

## ORIGINAL ARTICLE

### Prevalence of Hypokalemia among Patients with Acute Myocardial Infarction: An Observational Study

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#### ABSTRACT:

**Background:** Acute myocardial infarction remains a leading cause of morbidity and mortality worldwide, despite substantial improvements in prognosis over the past decade. Potassium levels alterations are known to occur in patients with cardiac disturbances. Hence; we planned the present study to assess the prevalence of hypokalemia in patients with AMI. **Materials & methods:** We planned the present study to evaluate the prevalence of hypokalemia in AMI patients. A total of 20 AMI patients and 20 healthy controls were included in the present study. Serum samples were obtained from all the patients for evaluating the serum potassium levels. All the results were analyzed by SPSS software version 17.0. **Results:** We didn't observe any significant difference while comparing the mean potassium levels of the subjects of the study group and the control group respectively. Prevalence of hypokalemia among AMI patients in the present study was found to be 20 percent. **Conclusion:** Hypokalemia is prevalent in significant population of AMI patients.

**Key words:** Acute myocardial infarction, Hypokalemia, Potassium

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#### INTRODUCTION

ST elevation or non-ST elevation myocardial infarction is the two traditional types of acute myocardial infarction (AMI).<sup>1</sup> However; there is considerable similarity in terms of treatment therapies for the two. Acute myocardial infarction remains a leading cause of morbidity and mortality worldwide, despite substantial improvements in prognosis over the past decade.<sup>2, 3</sup> 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.<sup>4, 5</sup> Clinical practice guidelines recommend maintaining serum potassium levels between 4.0 and 5.0 mEq/L in patients with acute myocardial infarction (AMI). These guidelines are based on small studies that associated low potassium levels with ventricular arrhythmias in the pre- $\beta$ -blocker and reperfusion era.<sup>6</sup>

Potassium levels alterations are known to occur in patients with cardiac disturbances. Hence; we planned the present study to assess the prevalence of hypokalemia in patients with AMI.

#### MATERIALS & METHODS

We planned the present study in the department of general medicine of the medical institute and it included evaluation of prevalence of hypokalemia in AMI patients. We obtained ethical approval from the ethical committee of the institution. Written consent was obtained from all the subjects after explaining in detail the entire research protocol. A total of 20 AMI patients and 20 healthy

controls were included in the present study. Complete demographic and clinical details of all the subjects were obtained of all the patients. Exclusion criteria for the including the subjects of the AMI group included:

- Patients with any other systemic illness,
- Patients with any known drug allergy,
- Patients with any other form of metabolic electrolyte disorder

Serum samples were obtained from all the patients for evaluating the serum potassium levels. All the results were analyzed by SPSS software version 17.0. Student t test and one way ANOVA were used for assessment of significance level. P- value of less than 0.05 was taken as significant.

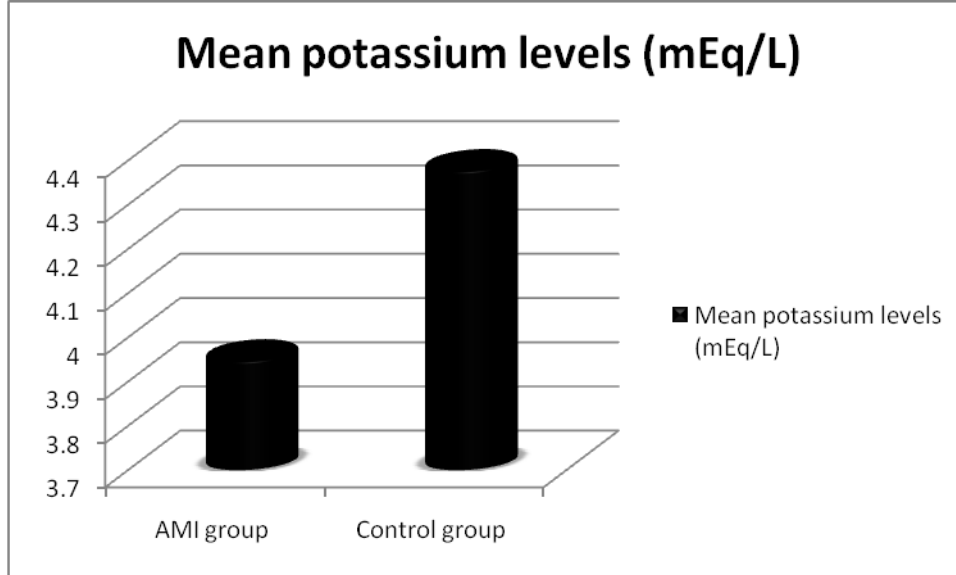
#### RESULTS

We evaluated 20 AMI patients and 20 healthy controls in the present study. Mean age of the subjects of AMI group was 44.5 years while mean age of the subjects of the control group was 45.1 years respectively. Among AMI group, 60 percent of the subjects were males, while among the control group, 70 percent of the subjects were males. Mean serum potassium levels of the subjects of the AMI group and the control group were 3.95 and 4.38 mEq/L respectively. We didn't observe any significant difference while comparing the mean potassium levels of the subjects of the study group and the control group respectively (P- value > 0.05). Prevalence of hypokalemia among AMI patients in the present study was found to be 20 percent.

**Table 1:** Demographic details of the subjects

Parameter	AMI group	Control group
Mean age (years)	44.5	45.1
Males	12	14
Females	8	6

**Graph 1:** Mean potassium levels in subjects of both the study groups



**Table 2:** Comparison of mean potassium levels in subjects of both the study groups

Parameter	AMI group	Control group	P- value
Mean potassium levels (mEq/L)	3.95	4.38	0.52

**Table 3:** Prevalence of hypokalemia of AMI group

Parameter	Number of subjects	Prevalence percentage
Hypokalemia	4	20

**DISCUSSION**

In the present study, observed non-significant difference while comparing the mean potassium levels of the subjects of the study group and the control group respectively (P-value > 0.05). We also observed that prevalence of hypokalemia among AMI patients was 20 percent. Patel RB et al evaluated the association between potassium levels, cardiac arrhythmias, and cardiovascular death in patients with non-ST-segment elevation myocardial infarction or unstable angina. Potassium levels were measured in 6515 patients prior to randomization to receive either ranolazine or a placebo in the MERLIN-TIMI 36 trial. A seven-day continuous electrocardiographic assessment was obtained to determine the incidence of non-sustained ventricular tachycardia (NSVT) and ventricular pauses. The risk of cardiovascular death at one year was also significantly increased at potassium levels  $\geq 4.5$  mEq/L and a similar trend was noted at potassium levels  $\geq 5$  mEq/L. The lowest risk of cardiovascular death was observed in patients with admission potassium levels between 3.5 and 4.5 mEq/L.<sup>7</sup>

Wali M V et al studied the alterations 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 and concluded that 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.<sup>8</sup> 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 and concluded that 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.<sup>9</sup>

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. The results of their analysis suggested that there is a need for change in our current concepts of the ideal serum potassium levels in patients with AMI.<sup>10</sup> Colombo MG et al examined the association between serum potassium concentration (SPC) and long-term mortality following AMI in patients recruited from a

population-based registry. Patients with SPC of  $\geq 5.0$  mEq/l had the highest long-term mortality (29.9%) and in the adjusted model, their risk of dying was significantly increased compared to patients with SPC between 4.0 and  $<4.5$  mEq/l. Analyses of increasing observation periods showed a trend towards a higher risk of dying in patients with SPC between 4.5 and  $<5.0$  mEq/l. An admission SPC of  $\geq 5.0$  mEq/l might be associated with an increased mortality risk in patients with AMI.<sup>11</sup> Grodzinsky A et al, in 38,689 consecutive patients with acute myocardial infarction, evaluated the association between maximum in-hospital potassium levels and in-hospital mortality. Patients were stratified by dialysis status and grouped by maximum potassium as follows:  $<5$  mEq/L, 5 to  $<5.5$  mEq/L, 5.5 to  $<6.0$  mEq/L, 6.0 to  $<6.5$  mEq/L, and  $\geq 6.5$  mEq/L. Multivariable logistic regression was used to adjust for multiple patient and site characteristics. The rate of hyperkalemia (maximum potassium  $\geq 5.0$  mEq/L) was 22.6% in patients on dialysis and 66.8% in patients not on dialysis. Moderate to severe hyperkalemia (maximum potassium  $\geq 5.5$  mEq/L) occurred in 9.8% of patients. There was a steep increase in mortality with higher maximum potassium levels. In-hospital mortality exceeded 15% once maximum potassium was  $\geq 5.5$  mEq/L regardless of dialysis status. The relationship between higher maximum potassium and increased mortality risk persisted after multivariable adjustment. Hyperkalemia is common in patients who are hospitalized with acute myocardial infarction.<sup>12</sup> Colombo MG et al examined the association between SPC and long-term mortality following AMI in patients recruited from a population-based registry. Analyses of increasing observation periods showed a trend towards a higher risk of dying in patients with SPC between 4.5 and  $<5.0$  mEq/l. An admission SPC of  $\geq 5.0$  mEq/l might be associated with an increased mortality risk in patients with AMI.<sup>13</sup>

## CONCLUSION

From the above results, the authors conclude that alterations do occur in the potassium levels of the AMI patients. Also, hypokalemia is prevalent in significant population of AMI patients. However; future studies are recommended.

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