

William Ballard, MD;
Mary N. Hall, MD

Carolinas Healthcare System,
Charlotte, NC

Leonora Kaufmann, MLS

Carolinas Healthcare System,
Charlotte, NC

> The quality of studies of diet and ADHD is limited by small sample sizes, subjective outcome measures, and nonstandardized intervention protocols.

Q / Do dietary interventions improve ADHD symptoms in children?

EVIDENCE-BASED ANSWER

A / **PROBABLY NOT**, based on available data. Insufficient evidence exists to suggest that dietary interventions improve the symptoms of attention deficit hyperactivity disorder (ADHD) in children (strength of recommendation: **B**, extrapolation from

randomized controlled trials [RCTs]). Interventions that have been investigated include removal of sugar and artificial food colorings from the diet and supplementation with fatty acids.

Evidence summary

ADHD affects 7% to 8% of school-age children, and the prevalence is increasing.¹ The quality of studies investigating the link between diet and ADHD is limited by small sample sizes, subjective outcome measures, and nonstandardized intervention protocols.

Elimination diets show little or no effect

Studies of elimination diets for ADHD have investigated the effects of withholding sugar and artificial food colorings (AFCs).

■ **Sugar.** A 1995 meta-analysis of 16 double-blind, randomized, placebo-controlled trials evaluated the effect of dietary sugar in the form of sucrose, glucose, and fructose on behavior or cognition of children. Outcomes included subjective measurements from teachers, parents, and researchers, as well as objective scoring of activities.

No significant differences in the summary effect size were noted for any measured variable. A weakness of the analysis was that not all of the trials studied children who had been specifically diagnosed with ADHD.²

■ **AFCs.** A 2004 meta-analysis of 15 double-blind, placebo-controlled trials (total 219 children) evaluated the effect of AFCs on

hyperactivity. Outcomes were measured by behavioral rating scales that ranged from standardized forms such as the Conners Parent-Teacher Questionnaire (12 trials) to non-validated author-developed scales (3 trials). Analysis revealed a small summary effect size (0.283; 95% confidence interval, 0.079-0.488), and the authors concluded that AFCs do have a small effect on hyperactivity.³

A secondary analysis of children who previously showed worsening of hyperactivity with AFCs (either by parental report or in an earlier study) found a larger effect size (0.53). This finding implies that a subset of children whose parents notice an increase in hyperactivity with AFCs may benefit from exclusion. However, because the quality of the meta-analysis is limited by the heterogeneity of the studies, publication bias, unvalidated outcome measures, and variety of diagnoses in the participants, no recommendation can be made for AFC exclusion diets.³

Supplementation with fatty acids doesn't improve symptoms

Because polyunsaturated fatty acids (PUFAs) are essential for brain development and function, a deficiency theoretically may contribute

to a range of developmental disorders, including ADHD. An RCT of 63 children 6 to 12 years of age with ADHD randomly assigned the children to supplementation with the most abundant PUFA, docosahexanoic (DHA), or placebo for 4 months. Measured outcomes included objective attention evaluation by computer and written tests and standardized objective measures such as the Conners Rating Scales.⁴ The study found no significant improvement in any ADHD symptom.⁴

The findings of this trial were confirmed by another double-blinded RCT of 40 children with ADHD who were randomized to DHA or placebo. The second trial found no significant differences in ADHD symptoms after 2 months.⁵

Recommendations

The American Academy of Pediatrics states that there is a need for well-designed, rigorous studies of currently promoted but less well-established therapies for ADHD, such as occupational therapy, biofeedback, herbs, vitamins, and food supplements. These interventions aren't supported by evidence-based studies at present.⁶

The American Academy of Child and Adolescent Psychiatry's guidelines on managing ADHD don't mention dietary interventions.⁷

Investigators from the Cincinnati Children's Hospital report that elimination diets and food supplements have little or no quality evidence to support their effectiveness.⁸ **JFP**

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Available data show no effect from sugar withdrawal and only small effects from elimination of artificial food colorings.

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