Original Article

Serum Magnesium and Hypertension

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ABSTRACT

Background: Despite advances in the prevention and treatment of hypertension over the past decade, hypertension remains an important public health challenge. Recent efforts to reduce the prevalence of hypertension have been focused on non-pharmacologic means, specifically diet. An increased in take of magnesium has been shown in some but not all studies to reduce blood pressure in patients with hypertension. Decreased Serum magnesium levels are associated with development of hypertension.

Aim: This study was planned to investigate relation of serum magnesium with blood pressure in patients with mild uncomplicated hypertension.

Place and Duration of Study: Study was conducted at LUMHS hospital Jamshoro and DHQ hospital charssadda for the period of six months.

Patients & Methods: Fifty known cases of uncomplicated mild hypertensive patients were selected, same number of healthy controls were also examined.

Results: When results were summed up and test parameters were compared, it was seen that no significant differences were found in serum magnesium levels among both groups, when compared statistically.

Conclusion: Finally we conclude that no relation of magnesium with hypertension was observed.

Suggestions: Much more work on wide scale population may be needed to clarify the idea.

Key Words: Magnesium, Hypertension, Ischaemic heart disease (IHD), Diabetes.

INTRODUCTION

Ischaemic heart disease (IHD) is a leading cause of death in most of industrial and western world. A number of risk factors are associated with IHD. Major being: hyperchlesterolaemia, hypertension, cigarette smoking, diabetes mellitus and stress and strain. Hypertension is an important accelerator of the atherosclerotic process and it frequently accompanies adult ischaemic heart disease[1]. Hypertension is associated with an increased risk of clinical cardiovascular complication due to atherosclerosis and atheroma develops earlier in these patients. There are significant differences between the severity of the lesions of atherosclerosis in hypertensive and non-hypertensive subject [2]. Magnesium is a biologically essential cat ion, has recently received considerable attention in clinic medicine, especially with regard to the role of its depletion in cardiovascular pathophysiology [3]. Magnesium is the fourth most abundant cat ion in the body and the second most abundant intra cellular cat ion, next to potassium [4]. Some authors have shown recently an increasing interest in the effects of calcium and magnesium on blood pressure [5]. Many reports have appeared in recent year discussing association between serum magnesium levels and Hypertension. Accumulating evidence implicates a role of magnesium and pathophysiology of essential hypertension [14, 15] but its role in pathophysiology is still unclear [16]. Present study was carried out to this burning issue. Study was aimed to investigate this relation.

PATIENTS AND METHODS

Study was conducted in the department of cardiovascular diseases, LUMHS, Jamshoro and DHQ teaching Hospital, Charsadda, for the period of six months. Fifty known cases of mild uncomplicated hypertension were selected. Same numbers of healthy control were also selected. The information about name, age, sex, duration of their illness and blood pressure, smoking habits, and family history of cardiovascular disease were recorded. Patients with diuretic therapy, thyroid abnormalities, liver failure, renal failure or alcoholics were excluded form the study. Fifty healthy controls were selected with no preexisting cardiovascular disease. A single casual supine blood pressure measurement was obtained by trained staff using a standard mercury sphygmomanometer according to W.H.O criteria. Blood samples of patients and healthy controls were drawn from antecubital vein by taking aseptic measures for determination of serum magnesium levels. Statistical analysis was done by student's t-test.

RESULT

When results were summed up and test parameters were compared it was seen that mean age of patients and controls was 40-50 years ± 0.1 Serum magnesium levels (table) in control subjects were 2.94 ± 0.05 mg/dl, while mean serum magnesium levels in hypertensive subjects were 2.89 ± 0.03 mg/dl. The differences were found-non-significant (p>0.5) when evaluated statistically.

Table: Comparison of mean values serum magnesium (mg/dl) in controls and hypertensive patients.

Group	Blood Pressure (mmHg) Systolic/diastolic		Serum magnesium (mg/dl)	P-value
Controls (n=50)	126.00 ±_1.87	79.96 ±_1.39	2.94 ±_0.05	>0.5
Patients (n=50)	155.00 ±_1.52	103.62 ±_1.21	2.83 ±_0.10	>0.5

Each value represents mean of individual observation ± indicates standard error of mean.

DISCUSSION

Investigations of the association between serum magnesium and blood pressure have yielded conflicting results. Hvarfner et al. found a positive association between serum magnesium and blood pressure in 58 hypertensive patients and 124 controls studied in Uppsala, Sweden. There was no difference between the relation identified in the hypertensive and control groups [7]. The relation between serum magnesium and blood pressure has also been examined by using data from national health and nutrition (NH&N) survey, no association was identified between serum magnesium and systolic blood pressure [8]. Similarly, data from a community based cross sectional study of elderly whites in Baltimore provided no evidence of an association between serum magnesium and blood pressure [9]. Peterson and co-workers reported a significant increase in correlation between serum magnesium levels and systolic blood pressure [10]. Rinner et al studied Dutch population, and they found no relation between serum magnesium and blood pressure[11]. Altura and Altura have reviewed the mechanism underlying in the relationship between magnesium and blood pressure. It has been postulated that if the concentration of extracellular magnesium is lowered, calcium infux is enhanced. There is relatively little information form both animal and human studies to indicate direct relationship between magnesium and blood pressure [12]. Similarly, Herzog in 1995 also failed to establish any relationship between blood pressure and serum magnesium [13]. In the present study, it was observed that the serum magnesium levels in patients with hypertension and in controls are with in normal limits. Therefore our study suggests no relation between serum magnesium levels and blood pressure in the patients of hypertension. Therefore, this study is in the favor of works done by whelton et al. Rinner et al. Cappuccio et al. And Herzog et al [6, 9, 11, 13] Our results are in contrasts with the study done by Hvarfner et al. as they found high serum magnesium levels in hypertensive patients [7]. Also, study of peteson and co-workers reported decreased levels of serum magnesium in hypertensive patients, conflicts with our study [10]. Finally we suggest that further large scale studies on a large population are to be carried out to clarify idea.

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