RISK FACTORS

Frequent consumption of sweetened beverages linked to coronary heart disease

Frequent consumption of sugar-sweetened soft drinks can increase the risk of coronary heart disease, even after known risk factors are taken into account, says a group of Boston-based researchers led by Teresa T. Fung of Simmons College.

A huge increase has been reported in the consumption of carbonated and noncarbonated sugar-sweetened beverages in the US over the past 30 years. Furthermore, epidemiological studies have implicated excessive consumption of these drinks in the development of obesity and type 2 diabetes mellitus in both children and adults. Given these findings, Fung and coworkers hypothesized that drinking large amounts of sugar-sweetened beverages might also expose individuals to an increased risk of coronary heart disease.

Fung *et al.* prospectively examined habits of soft-drink consumption in women aged 34–59 years who had enrolled in the US Nurses' Health Study, a long-running evaluation of factors that affect women's health. The researchers evaluated data from 88,520 women without previously diagnosed coronary heart disease, stroke or diabetes mellitus. The women were asked to complete food-frequency questionnaires every 4 years, which were designed to assess mean daily intakes of food items over the preceding year. Sugar-sweetened soft drinks assessed in the study included caffeinated and noncaffeinated colas, noncola carbonated beverages, noncarbonated beverages, and sweetened fruit drinks; in addition, Fung *et al.* conducted a separate analysis of low-calorie, artificially sweetened beverages. The primary end point of the analysis was incident coronary heart disease (nonfatal myocardial infarction or fatal coronary heart disease). The relative risks for coronary heart disease were calculated by the Cox proportional hazards model and adjusted for known risk factors of cardiovascular disease and potential confounders.

The participants' consumption of sweetened beverages was stratified by frequency: the highest frequency of consumption was at least two soft drinks each day (4,650 women), whereas the lowest frequency of consumption was less than one soft drink each month (34,010 women). A total of 3,105 incident cases of coronary heart disease were recorded during 24 years of follow-up. The researchers found a positive correlation between risk of coronary heart disease and consumption of sugar-sweetened beverages—women who consumed at least two of these drinks each day had an increased risk of incident coronary heart disease when compared to those women who consumed less than one of these drinks each month. Although adjustment for unhealthy diet, diabetes mellitus, BMI and total energy intake attenuated this relationship somewhat, the findings remained statistically significant. The association between high consumption of sugar-sweetened beverages and incident coronary heart disease was most robust for colas and noncarbonated fruit drinks. By contrast, the risks associated with artificially sweetened beverages and noncola carbonated beverages did not reach statistical significance.

The results presented by Fung and colleagues implicate high consumption of sugar-sweetened beverages in the development of coronary heart disease, at least in middle-aged women; however, the precise mechanisms that drive this increased risk remain to be determined. One possibility is that sugar-sweetened beverages represent a major contribution to the total dietary glycemic load. Increased glycemic load is thought to raise the concentration of C-reactive protein, a marker of inflammation. A second possibility put forward by Fung *et al.* is that fructose—the main sweetener used in sugar-sweetened beverages—increases hepatic production of triacylglycerol, a known risk factor for coronary heart disease. Furthermore, fructose can increase the concentration of uric acid in the blood, which in turn might lead to reduced nitric oxide in the endothelium. These theories clearly merit further investigation, particularly in light of the weak association between artificially sweetened beverages and incident coronary heart disease observed by Fung and colleagues.

Consumption of sweetened beverages has increased steadily over the years—what was once considered a 'treat' now constitutes a daily dietary component for many individuals. Frequent consumption of these beverages has already been implicated in the development of several chronic metabolic conditions prevalent in modern society. The data reported by Fung *et al.* now place coronary heart disease on this list.

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