

Therapeutics

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Artificial food colour exclusion and free fatty acid supplementation may reduce symptom severity in children with ADHD

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QUESTION

Question: Are dietary and pharmacological interventions effective for the treatment of attention deficit hyperactivity disorder (ADHD)?

Outcomes: Post-treatment change from baseline in total ADHD symptom severity as measured by ADHD-specific symptom scales (eg, the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) ADHD subscale of Conner's Parent and Teacher Rating Scales) or if this was not available, questionnaire measures of ADHD-related dimensions (eg, inattention on Rutter parents' and teachers' scales) or direct observations.

METHODS

Design: Systematic review and meta-analysis.

Data sources: Science Citation Index Expanded; Social Sciences Citation Index; Arts and Humanities Citation Index; Conference Proceedings Citation Index-Science and -Social Sciences and Humanities; Index Chemicus; Current Chemical Reactions; Current Contents Connect; Derwent Innovations Index; Biological Abstracts; BIOSIS Previews; CAB Abstracts and Global Health; Food Science and Technology Abstracts; Inspec; MEDLINE; Zoological Record; Ovid MEDLINE; PsycINFO; EMBASE; Web of Science; ERIC and CINAHL; searched from inception to April 2012. Articles were eligible if published in peer-reviewed journals. Search was supplemented by hand search of published reviews.

Study selection and analysis: Randomised controlled trials (RCTs) (including counterbalanced crossover designs) including children and adolescents (aged 3–18 years) with a diagnosis of ADHD of any subtype (DSM defined ADHD or International Classification of Diseases (ICD) defined hyperkinetic disorder, including historic variants) or who met symptom criteria on validated ADHD rating scales, which compared a non-pharmacological intervention with control (sham/placebo, attention/active control, waitlist control or treatment as usual). Eligible non-pharmacological interventions included three dietary approaches (restricted elimination diets, artificial food colour exclusions, or free fatty acid

supplementation) or three psychological interventions (cognitive training incorporating adaptive schedules, neurofeedback using the visualisation of brain activity to teach attention and impulse control, or behavioural interventions employing learning principles to target ADHD-related behaviours directly with the child or indirectly via an adult). Two analyses were conducted: the *most proximal assessment* used the outcome measure reported by the rater (ie, parent or teacher) closest to the therapeutic setting regardless of blinding status. The second was restricted to assessments where the rater was *probably blinded* to treatment allocation. Standardised mean differences (SMD) were pooled using the random effects model and heterogeneity assessed using the I^2 statistic.

MAIN RESULTS

Fifty-four eligible RCTs with sufficient statistical data were identified: 7 trials of restricted elimination diets, 8 of artificial food colour exclusions, 11 of free fatty acid supplementation, 6 of cognitive training, 8 of neurofeedback and 15 behavioural intervention trials. In the first analysis based on the most proximal assessment, all dietary interventions and psychological interventions were significantly more effective than control (SMD ranging from 0.21 to 0.48 for dietary interventions and 0.40 to 0.64 for psychological interventions). However, in the second analysis based on blinded assessments, only artificial food colour exclusion (SMD 0.42), free fatty acid supplementation (SMD 0.16) and provided statistically significant improvement compared to control (see Webextra Table for most proximal and blinded assessments for individual assessments).

CONCLUSIONS

Artificial food colour exclusion, and to a lesser extent free fatty acid supplementation, significantly reduce symptom severity in ADHD, although the clinical significance of these results has not been determined.

ABSTRACTED FROM

Sonuga-Barke EJ, Brandeis D, Cortese S, et al. European ADHD Guidelines Group. Nonpharmacological interventions for ADHD: systematic review and meta-analysis of randomized controlled trials of dietary and psychological treatments. *Am J Psychiatry* 2013;170:275–89.

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The extensive review by Sonuga-Barke and colleagues is a systematic review and meta-analysis of randomised controlled trials of dietary and psychological treatments for attention deficit hyperactivity disorder (ADHD). This study has employed a rigorous selection of high-quality data trials ($n=59$) from over 2904 studies. The trials are categorised into restrictive elimination diet ($n=7$), artificial food colour exclusion ($n=8$), free fatty acid supplement ($n=11$), cognitive training ($n=6$), neurofeedback ($n=8$) and behaviour interventions ($n=15$). Categories with significant findings are artificial food colour exclusions and free fatty acids supplementation. However, the magnitude of difference is small. Therefore, although there may be isolated patients

who benefit, the likelihood of substantial benefit is mildly clinically relevant.

This review contributes to the body of literature raising questions about the utility of these forms of treatment for ADHD. Although many initial positive trials capture media coverage giving the impression of benefit,¹ replicated studies often refute or attenuate the initial findings. Unfortunately, the follow-up negative studies do not capture the same media coverage, thus, leaving clinicians and the general public with an inaccurate understanding of effective treatments. Publications that review all available controlled trials with this scientific rigour give a more accurate reflection of the limitations of these treatments.

Studies of this nature serve to appraise and update physicians in considering dietary and psychotherapeutic

treatments for ADHD. Such information helps the physicians better educate patients about evaluating the efficacy of treatment options. Non-traditional treatments are sought out by 44% of patients who often do not inform their physician.² Such treatment pursuits increase the overall cost of care and delay time to utilising proven effective and safe treatments. The strength of this review's findings ought to instill confidence in physician when recommending effective treatments and discouraging ineffective 'treatments.'

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Competing interests None.

COMMENTARY