

## Is vitamin D deficiency associated with attention deficit hyperactivity disorder?

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Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder that affects about 5% of our children. There are significant problems with executive functions (e.g., attentional control and inhibitory control) that cause attention deficits, hyperactivity or impulsiveness. One of the paradoxes of these children, who look like they are on speed, is that they calm down when given stimulants like Adderall, Ritalin or Vyvanse. For reasons that are not entirely clear, this condition has been dramatically increasing in prevalence over the last 30-40 years. Like autism, boys are affected much more often than girls.

When treating children with ADHD, I noticed they did much better during the summer. I was told this is due to the increased outdoor activities which allow children to get rid of their excess energy. I always doubted that explanation as the kids did plenty of running around in school in the winter.

The disorder is much less common in sunny areas, explaining about 40% of the variance.

Arns M, van der Heijden KB, Arnold LE, Kenemans JL. Geographic variation in the prevalence of attention-deficit/hyperactivity disorder: the sunny perspective. *Biol Psychiatry*. 2013 Oct 15;74(8):585-90.

An open label trial of bright light (not ultraviolet) found a significant treatment effect in adult ADHD, indicating a beneficial effect independent of vitamin D.

Rybak YE, McNeely HE, Mackenzie BE, Jain UR, Levitan RD. An open trial of light therapy in adult attention-deficit/hyperactivity disorder. *J Clin Psychiatry*. 2006 Oct;67(10):1527-35.

This month, the latest of four studies has discovered that children with ADHD have much lower serum vitamin D levels than healthy controls.

Sharif MR, Madani M, Tabatabaei F, Tabatabaee Z. The Relationship between Serum Vitamin D Level and Attention Deficit Hyperactivity Disorder. *Iran J Child Neurol*. 2015 Fall;9(4):48-53.

Shang-Guan LL, Zhao YR. Serum levels of 25-hydroxyvitamin D in children with attention deficit hyperactivity disorder]. *Zhongguo Dang Dai Er Ke Za Zhi*. 2015 Aug;17(8):837-40.

Goksugur SB, Tufan AE, Semiz M, Gunes C, Bekdas M, Tosun M, Demircioglu F. Vitamin D status in children with attention-deficit-hyperactivity disorder. *Pediatr Int*. 2014 Aug;56(4):515-9.

Vitamin D deficiency may be related to ADHD in children says new study.

In the latest study, Dr. Madani of the Kashan University of Medical Sciences and colleagues in Iran studied 74 children, half with ADHD and half without the condition. The mean serum vitamin D level of children with ADHD was significantly lower than control children with levels of 19 ng/ml and 29 ng/ml, respectively ( $P < 0.001$ ).

While it is easy to conclude that vitamin D is related to ADHD, it is important to note that vitamin D levels are markers of sun-exposure; so it is possible that a non-vitamin D factor in sunshine is the link with this condition. This study leaves me with a possible explanation as to why those kids with ADHD improved so much in the summer.

During the fall and winter, when sunlight is not plentiful, we recommend giving your kids with ADHD 50 IU/pound of vitamin D3.