



A STUDY TO FIND TIME COURSE OF SERUM MAGNESIUM CONCENTRATION IN PATIENTS OF ACUTE MYOCARDIAL INFARCTION.

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ABSTRACT Magnesium is one of the important intracellular ion in human body. Its role in various physiological activity is well known. Therefore this present study is conducted to find the trend of serum magnesium level in patients of acute myocardial infarction. Serum magnesium was measured in 53 patients of acute MI on 1st, 4th, 10th and 14th day after an attack of MI. Also, 53 healthy volunteers were taken for normal serum Mg levels. Statistical analysis was done using two way ANOVA and Bonferonis t test. There was highly significant fall in serum magnesium levels on day 1 but as days increases there is increase in serum magnesium with levels reaching the normal range on the 14th day.

KEYWORDS : myocardial infarction, magnesium

INTRODUCTION

Magnesium is the most abundant intracellular ion in the plants, the second most common ion in the ocean, the third most common ion on the land and fourth most abundant ion in the living organisms. Interest in the role of magnesium in cardiovascular system was stimulated by work of Kruze et al who demonstrated cardiac necrosis, fibrosis and calcification of the elastic tissue of blood vessels in the rats fed on magnesium deficient diet.⁽¹⁾ Bantus community of south Africa has shown low incidence of coronary heart disease as serum magnesium was found to be quite high in the people protecting them from ischemic heart diseases.

Thus the present study was undertaken to evaluate serial serum magnesium levels in patients of acute myocardial infarction and to highlight the importance of magnesium in the diagnosis of acute myocardial infarction.

OBJECTIVES:

To study the time course of serum magnesium concentration in patients of acute myocardial infarction.

MATERIALS AND METHODS

This study was carried out in Intensive Cardiac Care Unit (ICCU) of GGMC and Sir JJ groups of hospitals, Mumbai. Three ml of fresh blood samples were collected from antecubital vein by sterile disposable syringe and immediately transferred to glass bottles containing anticoagulants on day 1, day 4, day 10 and day 14. Serum magnesium was estimated at Institute of Science, Colaba by Atomic Absorption Spectrophotometer.

Before commencement of the study approval from Institutional Ethical Committee (IEC) was obtained. Also the written informed consent of the subjects were taken.

INCLUSION CRITERIA:

Fifty three patients of acute transmural myocardial infarction admitted and diagnosed based on characteristic ECG changes within 24 hours of onset of chest pain using general guidelines based on WHO criteria of myocardial infarction. Also 53 healthy subjects were taken for normal serum magnesium levels.

EXCLUSION CRITERIA:

1. Patients with previous history of MI
2. Patients with Non-Q wave infarct
3. ECG showing any cardiac abnormalities
4. Other causes of reduction in plasma Mg content like hepatic or renal failure, neoplasia, acute E.Coli infections, chronic diseases like sickle cell anemia, liver cirrhosis.

TABLE 1 SHOWING AGE AND SEX DISTRIBUTION IN STUDY GROUP.

AGE	MALES	FEMALES	TOTAL
≤ 35 yrs	3	0	3
36 - 45 yrs	11	3	14
46 - 55 yrs	13	2	15
56 - 65 yrs	16	1	17
66 - 75 yrs	2	0	2
>75 yrs	1	1	2
TOTAL	46	7	53

TABLE 2: SHOWING TIME TREND OF SERUM MAGNESIUM IN STUDY CASES

Mg levels	MEAN ± SD	P VALUE
Day 1	1.275 ± 0.125	< 0.001
Day 4	1.806 ± 0.192	< 0.001
Day 10	2.275 ± 0.163	< 0.001
Day 14	2.53 ± 0.119	< 0.001

P < 0.001 = highly significant

GRAPH 1: SHOWING TIME TREND OF SERUM MAGNESIUM IN STUDY GROUP.

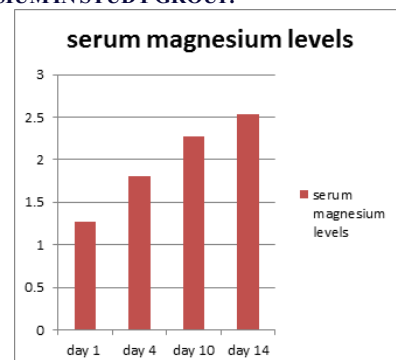


TABLE 3: THE POSSIBLE PAIRS WITH SIGNIFICANCE IS AS FOLLOWS:

1	Day 1 and day 4	t- 21.94	P < 0.001
2	Day 4 and day 10	t- 19.38	P < 0.001
3	Day 10 and day 14	t- 10.54	P < 0.001
4	Day 1 and day 14	t- 51.86	P < 0.001
5	Day 1 and day 10	t- 41.32	P < 0.001
6	Day 4 and day 14	t- 29.91	P < 0.001

RESULT:

Table 1 shows the age and sex distribution of the study group.

Table 2 and graph 1 shows the trend of serum magnesium in study group. It is clearly evident by the above findings, an upward trend of increase in serum magnesium is seen as days increases with levels reaching the normal range of 2.4 – 2.6 mg/dl on the 14th day.

To test this trend further, 2 ways analysis of variance (2 way ANOVA) was used as a test of significance which involves more than 2 repeated measurements in the same individual. There was significant difference between the subjects serum magnesium at various times of measurements.

And to evaluate between which pairs of measurements (eg at day 1 and 4) the increasing trends is statistically significant, the Bonferoni procedure, normal vaiant of 't' statistic was used.

Table 3 shows various possible pairs of serum magnesium on various combination of days. The result shows that all possible pairs show a very significance. This increasing trend of serum magnesium with increase in days of measurement is thus unlikely to have occurred by chance.

DISCUSSION :

The present study was carried out to elucidate the role of serum magnesium in patients of acute myocardial infarction.

In the present study, serum magnesium was estimated in 53 healthy individuals. The serum magnesium level was ranging from 2.399 mg/dl to 2.705 mg/dl with mean value of 2.444 mg/dl. These values are consistent with the previous studies.^(2,3,4)

MECHANISM OF HYPOMAGNESEMIA IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION.

The explanation for hypomagnesemia in myocardial infarction is still not well documented, however several hypotheses have been laid down.

Prasad et al and Nath et al suggested that serum magnesium may be utilized in checking increased adhesiveness of platelets following myocardial infarction in an attempt to prevent thrombosis and to check hypercoagulability of blood respectively.^(5,6)

Govind Mohan and V K Jain stated that there may be shift of magnesium from extracellular to intracellular compartment which occurs by increased uptake of magnesium into adipocytes following catecholamine induced lipolysis and formation of magnesium soap with free fatty acids.⁽⁷⁾

The findings of the present study are consistent with the findings of previous studies carried out by Kalpa et al, Abraham A S, Russman H S et al.^(8,9,10)

Thus the results of this study confirms the findings of many earlier studies that there is significant fall in serum magnesium concentration immediately after acute myocardial infarction and hence serum magnesium can be used as a reliable diagnostic indicator of acute myocardial infarction in ICCU.

CONCLUSIONS

Serial serum magnesium measurements in patients of acute myocardial infarction showed minimum level of serum magnesium on day one and gradually increasing to near normal values by fourteenth day of infarction.

Thus these findings of this study emphasize that the fall in serum magnesium concentration can be used as a reliable diagnostic indicator soon after myocardial infarction.

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