

Original Article

Analysis of serum potassium levels in patients with acute myocardial infarction

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ABSTRACT:

Background: To analysis serum potassium levels in patients with acute myocardial infarction (AMI). **Materials & methods:** A total of 50 patients with presence of AMI. Complete demographic details of all the patients were obtained. ECG and ECHO findings were recorded in all the patients. Blood samples were obtained from all the patients. All the collected samples were sent to laboratory and serum potassium levels were evaluated using auto-analyser. Hypokalemia was defined as presence of serum potassium levels less than 3.5 mEq/L. **Results:** Majority of the patients were of urban residence. Mean potassium levels was found to be 4.3 mEq/L. out of 100 patients, hypokalemia was found to be present in 23 percent of the patients. **Conclusion:** The possible cause for hypokalemia in the early phase of an acute myocardial infarction is most likely an influx of potassium from the extracellular to the intracellular body fluid compartment.

Key words: Potassium, Acute myocardial infarction

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Received: 14-04-2014

Revised: 08-05-2014

Accepted: 22-05-2014

This article may be cited as: Sobti S. Analysis of serum potassium levels in patients with acute myocardial infarction. J Adv Med Dent Sci Res 2014;2(2):229-231.

INTRODUCTION

The advent of continuous cardiac monitoring and the effective prevention and treatment of arrhythmias has had a major impact on the survival of patients with acute myocardial infarction. Disturbances of cardiac rhythm occur in 75 to 95 070 of patients with acute myocardial infarctions. Ventricular tachycardia and ventricular fibrillation occur in a smaller percentage of patients but are associated with an increased mortality. Although our pharmacologic armamentarium has continuously expanded, most antiarrhythmic agents variably suppress myocardial contractility, an effect which is particularly undesirable in patients already at risk for pump failure.^{1- 3}Potassium homeostasis is critical to prevent adverse events in patients with cardiovascular disease. Several studies have demonstrated a relationship between low serum potassium levels, usually less than 3.5 mEq/L, and the risk of ventricular arrhythmias in patients with acute myocardial infarction (AMI).¹⁻⁷ On the basis of these studies, experts and professional societies have recommended maintaining potassium levels between 4.0 and 5.0 mEq/L,^{8,9} or even 4.5 to 5.5 mEq/L,¹⁰ in AMI patients. However, most prior studies were conducted before the routine use of -blockers, reperfusion therapy, and early invasive management in eligible patients with AMI.⁴⁻⁷ Hence; the present study was conducted for analyzing serum potassium levels in patients with acute myocardial infarction (AMI).

MATERIALS & METHODS

The present study was conducted for analyzing serum potassium levels in patients with acute myocardial infarction (AMI). A total of 100 patients with presence of AMI. Complete demographic details of all the patients were obtained. ECG and ECHO findings were recorded in all the patients. Blood samples were obtained from all the patients. All the collected samples were sent to laboratory and serum potassium levels were evaluated using auto-analyser. Hypokalemia was defined as presence of serum potassium levels less than 3.5 mEq/L. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

56 percent of the patients belonged to the age group of 30 to 50 years. mean age of the patients was 47.3 years. Out of 100 patients, 66 patients were males while the remaining patients were females. Majority of the patients were of urban residence. Mean potassium levels was found to be 4.3 mEq/L. out of 100 patients, hypokalemia was found to be present in 23 percent of the patients.

Table 1: Age-wise distribution of patients

Age group (years)	Number	Percentage
Less than 30	23	23
30 to 50	56	56
More than 50	21	21
Total	100	100

Table 2: Potassium levels

Potassium levels	Value
Mean	4.3 mEq/L
SD	1.1

Table 3: Incidence of hypokalemia

Hypokalemia	Number	Percentage
Present	23	23
Absent	77	77
Total	100	100

DISCUSSION

Cardiovascular disease is one of the leading causes of morbidity and mortality across the world. World Health Organization (WHO) has declared cardiovascular disease as a modern epidemic. AMI is one of the manifestations of coronary heart disease leading to morbidity and mortality. In India, the prevalence of ischemic heart disease among adults (based on clinical and ECG criteria) was estimated at 96.7 per 1000 population in the urban and 27.1 percent in rural areas. Several systemic metabolic changes occur in AMI. These changes include increased plasma concentrations of catecholamines, free fatty acids, glucose, glycerol, cortisol and cyclic-AMP. There is decreased triglycerides concentration and an initial fall in plasma insulin concentration, followed by an early return to normal value. Serum electrolytes changes in AMI have not been studied extensively and there is paucity of information in the literature in this regard.⁷⁻¹⁰

56 percent of the patients belonged to the age group of 30 to 50 years. mean age of the patients was 47.3 years. Out of 100 patients, 66 patients were males while the remaining patients were females. Majority of the patients were of urban residence. Mean potassium levels was found to be 4.3 mEq/L. out of 100 patients, hypokalemia was found to be present in 23 percent of the patients. R J Solomon et al evaluated the importance of potassium in patients with acute myocardial infarction. The records of 151 patients entering a coronary care unit and subsequently diagnosed as having an acute myocardial infarction were reviewed. The prevalence of hypokalemia, its relationship to diuretic treatment and the development of either ventricular tachycardia or ventricular fibrillation were studied. At admission, 14% of patients were hypokalemic. The presence of hypokalemia was related to previous diuretic therapy. Twenty-three percent of patients receiving diuretics as compared to 7% of patients not taking diuretics had a serum potassium of 3.5 mEq/L or less. Thirty-seven patients experienced either ventricular tachycardia or ventricular fibrillation. The presence of hypokalemia was associated with an increased frequency of both of these arrhythmias. Sixty-seven percent of patients with a serum potassium of less than 3.1 mEq/L had these serious ventricular arrhythmias compared to 40% of patients with a serum potassium between 3.1 and 3.5 mEq/L and 20% of normokalemic patients. The

prevalence of premature ventricular beats was not correlated with the presence of hypokalemia. They conclude that hypokalemia is not only a common problem in patients with acute myocardial infarction but a clinically significant factor in the development of life threatening arrhythmias.¹⁰Choi, J. S 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 ≥ 5.0 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. In a multivariate Cox-proportional regression analysis, the mortality risk was greater for serum potassium levels of >4.5 mEq/L (hazard ratio [HR] 1.71, 95% confidence interval [CI] 1.04 to 2.81 and HR 4.78, 95% CI 2.14 to 10.69, for patients with potassium levels of 4.5 to <5.0 mEq/L and ≥ 5.0 , respectively) compared with patients with potassium levels of 3.5 to <4.0 mEq/L. The mortality risk was also higher for patients with potassium levels <3.5 mEq/L (HR 1.55, 95% CI 0.94 to 2.56). In contrast to the association with long-term mortality, there was no relation between serum potassium levels and the occurrence of ventricular arrhythmias. The results of the analysis suggest that there is a need for change in our current concepts of the ideal serum potassium levels in patients with AMI.¹¹

CONCLUSION

The possible cause for hypokalemia in the early phase of an acute myocardial infarction is most likely an influx of potassium from the extracellular to the intracellular body fluid compartment.

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