

ADHD PLUS MINUS TREATMENT PLAN

+ MAGNESIUM

Dr. James Greenblatt, MD

The plan below is part of a guide for practitioners to add elements (+) or remove them (-) from the patient's environment or lifestyle as treatment for ADHD symptoms. Biochemical individuality will determine the most important elements for each patient.

MAGNESIUM MECHANISM

Magnesium levels

Magnesium (Mg) is necessary for over 300 reactions in the body, including the production and modulation of neurotransmitters in the central nervous system. This essential mineral has been shown to exhibit antidepressant- and antianxiety-like effects that involve the serotonergic, dopaminergic, and noradrenergic systems (Cardoso et al., 2009).

In animal studies, Mg has been shown to activate tyrosine hydroxylase, the rate-limiting step in dopamine synthesis. Mg also binds serotonin and dopamine to their receptors, and resultantly has strong impacts on learning, behavior, and memory functions (Villagomez et. al., 2014; Mousain-Bosc et al., 2011).

Mg is a vital mineral for mental health, but unfortunately, it is also a common deficiency. Mg levels in the body are depleted by sweat, stress, chronic disease, several medications, decreased availability in soil and in food, and loss in food processing (DiNicolantonio et al., 2018).

Magnesium and ADHD

A recent meta-analysis showed that patients with ADHD have even lower levels of magnesium than the average population (Effatpanah et al., 2019). One study found low intracellular magnesium levels in 95% of the population of children with ADHD (n=116) (Kozielec et al., 1997). While some studies look at serum levels, intracellular (RBC) and tissue (hair) Mg levels may be more strongly associated with changes in neural transmission, behaviour and attention (Mousain-Bosc et al., 2011; Villagomez et. al., 2014; Baza et. al., 2016).

Effect of Magnesium Supplementation in ADHD

Several studies have demonstrated benefit from supplementing Mg in patients with ADHD, including reduction of hyperactivity, inattention, perseveration, and repetitive and oppositional behaviour, as well as improvements in executive function and task performance. In fact, some researchers have concluded that Mg supplementation could become a required treatment for patients with ADHD (Baza et al., 2016; Mousain-bosc, 2006; Kozielec et. al., 1997, Starobrat-Hermelin et. al., 1997).

Mg supplementation also improves sleep and regularity of bowels when a patient is constipated, both important functions for behavioural and mood regulation in children (Mousain-Bosc et al., 2011; Koppen et. al., 2015).

Augment with Vitamin B6

It is proposed that vitamin B6 increases absorption and cellular uptake of Mg and may improve efficacy of Mg as a treatment (Pouteau et. al., 2018). In children with autism, combination B6 + Mg has been shown to reduce symptoms more effectively than either vitamin B6 or Mg alone (Martineau et. al., 1985). In children with ADHD, two further studies have shown combination B6 + Mg to be an effective treatment combination (Nogovitsina et. al., 2007; Mousain-Bosc et. al., 2004).

Magnesium and ADHD stimulant medications

Even more unfortunate is the fact that many of the stimulant medications used to treat ADHD actually deplete the body of Mg even further, potentially worsening symptoms. This leaching may cause some adverse reactions to stimulant medications, such as worsening sleep, and increased agitation and anxiety. Repleting Mg status may be protective against adverse reactions. Trials in mice show supplementation in Mg-deficient subjects decreases adverse psychomotor reactions to medications, including clonidine, D-amphetamine, and 5HTP (Iezhitsa et. al., 2011).

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TEST

Most Mg is sequestered in cells and bones, so normal plasma levels may not reflect true Mg status. RBC Mg is more accurate, but hair mineral testing seems to be the most strongly correlated with symptoms (Baza et. al., 2016), and can show information about other important minerals like lithium and copper.

TREAT

Mg (bis)glycinate (eg. Natural Calm by Natural Vitality company)

Age 13+: 200mg bid

Age 10-12: 100mg bid

Age 6-9: 50mg bid

Under 6: microdoses of 10mg daily, liquid form, Liquid Ionic Magnesium by New Beginnings

*Mg Oxide is poorly absorbed- avoid this form.

Augment with adding B6

Age 13+: 50mg qd B6

Age 7-12: 25mg qd B6

You may increase mg-rich foods: dark chocolate, nuts, whole grains, beans, green leafy vegetables, but taking a Mg supplement is the only way magnesium can protect against medication side effects.

Take note the time required for Mg to work: it can take up to 3 months to replete intracellular magnesium levels and have an affect on ADHD symptoms, although sleep and constipation concerns may be alleviated sooner.

INDICATIONS AND CAUTION

Consider if patient is on a stimulant medication, experiencing side effects from stimulant medication, or is sleeping poorly, anxious, or constipated.

Magnesium supplementation is generally safe. Use caution with patients with loose stools as it can cause diarrhea as the only commonly reported adverse event. At very high dosages (beyond supplementation levels suggested here), Mg has been reported to cause serious digestive concerns (IOM Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, 1997).

SOURCES

1. Cardoso et. al., (2009). Progress in neuropsychopharmacology and biological psychiatry, 33(2), 235-242.
2. Villagomez et. al., (2014). Children, 1(3), 261-279
3. Mousain-Bosc et al., (2011). In: R. Vink and M. Nechifor, ed., Magnesium in the Central Nervous System. [online book] Adelaide: University of Adelaide Press.
4. DiNicolantonio et. al., (2018). Open heart, 5(1), e000668.
5. Effatpanah et. al., (2019). Psychiatry research. Apr; 274:228-234
6. Kozielec et. al., (1997). Magnesium research, 10(2), 143-148
7. Starobrat-Hermelin et. al., (1997). Magnesium research, 10(2), 149-156
8. Baza et. al., (2016). Egyptian Journal Of Medical Human Genetics, 17(1), 63-70
9. Mousain-Bosc et. al., (2006). Magnesium research, 19(1), 46-52
10. Koppen et. al., (2015). Pediatric Drugs, 17(5), 349-360
11. Pouteau et. al., (2018). PloS one, 13(12)
12. Martineau et al., (1985). Biological Psychiatry, 20(5), 467-478
13. Nogovitsina et. al., (2007). Neuroscience and behavioral physiology, 37(3), 199-202
14. Mousain-Bosc et. al., (2004). Journal of the American College of Nutrition, 23(5), 545S-548S
15. Iezhitsa et. al., (2011). Nutritional neuroscience, 14(1), 10-24
16. Institute of Medicine (IOM) (US) Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. (1997). Dietary reference intakes for calcium, phosphorus, magnesium, vitamin D, and fluoride. National Academies Press.