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File: ■ Yacon (*Smallanthus sonchifolius*)
■ Obesity
■ Insulin Resistance

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RE: Yacon Syrup Supplement Aids Weight Loss and Improves Health Parameters

Genta S, Cabrera W, Habib N, et al. Yacon syrup: beneficial effects on obesity and insulin resistance in humans. *Clin Nutr.* Apr 2009;28(2):182-187.

Yacon (*Smallanthus sonchifolius*) is an Andean plant cultivated for its tubers, which contain carbohydrates in the form of fructooligosaccharides (FOSs). FOSs are not hydrolyzed in the upper portion of the gastrointestinal tract and have a low caloric value. Yacon FOSs are a prebiotic soluble fiber fermented in the colon by beneficial bacteria, including *Bifidus* and *Lactobacillus* spp. FOSs have been shown to prevent and control constipation and to lower serum glucose and lipid levels. Yacon syrup made from yacon tubers contains approximately 41% FOSs. The purpose of this double-blind, placebo-controlled clinical trial was to study the tolerability and effects of yacon syrup on human health, using a model of obese pre-menopausal women with mild dyslipidemia.

Roots of yacon variety AMM5163 were obtained from the 2006 harvest at the International Potato Center in La Molina, Lima, Peru. A voucher specimen was deposited in the Center Collection and the syrup was produced at the Center's Processing Plant. The juice was extracted from yacon roots and concentrated. The resulting yacon syrup contained 41.4% FOSs and 25.7% free simple sugar. The authors enrolled 55 premenopausal women in the study, and 35 completed it with good compliance. The patients were aged 31-49 years with obesity, mild dyslipidemia, and a history of constipation. The study lasted 120 days and was conducted at the Hospital Angel C. Padilla in Tucuman, Argentina. The patients were randomized into 3 groups: group 1 took yacon syrup to add 20 g FOS/70 kg body weight/day (0.29 g FOS/kg body weight/day), group 2 took yacon syrup to add 10 g FOS/70 kg body weight/day (0.14 g FOS/kg body weight/day), and group 3 took the placebo syrup. The syrups were taken in 2 daily divided doses 1 hour before meals. The patients maintained a slightly hypocaloric diet comprised of 50% carbohydrates, 30% fat, 15% protein, and 10 g of dietary fiber per day. They avoided foods containing large amounts of FOSs and were instructed to walk for 45 minutes twice a week.

The 0.29 g FOS/kg body weight/day group experienced significant gastrointestinal adverse effects including diarrhea, severe abdominal distention, flatulence, and nausea

and therefore, was excluded from the analysis. The 0.14 g FOS/kg body weight/day group experienced no serious adverse effects. The FOS group experienced significant decreases compared to baseline in body weight, waist circumference, and body mass index (BMI, $P < 0.05$ for all), with no changes in the placebo group. The FOS group also reported increased satiety, though nutrient intake was not significantly different between groups. Frequency of defecation increased 3.5-fold (to 0.99 times daily) compared to baseline levels in the yacon group ($P < 0.05$). No significant effects on serum glucose levels were observed. At baseline, all of the subjects had abnormal homeostatic model of insulin resistance (HOMA-IR) values and elevated fasting insulin levels. The yacon syrup group showed significant decreases compared to baseline in insulin levels and HOMA-IR values ($P < 0.05$ for both), while the placebo group did not. No significant effects on high-density lipoprotein (HDL) cholesterol, triglycerides, or total cholesterol levels were observed. Low-density lipoprotein (LDL) cholesterol levels significantly decreased compared to baseline in the yacon group ($P < 0.05$), but not in the placebo group. Serum calcium levels increased compared to baseline levels in the yacon group ($P < 0.05$), but not in the placebo group.

The authors conclude, "a dose of yacon syrup of 0.14 g FOS/kg body weight/day is a safe and effective means of reducing the risk factors for the development of co-morbidities associated with type 2 diabetes." More research is needed to confirm these results and their mechanism of action. The mechanism of action may be modulated by the short chain fatty acid (SCFA) produced during FOS fermentation in the colon, or possibly by promotion of gastrointestinal peptide glucagon-like protein-1 (GLP-1) secretion. GLP-1 is associated with a delay in gastric emptying, decreased food intake, increased post-prandial insulin release, and suppression of glucagon secretion. More research is also needed to determine the effect of yacon syrup on calcium absorption and balance in women.

—*Marissa Oppel-Sutter, MS*

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