



## STUDY OF MAGNESIUM DEFICIENCY IN AN ALCOHOLIC PATIENTS: A PROSPECTIVE OBSERVATIONAL PREVALENCE STUDY

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**ABSTRACT** The prevalence of Magnesium deficiency is underestimated<sup>1</sup> and the deficiency is even more prevalent in alcoholic patients.

**Aims and objectives:** To study the prevalence of Magnesium deficiency in alcoholic patients

**Materials and methods:** This prospective observational study, was conducted on 100 chronic alcoholic patients, selected from OPD (Outdoor patient department) or Inpatients in tertiary care hospital over a period of 3 months. Detailed history and examination was done in such selected patients. Statistical Analysis was done using STATA Software.

**Results:** Out of total 100 patients, 59% patients had magnesium deficiency. Amongst patients with hypomagnesemia, 45.7% patients had mild deficiency, 37.2% had moderate deficiency while 17% patients had severe deficiency. Use of Diuretics, appeared to be associated with moderate to severe Magnesium deficiency. The association is statistically significant ( $p=0.00086$ ).

**Conclusions:** Magnesium deficiency is prevalent in alcoholic patients in our study. Diuretics use increased severity of deficiency even more.

### KEYWORDS :

#### INTRODUCTION

The prevalence of Magnesium deficiency is underestimated in General population.<sup>1</sup> The deficiency is estimated to be approximately 10%, from all admitted patients in hospital ; and the deficiency is likely to be more prevalent in alcoholic subset of patients. But this issue of "Hypomagnesemia in Alcoholic patients" is yet not studied adequately and data available is scarce from India.

#### AIMS AND OBJECTIVES

To study the prevalence of Magnesium deficiency in alcoholic patients.

#### MATERIALS AND METHODS

This prospective observational study, was conducted on 100 chronic alcoholic patients, selected from OPD (Outdoor patient department) or Inpatients in tertiary care hospital, after the approval from Institutional Ethics committee. Chronic alcohol intake was defined as daily alcohol drinking, for 1 year or more. The study was conducted over a period of 3 months from 23-9-17 to 23-12-17.

Inclusion criteria were :Alcoholic patients(as per above criteria) and who consented to be part of the study. The patients who were admitted in ICU / Critical patients, the patients who did not given consent, or who were suffering from chronic diarrhea, malabsorption syndrome, or those who were already taking Magnesium supplements were excluded.

Detailed history and examination was done in such selected patients. History of drug intake such as Diuretic(s) was specifically recorded.

Serum Magnesium levels were done in the reference laboratory by Calmagite dye method. The data was entered in the pre-structured MS Excel sheet. Statistical analysis done using STATA software. Hypomagnesemia was defined and classified as Mild (1.6 - 1.8 mg/dL), Moderate ( 1.4 – 1.6 mg/dL) and Severe ( <1.4 mg/dL).

#### RESULTS

A total 100 patients were enrolled. The mean age was 45.69 years (Min 18 years, Max 75 years). All patients were male patients. 59% patients had magnesium deficiency.

Amongst patients with hypomagnesemia, 45.7% ( $n=27$ ) patients had mild Magnesium deficiency, 37.2% ( $n=22$ ) had moderate deficiency while 17% ( $n=10$ ) patients had severe deficiency.

**Table 1: Showing Distribution of Hypomagnesemia in alcoholic patients**

Status of Magnesium deficiency	Number of Patients (n)
Normal level	40
Mild deficiency	27
Moderate deficiency	22
Severe deficiency	10
Hypermagnesemia	1

Use of Diuretics in alcoholic patients ( $n=18$ ), appeared to be associated with moderate to severe Magnesium deficiency. The association is statistically significant ( $p=0.00086$ )

Please refer the table as under :

**Table 2 : Showing Distribution of Hypomagnesemia in Alcoholic patientson Diuretics**

Magnesium deficiency classification	Alcoholic patients on diuretic therapy
Mild deficiency ( $n=27$ )	2
Moderate deficiency ( $n=22$ )	8
Severe deficiency ( $n=10$ )	7

Note : One patient had normal Serum Magnesium level, despite being on Diuretic therapy.

#### DISCUSSION

The word 'Magnesium' is derived from the name of ancient Grecian town of 'Magnesia'. Magnesium is the fourth most common Cation of the body (after Na, K, and Ca), second most intracellular Cation (after K) and is the commonest intracellular divalent cation.

Magnesium plays an important role in neuromuscular function and maintenance of cardiovascular tone<sup>4</sup> Magnesium is a cofactor in multiple enzymatic reactions which maintain homeostatic mechanism and also produce ATP for energy.<sup>10</sup> Also neurotransmitter regulations and in turn smooth neurological functioning require Magnesium.<sup>10</sup> Magnesium regulate rhythmicity of heart, vascular tone, platelet-derived thrombosis.<sup>11</sup> Magnesium has role in Insulin signal transduction and also important for smooth functionality of proteins and mitochondria<sup>10</sup> Of the total Magnesium in body, 60% is in Bones, 39% is in Intracellular compartment and only 1% is in the Intravascular compartment (Blood circulation). Of the Intravascular Magnesium, 40% is bound to Protein in various forms such as Magnesium phosphate, Citrate and other unidentified complexes<sup>5</sup>. Thus, it is only

in the late stages of Magnesium deficiency, Serum Magnesium level will start depleting.

The normal serum magnesium level is 1.8 to 2.4 mg/dl.<sup>3</sup> Various Causes of hypomagnesemia are: Chronic Alcohol Intake, Starvation, Prolonged Vomiting, Chronic diarrhea, Malabsorption, Diuretic therapy, DKA etc.<sup>4</sup> Magnesium deficiency can cause cerebellar ataxia, seizure and cardiac dysrhythmias<sup>9</sup>.

Magnesium deficiency is prevalent in malnourished &/or admitted inpatients. And it is only logical that amongst alcoholic patients, the incidence of hypomagnesemia is higher.

Alcohol ingestion causes GI loss and urinary loss of Magnesium<sup>6</sup>. In our study, we found Magnesium deficiency in 59% of patients; and deficiency was moderate to severe (94.4% alcoholic patients) in alcoholic patients on diuretic therapy.

This implies need for clinicians to have high index of suspicion of Hypomagnesemia amongst alcoholic patients. Early detection of Magnesium deficiency and its correction in alcoholic patients admitted in Intensive Care Unit with Wernicke's Encephalopathy, resulted in better treatment outcome.<sup>7,8</sup> In another study, correction of Magnesium deficiency improved patient outcome by reducing the need for ICU and duration of mechanical ventilation.<sup>2</sup>

## CONCLUSIONS

Magnesium deficiency is prevalent in alcoholic patients. Concurrent use of Diuretics amongst alcoholic patients, increased the prevalence and severity even more.

## REFERENCES

1. Manisha Naithani, Jyoti Bharadwaj, Anshuman Darbari. Magnesium. The fifth electrolyte. A review: Journal of Medical Nutrition and Nutraceuticals. 2014; 3:2
2. B Sheba Charles, Indira Memon, TS Girish, AM Cherian. Hypomagnesemia in the ICU- Does correction matter?. Journal of Association of Physicians of India. 2016; 64:11
3. Brian R. Walker, Nicki R. Colledge, Stuart H. Ralston, Ian D. Penman. Hypomagnesemia. Davidson's Principles & Practice of Medicine: 2014. 22, p.448-449
4. Sanjay N. Pandya. Fluid and Electrolyte Disorders. Practical Guidelines of Fluid Therapy: 2014. 2, p.124-127
5. Burch GE, Giles TD. Importance of magnesium deficiency in cardiovascular disease: American Heart Journal, 1977; 94:649
6. Shane SR, Flink EB. Magnesium deficiency in alcohol addiction and withdrawal. Magnesium Trace Elem. 1991-1992; 10(2-4):263-8.
7. Flannery AH, Adkins DA, Cook AM. Unpeeling the Evidence for the Banana Bag. Critical Care Medicine. 2016; 44(8):1545-52
8. Dingwall KM, Delima JF, Gent D, Batey RG. Hypomagnesemia and its potential impact on thiamine utilization in patients with alcohol misuse at the Alice Springs Hospital. Drug Alcohol Rev. 2015; 34(3):323-8
9. TeRiele MG, Verrips A. Severe hypomagnesemia causing reversible cerebellopathy. Cerebellum. 2014; 13(5):659-62
10. Wilhelm Jahnhen-Dechent, Markus Ketteler. Magnesium Basics: Clin Kidney Journal. 2012 Feb; 5(Suppl 1):i3-i14
11. Cunningham J, Rodriguez JM, Messa P. Magnesium in chronic kidney disease stages 3 and 4, and in dialysis patients. Clin Kidney J 2012; 5(Suppl 1): i39-i51