Antioxidant supplements improve biomarkers of oxidative stress and liver function in obese children and adolescents: a randomized controlled trial

Project: 427

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Background: Oxidative stress and inflammation may contribute to the early development of nonalcoholic fatty liver disease (NAFLD) in obese children. Increasing intake of dietary antioxidants might be beneficial, but there are few data from obese children, particularly those who have not yet developed symptomatic disease.

Objective: To determine the effect of antioxidant supplementation on biomarkers of oxidative stress, inflammation, liver function, and glucose and lipid metabolism.

Design: In a randomized, placebo-controlled study, 44 overweight or obese children and adolescents (mean age ± SD: 12.7 ± 1.5 y) participating in a lifestyle modification program were randomly assigned to a 4-mo intervention with daily antioxidants (vitamin E, 400 IU; vitamin C, 500 mg; selenium, 50 μg) or placebo. Anthropometrics, antioxidant status, oxidative stress (F_2-isoprostanes, F_2-isoprostane metabolites), inflammation, liver enzymes, fasting insulin and glucose, and lipid profile were measured at baseline and endpoint.

Results: Compared to placebo, treatment improved antioxidant status and reduced oxidative stress: there were significant increases in ascorbic acid, selenium, α-tocopherol, α-CEHC, γ-CEHC, and a significant decrease in 8-iso-$PGF_{2\alpha}$. Liver function tests improved with treatment, including a highly significant decrease in ALT. However, despite significant baseline correlations between oxidative stress and inflammation, treatment did not reduce markers of inflammation, and fasting insulin increased.

Conclusions: Combined supplementation with vitamin C, vitamin E, and selenium for 4-mo was well tolerated and improved liver function tests in obese children without established NAFLD. This beneficial effect suggests oxidative stress could play a role in the early etiology of NAFLD and that antioxidants could modulate progression towards NAFLD in obese children.