

# Assessment of Alteration of Serum Potassium Levels Among Patients Suffering From Acute Myocardial Infarction: An Institutional Based Study

Mukesh Agarwal

Associate Professor, Department of General Medicine,  
Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.

## ABSTRACT

**Background:** Acute myocardial infarction (AMI) is a common disease with serious consequences. Results from the past studies have highlighted the role of electrolyte dysfunction in AMI patients. Hence; present study was planned to assess the serum potassium levels in AMI patients.

**Materials & Methods:** The present study included evaluation of serum potassium levels in AMI patients. A total of 25 AMI patients and 25 healthy controls were included in the present study. Blood samples were obtained from all the patients. Mean serum potassium levels were estimated by Autoanalyzer.

**Results:** Mean serum potassium levels of the subjects of the AMI group and the control group were found to be 3.9 and 4.3 mEq/L. Non-significant alterations of serum potassium levels in AMI patients was observed in comparison to healthy controls.

**Conclusion:** Potassium might play a significant role in the pathogenesis of AMI.


**Key words:** Acute Myocardial Infarction, Potassium.

## \*Correspondence to:

**Dr. Mukesh Agarwal,**  
Associate Professor,  
Department of General Medicine,  
Teerthanker Mahaveer Medical College & Research Centre,  
Moradabad, Uttar Pradesh, India.

## Article History:

Received: 09-06-2016, Revised: 11-07-2016, Accepted: 28-07-2016

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2016.2.4.053	

## INTRODUCTION

Acute myocardial infarction is a common disease with serious consequences in mortality, morbidity, and cost to the society.<sup>1</sup> Coronary atherosclerosis plays a pivotal part as the underlying substrate in many patients. In addition, a new definition of myocardial infarction has recently been introduced that has major implications from the epidemiological, societal, and patient points of view.<sup>1,2</sup>

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.<sup>3</sup> Thus, identifying patients with possible AMI as early as possible in the community, getting them to emergency medical care, and continuing their diagnostic evaluation and subsequent treatment in a coronary care unit (CCU) have been major contributors to the almost 40-percent decrease in mortality from AMI over the last 20 years.<sup>4-6</sup> Results from the past studies have highlighted the role of electrolyte dysfunction in AMI patients.<sup>7</sup> Hence; present study was planned to assess the serum potassium levels in AMI patients.

## MATERIALS & METHODS

The present study was carried out in the Department of General Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, UP (India) and it included evaluation of serum potassium levels in AMI patients. Written consent was obtained after explaining in detail the entire research protocol. A total of 25 AMI patients and 25 healthy controls were included in the present study.

Inclusion criteria for the including patients in the AMI group included:

- Patients between age group of 20 years to 60 years,
- Patients who were diagnosed with AMI based on criteria described previously in the literature<sup>8</sup>,
- Patients with negative history of any metabolic disorder

Blood samples were obtained from all the patients. Mean serum potassium levels were estimated by Autoanalyzer. All the results were recorded on Microsoft excel sheet. Chi-square test was used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

Table 1: Demographic details of the patients

Parameter	AMI group	Control group
Mean age (years)	38.4	39.1
Males	18	16
Females	7	9

Graph 1: Mean serum potassium levels of AMI group and control group

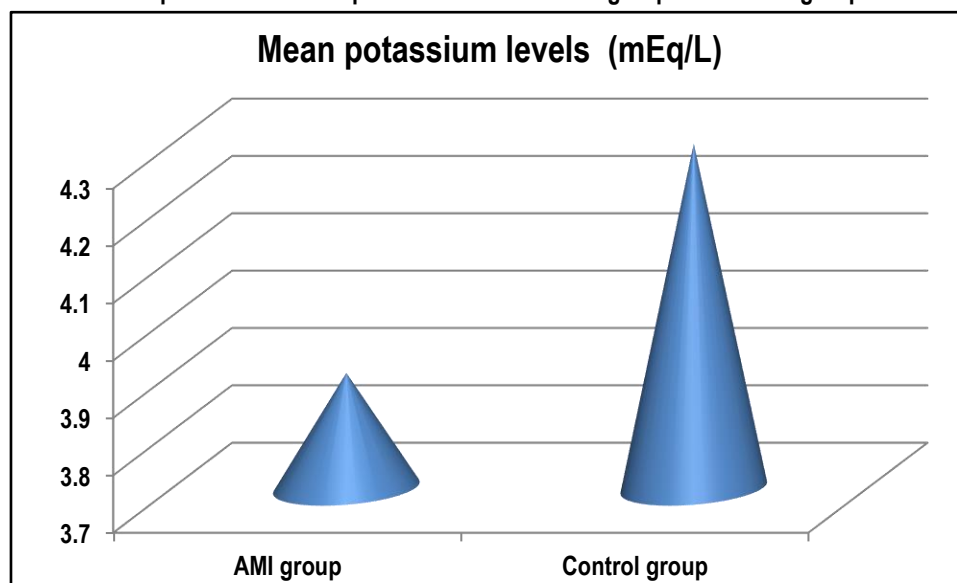


Table 2: Comparison of mean potassium levels in between the two study groups

Parameter	AMI group	Control group	P- value
Mean potassium levels (mEq/L)	3.9	4.3	0.84

## RESULTS

A total of 25 AMI patients and 25 healthy controls were included in the present study. Mean age of the subjects of the AMI group was 38.4 years while mean age of the subjects of the control group was 39.1 years respectively. There were 18 males in the AMI group, while there were 16 males in the control group. Mean serum potassium levels of the subjects of the AMI group and the control group were found to be 3.9 and 4.3 mEq/L. Non-significant alterations of serum potassium levels in AMI patients was observed in comparison to healthy controls.

## DISCUSSION

In the present study, non-significant alterations of serum potassium levels in AMI patients was observed in comparison to healthy controls. Goyal A et al determined the relationship between serum potassium levels and in-hospital mortality in AMI patients in the era of  $\beta$ -blocker and reperfusion therapy. All patients had in-hospital serum potassium measurements and were categorized by mean post-admission 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  $\geq$ 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. There was a U-shaped relationship between mean post-admission serum potassium level and in-hospital mortality that persisted after multivariable adjustment. Similarly, mortality rates were higher for

potassium levels of less than 3.5 mEq/L. In contrast, rates of ventricular fibrillation or cardiac arrest were higher only among patients with potassium levels of less than 3.0 mEq/L and at levels of 5.0 mEq/L or greater. Among inpatients with AMI, the lowest mortality was observed in those with post-admission serum potassium levels between 3.5 and <4.5 mEq/L compared with those who had higher or lower potassium levels.<sup>9</sup>

Solomon RJ et al records of 151 patients entering a coronary care unit and subsequently diagnosed as having an acute myocardial infarction. 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 patient's 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. We 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. Primary prevention of hypokalemia and its prompt treatment are indicated in these patients.<sup>10</sup> Kafka H et al measured serum potassium and magnesium levels in 590 patients admitted to a coronary care unit. Hypokalemia, often in the absence of diuretic use, occurred in 17% of the 211 patients with acute myocardial infarction. Patients with acute myocardial infarction and a potassium level of less than 4.0 mEq/L (4.0 mmol/L) had an increased risk of ventricular arrhythmias (59% vs 42%). Because hypokalemia is common in acute myocardial infarction and is associated with ventricular arrhythmias, routine measurement of serum potassium levels and prompt correction are recommended. Hypomagnesemia occurred in only 4% of the patients, but it was more common in the group with acute myocardial infarction than in the group without myocardial infarction (6% vs 3%). Ventricular arrhythmias occurred in ten of the 13 patients with both acute myocardial infarction and hypomagnesemia, but eight of these patients also had low serum potassium levels. This low incidence of hypomagnesemia does not justify routine measurement of serum magnesium levels. However, the mean level (2.5 +/- 0.4 mg/dL [1.03 +/- 0.16 mmol/L]) in a reference population of healthy volunteers was unexpectedly high and suggests that the low incidence of hypomagnesemia in their population may not be applicable to other centers and may reflect a higher magnesium content in our geographic area of southeastern Ontario.<sup>11</sup>

## CONCLUSION

From the above results, it can be concluded that potassium might play a significant role in the pathogenesis of AMI. However; future studies are recommended.

## REFERENCES

1. Boersma E1, Mercado N, Poldermans D, Gardien M, Vos J, Simoons ML. Acute myocardial infarction. *Lancet*. 2003 Mar 8;361(9360):847-58.
2. Marciniak TA, Ellerbeck EF, Radford MJ, et al. Improving the quality of care for Medicare patients with acute myocardial infarction: results from the Cooperative Cardiovascular Project. *JAMA*. 1998;279(17):1351-1357.
3. Rogers WJ, Bowlby LJ, Chandra NC, et al. Treatment of myocardial infarction in the United States (1990 to 1993). Observations from the National Registry of Myocardial Infarction. *Circulation*. 1994;90(4):2103-2114.
4. Canto JG, Allison JJ, Kiefe CI, et al. Relation of race and sex to the use of reperfusion therapy in Medicare beneficiaries with acute myocardial infarction. *N Engl J Med*. 2000;342(15):1094-1100.
5. Bradley EH, Herrin J, Wang Y, et al. Racial and ethnic differences in time to acute reperfusion therapy for patients hospitalized with myocardial infarction. *JAMA*. 2004;292(13):1563-1572.
6. Canto JG, Taylor HA, Jr, Rogers WJ, Sanderson B, Hilbe J, Barron HV. Presenting characteristics, treatment patterns, and clinical outcomes of non-Black minorities in the National Registry of Myocardial Infarction 2. *Am J Cardiol*. 1998;82(9):1013-1018.
7. White HD, Chew DP. Acute myocardial infarction. *Lancet*. 2008 Aug 16;372(9638):570-84.
8. Sequist TD, Zaslavsky AM, Galloway JM, Ayanian JZ. Cardiac procedure use following acute myocardial infarction among American Indians. *Am Heart J*. 2006;151(4):909-914.
9. Goyal A, Spertus JA, Gosch K, Venkitachalam L, Jones PG, Van den Berghe G, Kosiborod M. Serum potassium levels and mortality in acute myocardial infarction. *JAMA*. 2012 Jan 11;307(2):157-64. doi: 10.1001/jama.2011.1967.
10. Solomon RJ, Cole AG. Importance of potassium in patients with acute myocardial infarction. *Acta Med Scand Suppl*. 1981;647:87-93.
11. Kafka H, Langevin L, Armstrong PW. Serum magnesium and potassium in acute myocardial infarction. Influence on ventricular arrhythmias. *Arch Intern Med*. 1987 Mar;147(3):465-9.

**Source of Support:** Nil.

**Conflict of Interest:** None Declared.

**Copyright:** © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Cite this article as:** Mukesh Agarwal. Assessment of Alteration of Serum Potassium Levels Among Patients Suffering From Acute Myocardial Infarction: An Institutional Based Study. *Int J Med Res Prof*. 2016; 2(4):213-15.