

Dietary factors appear to be associated with diabetes risk

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Drinking more sugar-sweetened beverages or eating fewer fruits and vegetables both may be associated with an increased risk of type 2 diabetes, whereas eating a low-fat diet does not appear to be associated with any change in diabetes risk, according to three reports in the July 28 issue of *Archives of Internal Medicine*.

Diabetes rates continue to increase, particularly in developed countries, according to background information in the articles. By the year 2030, 11.2 percent of U.S. adults are expected to have the condition. Obesity is the strongest modifiable risk factor for the development of type 2 diabetes.

In one study, Julie R. Palmer, Sc.D., of the Slone Epidemiology Center, Boston University, and colleagues examined the association between type 2 diabetes, weight gain and the consumption of sugar-sweetened soft drinks and fruit drinks in 43,960 African American women. In 1995 and again in 2001, the women completed a questionnaire about the types of foods and beverages they typically consumed. A total of 17 percent reported drinking one sugar-sweetened soft drink each day, 32 percent drank one sweetened fruit drink each day and 22 percent had at least one glass of orange juice or grapefruit juice.

Over 10 years of follow-up, 2,713 of the women developed type 2 diabetes. Those who drank more regular soft drinks and fruit drinks—including regular soda, other fruit juices, fortified fruit drinks and Kool-Aid but not diet soda, orange juice or grapefruit juice—were

more likely to develop diabetes than those who drank less of those beverages.

Women who drank two or more soft drinks per day had a 24 percent increase in diabetes risk compared with women who drank less than one soft drink per month, and those who drank two or more fruit drinks per day had a 31 percent increased risk compared with women who drank less than one per month. Diet soft drinks, grapefruit juice and orange juice were not associated with diabetes risk.

When the researchers adjusted for body mass index (BMI), the association between soft drinks and diabetes risk decreased. However, the association between fruit drinks and diabetes risk did not appear dependent on BMI. "Our study suggests that the mechanism for the increase in diabetes risk associated with soft drink consumption is primarily through increased weight. Reducing consumption of soft drinks or switching from sugar-sweetened soft drinks to diet soft drinks is a concrete step that women may find easier to achieve than other approaches to weight loss," the authors write.

"Finally, it should be noted that consumption of fruit drinks conveyed as high an increase in risk as did consumption of soft drinks. Fruit drinks typically contain as many or more calories compared with soft drinks and, like soft drinks, may not decrease satiety to the same extent as solid food," they conclude. "The public should be made aware that these drinks are not a healthy alternative to soft drinks with regard to risk of type 2 diabetes."

In another study, Anne-Helen Harding, Ph.D., of Addenbrooke's Hospital, Cambridge, England, and colleagues analyzed blood vitamin C levels and fruit and vegetable intake in 21,831 individuals (average age 58) who did not have diabetes at the beginning of the study (1993 to 1997). Vitamin C level is a good indicator of fruit and vegetable

consumption, the authors note, because these foods are the main source of vitamin C in the Western diet. Participants provided blood samples and reported how often they ate fruits and vegetables on a food frequency questionnaire.

Over 12 years of follow-up, 735 participants developed diabetes. Those with higher blood levels of vitamin C were substantially less likely to develop diabetes. "Compared with men and women in the bottom quintile [one-fifth] of plasma vitamin C, the odds of developing diabetes was 62 percent lower for those in the top quintile of plasma vitamin C," the authors write. "A weaker inverse association between fruit and vegetable consumption and diabetes risk was observed."

Fruits and vegetables may reduce diabetes risk by preventing obesity or by providing nutrients that protect against diabetes, including antioxidants, the authors note. "Because fruits and vegetables are the main sources of vitamin C, the findings suggest that eating even a small quantity of fruits and vegetables may be beneficial and that the protection against diabetes increases progressively with the quantity of fruit and vegetables consumed," they conclude.

In a third article, Lesley F. Tinker, Ph.D., of the Women's Health Initiative, Fred Hutchison Cancer Research Center, Seattle, and colleagues studied the effects of eating a low-fat diet on diabetes risk in 48,835 post-menopausal women. From 1993 to 2005, 29,294 of the women were randomly assigned to continue eating their usual diet while 19,541 were given a low-fat (20 percent of calories from fat) diet with increased levels of fruits, vegetables and whole grains. The diet was not intended to help participants lose weight.

A total of 1,303 of the women eating the low-fat diet (7.1 percent) and 2,039 women eating their usual diet (7.4 percent) developed diabetes over the 8.1 years of the study. There was no significant reduction in the

risk of developing diabetes among women on the low-fat diet. However, "trends toward reduced incidence were greater with greater decreases in total fat intake and weight loss," the authors write.

Women in the low-fat diet group lost about 1.9 kilograms or 4.2 pounds more weight over the course of the study than women in the regular diet group. "Weight loss, rather than macronutrient composition, may be the dominant predictor of reduced risk of diabetes," the authors conclude.

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