

Fruit and vegetable intake decreased risk for ischemic stroke

Joshiyura KJ, Ascherio A, Manson JE, et al. Fruit and vegetable intake in relation to risk of ischemic stroke. *JAMA*. 1999 Oct 6;282:1233-9.

QUESTION

Is fruit and vegetable intake associated with ischemic stroke?

DESIGN

Population-based cohort study of women in the Nurses' Health Study with 14 years of follow-up and men in the Health Professionals' Follow-up Study with 8 years of follow-up.

SETTING

United States.

PARTICIPANTS

121 700 women in the Nurses' Health Study who were 30 to 55 years of age in 1976 (baseline) and 51 529 men in the Health Professionals' Follow-up Study who were 40 to 75 years of age in 1986 (baseline). Exclusion criteria were ≥ 10 nonresponses to dietary questions for women or ≥ 70 nonresponses for men; implausible scores for total food intake (< 2092 or $> 14\ 644$ kJ/d for women, or < 3360 or $> 17\ 640$ kJ/d for men); or previous cancer, diabetes, or cardiovascular disease. Data from 75 596 women and 38 683 men were eligible for analysis.

ASSESSMENT OF RISK FACTORS

Participants completed mailed questionnaires at baseline and every 2 years thereafter. Information on food and beverage intake and portion sizes was gathered. Participants were divided into quintiles based on mean intakes of fruits and vegetables and composites thereof. The lowest quintile was given a relative risk (RR) of 1.0. Data were adjusted for age; smoking; alcohol consumption; family history of myocardial infarction; body mass index; multivitamin, vitamin E, and aspirin use; physical activity; hypertension; total energy intake; hypercholesterolemia; and postmenopausal hormone use.

MAIN OUTCOME MEASURE

Stroke, confirmed by blinded assessment of medical records.

MAIN RESULTS

670 cases of stroke were reported among women and 317 among men. Participants in the top quintile of intake (median 9.15 and 10.15 servings/d for men and women, respectively) had a lower risk for ischemic stroke (RR 0.69, 95% CI 0.52 to 0.92)

than those in the bottom quintile. Lower risks for ischemic stroke were associated with an increment of 1 serving/d of fruits or vegetables (RR 0.94, CI 0.90 to 0.99, *P* for trend 0.01), all citrus fruits (RR 0.81, CI 0.68 to 0.96), citrus fruit juices (RR 0.75, CI 0.61 to 0.93), cruciferous vegetables (RR 0.68, CI 0.49 to 0.94), and green leafy vegetables (RR 0.79, CI 0.62 to 0.99). Lower risk for ischemic stroke was not associated with intake of legumes (RR 1.09, CI 0.47 to 2.51) or potatoes (RR 1.21, CI 0.89 to 1.64).

CONCLUSION

Intake of fruits and vegetables, specifically citrus fruits and juice, cruciferous vegetables, and green leafy vegetables, was associated with a lower risk for ischemic stroke.

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COMMENTARY

The study by Joshiyura and colleagues suggests that middle-aged women and men who have a high intake of fruits and vegetables have a lower risk for ischemic stroke than those who have a lower intake.

Although this association is consistent with other studies (1, 2), dose-dependent, and biologically plausible, the crucial question is whether a diet of fruits and vegetables is responsible for the association or is simply a marker of another factor associated with better health.

In this study, a higher intake of fruits and vegetables was associated with healthier lifestyle behavior but was also associated with older age and a higher intake of protein, cereal, fiber, trans fatty acids, saturated fat, polyunsaturated fat, and cholesterol. Adjustment for known behavioral risk factors attenuated the observed associations but did not abolish them.

These analyses suggest that a high intake of fruits and vegetables is associated with a lower risk for ischemic stroke and the association is independent of other known dietary, behavioral, and conventional

vascular risk factors. However, to be sure that the association is causal, a large, randomized, single-blind trial is needed to show that the incidence of first-ever ischemic stroke is lower among persons allocated to 5 servings/d of fruits and vegetables compared with those allocated to ≤ 2 servings/d. Such a trial is likely to require thousands of participants, a large amount of fruits and vegetables, years of rigorous follow-up, and millions of dollars. In these days of resource rationing, I think we should accept the evidence of this and other studies that 4 or 5 servings/d of fruits and vegetables is healthy and this dietary behavior should be encouraged.

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References

- Gillman MW, Cupples LA, Gagnon D, et al. Protective effect of fruits and vegetables on development of stroke in men. *JAMA*. 1995;273:1113-7.
- Gaziano JM, Manson JE, Branch LG, et al. A progressive study of consumption of carotenoids in fruits and vegetables and decreased cardiovascular mortality in the elderly. *Ann Epidemiol*. 1995;5:255-60.