

Abstract

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Omega-3 fatty acid status in attention-deficit/hyperactivity disorder.

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BACKGROUND: Lower levels of long-chain polyunsaturated fatty acids, particularly omega-3 fatty acids, in blood have repeatedly been associated with a variety of behavioral disorders including attention-deficit/hyperactivity disorder (ADHD). The exact nature of this relationship is not yet clear.

OBJECTIVE: We have studied children with ADHD who exhibited skin and thirst symptoms classically associated with essential fatty acid (EFA) deficiency, altered plasma and red blood cell fatty acid profiles, and dietary intake patterns that do not differ significantly from controls. This led us to focus on a potential metabolic insufficiency as the cause for the altered fatty acid phenotype. Here we review previous work and present new data expanding our observations into the young adult population.

METHODS AND RESULTS: The frequency of thirst and skin symptoms was greater in newly diagnosed individuals with ADHD (n = 35) versus control individuals without behavioral problems (n = 112) drawn from the Purdue student population. A follow up case-control study with participants willing to provide a blood sample, a urine sample, a questionnaire about their general health, and dietary intake records was conducted with balancing based on gender, age, body mass index, smoking and ethnicity. A number of biochemical measures were analyzed including status markers for several nutrients and antioxidants, markers of oxidative stress, inflammation markers, and fatty acid profiles in the blood. The proportion of omega-3 fatty acids was found to be significantly lower in plasma phospholipids and erythrocytes in the ADHD group versus controls whereas saturated fatty acid proportions were higher. Intake of saturated fat was 30% higher in the ADHD group, but intake of all other nutrients was not different. Surprisingly, no evidence of elevated oxidative stress was found based on analysis of blood and urine samples. Indeed, serum ferritin, magnesium, and ascorbate concentrations were higher in the ADHD group, but iron, zinc, and vitamin B6 were not different.

CONCLUSIONS: Our brief survey of biochemical and nutritional parameters did not give us any insight into the etiology of lower omega-3 fatty acids, but considering the consistency of the observation in multiple ADHD populations continued research in this field is encouraged.

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