serum potassium levels and in-hospital mortality in AMI patients in the era of β-blocker and reperfusion therapy. All patients had in-hospital serum potassium measurements and were categorized by mean postadmission serum potassium level (<3.0, 3.0-<3.5, 3.5-<4.0, 4.0-<4.5, 4.5-<5.0, 5.0-<5.5, and ≥5.5 mEq/L). Hierarchical logistic regression was used to determine the association between potassium levels and outcomes after adjusting for patient- and hospital-level factors. Among inpatients with AMI, the lowest mortality was observed in those with postadmission serum potassium levels between 3.5 and <4.5 mEq/L compared with those who had higher or lower potassium levels.[9]

Shlomai G et al evaluated whether different levels of serum potassium, within the normal range, are associated with worse outcomes. The study comprised 1277 patients with AMI and normal-range admission potassium levels (3.5–5.2 mEq/L), who were enrolled and prospectively followed up in the Acute Coronary Syndrome Israeli Survey between 2010 and 2013. Patients were divided into 4 quartiles based on admission potassium levels; "normal-low" (K≥3.5 and K≤3.9), "normal-moderate" (K>3.9 and K≤4.18), "normal-high" (K>4.18 and K≤4.45), and "normal-very high" (K>4.45 and K≤5.2). We analyzed the association between admission serum potassium levels and 7 days in-hospital complication rates, and 30-day and 1-year all-cause mortality rates. In patients admitted with AMI, admission serum potassium

levels of 4.45 to 5.2 mEq/L were not associated with in-hospital ventricular arrhythmias, but are associated with increased short and long-term mortality.[10] Peng Y et al investigated patients with acute coronary syndrome (ACS) and analyzed the relationship between admission serum potassium levels and long-term mortality. 2369 patients with ACS that was confirmed by coronary angiography were enrolled in this study and completed the follow-up. Patients were categorized into five groups to determine the relation between admission serum potassium levels and long-term mortality: < 3.5, 3.5 to < 4.0, 4.0 to < 4.5, 4.5 to < 5.0, and > 5 mEq/L. There was a U-shaped relationship between admission serum potassium levels and long-term mortality for ACS patients; in particular, among the examined patients, the lowest mortality was observed in those with admission serum potassium levels of between 3.5 and < 4.5 mEq/L compared with those who had higher or lower potassium levels.[11]

Choi JS et al retrospectively studied 1,924 patients diagnosed with AMI. The average serum potassium levels measured throughout the hospitalization were obtained and statistically analyzed. Patients were categorized into 5 groups to determine the relation between mean serum potassium and long-term mortality: <3.5, 3.5 to <4.0, 4.0 to <4.5, 4.5 to <5.0, and ≥5 mEq/L. The long-term mortality was lowest in the group of patients with potassium levels of 3.5 to <4.0 mEq/L, whereas mortality was higher in the patients with potassium levels≥4.5 or <3.5 mEq/L. The results of their analysis suggested that there is a need for change in current concepts of the ideal serum potassium levels in patients with AMI.[12]

Colombo MG et al examined the association between SPC and long-term mortality following AMI in patients recruited from a population-based registry. In their study population, 249 patients (7.4%) had a low SPC (<3.5 mEq/l) and 134 (4.0%) patients had a high SPC (≥5.0 mEq/l). An admission SPC of ≥5.0 mEq/l might be associated with an increased mortality risk in patients with AMI. Patients with an admission SPC between 4.5 and <5.0 mEq/l might have an increased mortality risk in the first few years following AMI.[13] Ma W et al retrospectively analyzed 6613 patients diagnosed with ST-segment elevation myocardial infarction (STEMI) who presented without renal insufficiency. The lowest 30-day mortality was observed in patients with STEMI having potassium levels between 4.0 and 4.5 mEq/L, and a level >4.5 mEq/L significantly increased mortality risk.[14]

CONCLUSION

Alterations in the electrolyte profile of the AMI patients do occur during the course of the diseases. Hence; careful monitoring of the electrolyte parameters should be done in such patients for avoiding complications.

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