Diet and ADHD, Reviewing the Evidence: A Systematic Review of Meta-Analyses of Double-Blind Placebo-Controlled Trials Evaluating the Efficacy of Diet Interventions on the Behavior of Children with ADHD.

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Abstract

INTRODUCTION:
Attention-deficit/hyperactivity disorder (ADHD) is a debilitating mental health problem hampering the child's development. The underlying causes include both genetic and environmental factors and may differ between individuals. The efficacy of diet treatments in ADHD was recently evaluated in three reviews, reporting divergent and confusing conclusions based on heterogeneous studies and subjects. To address this inconsistency, we conducted a systematic review of meta-analyses of double-blind placebo-controlled trials evaluating the effect of diet interventions (elimination and supplementation) on ADHD.

METHODS:
Our literature search resulted in 14 meta-analyses, six of which confined to double-blind placebo-controlled trials applying homogeneous diet interventions, i.e. artificial food color (AFC) elimination, a few-foods diet (FFD) and poly-unsaturated fatty acid (PUFA) supplementation. Effect sizes (ES) and Confidence intervals (CI) of study outcomes were depicted in a forest plot. I2 was calculated to assess heterogeneity if necessary and additional random effects subgroup meta-regression was conducted if substantial heterogeneity was present.

RESULTS:
The AFC ESs were 0.44 (95% CI: 0.16-0.72, I2 = 11%) and 0.21 (95% CI: -0.02-0.43, I2 = 68%) [parent ratings], 0.08 (95% CI: -0.07-0.24, I2 = 0%) [teacher ratings] and 0.11 (95% CI: -0.13-0.34, I2 = 12%) [observer ratings].
The FFD ESs were 0.80 (95% CI: 0.41-1.19, I2 = 61%) [parent ratings] and 0.51 (95% CI: -0.02-1.04, I2 = 72%) [other ratings], while the PUFA ESs were 0.17 (95% CI: -0.03-0.38, I2 = 38%) [parent ratings], -0.05 (95% CI: -0.27-0.18, I2 = 0%) [teacher ratings] and 0.16 (95% CI: 0.01-0.31, I2 = 0%) [parent and teacher ratings]. Three meta-analyses (two FFD and one AFC) resulted in high I2 without presenting subgroup results. The FFD meta-analyses provided sufficient data to perform subgroup analyses on intervention type, resulting in a decrease of heterogeneity to 0% (diet design) and 37.8% (challenge design).

CONCLUSION:
Considering the small average ESs PUFA supplementation is unlikely to provide a tangible contribution to ADHD treatment, while further research is required for AFC elimination before advising this intervention as ADHD treatment. The average FFD ES is substantial, offering treatment opportunities in subgroups of children with ADHD not responding to or too young for medication. Further FFD research should focus on establishing the underlying mechanisms of food (e.g. incrimination of gut microbiota) to simplify the FFD approach in children with ADHD.