

Insulin Resistance and Adiposity in Relation to Serum β -Carotene Levels

Objective

To determine the effects of placebo vs an encapsulated supplement of fruit and vegetable juice concentrate (FVJC) on serum β -carotene levels, insulin resistance, adiposity, and subclinical inflammation in boys.

Study design

Thirty age-matched prepubertal boys (9 lean and 21 overweight (OW); age range, 6-10 years) were studied. All participants received nutrition counseling and were randomized to receive FVJC or placebo capsules for 6 months. Total cholesterol, triglycerides, lipid corrected β -carotene, serum retinol, glucose, insulin, retinol binding protein-4, leptin, adiponectin, leptin-to-adiponectin ratio, high-sensitivity C-reactive protein, and interleukin-6 were measured before and after the 6-month intervention. Homeostasis model assessment-insulin resistance (HOMA-IR), acute insulin response to intravenous glucose, along with abdominal fat mass (dual-energy x-ray absorptiometry) were also determined.

Results

Baseline β -carotene concentrations correlated inversely with HOMA-IR, leptin-to-adiponectin ratio, and abdominal fat mass ($P \leq .01$). FVJC intake increased β -carotene concentrations ($P \leq .001$) but did not influence retinol or retinol binding protein-4. Retinol insufficiency $<1.047 \mu\text{M}$ was present in 18% of the entire cohort at baseline and in 37% at 6 months. HOMA-IR decreased after supplementation in the OW cohort, when adjusted for percent weight change ($P = .014$). The percent change in abdominal fat mass increased in the placebo group and decreased in the FVJC group ($P = .029$).

Conclusions

A 6-month supplementation with FVJC in the presence of nutritional counseling was associated with an increase in serum β -carotene concentrations and a reduction in adiposity in conjunction with an improvement in insulin resistance in OW boys.

[AIR](#), [Acute insulin response](#), [BMI](#), [Body mass index](#), [FFQ](#), [Food frequency questionnaire](#), [FVJC](#), [Fruit and vegetable juice concentrate](#), [HDL](#), [High-density lipoprotein](#), [GDI](#), [Glucose disposal index](#), [HOMA-IR](#), [Homeostasis model assessment-insulin resistance](#), [HS-CRP](#), [High sensitivity C-reactive protein](#), [IR](#), [Insulin resistance](#), [IL-6](#), [Interleukin-6](#), [L/A](#), [Leptin-to-adiponectin ratio](#), [LC \$\beta\$ C](#), [Lipid corrected \$\beta\$ -carotene](#), [OW](#), [Overweight](#), [QUICKI](#), [Quantitative insulin sensitivity check index](#), [RBP4](#), [Retinol-binding protein-4](#), [SR](#), [Serum retinol](#)