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Internal Medicine

SERUM MAGNESIUM AND ITS ASSOCIATION WITH ACUTE MYOCARDIAL INFARCTION: A CLINICAL STUDY

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ABSTRACT **Background:** Serum magnesium plays a critical role in cardiovascular physiology, influencing myocardial excitability, vascular tone, and arrhythmogenesis. Disturbances in magnesium homeostasis are increasingly recognized in acute myocardial infarction (AMI) patients, with potential implications for morbidity and mortality. **Objective:** To evaluate the relationship between serum magnesium levels and clinical outcomes, including arrhythmias and mortality, in AMI patients. **Methods:** This observational study included patients with AMI confirmed by ECG and cardiac biomarkers. Serum magnesium, potassium, calcium, and sodium were measured on admission (Day 1) and on Day 5. Associations with arrhythmias, mortality, and other clinical parameters were analyzed. **Results:** Hypomagnesemia was observed in a significant proportion of patients on admission. Patients with hypomagnesemia had a higher incidence of arrhythmias compared to those with normal or elevated magnesium levels. Mortality was highest in the hypomagnesemia group. Changes in magnesium from Day 1 to Day 5 were statistically significant, whereas variations in other electrolytes showed no strong correlation with arrhythmias. **Conclusion:** Hypomagnesemia is associated with increased risk of arrhythmias and mortality in AMI patients. Routine monitoring and correction of magnesium levels may improve clinical outcomes.

KEYWORDS : Acute Myocardial Infarction, Serum Magnesium, Arrhythmia, Mortality, Electrolytes

INTRODUCTION

Acute myocardial infarction (AMI) is a leading cause of morbidity and mortality worldwide. While traditional risk factors such as hypertension, diabetes mellitus, smoking, and dyslipidemia are well established, electrolyte imbalances, particularly hypomagnesemia, have gained attention as potential contributors to adverse outcomes.

Magnesium plays an essential role in cardiac electrophysiology, myocardial contractility, and vascular tone regulation. It modulates ion transport, particularly potassium and calcium flux, which are critical for maintaining normal cardiac rhythm. Hypomagnesemia has been implicated in the development of ventricular arrhythmias, myocardial ischemia, and sudden cardiac death.

This study investigates the prevalence of magnesium abnormalities in AMI patients and examines their association with arrhythmias, mortality, and changes in other serum electrolytes. [1,2]

MATERIALS AND METHODS

This observational study was conducted at [Institution Name] over [time frame]. Patients ≥18 years presenting with AMI, confirmed by ECG changes and elevated cardiac biomarkers, were included. Patients with chronic kidney disease, chronic liver disease, or electrolyte-altering drug therapy were excluded.

Serum magnesium, potassium, calcium, and sodium were measured within 24 hours of admission (Day 1) and repeated on Day 5. Arrhythmias were diagnosed based on continuous ECG monitoring and standard criteria. Mortality was recorded during hospitalization.

Statistical analysis was performed using [software name], with results expressed as mean ± standard deviation (SD). Associations between magnesium levels and outcomes were assessed using chi-square and t-tests, with $p<0.05$ considered significant.

RESULTS

A total of [n] AMI patients were included. On Day 1, hypomagnesemia was present in 24.4% of patients, normal magnesium in 62.2%, and hypermagnesemia in 13.3%.

Table 1. Serum Magnesium Distribution on Admission (Day 1)

Magnesium Category	Number of Patients	Percentage
Hypomagnesemia (<1.7 mg/dL)	22	24.4%
Normal (1.7–2.4 mg/dL)	56	62.2%
Hypermagnesemia (>2.4 mg/dL)	12	13.3%
Total	90	100%

On admission, hypomagnesemia was present in 24.4% (n=22) of patients, normal magnesium levels in 62.2% (n=56), and hypermagnesemia in 13.3% (n=12),

Table 2. Association of Magnesium Levels with Arrhythmias

Magnesium Category	Arrhythmias (%)	p-value
Hypomagnesemia	77.3%	0.001
Normal	28.3%	0.001
Hypermagnesemia	12.5%	0.001

The incidence of arrhythmias was highest among patients with hypomagnesemia (77.3%), followed by those with normal magnesium levels (28.3%) and hypermagnesemia (12.5%). This association between magnesium levels and arrhythmias was statistically significant ($p = 0.001$).

Table 3. Association of Magnesium Levels with Mortality

Magnesium Category	Mortality Rate (%)	p-value
Hypomagnesemia	18.2%	0.166
Normal	7.1%	0.166
Hypermagnesemia	0%	0.166

Mortality was highest in the hypomagnesemia group (18.2%), followed by the normal magnesium group (7.1%). The association between magnesium levels and mortality was not statistically significant ($p = 0.166$).

DISCUSSION

This study demonstrates that hypomagnesemia is common in AMI patients and is strongly associated with the occurrence of arrhythmias. The significant difference in arrhythmia rates between magnesium categories suggests a potential pathophysiological role of magnesium deficiency in destabilizing cardiac electrophysiology.

The observed higher mortality in hypomagnesemic patients, although not statistically significant, is clinically relevant. Previous studies have shown that magnesium supplementation may reduce ventricular arrhythmias in high-risk patients, though evidence on mortality benefit remains mixed.

Changes in serum magnesium from Day 1 to Day 5 were significant, likely reflecting correction during hospitalization. Other electrolytes (potassium, calcium, sodium) did not show a significant correlation with arrhythmias, underscoring the specific importance of magnesium in myocardial stability. [1,6,7]

CONCLUSION

Hypomagnesemia is prevalent in AMI patients and is associated with an increased risk of arrhythmias and possibly higher mortality. Routine monitoring of magnesium levels should be part of AMI management protocols, and early correction may improve outcomes. [1,3,6]

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