Important food sources of fructose-containing sugars and fasting serum uric acid levels: a systematic review and meta-analysis of controlled feeding trials

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Fructose as a source of excess calories increases uric acid. Whether this effect is mediated by the food matrix at different levels of energy is unknown. We aim to conduct a systematic review and meta-analysis of controlled feeding trials in people with and without or at risk for diabetes on the effect of food sources of fructose-containing sugars at different energy levels on uric acid (NCT02716870). MEDLINE, Embase and the Cochrane Library were searched through January 27, 2020 for controlled trials ≥7-days assessing the effect of food sources of fructose-containing sugars on uric acid. Trial designs were prespecified based on energy control: substitution (energy matched replacement of sugars by other macronutrients); addition (excess energy from sugars added to diets); subtraction (energy from sugars subtracted from diets); and ad libitum (energy from sugars freely replaced by other macronutrients) trials. Independent reviewers extracted data and assessed risk of bias. Certainty of evidence was assessed using the GRADE approach. Eligibility was met by 41 trials (72 trial comparisons, N=2,109) assessing the effect of 9 food sources (sugar-sweetened beverages [SSBs], sweetened dairy, fruit drink [lemonade], 100% fruit juice, fruit, dried fruit [raisins], baked goods desserts and sweets, added nutritive [caloric] sweetener and mixed sources) across the 4 energy levels. Total fructose-containing sugars increased uric acid in substitution trials (mean difference, 0.15 mg/dL [95% confidence interval, 0.03 to 0.27 mg/dL], p=0.012) with no effect in addition, subtraction or ad libitum trials. There was evidence of interaction by food source with SSBs and baked goods, desserts and sweets increasing uric acid in substitution and SSBs increasing and 100% fruit juice decreasing uric acid in addition trials. The overall certainty of evidence was moderate for the increasing effect of SSBs in substitution and addition trials and low to very low for all other comparisons. Food source more than energy control mediate the effect of fructose-containing sugars on uric acid. SSBs and baked goods, desserts and sweets appear to increase, and 100% fruit juice appear to decrease uric acid. More high-quality trials of different food sources of fructose-containing sugars are needed to improve our estimates. (Diabetes Canada [CS-5-15-4771-jS])