# Serum Magnesium Level in Chronic Asthma In pediatrics

**Najim Al-Ruznamaj** [1] *FAAP*, **Hussam M. Al-Alwany** [2] *CABP*, **Ibtisam T. Alobusi** [3] *PhD*, **Ammar Al-Shebli**[3] *CABP*.

**Abstract :**

**Background:** Asthma in Latin means difficult breathing; it's the most common chronic illness in children. Asthma defined as reversible airway obstruction due to hyper- reactivity of the airways, and its still raising a lot of concern regarding mortality and morbidity, which are still increasing regardless of the advance of management.

The Serum level of Magnesium (Mg) in asthmatics & if any variation from normal children is the subject of this study.

**Aim:** Aim of the study is to measure the serum level of Mg in asthmatics with different degrees of severity & compare it to normal children.

**Patients and method:** A total number of 100 patients subjected to study, 50 asthmatics patients & 50 controls patients.

Assessment of asthmatics attacks & measurement of serum Mg for the cases & measurement of serum level of magnesium for the non-asthmatics controls.

**Results:** The results show that there is lower serum Mg in asthmatics than the control group but no significant correlation to severity of asthma.

**Conclusion:** Serum magnesium is important element to look for in asthma hence the low serum level compare to other children, which may help in management.

**Key words:** asthma, magnesium, and severity

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## Introduction

Asthma in Latin means difficult breathing & it is also known as reactive airway disease. Asthma is the most frequent admitting diagnosis in children hospitals result in 5-8 lost school days /yr/child [1.]

Asthma defined as reversible airway obstruction due to hyper- reactivity of the airway [1]. It's the most common chronic disease in childhood. Both small (<2mm) and large (>2mm)

Airways involved to varying degree in this hyper reactivity. [2.]

The prevalence, morbidity and mortality of asthma have increased during the last two decades, without specific causes [3].

Airway obstruction in asthma is due to bronchoconstruction, hypersecretion of mucous and mucosal edema due to inflammatory cells. Various allergic and non-specific stimuli and wide variation of factors can cause bronchoconstriction leading to asthmatic attack [4].

Magnesium is the second most abundant intracellular cation. It is

**[1]Chief of Iraqi committee of Medical specialization of Pediatrics**
**[2]Dep.Pediatrics of medical college/Al-Nahrain University.**
**[3]Dept.of chemistry & biochemistry ,college of Medicine,Al-Nahrain University.**
**Address Correspondence to Dr. Hussam M. Al-Alwany**
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Essential for the activity of many enzymes including the phosphotransferases. Bone contains about 50% of the body magnesium; small proportion of the body·s content is in the ECF(extracellular fluid ) [5].

Magnesium found in significant amount in gastric & biliary secretions. Factors concerned with the control of Mg absorption have not been defined, but may involve active transport across intestinal mucosa by a process involving vitamin D. Renal conservation of Mg is at least partly controlled by PTH & aldosteron [6].

Assessed by clinical criteria (mild, moderate and severe) and supported by

The Serum level of Mg in asthmatics is the focus of this study which is an interesting issue.

**Aim**

To measure the serum level of magnesium in asthmatics & compare it to controls & to see if any change of serum level with severity of their disease.

**Patients and Methods**

A total number of 50 asthmatic children were subjected to a prospective study regarding the severity of their asthma, which was spirometry measurement of $FEV^1$ taken by portable spirometer (table 1).

**Severity of Asthma attacks(1)**

| Parameters | Mild | Moderate | Severe | Respiratory arrest imminent |
|---|---|---|---|---|
| Talking alertness | Sentences, may be agitated | Phrases, usually agitated | Words, usually agitated | Drowsy or confuse |
| Respiratory rate | Increased | Increased | Mark increase | Parodoxical |
| Accessory muscle | Usually not | Usually | Usually | Paradoxical thoraco-abdo movement |
| Wheeze | Moderate, often only end expiratory | Loud | Usually Loud | Absence of wheeze |
| Pulse / min | <100 | 100-200 | >120 | Bradycardia |
| PEF* | over 80% | 60-80% | <60% | |

***PEF: peek expiratory flow rate**

A sample of blood was collected from each patient & control in non- heprenized test tube & serum taken after centrifugation.

The principle of test is that Mg ions react with calmagite in alkaline medium to produce a red complex that is measured photometrically at 532 nm . The intensity of color produced is directly proportional to magnesium concentration. Calcium interference is virtually eliminated by EGTA.

The procedure is summarized in table (2).

**Table (2)**

| | Blank | Calibrator | Sample |
|---|---|---|---|
| **Doubledist.water** | 10 µl | -------- | ---------- |
| **Calibrator** | --------- | 10 µl | --------- |
| **Sample** | --------- | --------- | 10 µl |
| **Color reagentR1** | 500 µl | 500 µl | 500 µl |
| **AlkalinereagentR2** | 500 µl | 500 µl | 500 µl |

Mix & incubate for one minute at 37C or 5 minutes at 20-25 c
Read absorbance (A) against reagent blank. The final color is stable for at least one hour

Calculation of Mg concentration = A sample /A calibrator * concent.calib

**Results**

The mean serum magnesium concentration of asthmatic patient is 2.6 mg/dl while that of control group is 3.7 mg/dl (p value < 0.01).

No significant correlation between the severity of asthmatic attacks & serum level of magnesium.

**Discussion**

Many studies suggest the change in serum level of magnesium in hyper reactive airway diseases.

Zervas E., shows that there is 20% decrease in serum Mg & response to nebulized Mg [7].

Alamoudi,O.S., declares that hypomagnesaemia is common in chronic asthmatics. Chronic asthmatics with low Mg tend to have more hospitalizations than chronic asthmatics with normal Mg.Hypomagnesaemia was also associated with more severe asthma [8] .

Hashimoto& colleagues show that 40% of asthmatic patients demonstrated magnesium deficiency, and that the low magnesium

Concentration in erythrocytes reflects decreased magnesium stores in patients with bronchial asthma [9.]

Other studies show that there is normal serum level of Mg in asthma. e.g.

Kakish,K.S., shows that serum magnesium levels in asthmatic children during acute attacks and between exacerbations are not significantly different from those of controls.[10]

Vural & collegues show that No changes were found in serum magnesium and iron levels in patients with asthma as compared to controls [11].

Zervas & colleagues present that the acute asthma is associated with lower erythrocyte Mg content while plasma levels remain unchanged. This decrease in intracellular Mg content occurs regardless of the severity of the exacerbation and returns to normal values after control has been achieved[12].

**Conclusion**

The serum level of magnesium in asthmatics is lower than other children .No significant correlation of magnesium level to severity of attacks.

**Recommendations**

- Measurement of serum magnesium level can be added to usual investigations of asthmatic children.
-Magnesium can be used in management of asthmatic attacks because of low level of serum magnesium.
-Measurement of intracellular magnesium can help in asthmatic patients.

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