

## A Review on Clinical Uses of Magnesium

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Submitted: 15-04-2024

Accepted: 25-04-2024

### ABSTRACT: -

Magnesium is a cofactor for more than 300 cell different enzymatic processes, and therefore plays role virtually every process in cell, including cellular process in energy production, neuromuscular and cardiac function, maintaining ionic gradients regulation of cell membrane receptors and DNA, RNA and protein synthesis. It is also an essential component for DNA and DNA on the cellular level as well as bones & teeth.

The organic magnesium formulations, such as Citrate have been shown to be slightly better absorbed the organic Ones, but many clinical trials have used inorganic formulations of magnesium. In clinical practice, optimizing magnesium status through diet and supplementation appears to be a safe, useful and well-documented therapy for several medical conditions.

The magnesium has been reported as effective medical therapy in an expanding array of Conditions. Evidence investigating magnesium's use is presented with a number of studies suggesting it should be seriously considered in such conditions. As Ischemic heart disease, cardiac arrhythmias, and asthma.

### I. INTRODUCTION: -

According to currently experiencing two medical literatures, we are concomitant phenomena.

1. A neglected epidemic of chronic disease
2. Widespread deficiency of selected nutrients.

Importance of magnesium and other elements for organism is discussed in programs for trainers in physiology, nutrition and dietetics the importance of acquiring the tools necessary for assessment.

The magnesium is the fourth most common mineral in the human body after calcium, sodium, potassium and is the second most common intercellular cation after potassium. Magnesium is involved as a cofactor in more than 300 enzyme system and is required for fundamental processes as energy production and nucleic acid Synthesis. Intracellular mg stores are found in high concentration mitochondria where this element

plays a pivotal role in synthesis of ATP from ADP and inorganic phosphate. Mg is bound to ATP from ADP in order to yield the bioactive form of ATP and it Is estimated that 3571 human proteins bind to Mg<sup>2+</sup>.The biologic half-life of mg in body is about 1000 hours, (42 days).

Magnesium is involved in hundreds of essential physiological processes and adequate levels are therefore vital for general health. Magnesium deficiency can arise from poor diet, malabsorption, kidney disease, alcoholism and drug interactions.

Good food sources include green leafy vegetables, wholegrains, nuts and seeds. Various dietary components, including certain types of fiber, phytates and oxalates can hinder absorption, which needs to be considered. Most common side effect of magnesium at high doses in diarrhea. Caution is advised in patients with kidney disease as renal excretion plays important part in magnesium homeostasis. Magnesium can also interact with number of pharmaceutical drugs.

### Functions: -

Magnesium is associated with maintaining or improving bone mineral density as a dietary component in combination with potassium, fruits, and vegetables or as an oral supplement one study suggested that adults 18 to 30 years of age with higher magnesium intake have a lower risk of developing metabolic syndrome.

Magnesium is an essential cofactor for various enzymes involved in glycolysis and Krebs cycle and mitochondrial magnesium also appears to play important part in regulating mitochondrial function. As such, magnesium is essential for cellular energy production. Magnesium acts as an antagonist to calcium, for example in neuromuscular and cardiac function and helps to maintain ionic gradients

### Deficiency: -

Magnesium deficiency can cause a wide variety of features including hypocalcemia, hypokalemia and cardiac and neurological manifestation chronic low magnesium state has

been associated with a number of chronic diseases including diabetes, hypertension, coronary heart disease and osteoporosis.

About 60% of magnesium is contained in the bones, another 30% in muscles Less than 1% of total body magnesium is extracellular i.e. serum or plasma, serum levels are maintained with a narrow range through homeostatic mechanism, mainly renal excretion /reabsorption and gastrointestinal absorption of magnesium can also be released from bones and muscles to maintain serum levels when intake is low.

**Food sources: -**

Magnesium is widely distributed in plant and animal foods and in beverages. Green leafy vegetables, such as spinach, legumes, nuts, seeds and whole grains, are good sources. In general foods containing dietary fiber provide magnesium. Magnesium is also added to some breakfast Cereals and other fortified foods. Refined and highly processed foods tend to be depleted of magnesium.

Table no. 01- The foods contains magnesium

Food	Content of magnesium (Mg)
Spinach Boiled	78 mg
Cashews	74 mg
Peanuts	63 mg
Soy milk	61 mg
Whole wheat bread	46 mg
Avocado cubed	44 mg
Brown rice	42 mg
Milk	24 mg

**Supplements: -**

Taking magnesium supplements can treat and prevent magnesium deficiency. Magnesium deficiency can occur when people have liver disorders heart failure, Vomiting or diarrhea, kidney dysfunction, and other conditions. A pregnancy complication marked by high blood pressure and protein in the urine.

Magnesium is mostly absorbed via both saturable and non-saturable active transport pathways in small intestine, smaller amounts are absorbed in colon. Magnesium is absorbed as Mg<sup>2+</sup> ions. Absorption rates depend on magnesium status of person and are usually between 30% and 50% but can also be as high as 80% and low as 20%.

**Clinical uses: -**

Magnesium most commonly used for constipation as an antacid for heartburn for low magnesium levels, for pregnancy complications called pre-eclampsia and eclampsia and for certain type of irregular heartbeat. Magnesium helps to maintain a normal heart rhythm.

**Metabolic syndrome: -**

It refers to a cluster of signs and symptoms, including insulin resistance, obesity, abnormal blood lipids and hypertension, which increase the risk of developing CVD and diabetes – Epidemiological studies have shown consistently that metabolic syndrome is associated with low magnesium levels and that those with low intakes of magnesium are at increased risk of developing metabolic syndrome.

**Hypertension: –**

Magnesium is important for relaxation of the smooth muscles of vascular system as well as functions that are important in regulation of BP

**Atherosclerosis: -**

Magnesium deficiency can cause calcification of soft tissues and may promote progression of atherosclerosis.

**Osteoporosis: -**

Osteoporosis is characterized by a loss of is bone mass that leads to a weakening of the bone and an increased risk of fractures. Magnesium

forms a structural part of bones and bones also serve as reservoir of magnesium.

**Asthma: -**

Low magnesium levels have been reported in asthmatics but results from epidemiological studies are heterogeneous.

**Depression: -**

Two reviews and meta-analyses suggest an inverse relationship between magnesium levels or intake and risk of depression.

**Sleep: -**

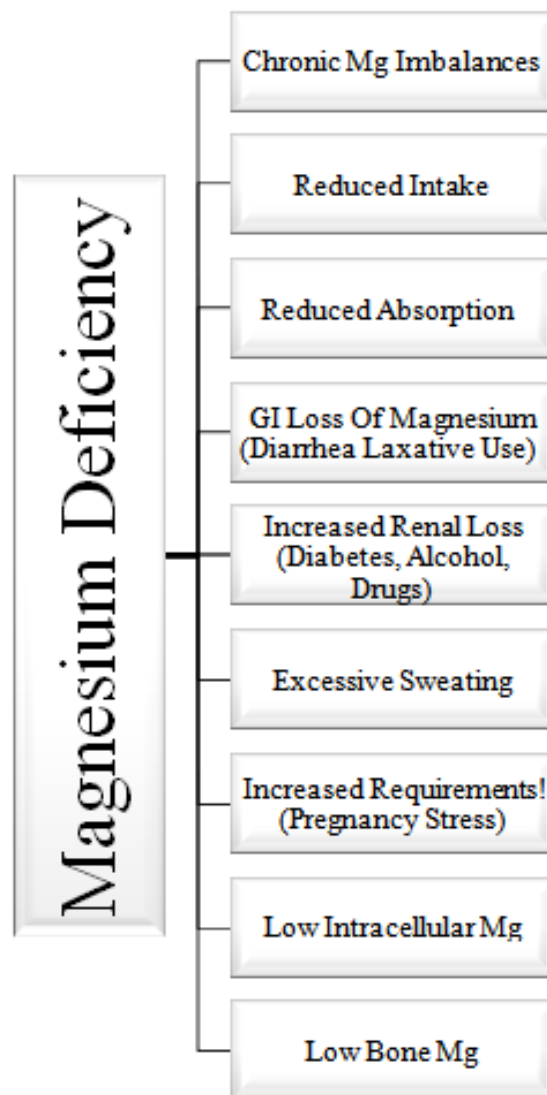
Lower intakes of magnesium are associated with shorter sleep time and magnesium appear to be involved in regulating circadian rhythms.

**Constipation: -**

Magnesium salts act as osmotic laxatives and are used for both bowel clearance in preparation for procedures such as colonoscopies and in the management of chronic constipation.

**Therapeutic uses of magnesium: -**

Magnesium has been reported as an effective medical therapy in an expanding array of conditions. Evidence investigating magnesium use I presented with a number of studies suggesting it should be seriously considered in such conditions as ischemic heart disease, cardiac arrhythmias and asthma. Magnesium is an essential mineral for optimal metabolic function.



**Advantages of Magnesium: -**

1. Magnesium is an essential mineral that powers many functions in our bodies.
2. Magnesium plays a crucial role in muscle function, the nervous system and energy production.
3. It also helps to maintain blood sugar and blood pressure.
4. Promotes healthy blood sugar regulation.
5. It may reduce stress and improve symptoms off anxiety and depression.
6. It helps to maintain healthy bones.
7. It may improve some headaches.
8. It supports healthy blood pressure level.
9. It may improve sleep.
10. Dosage.
11. Potential drug interaction.

1. Too much magnesium from foods isn't a concern for healthy adults. However, the same can't be said for supplements.
2. High doses of magnesium from supplements or medications can cause nausea, abdominal cramping and diarrhea.

**Dose recommendations: -**

Magnesium is essential for maintaining proper health. Low magnesium intake is relatively common.

It's found in people who follow a typical western diet, which contains processed foods and refined grains and can lack foods like leafy green. Vegetables and legumes which provide magnesium and other important nutrients.

The table below shows recommended daily intake of magnesium for adults, infants & children: -

**Disadvantages of magnesium: -**

Sr. no	Age	Male	Female
1	Birth to six months	30 mg	30 mg
2	7-12 months	75 mg	75 mg
3	1-3 years	80 mg	80 mg
4	4-8 years	130 mg	130 mg
5	9-13 years	240 mg	240 mg
6	14-18 years	410 mg	360 mg
7	19-30 years	400 mg	310 mg
8	31- 50 years	420 mg	320 mg
9	Above 51 years	420 mg	320 mg
<b>For pregnant women the requirement increased to 350-360 mg/day</b>			

**Safety: -**

The most Common side effects of excessive magnesium intake are gastrointestinal disturbances, in particular diarrhea. Hypomagnesemia, defined as a serum magnesium level above 2.6 mg/ dl is rare and is most commonly seen in patients with kidney disease caution is therefore advised for the use of magnesium supplements in patients with the kidney disease. Excessive use of magnesium usually as a laxative or antacid, can also cause. Hypermagnesemia at intakes over 2500 mg magnesium. Symptoms include weakness, hypotension respiratory depression and can lead to cardiac arrest Magnesium from food does not induce diarrhea or other side effects. The upper tolerable or limit of magnesium from supplements is based on the amount that does not induce diarrhea and is in addition to intakes from food.

**II. CONCLUSION: -**

Magnesium is an essential mineral, which plays crucial role in many cell functions. Its regular supply to the body from foods is mandatory for body functioning foods rich in magnesium includes leafy green vegetables, nuts, grain, and cereals.

Magnesium helps to maintain normal muscle and nerve function and keep the bones strong magnesium is also needed for the heart to function normally and to help regulate blood pressure. Magnesium also helps the body control blood sugar level and body's immune system.

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