A dose-response study of consuming high-fructose corn syrup-sweetened beverages on lipid/lipoprotein risk factors for cardiovascular disease in young adults. Stanhope KL, Medici V, Bremer AA, Lee V, Lam HD, Nunez MV, Chen GX, Keim NL, Havel PJ. Am J Clin Nutr. 2015 Jun;101(6):1144-54. doi: 10.3945/ajcn.114.100461.

MAIN POINTS FROM THE STUDY:

- The aim of this study was to determine the dose-response effects of consuming beverages providing 0%, 10%, 17.5%, or 25% of energy requirements (Ereq) from HFCS on circulating concentrations of lipid/lipoprotein risk factors for cardiovascular disease (CVD) and uric acid in normal to overweight adults.

- This was a parallel-arm, double-blinded diet intervention study with 3 phases:
    - 1) a baseline period during which subjects consumed an isocaloric standardized baseline diet in a controlled setting (inpatient);
    - 2) a 12-d outpatient intervention period during which subjects consumed their assigned sweetened beverages along with their usual ad libitum diets (non-isocaloric); and
    - 3) an inpatient intervention period during which subjects consumed isocaloric standardized diets that included the sweetened beverages.

- Examining the difference in responses after 2 weeks, the authors concluded that "this study demonstrates for the first time that established risk factors for CVD, plasma concentrations of non–HDL cholesterol, LDL cholesterol, and apoB, increase in a dose-dependent manner in young adults consuming beverages providing 10%, 17.5%, or 25% Ereq from HFCS for 2 wk. The dose-dependent increases of these risk factors for CVD, which were shown to be statistically independent of body weight gain, provide mechanistic support for the recent epidemiologic findings that there is increased risk of CVD mortality with increased intake of added sugar across quintiles."

- Authors report a strength of the current study was the presence of a biomarker in the study beverages providing an objective measure of compliance. The 3.5-d inpatient periods during baseline and at the end of intervention ensured that the study results were not confounded by noncompliance or variations in diet or physical activity during the days immediately preceding the blood collection procedures, were an additional strength.

- The authors report that the study was not randomized increasing risk of bias and participants were given the study beverage in addition to an ad libitum diet throughout the 12-d outpatient period. Authors further state, this has been shown to result in an increase in total calories in previous studies and therefore it is not clear what the final responses actually measured (a few day or 2-week response to changes in HFCS beverage intake).

COMMENTS:

Please see ABA and CRA statements.

Sugar-sweetened beverages, vascular risk factors and events: a systematic literature review. Keller A, Heitmann BL, Olsen N. Public Health Nutr. 2015 May;18(7):1145-54. doi: 10.1017/S1368980014002122.

MAIN POINTS FROM THE STUDY:

- Researchers Keller, Heitmann and Olsen conducted a systematic review of literature and concluded that there is a relationship between SSB intake and vascular risk factors, and a less consistent relationship with vascular events (i.e., stroke, fatal and non-fatal myocardial infarction, vascular death).

- The evaluation of full-text articles resulted in the inclusion of ten prospective studies and one RCT in the review. The quality of these studies was assessed using the Academy of Nutrition and Dietetics' (US) Quality Criteria Checklist: Primary Search from the ADA Evidence Analysis Manual, and ranged from good to medium quality.

- Of the five identified prospective studies using vascular events as outcomes, two found direct associations between SSB consumption and CHD, one found an association between SSB consumption and combined vascular events, and the remaining two reported an association between SSB consumption and stroke. Six studies using vascular risk factors as outcomes found direct associations between baseline or change in SSB consumption and changes in blood pressure or lipid metabolism. However, one study only found a small direct association with diastolic blood pressure but not systolic blood pressure, while examining baseline SSB intake.

- The strength of the evidence was graded as 'fair' for the association between SSB and vascular risk factors, and as 'limited to fair' for the association between SSB and vascular events as well as for diabetes, hypertension, BMI and energy intake as mediators.

- The authors concluded that strength of the evidence relating SSB and CVD is still limited, and warrants further study. The articles reviewed "generally showed discrepant results for the association between SSB intake and vascular events, while the evidence for an association between SSB and vascular risk factors was stronger".

COMMENTS:

- This review included only published articles, which presents the possibility of publication bias, in which studies showing an association between the variables in question are favored. It is possible that the positive associations shown may have been limited, had the authors included the results of unpublished articles.
- Most of the studies included were from the United States, limiting the generalization of the results to other racial and ethnic populations.
- The use of Food Frequency Questionnaires (self-reported dietary intake assessment tool), is prone to measurement errors or recall bias, leading to over- or underestimation of dietary intake. The majority of the studies included in this review utilized this method.

Sugar-sweetened beverage consumption and central and total adiposity in older children: a prospective study accounting for dietary reporting errors. Bigornia SJ, LaValley MP, Noel SE, Moore LL, Ness AR, Newby PK. Public Health Nutr. 2015 May;18(7):1155-63. doi: 10.1017/S1368980014001700.

MAIN POINTS FROM THE STUDY:

- Researchers Bigornia et al., conducted a prospective study to determine the relationship between changes in sugar-sweetened beverage (SSB) intake and waist circumference (WC), BMI and body fat in children at age 13. A stronger proportional association was seen between higher consumption of SSB and larger waist circumference, independent of differences in total adiposity, once errors in dietary reporting were accounted for.

- Dietary intake, WC and BMI (determined from weight and height measurements) were measured at ages 10 and 13 years. Total body fat mass and physical activity levels were assessed at 13 years. Covariates including maternal height and weight, and educational level (as a proxy for socio-economic status), in addition to the participants' pubertal stage, dieting status, and change in fruit juice, fruit, vegetable, and total fat intakes were also assessed.

- At baseline, less than a quarter of participants were overweight or obese, and approximately 60% of the boys and girls were consuming SSB at age 10. At age 13, change in SSB consumption was positively associated with higher weight and BMI, and a weaker effect was shown on WC and total body fat mass.

- The authors concluded that the results of this study "provide evidence that SSB consumption in children influences total fat mass accumulation" and "add further support to recommendations to curtail intakes of SSB as a means to combat excess weight gain in children".

COMMENTS:

- The interpretation of these finding should be done with caution, given the concern for residual confounding due to the fact that the cause of weight gain is multifactorial. Several potential confounders (such as, meals consumed outside of the home, dieting status, and fruit, vegetable and fat intake) were either not assessed, or were not available for all participants.
- The observational nature of this study, as well as the implementation of dummy variables in order to preserve the sample size and account for missing data, also adds to the concern for residual confounding. Dummy coding likely resulted in underestimation of the results of this study, once potentially confounding variables were collapsed into dichotomous measures (no=never and yes=all other responses).
- Lastly, maternal BMI was calculated using self-reported height and weight, and errors in reports may result in misclassification which will inevitably impact the findings of the study.