Original Research Paper

Volume - 16 | Issue - 01 | January - 2026 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Internal Medicine

HYPOMAGNESEMIA AS A PREDICTOR OF IN-HOSPITAL OUTCOMES IN ACUTE MYOCARDIAL INFARCTION: A HOSPITAL-BASED OBSERVATIONAL STUDY

Dr Devyani Arote* Junior Resident. *Corresponding Author

Dr Sanjay Agrawal Professor Dept of medicine ACPM Dhule.

Dr Prashant More Professor Dept of medicine ACPM Dhule.

Dr Ninad Patil Assistant Professor Dept of medicine ACPM Dhule.

Dr Manoj Patel Assistant Professor Dept of medicine ACPM Dhule.

ABSTRACT **Background:** Acute myocardial infarction (AMI) remains a leading cause of morbidity and mortality worldwide. Besides established cardiovascular risk factors, electrolyte disturbances-particularly hypomagnesemia-have gained attention due to their role in cardiac electrophysiology, myocardial contractility, and arrhythmogenesis [2,3,6]. Hypomagnesemia is frequently overlooked in routine clinical practice despite its potential prognostic significance. **Aim:** To evaluate the association between serum magnesium levels and in-hospital outcomes in patients with acute myocardial infarction. **Materials And Methods:** This hospital-based observational study was conducted on patients admitted with acute myocardial infarction at a tertiary care teaching hospital. Serum magnesium levels were measured within 24 hours of admission (Day 1). Patients were categorized into hypomagnesemia, normomagnesemia, and hypermagnesemia groups. In-hospital outcomes including arrhythmias, complications, and mortality were recorded and analyzed statistically. **Results:** Hypomagnesemia was observed in a significant proportion of AMI patients on admission. The incidence of arrhythmias was markedly higher in patients with hypomagnesemia compared to those with normal or elevated magnesium levels ($p = 0.001$). Mortality was also higher among hypomagnesemic patients, though this association did not reach statistical significance. **Conclusion:** Hypomagnesemia is common in acute myocardial infarction and is strongly associated with adverse in-hospital outcomes, particularly arrhythmias. Routine monitoring and early correction of serum magnesium levels may improve clinical outcomes in AMI patients.

KEYWORDS : Acute myocardial infarction, Serum magnesium, Hypomagnesemia, Arrhythmia, Mortality

INTRODUCTION

Acute myocardial infarction (AMI) is one of the most serious manifestations of coronary artery disease and continues to contribute substantially to global and Indian cardiovascular mortality. In India, AMI tends to occur at a younger age and is often associated with delayed presentation, limited access to advanced cardiac care, and higher complication rates. While traditional risk factors such as hypertension, diabetes mellitus, smoking, and dyslipidemia are well established, increasing emphasis has been placed on metabolic and electrolyte abnormalities that may influence outcomes in AMI [1,7].

Magnesium is the second most abundant intracellular cation and plays a vital role in cardiovascular physiology. It functions as a cofactor in over 300 enzymatic reactions and is essential for maintaining myocardial electrical stability, regulating calcium and potassium transport across cell membranes, and modulating vascular tone. Hypomagnesemia has been linked to enhanced myocardial excitability, coronary vasospasm, platelet aggregation, and impaired myocardial perfusion [3,6].

In patients with acute myocardial infarction, stress-induced catecholamine surge, renal magnesium wasting, and intracellular shifts contribute to reduced serum magnesium levels. Several studies have suggested an association between hypomagnesemia and ventricular arrhythmias, sudden cardiac death, and adverse outcomes in AMI [2,4,5,6]. However, magnesium levels are not routinely assessed in all patients with acute coronary syndromes.

The present study was undertaken to evaluate the prevalence of hypomagnesemia in acute myocardial infarction and to assess its role as a predictor of in-hospital outcomes, including arrhythmias and mortality.

MATERIALS AND METHODS

This hospital-based observational study was conducted in the Department of General Medicine at a tertiary care teaching hospital. Patients aged 18 years and above admitted with a diagnosis of acute myocardial infarction were included in the study.

Inclusion Criteria

Patients diagnosed with acute myocardial infarction based on clinical features, electrocardiographic changes, and elevated cardiac biomarkers.

Exclusion Criteria

- Chronic kidney disease
- Chronic liver disease
- Patients on magnesium supplementation or drugs affecting magnesium levels
- Electrolyte imbalance due to non-cardiac causes

Data Collection

Detailed demographic and clinical data were recorded, including age, sex, type of myocardial infarction, and presence of complications. Continuous ECG monitoring was used to detect arrhythmias.

Serum magnesium levels were measured within 24 hours of admission (Day 1) using standard laboratory methods. Based on serum magnesium values, patients were classified into:

- **Hypomagnesemia** (<1.7 mg/dL)
- **Normomagnesemia** (1.7–2.4 mg/dL)
- **Hypermagnesemia** (>2.4 mg/dL)

Outcome Measures

In-hospital outcomes assessed included:

- Occurrence of arrhythmias
- Development of complications
- In-hospital mortality

Statistical Analysis

Data were analyzed using standard statistical software. Categorical variables were expressed as percentages. Associations between serum magnesium levels and outcomes were assessed using the Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

Serum Magnesium Status On Admission

Hypomagnesemia was observed in nearly one-fourth of patients admitted with acute myocardial infarction.

Table 1: Distribution Of Serum Magnesium Levels On Day 1

Serum Magnesium Status	Number of Patients	Percentage (%)
Hypomagnesemia	22	24.4
Normomagnesemia	56	62.2
Hypermagnesemia	12	13.3
Total	90	100

Association Between Serum Magnesium Levels and Arrhythmias

The incidence of arrhythmias was significantly higher among patients with hypomagnesemia.

Table 2: Serum Magnesium Levels And Arrhythmias

Magnesium Status	Arrhythmias Present (%)	p-value
Hypomagnesemia	77.3	
Normomagnesemia	28.3	0.001
Hypermagnesemia	12.5	

Association Between Serum Magnesium Levels And Mortality

Mortality was highest in the hypomagnesemia group, though the association was not statistically significant.

Table 3: Serum Magnesium Levels And Mortality

Magnesium Status	Mortality (%)	p-value
Hypomagnesemia	18.2	
Normomagnesemia	7.1	0.166
Hypermagnesemia	0	

DISCUSSION

The present study demonstrates that hypomagnesemia is a common finding in patients with acute myocardial infarction and is strongly associated with adverse in-hospital outcomes, particularly arrhythmias [2,6]. Nearly one-fourth of patients in the study had low serum magnesium levels at admission, highlighting the high prevalence of this electrolyte disturbance in AMI.

Magnesium plays a critical role in maintaining myocardial electrical stability by regulating calcium influx and potassium transport across cardiac cell membranes. Hypomagnesemia increases myocardial excitability, prolongs repolarization, and predisposes patients to ventricular arrhythmias [3,6]. The significantly higher incidence of arrhythmias observed in hypomagnesemic patients in this study supports these pathophysiological mechanisms.

Although mortality was higher among patients with hypomagnesemia, the association did not reach statistical significance. This may be attributed to the limited sample size and the influence of multiple confounding factors affecting mortality in AMI. Nevertheless, the observed trend toward increased mortality is consistent with previous studies that have reported worse outcomes in patients with low magnesium levels [4,5,6].

Given the simplicity, low cost, and wide availability of serum magnesium estimation, routine assessment of magnesium levels in acute myocardial infarction may aid in early identification of high-risk patients. Prompt correction of hypomagnesemia could potentially reduce arrhythmic complications and improve in-hospital outcomes [3,4,5].

CONCLUSION

Hypomagnesemia is frequently observed in patients with acute myocardial infarction and is significantly associated with an increased risk of in-hospital arrhythmias. Although its association with mortality was not statistically significant, hypomagnesemia remains a clinically important and potentially modifiable risk factor. Routine monitoring and early correction of serum magnesium levels should be considered an integral part of the management of patients with acute myocardial infarction.

REFERENCES (Vancouver Style)

1. Gupta R, Sharma K. Electrolyte disturbances in acute myocardial infarction. *Indian Heart J*. 2019;71(1):45-50.
2. Dyckner T. Serum magnesium in acute myocardial infarction: relation to arrhythmias. *Acta Med Scand*. 1992;211(1-2):59-66.
3. Shechter M. Magnesium and the cardiovascular system. *Magnes Res*. 2010;23(2):60-72.
4. Rasmussen HS, McNair P, Norregard P, et al. Intravenous magnesium in acute myocardial infarction. *Lancet*. 1986;1(8475):234-236.
5. Woods KL, Fletcher S, Roffe C, Haider Y. Intravenous magnesium sulphate in suspected acute myocardial infarction: results of the LIMIT-2 trial. *Lancet*. 1992;339(8809):1553-1558.
6. Abraham AS, Rosenmann D, Kramer M, et al. Magnesium in the prevention of lethal arrhythmias in acute myocardial infarction. *Arch Intern Med*. 1987;147(4):753-755.
7. Del Gobbo LC, Imamura F, Wu JHY, et al. Circulating and dietary magnesium and risk of cardiovascular disease. *Am J Clin Nutr*. 2013;98(1):160-173.