

# Coffee May Decrease Risk of Developing Type 2 Diabetes in Women

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Feb. 6, 2006 — Coffee decreases the risk of developing type 2 diabetes in younger and middle-aged US women, according to the results of a large, prospective cohort study reported in the February issue of *Diabetes Care*.

"High coffee consumption has been associated with better glucose tolerance and a substantially lower risk of type 2 diabetes in diverse populations in Europe, the U.S., and Japan," write Rob M. Van Dam, PhD, from the Harvard School of Public Health in Boston, Massachusetts, and colleagues. "However, it remains unclear what coffee components may be responsible for the apparent beneficial effect of coffee on glucose metabolism.... Data on decaffeinated coffee and various methods of coffee preparation in relation to risk of type 2 diabetes are sparse."

This study included 88,259 US women enrolled in the Nurses' Health Study II who were aged 26 to 46 years and had no history of diabetes at baseline. The investigators determined consumption of coffee and other caffeine-containing foods and drinks in 1991, 1995, and 1999, and they documented 1,263 incident cases of confirmed type 2 diabetes between 1991 and 2001.

After adjustment for potential confounding variables, the relative risk for type 2 diabetes was 0.87 (95% confidence interval [CI], 0.73 - 1.03) for 1 cup per day, 0.58 (95% CI, 0.49 - 0.68) for 2 to 3 cups per day, and 0.53 (95% CI, 0.41 - 0.68) for 4 or more cups per day compared with nondrinkers (*P* for trend, <.0001).

This association was similar for caffeinated coffee (0.87; 95% CI, 0.83 - 0.91 for a 1-cup increment per day), decaffeinated coffee (0.81; 95% CI, 0.73 - 0.90), filtered coffee (0.86; 95% CI, 0.82 - 0.90), and instant coffee (0.83; 95% CI, 0.74 - 0.93). In contrast, tea consumption was not significantly associated with risk for type 2 diabetes (0.88; 95% CI, 0.64 - 1.23) for 4 or more vs no cups per day (*P* for trend = .81).

"These results suggest that moderate consumption of both caffeinated and decaffeinated coffee may lower risk of type 2 diabetes in younger and middle-aged women," the authors write. "Coffee constituents other than caffeine may affect the development of type 2 diabetes."

Study limitations include possible underdiagnosis of diabetes or misclassification of exposure to relevant coffee constituents and lack of generalizability to other populations.

"Weight management and increased physical activity, which can lower risk of multiple chronic diseases, should be the mainstay of preventive efforts to reduce incidence of type 2 diabetes," the authors write. "For individual choices regarding coffee consumption, the potential effects of coffee consumption on risk of type 2 diabetes may be relevant but should be considered in combination with other health effects of coffee. Consumption of decaffeinated coffee may reduce risk of type 2 diabetes, while avoiding potential detrimental effects on blood pressure and sleep quality."

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## **Learning Objectives for This Educational Activity**

Upon completion of this activity, participants will be able to:

- Describe the association between coffee consumption and risk for type 2 diabetes in women.
- Describe the association between coffee preparation, caffeine or tea intake, and risk for type 2 diabetes in women.

## **Clinical Context**

According to the authors, high coffee consumption has been associated with better glucose tolerance and lower risk of type 2 diabetes. In a meta-analysis of cohort studies published by Van Dam and colleagues in the July 6, 2005, issue of *JAMA*, the summary relative risk (RR) of diabetes was 0.65 for 6 to 7 or more cups of coffee per day and 0.72 for 4 to 6 cups of coffee per day compared with the reference category. The authors reported that short-term metabolic studies have shown that caffeine can acutely lower insulin sensitivity, but the long-term effects of caffeine on glucose metabolism are unknown.

The current trial is a prospective cohort study of younger middle-aged women in the Nurses' Health Study II to examine the association between habitual coffee and caffeine intake and risk for incident type 2 diabetes.

## **Study Highlights**

- 88,259 female US nurses aged 26 to 46 years who completed biennial mailed validated questionnaires on dietary intake, physical activity, and medical history were participants.
- Exclusion criteria were history of diabetes, cancer, and cardiovascular disease; and incomplete questionnaire, with more than 70 items left blank, or implausibly reported daily energy intake.
- Participants were asked how often on average they consumed caffeinated and decaffeinated coffee, tea, caffeinated soft drinks, and chocolate products, with 9 possible responses.
- The 9 possible responses were never or less than 1 per month, 1 to 3 per month, 1 per week, 2 to 4 per week, 5 to 6 per week, 1 per day, 2 to 3 per day, 4 to 5 per day, and 6 or more per day.
- Questionnaires were sent to participants in 1991, 1995, and 1999, and incident cases of type 2 diabetes between 1991 and 2001 were documented.
- In one questionnaire, participants were also asked about the method of preparation of coffee: mainly filtered, mainly instant, or mainly espresso/percolator.
- Caffeine content was calculated as 137 mg per cup of coffee, 47 mg per cup of tea, 46 mg per bottle or can of soda, and 7 mg per serving of chocolate candy.
- Diagnosis of type 2 diabetes was established before 1998 using the National Diabetes Data Group criteria requiring at least one of the following: (1) elevated plasma glucose level of 140 mg/dL or more, random glucose level of 200 mg/dL or more, and/or elevated glucose level after an oral glucose load plus at least one classic symptom, (2) no symptoms but same plasma glucose levels, or (3) treatment with insulin or hypoglycemic medication.
- After 1998, the American Diabetes Association criteria were substituted for plasma glucose levels (cutoff of 126 mg/dL for fasting plasma glucose).

- In a separate validation study for the Nurses' Health Study II, 98% of cases of type 2 diabetes were confirmed by medical record review.
- Person-years of exposure were calculated from the date of return of the baseline questionnaire till diagnosis of type 2 diabetes, or death by July 1, 2001, or whichever came first.
- For 866,118 person-years of follow-up, 1,263 incident cases of type 2 diabetes were diagnosed.
- Higher caffeinated but not decaffeinated coffee consumption was strongly associated with cigarette smoking and higher alcohol consumption.
- Higher caffeinated and decaffeinated coffee consumption were associated with older age and lower consumption of sugar-sweetened beverages.
- Women who did not consume caffeinated or decaffeinated coffee tended to have a higher body mass index vs those who consumed either type of coffee.
- The RR of type 2 diabetes was 0.87 for 1 cup per day, 0.58 for 2 to 3 cups per day, and 0.53 for 4 or more cups per day vs no coffee consumption.
- After adjustment for confounding variables, the RR for 4 or more cups daily vs no cups of coffee daily ranged from 0.51 to 0.60 (all *P* values < .0001).
- Tea consumption was not substantially associated with risk of type 2 diabetes.
- The RR for a 1-cup increment in consumption was 0.86.
- The strength of the association was similar for decaffeinated and caffeinated coffee consumption.
- The inverse association was similar for filtered, instant, and espresso/percolator coffee.
- The inverse association was independent of caffeine intake.

### **Pearls for Practice**

- Caffeinated and decaffeinated coffee consumption is associated with lower risk for type 2 diabetes in women.
- The protective effect of coffee consumption on incidence of type 2 diabetes in women is independent of coffee preparation method and caffeine and tea intake.