

 NUTRITION

Breaking the fructose habit

In studies of the health effects of sugar consumption, caloric intake and obesity can obscure other mechanisms. Newly published results suggest sugar has harmful effects independent of caloric intake or weight gain, contributing to the unprecedented worldwide prevalence of the metabolic syndrome and type 2 diabetes mellitus, especially in children.

Fructose, which is commonly added to processed foods and soft drinks, is almost exclusively metabolized in the liver, leading to triglyceride synthesis, lipogenesis and formation of reactive oxygen species. Attempts to determine the contribution of these mechanisms to induction of the metabolic syndrome have failed to control for the caloric content of added dietary sugars.

This failing has been addressed by isocaloric substitution of starch for sugar, with dramatic results.

The new study involved 43 Hispanic or African-American children with obesity (mean age 13 years, BMI z-score 2.4), with high dietary consumption of sugar (mean 27.7% of daily calories), and comorbidities. Diets were modified for 9 days, maintaining macronutrient intake profiles and percentage of daily calories from carbohydrates, but reducing sugar to 10% and fructose to 4% of total calories. Participants reporting weight loss were encouraged to eat more.

Significant reductions from baseline were observed in diastolic blood pressure (-5 mmHg) and levels of lactate (-0.3 mM),

triglyceride (-46%) and LDL cholesterol (-0.3 mM), along with improvements in glucose tolerance and hyperinsulinaemia. Regression analyses suggested that fructose restriction, rather than weight loss, was responsible. Changes in biochemical parameters led to the hypothesis that the metabolic syndrome results from fructose-induced hepatic mitochondrial overload. The dangers of added dietary sugar should be increasingly apparent in the face of catastrophic levels of obesity and diabetes.

Robert Phillips

ORIGINAL ARTICLE Lustig, R. H. *et al.* Isocaloric fructose restriction and metabolic improvement in children with obesity and metabolic syndrome. *Obesity* <http://dx.doi.org/10.1002/oby.21371>