

## Magnesium: How can we benefit?

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Magnesium is one of the important minerals that has multiple physiological roles. However, its role has not been valued and has remained one of the most underestimated micronutrient imbalance. This is one of the reason for its low intake, and being ignored by physicians and nutritionists. Magnesium is mostly found in intracellular spaces of the body, mainly in skeleton complexed with calcium and phosphorus and also in soft tissues, muscles, and other organs.<sup>1</sup> Magnesium is involved in a variety of biochemical and metabolic processes such as neuromuscular functions, bone deposition, energy storage etc. It also has role in the modification of intestinal microbiota and metabolism of different vitamins.<sup>1</sup> The promising role of Magnesium is its action as co-factor in many enzymatic process in the body and most prominently in ATP related reaction.<sup>2</sup> It acts as a metabolite at cellular level along with a signaling element. Magnesium is absorbed through gut and excretion is regulated via the kidneys.<sup>3</sup>

Recently, Magnesium has been widely studied in chronic diseases and many reports suggests the correlation of low level of magnesium with the aggravation of the chronic conditions. The most common and prevalent disorders reported to have association with low level of Mg are obesity, type 2 diabetes mellitus and metabolic syndrome (Ref). Recent review by Piuri et. al, 2021 highlights the pathophysiological mechanism that link magnesium deficiency with obesity, metabolic syndrome and development of diabetes 1 In addition, the clarity regarding its daily requirement (RDA) and normal blood level in adults is not well understood. This creates discrepancy of dosage requirements and duration of supplementation that can therapeutically improve the metabolic syndrome and obesity. Magnesium deficiency has been reported in individuals suffering from chronic kidney disease, deranged lipid profile, atherosclerosis<sup>4</sup> and dyslipidemia.<sup>5</sup> Deficiency of magnesium in chronic renal condition is attributed to its increased urinary excretion. Accumulated evidence suggests that a hypomagnesaemia state occurs among chronic alcoholics as well as NAFLD, and liver fibrosis.<sup>6</sup> A meta-analysis by Vanoni et al. showed that both ionized and total magnesium levels are markedly reduced with chronic alcohol use.<sup>6</sup> Similarly, the role of magnesium in many

conditions such as, cancers, musculoskeletal health, stress, and headache has been widely discussed in literature.

It is widely prescribed as supplement in Europe and USA in the elderly and subjects with chronic conditions such as diabetes, metabolic syndrome etc. Furthermore, it is available as over the counter

supplement and can help in many physiological functions and improve health. Despite the fact that the deficiency is frequent and associated with other micronutrient imbalance. Being a divalent cation its absorption may get affected in the presence of other divalent cations such as calcium and therefore caution needs to be taken when prescribing both minerals. There is no standard technique that can measure Magnesium levels in routine clinical set ups. Therefore, methods to measure the levels of the magnesium in the body are controversial; necessitating the need to identify a reliable, accurate, cost-effective and quick method. Zahn et al suggested that measurement of circulating ionized magnesium to be more sensitive than urinary magnesium.<sup>7</sup>

Due to the rise of many chronic conditions like diabetes, obesity and metabolic syndrome in Pakistan, it is suggested to design studies in our population to look for the normal levels in the healthy population along with the levels in these chronic conditions. This will identify the normal ranges and will further suggest the dosage and duration of the supplementation in the disease state, as is done for the levels of Ferritin and iron supplementation.

Dietary sources of magnesium include green leafy vegetables like spinach, nuts (almonds, cashew, peanut), fruits (bananas and avocados) and beans. The bioavailability of different formulations are discussed in literature along with the side effects of the drugs. In Pakistan, Trisil is most common antacid used for heartburn and has magnesium trisilicate in it. The magnesium content of Trisil is less than 200 mg per tablet, and so not ideal solution for magnesium deficiency. However, Trisil is used as a magnesium

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This Editorial may be Cited as, Habib HS. Magnesium: How can we benefit? Adv Basic Med Sci. 2023;7(1):01-02. DOI: <https://doi.org/10.35845/abms.2023.1.276>

supplement for masses due to its low cost. It is one of the cheapest formulation for a developing country like Pakistan and can be used in less severe cases of magnesium deficiency. The bioavailability might be low and in severe deficiency other formulation containing Magnesium oxide or gluconate are available in the market. Magnesium supplementation can help reduce the symptoms such as muscle cramps, reduction in BP, obesity etc. A large scale promotion of the health benefits of magnesium can help physician and nutritionist to benefit from the common supplementation. However, caution needs to be taken while prescribing it to subjects with impaired renal function, as it might lead to hypomagnesaemia and monitoring of magnesium levels is required.<sup>8</sup>

## REFERENCES

1. Piuri G, Zocchi M, Della Porta M, Ficara V, Manoni M, Zuccotti GV, Pinotti L, Maier JA, Cazzola R. Magnesium in Obesity, Metabolic Syndrome, and Type 2 Diabetes. *Nutrients*. 2021 Jan 22;13(2):320. doi: 10.3390/nu13020320. PMID: 33499378; PMCID: PMC7912442.
2. Bairoch A. The ENZYME database in 2000. *Nucleic Acids Res*. 2000 Jan 1;28(1):304-5. doi: 10.1093/nar/28.1.304. PMID: 10592255; PMCID: PMC102465.
3. Blaine J, Chonchol M, Levi M. Renal control of calcium, phosphate, and magnesium homeostasis. *Clin J Am Soc Nephrol*. 2015 Jul 7;10(7):1257-72. doi: 10.2215/CJN.09750913. Epub 2014 Oct 6. Erratum in: *Clin J Am Soc Nephrol*. 2015 Oct 7;10(10):1886-7. PMID: 25287933; PMCID: PMC4491294.
4. Cambray S, Ibarz M, Bermudez-Lopez M, Marti-Antonio M, Bozic M, Fernandez E, Valdivielso JM. Magnesium Levels Modify the Effect of Lipid Parameters on Carotid Intima Media Thickness. *Nutrients*. 2020 Aug 28;12(9):2631. doi: 10.3390/nu12092631. PMID: 32872319; PMCID: PMC7551902.
5. G man MA, Dobric EC, Cozma MA, Antonie NI, St nescu AMA, G man AM, Diaconu CC. Crosstalk of Magnesium and Serum Lipids in Dyslipidemia and Associated Disorders: A Systematic Review. *Nutrients*. 2021 Apr 22;13(5):1411. doi: 10.3390/nu13051411. PMID: 33922341; PMCID: PMC8146023.
6. Vanoni FO, Milani GP, Agostoni C, Treglia G, Faré PB, Camozzi P, Lava SAG, Bianchetti MG, Janett S. Magnesium Metabolism in Chronic Alcohol-Use Disorder: Meta-Analysis and Systematic Review. *Nutrients*. 2021 Jun 7;13(6):1959. doi: 10.3390/nu13061959. PMID: 34200366; PMCID: PMC8229336.
7. Zhan J, Wallace TC, Butts SJ, Cao S, Ansu V, Spence LA, Weaver CM, Gletsu-Miller N. Circulating Ionized Magnesium as a Measure of Supplement Bioavailability: Results from a Pilot Study for Randomized Clinical Trial. *Nutrients*. 2020 Apr 28;12(5):1245. doi: 10.3390/nu12051245. PMID: 32353962; PMCID: PMC7281967.
8. Van Laecke S, Van Biesen W. Hypomagnesaemia in kidney transplantation. *Transplant Rev (Orlando)*. 2015 Jul;29(3):154-60. doi:10.1016/j.trre. 2015.05.002. Epub 2015 May 7. PMID: 26001746.

### CONFLICT OF INTEREST

*Author declared no conflict of interest*

### GRANT SUPPORT & FINANCIAL DISCLOSURE

*Author declared no specific grant for this research from any funding agency in the public, commercial or non-profit sectors*

### Author Contribution

**SHH: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable**



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