International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "*Society for Scientific Research and Studies*" [Regd.]

ISSN 2455-7803 Index Copernicus value 2016 = 68.10

Original Article

Prevalence of Hypokalemia in Acute Myocardial Infarction Patients

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ABSTRACT:
Background: Myocardial infarction or acute myocardial infarction (AMI) is a term for an event of heart attack. Hypokalemia is independent risk factor contributing to reduced survival of cardiac patients and increased incidence of arrhythmic death.Hence; we planned the present study to assess the prevalence of hypokalemia among patients with AMI. **Materials & methods:** We planned the present study to evaluate the prevalence of hypokalemia among AMI patients. A total of 50 AMI patients were included in the present study. Blood samples of all the patients were taken and serum potassium levels were estimated. All the results were analyzed by SPSS software. **Results:** Among 50 AMI patients, 28 patients belonged to the age group of 31 to 50 years. 12 patients belonged to the age group of 51 years and above. Hypokalemia was found to be prevalent in 24 percent of the AMI population in the present study. **Conclusion:** Potassium plays a significant role in the pathophysiology of AMI.
Key words: Acute myocardial infarction, Hypokalemia, Potassium.

Received: 28 January 2018 Revised: 18 February 2018 Accepted: 26 February 2018

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This article may be cited as: Sharma V, Gupta A. Prevalence of Thiazide- Induced Hyponatremia. Int J Res Health Allied Sci 2018; 4(2):64-67.

INTRODUCTION

Myocardial infarction or acute myocardial infarction (AMI) is a term for an event of heart attack. MI occurs when blood stops flowing properly to a part of the heart, and the heart muscle is injured because of lack of oxygen supply. And one of the coronary arteries which supplies blood to the heart develops a blockage due to an unstable buildup of plaques, white blood cells, cholesterol and fat.[1- 3] If the event becomes serious then it is called as ''acute'' AMI, acute myocardial infarction.[4] Hypokalemia is independent risk factor contributing to reduced survival of cardiac patients and increased incidence of arrhythmic death. Animal studies demonstrate that hypokalemia-induced arrhythmogenicity is attributed to prolonged ventricular repolarization, slowed conduction, and abnormal pacemaker activity.[5- 7] The prolongation of ventricular repolarization in hypokalemic setting is caused by inhibition of outward potassium currents and often associated with increased propensity for early after depolarizations.[8]Hence; we planned the present study to assess the prevalence of hypokalemia among patients with AMI.

MATERIALS & METHODS

We planned the present study in the department of general medicine of the medical institution and included evaluation of prevalence of hypokalemia among AMI patients. We obtained ethical approval from institutional ethical committee and obtained written consent from all the patients after explaining in detail the entire research protocol. A total of 50 AMI patients were included in the present study. Criteria described previously in the literature were used for diagnosing the patients with AMI.[6] Exclusion criteria for the present included:

- Patients with history of any other systemic illness,
- Patients with any known drug allergy,
- Patients with history of any other cardiac pathology,
- Patients who refused to give informed consent

After meeting the exclusion criteria, a total of 50 AMI patients were enrolled in the present study. Blood samples of all the patients were taken and serum potassium levels were estimated. All the results were analyzed by SPSS software. Student t test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, we analyzed a total of 50 patients which were diagnosed with AMI. Among these 50

patients, 28 patients belonged to the age group of 31 to 50 years. 12 patients belonged to the age group of 51 years and above. Out of 50 AMI patients, 30 were males and the remaining 20 were females. Hypokalemia was found to be prevalent in 24 percent of the AMI population in the present study.

Table 1: Demographic details of the patients

Parameter		No. of patients
Age group (years)	Less than 30	10
	31- 50	28
	51 and above	12
Gender	Males	30
	Females	20

Graph 1: Demographic details of the patients

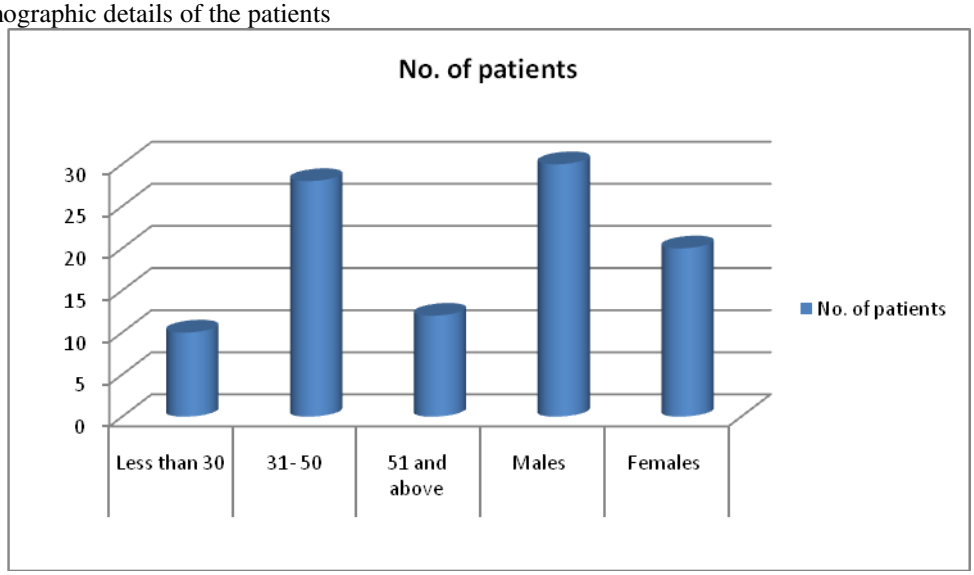
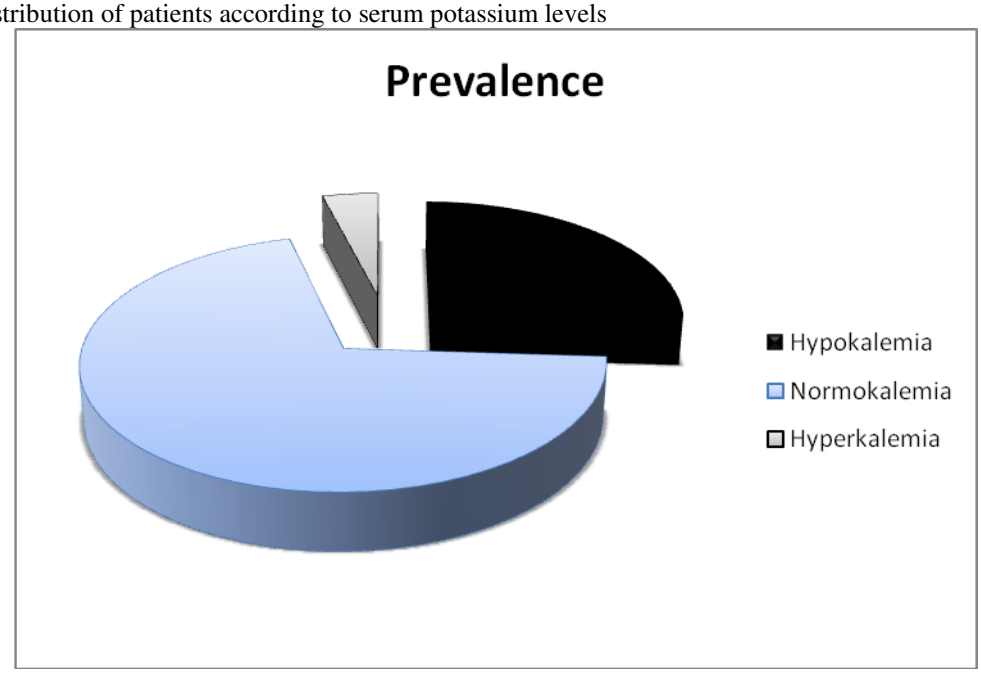


Table 2: Distribution of patients according to serum potassium levels

Parameter	No. of patients	P- value	Prevalence
Hypokalemia	13	0.02*	26
Normokalemia	35		70
Hyperkalemia	2		4

*: Significant

Graph 2: Distribution of patients according to serum potassium levels



DISCUSSION

Potassium is important in physiological homeostatic control of cardiac function. The importance of potassium in maintaining stable cardiac function is a clinically understood phenomenon. Physiologically the importance of potassium in cardiac function is described by the large number of different kinds of potassium ions channels found in the heart compared to channels and membrane transport mechanisms for other ions such as sodium and calcium. However; the Potassium is also of relevance to the diseased state, as potassium-related effects may stabilize or destabilize cardiac function.[12]Hence; we planned the present study to assess the prevalence of hypokalemia among patients with AMI.

In the present study, we observed that hypokalemia was present in 24 percent of the AMI patients in the present study. Wali MV et al studied the 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.[13]

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 analysed. 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. In a multivariate Cox-proportional regression analysis, the mortality risk was greater for serum potassium levels of >4.5 mEq/L 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 their analysis suggested that there is a need for change in our current concepts of the ideal serum potassium levels in patients with AMI.[14] Krogager ML et al examined the relation between different levels of potassium and mortality. From Danish national registries we identified 2596 patients treated with loop diuretics after their first MI episode where potassium measurement was available within 3 months. All-cause mortality was examined according to seven predefined potassium levels: hypokalaemia <3.5 mmol/L, low normal potassium 3.5-3.8 mmol/L, normal potassium 3.9-4.2 mmol/L, normal potassium 4.3-4.5 mmol/L, high normal potassium 4.6-5.0 mmol/L, mild hyperkalaemia 5.1-5.5 mmol/L, and severe hyperkalaemia: >5.5 mmol/L. Follow-up was 90 days and using normal potassium 3.9-4.2 mmol/L as a reference, we estimated the risk of death with a multivariable-adjusted Cox proportional hazard model. After 90 days, the mortality rates in the seven potassium intervals were 15.7, 13.6, 7.3, 8.1, 10.6, 15.5, and 38.3%, respectively. Multivariable-adjusted risk for death was statistically significant for patients with hypokalaemia, and mild and severe hyperkalaemia. Low and high normal potassium were also associated with increased mortality. Potassium levels outside the interval 3.9-4.5 mmol/L were associated with a substantial risk of death in patients requiring diuretic treatment after an MI.[15]Verma S et al studied twenty-five patients of acute myocardial infarction with a mean age of 55 years. Twenty five age and sex matched healthy controls were also included in the study. In patients of acute myocardial infarction, hypokalaemia was present in 29.3% cases. Serum potassium concentration was decreased significantly in patients of acute myocardial infarction with arrhythmia (3.6 ± 0.87). Hypokalaemia was fairly common finding among acute MI patients, while serum sodium concentration showed no significant difference among the two groups. Mortality was more in males (31.4%) as compared to females (19%). Mortality was more in hypokalemic patients (27.2%). Therefore it was recommended by the authors that potassium levels which affect the clinical outcomes in patients of acute myocardial infarction should be monitored, and potassium replaced whenever required.[16]

CONCLUSION

From the above results, the authors concluded that significant role in the pathophysiology of AMI, is played by potassium. Therefore, AMI is characterized by alterations in the serum potassium levels.

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Source of support: Nil **Conflict of interest:** None declared