Effect of a 12-month micronutrient intervention on learning and memory in well-nourished and marginally nourished school-aged children: 2 parallel, randomized, placebo-controlled studies in Australia and Indonesia

The NEMO Study Group

Background: Little is known about the combined effect of micronutrients and essential fatty acids on cognitive function in school-aged children.

Objective: We assessed the effect of micronutrients, long-chain n–3 fatty acids, or both on indicators of cognitive performance in well-nourished and marginally nourished school-aged children.

Design: Two 2-by-2 factorial randomized controlled double-blind trials were performed home-based in Adelaide, South Australia, and at 6 primary schools in Jakarta, Indonesia. A total of 396 children (aged 6-10 y) in Australia and 384 children in Indonesia were randomly allocated to receive a drink with a micronutrient mix (iron, zinc, folate, and vitamins A, B-6, B-12, and C), with docosahexanoic acid (DHA,88 mg/d) and eicosapentaenoic acid (EPA, 22 mg/d), or with both or placebo 6 d/wk for 12 mo. Biochemical indicators were determined at baseline and 12 mo. Cognitive performance was measured at baseline, 6 mo, and 12 mo.

Results: The micronutrient treatment significantly improved plasma micronutrient concentrations in Australian and Indonesian children. DHA+EPA treatment increased plasma DHA and total plasma n–3 fatty acids in both countries. The micronutrient treatment resulted in significant increases in scores on tests representing verbal learning and memory in Australia (estimated effect size: 0.23; 95% CI: 0.01, 0.46). A similar effect was observed among Indonesian girls (estimated effect size: 0.32; 95% CI: −0.01, 0.64). No effects were found on tests measuring general intelligence or attention. No effects of DHA+EPA on the factors of cognitive tests were observed.

Conclusion: In well-nourished school-aged children, fortification with multiple micronutrients can result in improvements in verbal learning and memory.

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