ORIGINAL RESEARCH

Evaluation of serum potassium levels in patients with myocardial infarction: An observational study

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ABSTRACT

Introduction-Serum potassium levels are crucial in preventing adverse events in cardiovascular diseases.[1] About majority of the body's potassium is intracellular, and maintaining a level of approximately 3.5-5 mmol/L is essential for proper functioning. **Materials and Methods-** A total of 50 adult patients diagnosed with acute myocardial infarction (AMI) were included in this study. The patients with AMI were in group 1, while a separate group 2 consisted of healthy controls. Data analysis was performed using SPSS. **Results-**In the age group of less than 35 years, Group I had 14 males and 9 females, while Group II had 17 males and 2 females. For participants aged over 35 years, Group I included 15 males and 12 females, and Group II had 8 males and 13 females. **Conclusion-** Fluctuations in potassium levels may serve as a predictive factor for assessing prognosis.

Keywords-serum, potassium, hypokalemia

INTRODUCTION

Serum potassium levels are crucial in preventing adverse events in cardiovascular diseases.[1] About majority of the body's potassium is intracellular, and maintaining a level of approximately 3.5-5 mmol/L is essential for proper functioning. Hypokalemia, defined as sK levels below 3.5 mmol/L, is implicated in the pathogenesis of cardiovascular diseases, particularly during acute myocardial infarction (MI).Studies indicate that hypokalemia occurs during the acute phase of MI, leading to ventricular arrhythmias.[2,3] The surge in catecholamine during acute MI stimulates the Na-K-ATPase pump, causing intracellular potassium shifts and resulting in redistributional hypokalemia. This hyperpolarizes non-ischemic myocardium, leading to electrical inhomogeneity and ventricular arrhythmias. Maintaining potassium homeostasis is critical to preventing adverse events in cardiovascular patients.[4,5] Numerous studies show a correlation between low serum potassium levels and an increased risk of ventricular arrhythmias in acute myocardial infarction cases. The study aims to assess serum potassium levels in patients with acute myocardial infarction to further understand its implications.

MATERIALS AND METHODS

A total of 50 adult patients diagnosed with acute myocardial infarction (AMI) were included in this study. The demographic information, including names, ages, genders, and other relevant details, was documented for each participant. The patients with AMI were in group 1, while a separate group 2 consisted of healthy controls. Venous blood samples were collected from the antecubital vein of all participants on the day of admission, following strict aseptic precautions. The blood samples were obtained within a day of admission. Subsequently, all collected samples were sent to the laboratory for detailed analysis to determine the potassium levels. This study aims to compare and analyze the potassium levels between the AMI patient group and the healthy control group, shedding light on the potential implications of serum potassium levels in the context of acute myocardial infarction.

RESULTS

In the age group of less than 35 years, Group I had 14 males and 9 females, while Group II had 17 males and 2 females. For participants aged over 35 years, Group

I included 15 males and 12 females, and Group II had 8 males and 13 females (Table 1).

AGE(years)	GENDER	Group I (AMI)	Group II (Healthy Controls)
<35	Male	14	17
	Female	9	12
>35	Male	15	8
	Female	12	13

DISCUSSION

Acute myocardial infarction (AMI) is part of the ischemic heart disease (IHD) spectrum, encompassing conditions such as unstable angina and AMI with or without ST elevation. Maintaining optimal serum potassium levels are crucial for cardiovascular health.[6] Numerous studies have highlighted the correlation between low serum potassium levels and an elevated risk of ventricular arrhythmias in individuals experiencing AMI. During an acute MI, there is a surge in catecholamine, which, through the stimulation of the Na-K-ATPase pump, causes a shift of potassium intracellularly, leading to redistributional hypokalemia. This process hyperpolarizes the non-ischemic myocardium, resulting in electrical inhomogeneity and contributing to the development of ventricular arrhythmias. Several investigations have suggested an increased incidence of ventricular arrhythmias during the acute phase of MI, with this phenomenon being associated with hypokalemia.[7,8] Understanding the intricate relationship between potassium levels and ventricular arrhythmias in the context of acute myocardial infarction is essential for advancing our knowledge of cardiovascular pathophysiology.

During the acute phase of myocardial infarction (MI), hypokalemia occurs, which may contribute to the development of ventricular arrhythmia. Potassium plays a crucial role in mediating vasodilatation through the Na-K-ATPase pump and inwardly rectifying K channels. Additionally, potassium inhibits vasoconstriction associated with angiotensin-II.[9] Consequently, a low level of potassium further exacerbates infarction and ischemia. Previous studies have demonstrated that hypokalemia is a relatively common finding upon admission in patients experiencing acute MI. The mean admission level of serum potassium (sK) was approximately 3.9 mmol/L, a level that is not officially defined as hypokalemia. Despite being within the normal range, the role of potassium in vasodilatation and its impact on vasoconstriction-related processes highlight the importance of understanding potassium dynamics in the context of acute myocardial infarction.

In our study the age group of less than 35 years, Group I had 14 males and 9 females, while Group II had 17 males and 2 females. For participants aged over 35 years, Group I included 15 males and 12 females, and Group II had 8 males and 13 females

Choi et al.[10] demonstrated that maintaining a mean serum potassium (sK) level above 4.3 mmol/L is associated with an increase in both in-hospital and long-term mortality. Notably, even though the group with sK levels exceeding 4.3 mmol/L was less frequently treated with beta-blockers and angiotensin-converting enzyme inhibitors in that study, after adjusting for confounding factors, the elevated mean sK level of >4.3 mmol/L remained independently associated with an increased risk of long-term mortality.

Singh et al[11] assessed levels of serum potassium levels in 100 acute myocardial infarction patients. Mean serum potassium levels were higher in the control group in comparison to the study group.

Khan et al.[12] discovered that serum potassium levels measured within 48 hours after hospital admission tend to be abnormal and often increase during the hospitalization of patients with heart failure. In light of this, the study investigated both serum potassium levels on admission and those measured post-admission to comprehensively assess the impact of related treatments. Interestingly, the influence of related treatments on serum potassium levels was slightly more pronounced during the post-admission period compared to the levels observed at the time of admission, particularly in the hyperkalemia groups.

CONCLUSION

Fluctuations in potassium levels may serve as a predictive factor for assessing prognosis. In individuals experiencing acute myocardial infarction (AMI), there was a notable decrease in serum potassium levels compared to those observed in a healthy control group.

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