The Role of Nutrition in ADHD

Attention deficit hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders of childhood. Depending on the presentation of symptoms, patients may be diagnosed with three different types of ADHD: primarily inattentive, primarily hyperactive-impulsive, and combined.

Approximately 8.7% of US children were estimated to have a current diagnosis of ADHD, with males being diagnosed about twice as often as females. Although ADHD is diagnosed at an average age of about 6 years, ADHD symptoms—particularly those related to inattention—can continue into adolescence and adulthood.

Common psychiatric comorbidities of ADHD include depression, anxiety disorders, bipolar disorder, oppositional defiant disorder, eating disorders, and substance abuse disorders. ADHD can cause problems in social and academic functioning and may increase the risk of multiple health conditions, including obesity, hypertension, and diabetes.

Nutrition has long been of interest in the management of ADHD. Some studies have found that patients with ADHD have lower quality diets or lower blood levels of nutrients compared with those without the disorder.

Nutrient Levels in ADHD: Some studies have noted lower levels of nutrients in participants with ADHD compared with controls, including reduced blood levels of vitamin B complex, iron and ferritin and hemoglobin, lower levels of zinc, magnesium, and vitamin D, and decreased levels of omega-3 fatty acids, particularly DHA. Several nutrients, some of which have been found to be altered in ADHD, are involved in brain function. B vitamins, especially vitamins B6, B9, and B12, are involved in neurotransmitter production, as are iron and zinc.

Due to the associations between lower nutrient levels and ADHD or concerns about using medications, many families are interested in alternative or complementary treatments, including vitamins and minerals, essential fatty acids, and particularly omega-3 fatty acids, and probiotics.

Micronutrient: Several trials in children with ADHD have found that multiple-nutrient supplements, including varying combinations of vitamins and minerals have significantly improved symptoms over placebo.

One trial in New Zealand, in which 80 adults with ADHD were given either a broad-spectrum multivitamin and mineral formula or a placebo, found that the treatment significantly improved self and observer ratings of symptoms and significantly increased blood levels of vitamin D, vitamin B12, and folic acid.

In a review of three small RCTs providing vitamin D to children with ADHD in addition to the stimulant methylphenidate, all found significantly improved symptoms, by parent ratings, with vitamin D over placebo.

Essential Fatty Acid and Phospholipid Supplements: Some individuals with ADHD have been found having lower levels of omega-3 fatty acids or higher omega-6 to omega-3 fatty acid ratios. Omega-3 fatty acids are critical in brain development and function; DHA, in particular, has been found to have a role in neural transmission and in the function of dopamine, a neurotransmitter involved in ADHD symptoms. Omega-3 fatty acids also have anti-inflammatory and antioxidant effects; increased omega-3 levels have been found to reduce oxidative stress, which may be higher in ADHD, whereas a higher omega-6 to omega-3 fatty acid ratio may promote neuroinflammation.

Multiple studies have found significant improvement in the ADHD symptoms of youth given omega-3 fatty acid supplements. Certain attributes of the studies with positive effects were identified, including providing both EPA and DHA for a period of at least 15 weeks. A meta-analysis of eight RCTs using doses varying from 2.7 to 640 mg of DHA and 80 to 650 mg of EPA found that the supplements improved ratings of both inattentive and overall ADHD symptoms and some cognitive measures.

In one small RCT, 100 mg of phosphatidylserine alone was given to children with ADHD for eight weeks, and the children's symptoms improved over placebo.

The Microbiome and ADHD: Some researchers have suggested that the apparent link between ADHD and diet is mediated through the gut microbiome, including food sensitivities. Disturbance of the microbiome in early life can impact neurodevelopment, and there's evidence that the microbiome influences neurotransmitter function, supporting a connection between the gut microbiome and neuropsychological disorders such as ADHD.