

STUDY OF SERUM MAGNESIUM LEVEL IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION AT PRESENTATION AND ITS PROGNOSTIC CORRELATION

***¹Dr.M.Arun karki, ²S.Dr. Balasubramaniyan, ³Dr.G.Prabhu, ⁴Dr.J.Barath**

^{*1}Post Graduate, Department of Medicine, Rajah Muthiah Medical College, Chidambaram

²Professor, Department of Medicine, Rajah Muthiah Medical College, Chidambaram

³Lecturer, Department of Medicine, Rajah Muthiah Medical College, Chidambaram

⁴Senior Resident, Department of Medicine, Rajah Muthiah Medical College, Chidambaram

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ABSTRACT

Background: Magnesium has been implicated in the pathogenesis of acute myocardial infarction and its complications like arrhythmia. Magnesium improves myocardial metabolism, inhibits calcium accumulation and myocardial cell death. It improves vascular tone, peripheral vascular resistance, after load and cardiac output, reduces cardiac arrhythmias and improves lipid metabolism. Magnesium also reduces vulnerability to oxygen derived free radicals, improves endothelial function and inhibits platelet function including platelet aggregation and adhesion. **Objective:** To know the relationship between the serum magnesium levels and arrhythmias in patients with acute myocardial infarction. **Method:** By using simple random method, 50 cases of acute myocardial infarction, admitted in Rajah Muthiah Medical College over a period of 2 years. **Results:** There is a significant difference in the magnesium levels in patients with arrhythmias and without arrhythmias. **Conclusion:** In acute myocardial infarction, patients with low magnesium levels are more prone to get arrhythmias. So magnesium treatment can be considered in patients of acute myocardial infarction with low magnesium levels.

Keywords: Magnesium; Myocardial infarction; Arrhythmias.

1.INTRODUCTION

Magnesium has been implicated in the pathogenesis of acute myocardial infarction and its complications like arrhythmias. It plays a significant role in other cardiovascular diseases as well. Magnesium ions are considered essential for the maintenance of the functional integrity of the myocardium¹.

Investigations revealed that magnesium level in the blood is decreased in the first 48 hours following an acute myocardial infarction and then increased steadily to reach the normal level in about three weeks time. The heart muscle subjected to myocardial infarction was found to contain low magnesium concentration.

Myocardial magnesium concentrations in patients after sudden death due to ischemic heart disease were found to be very low². It has been pointed out that magnesium has a vital role in atrial and ventricular arrhythmia, which causes sudden death in IHD. Coronary vasospasm resulting from magnesium deficiency is also another important factor in the sudden death in IHD.

Magnesium deficiency has also been postulated to have a role in the genesis of atheromatous plaques which leads to hyperlipidemia. Also myocardial infarction is one of the common causes of death at present where the prognosis depends on multiple factors of which, many still unexplained. This study is designed to know the relationship between serum magnesium levels and arrhythmias in patients with acute myocardial infarction.

2.METHODOLOGY

By using descriptive study, 50 cases of acute myocardial infarction, admitted in the CCU of RMMCH were taken. Inclusion Criteria for Patients: All patients presenting with acute myocardial infarction within 12 hours of onset of symptoms and patients between 30 to 70 years of age of both sexes.

Patients were considered to have acute myocardial infarction, only if they had 2 of the following criteria: 1.History of chest discomfort, 2.ECG changes of acute myocardial infarction, 3.Rise of cardiac enzymes.Exclusion Criteria: Patients who are known cases of any Cardiac Disease, Chronic Renal Failure, hyperthyroidism,patients on

**Corresponding author Dr.M.Arun karki, Post Graduate, Department of Medicine, Rajah Muthiah Medical College, Chidambaram*

Antihypertensive drugs, digoxin, and magnesium containing antacids and patients with past history of arrhythmias Cases selected were subjected to a detailed history and thorough physical examination, routine investigation like hemoglobin, blood count, urine examination, blood sugar, blood urea, serum creatinine, serum electrolytes, fasting lipid profile, cardiac enzymes and echocardiography was performed in all case. Serum magnesium levels were estimated on day-1 and day-5.

3.RESULTS

Table-1: Age and Sex Distribution of the Study group

Age range (years)	Sex		Total
	Male	Female	
30-40	9	1	10
40-50	7	3	10
50-60	12	1	13
60-70	13	4	17

Table-2: Risk Factors

Risk factors	No. of cases	Percentage
Smoking	35	70.00
Family history of HTN, DM, IHD, CVA	10	20.00
Obesity	12	24.00
Dyslipidemia	6	12.00

Table-3: Time of Presentation

Time at presentation	No. of cases	Percentage
0 – 6 hours	38	76.00
6 – 12 hours	12	24.00

Table-4: Serum magnesium levels in patients with arrhythmias

Serum magnesium levels (mg/dL)	Day-1		Day-5	
	Day-1	Percent	Day-5	Percent
<1.6	8	16.00	2	4.00
1.6 to 2.40	17	34.00	16	32.00
>2.4	-	-	2	4.00

Table-5: Serummagnesium levels in patients without arrhythmias

Serum magnesium levels (mg/dL)	Day-1		Day-5	
	Day-1	Percent	Day-5	Percent
<1.6	2	4.00	-	-
1.6 to 2.40	17	34.00	14	28.00
>2.4	6	12.00	9	18.00

Table-6: Mean serum magnesium level

	Day-1	Day-5
Mean serum magnesium in 50 Cases	1.86±0.39	2.26±0.50
Mean serum magnesium level in patients with arrhythmia(25patients)	1.65±0.26	1.98±0.25

Table-7: Comparison of Serum Magnesium level in patients with Arrhythmias and without Arrhythmias (Day-1)

	No. of cases	Serum magnesium Day-1	t- value	p-value
Mean serum magnesium level in patients with Arrhythmia	25	1.65±0.26	4.63	<0.001
Mean serum magnesium level in patients without Arrhythmia	25	2.08±0.41		

Table-8: Comparison of Serum Magnesium level in patients with Arrhythmias and without Arrhythmias (Day-5)

	No. of cases	Serum magnesium Day-1	t- value	p-value
Mean serum magnesium level in patients with Arrhythmia	20	1.98±0.25	4.17	<0.001
Mean serum magnesium level in patients without Arrhythmia	23	2.48±0.52		

4.DISCUSSION

The magnesium ion is becoming a major cardiovascular cation during these decades. It has been implicated in the pathogenesis of acute myocardial infarction and complication like arrhythmias. Magnesium inhibits the accumulation of calcium ion, improves the myocardial metabolism and reduces the myocardial cell death. It also helps in the activation of ATP which maintains the sodium-potassium pump and also because of its calcium blocking action, it is implicated in relation to arrhythmias after an acute myocardial infarction.

In this study group of 50 cases, 41 were males and 9 were female patients with a male-female ratio of 4.55:1. The maximum Incidence of acute myocardial infarction was seen in the 5th and 6th decades.

In the present study of 50 patients, the mean serum magnesium level on day-1 in all 50 patients was 1.86±0.39 and the mean serum magnesium level on day-5 was 2.26±0.5.

Sachdev et al³ (1978) reviewed magnesium levels in 30 patients of myocardial infarction within 24 hours, 5th and 8th day and reported that 1.83±0.087 mgm%, 1.91±0.149 and 1.97±0.089 as against control of 2.44±0.162 mgm%. The values were statistically lower on all the three days and on following days the values were showing a progressive rise.

In the present study group, the serum magnesium level on day-1 was significantly lower in patients with arrhythmias than those without arrhythmia (p<0.001). There was an increase in serum magnesium from Day-1 to Day-5 in both those with arrhythmias and those without arrhythmias.

Ceremuzynski et al⁴ studied 48 patients with acute myocardial infarction over 24 hours with infusion of magnesium as placebo. The incidence of ventricular tachycardia (3 or more consecutive premature ventricular contraction at a rate faster than 120/ min) recorded by Holter monitoring was significantly reduced ($p < 0.001$), but the incidence of other ventricular arrhythmias were not statistically different.

Felstedt et al⁵ randomized 298 patients with suspected acute myocardial infarction to 24 hours infusion of magnesium or placebo. Myocardial infarction was documented in 162 patients. During the mean observation period of 245 days, there was no difference in the incidence of tachyarrhythmias. Magnesium infusion was associated with a significant increase in bradyarrhythmias.

5. CONCLUSION

This study was carried out in 50 patients of acute myocardial infarction who were admitted in CCU of Rajah muthiah medical college hospital, Annamalainagar, Chidambaram.

1. The male to female ratio in the study group was 4.55:1 and the maximum incidence of acute myocardial infarction was seen in 5th and 6th decade.
2. In the study Hindus were 80% and Muslim were 12% and Christians were 8%.
3. In the study, the most common presenting symptom of patient was chest pain (100%). It was associated with sweating in 26% of patients, breathlessness in 26% of patients and palpitation in 60% of cases.

4. In the study, the most common risk factor was smoking followed by obesity and dyslipidemia.
5. In the study group mean serum magnesium level in 50 patients on day-1 is 1.86 ± 0.39 and on Day-5 is 2.26 ± 0.5 .
6. In the study group, mean serum magnesium level in 25 patients with arrhythmia is 1.65 ± 0.26 on day-1 and 1.98 ± 0.25 on day-5.
7. In the study group, mean serum magnesium level in 25 patients without arrhythmia is 2.05 ± 0.41 on day-1 and 2.48 ± 0.52 on day-5
8. The difference between the magnesium level in patients with arrhythmia and without arrhythmia is statistically significant on both day-1 and day-5.

6. REFERENCES

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