



A STUDY OF SERUM MAGNESIUM LEVELS IN ACUTE MYOCARDIAL INFARCTION

Dr Naseem Hussain

Professor, Department of Medicine, Kanachur Institute of Medical Sciences, Mangalore.

ABSTRACT

Several studies and reports are present in which there is serum hypo magnesium when acute myocardial infarction was diagnosed. Several studies have reported and tagged magnesium deficiency with poor prognostic outcome in patients who have myocardial infarction. The role of magnesium in treating arrhythmias due to acute myocardial infarction (AMI) has been controversial and never the study was totally formally conducted. Most of the studies have reported a significant reduction in the mortality and frequency of arrhythmias in patients with AMI with magnesium treatment. This study was done with the main purpose of studying serum levels of Mg in these patients, in order to establish possible relation between low levels of serum Mg and increased risk & associated poor prognosis in patients with acute MI.

KEYWORDS : arrhythmias, Hypomagnesemia, Acute Myocardial infarction.

Ischemic heart disease is the leading cause of morbidity and mortality worldwide. [1] The prevalence of myocardial infarction (MI) is more in the middle income world; (WHO report, 2004) and it is well known that males are more commonly affected than females. Magnesium is the second most abundant intracellular cation and it is vital for more than 300 enzymatic reactions which are involved in various metabolic processes in our body, but still, it is often a parameter which is overlooked by the clinicians. [2] Hypomagnesemia is now recognized as a significant risk factor for atherogenesis, and thus for hypertension, ischemic heart disease, cardiac arrhythmias, coronary vasospasm, myocardial infarction, sudden cardiac death, and even cerebrovascular accident. Magnesium is a cardio protective element because of its β adrenoreceptor blocking action, antiplatelet action and inhibitory effect on the cardiac conducting system. [3] The ion stabilizing effect of magnesium helps in maintaining stable intra and extracellular concentrations of other electrolytes. Studies have documented significant alterations in magnesium (Mg²⁺) and other electrolytes in patients with Acute Myocardial Infarction (AMI). [4]

AIMS AND OBJECTIVES:

To study the serum magnesium levels in acute myocardial infarction

MATERIALS AND METHODS:

This study was done in Basaweshwara Medical College, Chitradurga
This study was done from May 2006 to April 2007.

A total number of 30 patients were selected.

Patients presenting with chest pain suggestive of MI, who showed ECG evidence of acute MI were assessed by detailed history and physical examination. The infarction was confirmed by elevated CPK/SGOT/SGPT levels. Serum or heparinized plasma was collected and was sent for the estimation of Mg levels. Serum Mg levels were estimated within first 24hrs of chest pain on day one. Serum Mg levels were estimated using calorimetric method. Calorimetric determination of magnesium without deproteinization using calmagite was performed. Elimination interferences due to calcium are around up to 3.8 mol/l (150mg/l). Range of expected values is serum of Mg is between 0.65 – 1.05 mol/l or 14 – 25.5 mg/l. Reagents used include Mg sulphate, calmagite and Reagent PH 11 EGTA.

RESULTS:

TABLE 1: Mean Distribution:

Number of Patients	Mean Age	Standard Deviation
30	56.74 years	± 09.87 years

TABLE 2: Sex Distribution:

Number of Patients	Male	Female
30	17	13

TABLE 3: hypomagnesemia Frequency

Total	Male	Female
11	8	3

TABLE 4: Test for Significance

Total	X-Value	Significance (p<0.05) (2 tailed probability)
11	0.625	Significant (0.0023)
This was done by Z-Test with 30 sample taken as control (2 out of 30)		

DISCUSSION:

Magnesium has coronary and systemic vasodilatation and antiarrhythmic, antithrombotic and antioxidant properties and direct, myocardial protective effect in experimental and clinical models of ischemia- reperfusion injury. In the present study there was a statically significant fall in serum Mg concentration on the first day of AMI as compared to controls was observed.

A review of epidemiologic studies has highlighted an inverse relation between the magnesium content of drinking water and ischemic heart disease-related mortality in various populations. Intravenous infusions of magnesium in patients have been reported to reduce coronary and systemic vascular resistance, inhibit platelet aggregation, and terminate episodes of torsades de pointes-type ventricular tachycardia. Magnesium deficiency is known to predispose to the evolution of cardiac arrhythmias even with normal serum potassium concentration. Magnesium deficiency interferes with the function of membrane ATP-ase and thus, the pumping of sodium out from the cells and potassium into the cells is impaired. This disequilibrium of potassium between intra and extra cellular spaces may result in changes in resting membrane as well as disturbance in the repolarization phase and results in cardiac arrhythmias.

Data are accumulating that indicate that the magnesium cation may be a promising agent for protection of ischemic myocardium and modulation of reperfusion injury. Magnesium is a critical cofactor in more than 300 intracellular enzymatic processes, many of which are integrally involved in mitochondrial function, energy production, maintenance of transsarcolemmal ionic gradients, cell volume control, and resting membrane potential. [5] Small trials reporting the use of magnesium in acute myocardial infarction have been identified intermittently for 20 years. The rationale for these studies came partly from observations of differences in heart attack rates associated with geographic variations in Mg and partly from laboratory studies showing that Mg had cardioprotective effects during ischemia and that myocardial Mg concentrations were relatively low during acute ischemia. [6] We found serum Mg levels, independent of other risk factors, are inversely related to the incidence of acute myocardial infarction. Few studies have demonstrated that serum Mg concentration decreases significantly

during AMI. The cause of hypomagnesemia during the early phase of infarction is related to the increase stress induced catecholamines release, which induce enhanced lipolysis and sequestration of magnesium with free fatty acids and adipocytes. The cardiovascular consequences of magnesium deficiency in animal and clinical studies have been summarized by Seelig[7] and include multifocal necrosis with calcium accumulation in mitochondria in a pattern reminiscent of myocardial ischemia and catecholamine-induced cardiomyopathy, atherogenesis, a heightened tendency to platelet aggregation, increased coronary and peripheral vascular resistances, sinus tachycardia and repolarization abnormalities, and ventricular tachyarrhythmia.[8]

CONCLUSION:

In the present study there was a statically significant fall in serum Mg concentration on the first day of AMI as compared to controls was observed.

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