Volume : 5 | Issue : 5 | May 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Research Paper

Serum Magnesium Levels In Chronic Alcoholics

Medical Science

KEYWORDS : Serum Magnesium, Alcoholic Liver disease (ALD)

Dr Aher Sangeeta — DHA(TISS) -Associate Professor,TNMC &Nair hospital

Dr.Nikumbhe Anand — Registrar, TNMC &Nair hospital

ABSTRACT

Magnesium (Mg2+) is the second most abundant intracellular cation1 . It plays a fundamental role in many functions of the cell, including energy transfer, protein, carbohydrate, and fat metabolism and the regulation of parathyroid hormone (PTH) secretion. Very few studies have evaluated hypomagnesemia in Indian alcoholics population.. Aims and Objectives: To study prevalence of hypomagnesemia and other electrolytes abnormalities in alcoholic patient and study various clinical features. Materials and Methods This was a cross sectional, observational study conducted in 40 alcoholic patients Age (years) 46.73 mean, with 38 male and 2 female. Statistical Analysis :The data was analyzed using Graph pad prism 6 software. The quantitative data was represented using mean± SD. Result : Prevalence of hypomagnesemia in chronic alcoholic patients included in the study was observed to be 20% (P< 0.01) and normal levels of serum magnesium were observed in 80% of the patientsTable1. It was observed that percentage of serum magnesium, potassium, phosphorus,calcium and serum sodium were below normal levels Table 2 .Data of the present study clearly conclude that serum Mg++ status can be useful marker for alcoholic liver disease2.

Introduction: Alcohol abuse may result in a wide range of electrolyte and acid-base disorders, including hypophosphatemia, hypomagnesemia, hypocalcemia, hypokalemia, metabolic acidosis, and respiratory alkalosis Hypomagnesemia is a common entity occurring in up to 12% of hospitalized patients3. Other factors also contribute to hypomagnesemia like dietary deficiency, acute pancreatitis, and diarrhea. 25% to 30% of serum magnesium is bound to albumin and is therefore inactive .Thus measuring total serum magnesium may provide a spuriously low value in hypoalbuminemic states6.

Materials and Methods:

Study design :This was a cross sectional, observational study conducted in 40 alcoholic patients admitted in the medicine ward of this institution carried out from February 2014 to August 2015 .Inclusion Criteria: The alcoholic patients with any three of following characteristics were included in the study:

1. Alcoholism for more than five years
2. Average minimum daily alcohol intake of about 40 grams
3. Alcohol intake for minimum of five days per week
4. Alcohol withdrawal signs/symptoms
5. Past history of alcohol related disorder like alcohol liver disease, blackouts, rumfits, delirium tremens etc.

Exclusion Criteria: 1. Presence of concomitant conditions causing magnesium depletion e.g. 1.Intestinal cause [malabsorption syndrome, endocrine & metabolic cause [hyperthyroidism, aldosteronism], 2.Renal causes [renal tubular necrosis, glomerulonephritis, pyelonephritis]. 3. History of intake of drugs containing magnesium

Primary endpoint: To study prevalence of hypomagnesemia in alcoholic patients.

Secondary endpoint: To study association between serum magnesium and other electrolytes in alcoholic patient and their various clinical features.

Investigations done: Serum magnesium, Serum calcium, phosphorus, sodium and potassium Blood urea nitrogen (BUN). Routine investigation like Hb, CBC, LFT, RFT, RBS, total protein and albumin, prothrombin time, ALP etc were done on each patient

RESULTS

Prevalence of hypomagnesaemia in chronic alcoholic patients included in the study was observed to be 20% and normal levels of serum magnesium were observed in 80% of the patients. In our study it was observed that 12 (30%) alcoholic patients had hypophosphatemia. It was observed that serum levels of magnesium and phosphorus fall together. However, the correlation is statistically not significant. In our study, it has been observed that, the prevalence of hypomagnesemia in chronic alcoholic patients was 20%. Correlation between serum magnesium and other electrolytes abnormalities was studied which showed fall in levels of electrolytes along with serum magnesium. However, this was not statistically significant.

DISCUSSION

. Mg2+ deficiency is common among alcoholics . It has been reported in animal studies that Mg2+ deficiency aggravates the hepatic damage caused by alcohol. Hypomagnesemia in alcoholics is known to cause several complications such as neurological damage, hypertension, cardiovascular diseases and cancer .Normal plasma magnesium concentration is 1.7-2.1 mg/dL (0.7-0.9 mmol, or 1.4-1.8 mEq/L). Hypomagnesemia is defined as serum Mg2+ concentration < 1.4 mEq/L (< 0.70 mmol/L). Hypomagnesemia is known to result in disturbances in nearly every organ system and can cause potentially fatal complications (eg. ventricular arrhythmia, coronary artery vasospasm, sudden death). It has occasionally been called as the "forgotten cation".

It was observed that the prevalence of hypomagnesemia in chronic alcoholic patients included in our study was 20% (8) and normal levels of serum magnesium were observed in 80% (32) of the patients. The association between gender and prevalence of hypomagnesemia among chronic alcoholic patient is not dependent on gender of the patient and was not statistically significant. It was also observed that the difference in prevalence of hypomagnesemia in chronic alcoholic patients of duration less than 10 years and chronic alcoholics for more than 10 years was statistically significant Table1. Elisaf M et all observed that the mean (SD) total serum magnesium level was 0.7 + 0.2 mmol/L, which was significantly lower than that observed in 203 normal controls (0.9 5 0.3 mmol/L, $p < 0.01$)[7]. This result is similar to the study conducted by Biswajit Das, Prasanna Chandra et al which showed that serum magnesium level is decreased in patients with liver cirrhosis8. Hypomagnesemia in alcoholics could be explained by decreased nutritional intake and increased excre-

Volume : 5 | Issue : 5 | May 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

tion of magnesium due to indirect effects of alcohol on the renal tubules.Ingestion of ethanol causes a marked increase in urinary excretion of magnesium

Several studies have reported electrolyte changes like hypokalemia, hypocalcemia, hypernatremia in alcoholics4.5 Hence this study was planned to observe correlation of hypomagnesemia with other electrolyte abnormalitiesTable 2. Alcohol consumption has major effects on absorption, elimination and serum concentration of many physiological important electrolytes. It can induce excessive urinary excretion of magnesium, calcium and phosphorus. In this study, it was observed that 21(52.5%) had hypokalemia. It may be due to impaired reabsorption of potassium by the damaged renal tubular cells, along with coexistent hypomagnesemia. In this study, 30% of patients had hyponatremia. Magnesium depletion leads to interference with ATP generation, causing sickling of cells and are not able to maintain normal transcellular gradient for sodium and potassium. In our study, out of 40 alcoholic patients 36 (90 %) alcoholic patients had hypocalcemia. It was observed that serum levels of magnesium and calcium fall together. However, the correlation is statistically not significant. Elisaf M et al , Pall H.S. et al reported presence of hypocalcemia in alcoholic patients with with hypomagnesemia2,3. The classic sign of severe hypomagnesemia (< 1.2 mg/dL) is hypocalcemia. The mechanism is multifactorial. Parathyroid gland function is abnormal, largely because of impaired release of PTH. Impaired magnesium-dependent adenyl cyclase generation of cyclic adenosine monophosphate (cAMP) mediates the decreased release of PTH. Skeletal resistance to this hormone in magnesium deficiency has also been implicated In our study it was observed that 12 (30%) alcoholic patients had hypophosphatemia. It was observed that serum levels of magnesium and phosphorus fall together. However, the correlation is statistically not significant. Similarly Elisaf M.S et al have reported hypophosphatemia occurring along with hypomagnesemia in alcoholics4.

The neuromuscular manifestations of hypomagnesemia include muscular weakness, tremors, seizure, paresthesias, tetany, positive Chvostek sign and Trousseau sign, vertical and horizontal nystagmus. It was found that association between hypomagnesemia and Chvostek's sign was statistically significant. However it was found that association between hypomagnesemia and seizures was not significant. It was observed that association between hypomagnesemia and calcium (Ca 2+), Mg2+ plays a role in the regulation of parathyroid hormone (PTH) secretion. Profound Mg2+ depletion decreases the release of PTH and induces skeletal resistance to PTH and severe hypocalcaemia1.5. A limitation of our study is small sample size .

Summary and Conclusions

The prevalence of hypomagnesemia, its association with various clinical signs and symptoms and its correlation with other serum electrolytes was studied in chronic alcoholic patients. It was a prospective observational study conducted in 40 chronic alcoholic patients. The prevalence of hypomagnesemia in chronic alcoholic patients was found to be 20%. Correlation between serum magnesium and other serum electrolytes was not significant. Association between hypomagnesemia in chronic alcoholics and some clinical signs and symptoms was found to be significant. Correlation between serum magnesium and other serum electrolytes was not significant..Association between hypomagnesemia in chronic alcoholics and some clinical signs and symptoms was found to be significant.

Table 1: Prevalence of hypomagnesemia in chronic alcoholic patients (n=40)

Normal serum magnesium levels (percentage)	32 (80%)
Hypomagnesemia (percentage)	8 (20%)
Total	40 (100%)

Prevalence of hypomagnesemia in chronic alcoholic patients included in the study was observed to be 20% and normal levels of serum magnesium were observed in 80% of the patients. (Table 1).

Table 2: Serum electrolyte abnormalities in chronic alcoholic patients (n=40)

Serum electrolyte	Normal levels (percentage)	Below normal level (percentage)
Magnesium	32 (80)	8 (20)
Potassium	19(47.5)	21(52.5)
Phosphorus	28 (70)	12 (30)
Calcium	04 (10)	36 (90)
Sodium	10 (25)	30 (75)

Values are expressed as percentage.

It was observed that percentage of serum magnesium, serum potassium, serum phosphorus, serum calcium and serum sodium below normal levels were 20, 52.5, 30, 90 and 75 respectively. (Table 2)

REFERENCES

1. Elisaf M[1,] Merkouropoulos M ET all. Pathogenetic mechanisms of hypomagnesemia in alcoholic patients 1995 Dec; 9(4):210-4.
2. S Kulkarni, K.Pratibha Ravindra.Hypomagnesemia in alcohol dependent population attending the deaddiction center. Journal of Pharmaceutical Research
3. Volume 4, Issue 6, 1718-1728., 1718-1728..
4. Huang C-L, Kuo E. Mechanism of hypokalemia in magnesium deficiency. Journal of the American Society of Nephrology: JASN. 2007. p. 2649–52.
5. De Marchi S et al. Renal tubular dysfunction in chronic alcohol abuse: Effects of abstinence. N Engl J Med 329:1927-1934, 1993 .
6. Elisaf M, Bairaktari E et al. Hypomagnesemia in Alcoholic Patients. 1995;2(1):600.
7. Biswajit Das, Prasanna Chandra et al. Serum magnesium level in patients with liver cirrhosis. Int J Biol Med Res.2011; 2(3): 709-711.