

A STUDY ON SERUM MAGNESIUM CONCENTRATION AND PREVALENCE OF MAGNESIUM DEFICIENCY IN THE CENTRAL PROVINCE OF SRI LANKA

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Introduction

Magnesium is an important mineral to the body. Many enzymes require magnesium ions for their catalytic action, especially as a cofactor for Na⁺/K⁺ ATPase that provides energy for the Na⁺/K⁺ channels. Mg²⁺ also has many reported electrophysiological effects, including blocking of voltage dependent L type Ca²⁺ channels (Teik, 2003). The total body Mg²⁺ content is 1000 mmols/l and the plasma concentration ranges from 1.7 - 2.7 mg/dl (0.70 - 1.1 mmol/l). Average daily intake of Mg²⁺ is 20 mmol of which 40 % is absorbed. Urinary loss is the major source of Mg²⁺ excretion (Khosrow and Hamid, 2005). The plasma level of <1.7 mg/dl (< 0.7 mmol/l) is diagnosed as hypomagnesaemia which can lead to delirium, tremors, confusion, irritability, convulsion and tachyarrhythmias (Khosrow and Hamid, 2005).

Mg deficiency is marked in critically ill patients and development of such ionized hypomagnesaemia during a severe illness is associated with a poor prognosis (Reinhart, 1996). In Sri Lanka, estimation of Mg concentration is usually not included in the routine electrolyte laboratory studies. The high investigation cost in private laboratories (Rs.500/-) deprives the

physicians to determine Mg deficiency and correction of deficiency, which invariably leads to increased morbidity and mortality. Therefore, it is very important to establish serum Mg concentration and the prevalence of Mg deficiency if any, in general Sri Lankan healthy population. As an initial step, this study was conducted in healthy subjects from Central province of Sri Lanka. This study will help to make necessary modifications in the routine electrolyte laboratory studies to optimize the electrolyte imbalances in the management of ill patients and improve the dietary and medicinal supplementation.

As we have designed another study to find out the changes in serum Mg concentration in severely and critically ill patients, this study will provide a good foundation for that.

Objective

The objective of this study was to determine the level of Mg and prevalence of Mg deficiency if any in the Central province of Sri Lanka.

Materials and Methods

This analytical cross sectional study was carried out on 250 healthy randomly selected individuals during the period of 30th June 2009 to 22nd July 2009.

Ethical clearance for the study was obtained from the Ethical Review Committee, Faculty of Medicine, Peradeniya. Consenting healthy male or female aged between 20-50 years, on an average diet, from the Central Province of Sri Lanka were recruited for the study. People who didn't consent and those with clinically detectable anaemia or any other micro nutrient deficiency were excluded.

Blood samples were drawn from the selected subjects under aseptic conditions. The samples were collected into plain bottles and serum was separated within 20 minutes of collection and stored at -20^oC. Mg concentration was measured by the xylydyl blue method using 'Randox' assay kits.

Results

Serum magnesium concentrations were analyzed using the independent t-test (SPSS V13). Our study included 250 subjects, 78 men (31.2 %) and 172 women (68.8 %) whose average age was 32 ± 9 years and 36 ± 9 respectively.

Majority (97.2 %) of the subjects were non-vegetarian and 42.6 % of study group consumed well water, 41.4 % tap water and the rest (16.1 %) were using other water sources.

Table 1. Age and BMI of the subjects

Gender	Male	Female
Age (years)	32 ± 9	36 ± 9
BMI (Kg/m ²)	21.1± 4	22.2 ± 4

The mean serum magnesium level for our study sample was 2.04 mg/dl (range of 1.7-2.7 mg/dl), which was within normal reference values. The mean serum magnesium level for males and females were 2.1 mg/dl and 2.0 mg/dl respectively and no significant difference (P<0.01) was observed between males and females.

Discussion

Magnesium is an essential element of the human body and only 1 % of total body Mg exists in serum and the rest is distributed intracellularly and in bones. Many enzymes require magnesium ions for their catalytic action. The importance of Mg in human metabolism in health and disease has gained increasing attention. There is limited data available on the normal serum Mg levels among general population in Sri Lanka. Our study revealed normal serum Mg concentrations in the subjects, and there was no evidence that it varied with the gender, dietary habits or the water source.

Conclusion

The serum Mg concentrations of our study group were within the normal reference range.

References

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