ORIGINAL ARTICLE

To Evaluate the Serum Magnesium Level in Hypertensive and Diabetic Cases of Acute Myocardial Infarction

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ABSTRACT

Aim: To evaluate the serum magnesium level in hypertensive and Diabetic cases of acute Myocardial Infarction. The study was conducted in May 2001 in PIC Lahore**.** Patients were selected randomly and diagnosed as the case of AMI according to WHO criteria i.e. Typical Chest pain, T wave Inversion or ST segment elevation, Increased CKMB. The patients having hypotension or renal failure are excluded from the study.

Results: In hypertensive patients, serum Mg^{++} level was decreased as compared to normotensive patients with significant difference. In diabetic patients, serum Mg^{++} level was decreased when comparing with non diabetics and difference was significant statistically ($p<0.05$).

Keywords: Magnesium, Diabetes mellitus, Hypertension

INTRODUCTION

Acute myocardial infarction (AMI) is a clinical syndrome that results from an injury to myocardial tissue caused by prolonged ischaemia. Myocardial ischaemia is defined as an imbalance between fractional uptake of oxygen and the rate of cellular oxidation in the heart[1]. Immediately after the AMI, the serum level of Mg^{++} may be elevated. This elelvation is caused by the release of catecholamine with marked increase of Mg^{++} efflux from the heart and other tissues .There is also release of free fatty acid, the conjugation of Mg^{++} with lipid may occur resulting in dropping the level of Mg^{++2}. In hypomagnesaemia, cardiac arrhythmias, particularly torsade de pointei may occur. The diagnosis of hypomagnesemia can be confirmed by finding plasma Mg^{++} concentration less than 1.7 mg/dl. Since most Mg^{++} is intra cellular, a body deficit can present with a normal plasma concentration. Up to 60% of patients with hypomagnesaemia suffer from hypokalemia and 40% will be hypocalcemic[3].

Methodology: The study was conducted in May 2001, in Punjab Institute of Cardiology, Lahore**.**

Selection Criteria:

Patients were selected randomly and diagnose as the case of AMI according to WHO criteria i.e.

- Typical Chest pain
- T wave Inversion or ST segment elevation.
- Increased CKMB

The patients having hypotension or renal failure are excluded from the study.

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RESULTS

The details of results are given in tables 1and 2.

Table 1: Serum Magnesium levels in Hypertensive and Normotensive Patients of AMI

Serum Magnesium (mg/dl)	Hypertensive Patients	Normotensive Patients
Mean±SD values	0.99±0.03	1.84±0.06
Ranges	0.7–2.00	0.9–2.50
Total Subjects	102	48

Statistical Analysis: P < 0.05 (Significant)

Table 2: Serum Magnesium levels in diabetic and non-diabetic patients of AMI

Serum Magnesium (mg/dl)	Diabetic Patients	Non-Diabetic Patients
Mean ± SD values	0.85±0.02	1.66±0.13
Ranges	0.7–1.00	0.7–9.00
Total Subjects	28	122

Statistical Analysis: P < 0.05 (Significant)

Fig. 1: Serum Magnesium levels in Hypertensive and Normotensive Patients of AMI

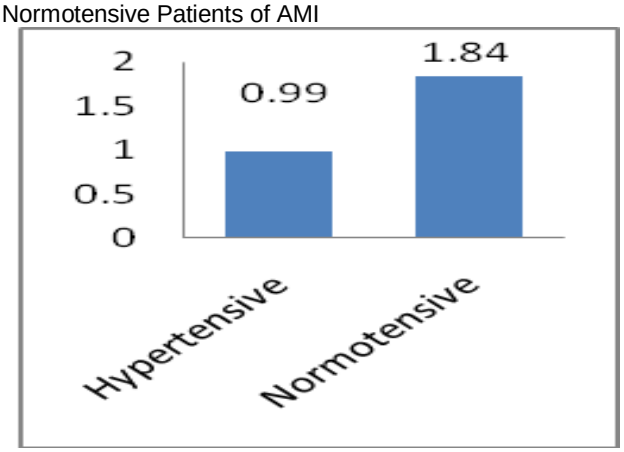
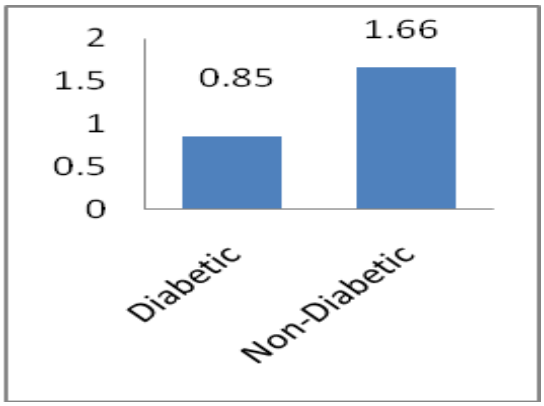


Fig. 2: Serum Magnesium levels in Diabetic and Non-Diabetic Patients of AMI



DISCUSSION

AMI is more common in hypertensive patients (68%) as compared with normotensive patients. It is with the reference to the study conducted by khan (2000)[4], who reported that relative risk of death from CHD rises continuously with increasing levels of systolic and diastolic blood pressure. 10mmHg pressure difference in systolic and 5mmHg difference in diastolic blood pressure caused 28% difference in risk of death from CHD and reduction in blood pressure by 6mmHg, reduces the risk of CHD incidence by 14%. Serum Mg^{++} levels were also done in both hypertensive and normotensive AMI Patients. It was noted that the mean serum Mg^{++} level in hypertensive patients was 0.99±0.03 mg/dl while it was 1.84±0.06 mg/dl in normotensive patients. It was noted that serum magnesiun levels were low in hypertensive patients as compared with nomotensive patients. Hypomagnesaemia is commonly associated with hypertension and myocardial infarction. In hypertensive patients Mg^{++} deficit must be controlled because of its numerous harmful actions on the nervous system and on the nephro cardiovascular apparatus as described by Chakraborti et al (2002)[5].

Considerable evidence suggests a linkage between magnesium deficiency and hypertension. An inverse correlation between serum magnesium and blood pressure is observed. Both rat and human studies confirm that in the presence of deficient serum magnesium, there is an increase intracellular calcium resulting in increased vascular tone and hypertension as studied by Fox et al (2001)[6].

In our study, it was revealed that out of 150 selected patients of AMI, only 28 (19%) were diabetics as compared with 122 patients (81%) who were non-diabetics. The mean serum Mg^{++} level in diabetics was 0.85±0.2mg/dl, while it was 1.66±0.13 mg/dl in non-diabetics. Magnesium deficit in the diabetic patients represent a typical example where depletion is mainly involved. It cannot be explained by an insufficient intake but derives from complex dysregulation that differs according to the various clinical forms of diabetes mellitus. The relationship between diabetic macro and micro angiopathy (retinopathy mainly) and Mg^{++} deficit will only be explained by further understanding of the mechanism involved in diabetic Mg^{++} depletion[7]. Hypomagnesaemia occurs in poorly controlled diabetes mellitus and may be more severe after diabetic Ketoacidosis[8]. The clinical correlation between decreased plasma Mg^{++} and the diabetic condition was first reported by Londono & Roscnbloom (1971). The inverse relationship between glycemic control and plasma Mg^{++} level has been attributed by increased Mg^{++} urinary losses. The net tubular reabsorption of Mg^{++} decreases in severe hyperglycemia[6].

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