Flavonoid intake is associated with lower mortality in the Danish Diet Cancer and Health Cohort

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BACKGROUND

- Flavonoids are found in plant derived foods and beverages (i.e., fruit and vegetables or tea)
- Flavonoid intake is associated with lower mortality
- Flavonoids may have positive impact on endothelial function, blood pressure, inflammation, blood lipids, platelet function and/or thrombosis
- It is also suggested that flavonoids can modulate the risk of cancer

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AIM

The primary aim was to investigate the association of flavonoid intake with all cause, cardiovascular disease related, and cancer related mortality in participants of the Danish Diet, Cancer and Health cohort

The secondary aim was to investigate whether these associations differ, according to the presence of modifiable lifestyle risk factors

METHODS

- 56,468 Danish participants aged 50-65 at recruitment, followed up for 23 years
- Dietary data were collected using a validated 192-item food frequency questionnaire
- Total flavonoid and flavonoid subclass intakes were categorized in quintiles
- Prevalence and cause of mortality was obtained from the Danish Register of Causes of Death, which follows the International Classification of Diseases (ICD) codes
- Information about sex, age and lifestyle factors were obtained from a questionnaire, participants received at enrollment
- For analysis, 3 different adjustment models based on several parameters were used

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METHODS

Model 1:

Age and sex

Model 2:

Age, sex, BMI, smoking status, physical activity, alcohol intake, hypertension, hypercholesterolemia, social economic status and prevalence of diseases

Model 3:

Model 2 + intake of fish, red meat, processed meat, dietary fiber, polyunsaturated fatty acids, monounsaturated- and saturated fatty acids

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RESULTS

Total flavonoids and flavonoid subclasses and all cause mortality

- An inverse relationship between total flavonoid intake and all-cause mortality was found for intake levels up to 500 mg/d
- No added benefits were observed for higher intake levels
- A similar association was found for the majority of flavonoid subclasses, with benefits up to or within certain intake levels
- Following multivariable adjustments (model 2) for total flavonoid intake, participants in the 3 highest quintiles were at lower risk of all-cause mortality
- Adjusting total flavonoid intake for model 3 (potential lifestyle and dietary confounders), the association was slightly attenuated in quintiles 2 - 5

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RESULTS

Total flavonoids and flavonoid subclasses and cause-specific mortality (CVD and cancer)

- After adjustment for lifestyle and dietary confounders (model 3), intakes above the lowest quintile (Q1) for total flavonoids and flavonoid subclasses were associated with lower risk of both CVD and cancer-related mortality
- For CVD related mortality, the inverse association plateaued at 500 mg/d of total flavonoids
- Regarding cancer-related mortality, the association plateaued at around 1000 mg/d of total flavonoids
- For any flavonoid subclasses, the associations were stable beyond quintile 3

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RESULTS

Flavonoids and modifiable risk factors

- The inverse association between total flavonoid intake and both all-cause and cause-specific mortality was found to be stronger in smokers than in non-smokers
- The same was true for participants consuming >20 g/d alcohol
- In obese participants (BMI>30) the association between higher (total) flavonoid intake and lower risk of mortality tended to be weaker, when compared to normal/overweight participants (BMI:18.5-30)

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CONCLUSION

"The findings highlight the potential to reduce mortality through recommendations to increase intakes of flavonoid-rich foods, particularly in smokers and high alcohol consumers".

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ARTICLE

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Flavonoid intake is associated with lower mortality in the Danish Diet Cancer and Health Cohort

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Flavonoids, plant-derived polyphenolic compounds, have been linked with health benefits. However, evidence from observational studies is incomplete; studies on cancer mortality are scarce and moderating effects of lifestyle risk factors for early mortality are unknown. In this prospective cohort study including 56,048 participants of the Danish Diet, Cancer, and Health cohort crosslinked with Danish nationwide registries and followed for 23 years, there are 14,083 deaths. A moderate habitual intake of flavonoids is inversely associated with all-cause, cardiovascular- and cancer-related mortality. This strong association plateaus at intakes of approximately 500 mg/day. Furthermore, the inverse associations between total flavonoid intake and mortality outcomes are stronger and more linear in smokers than in non-smokers, as well as in heavy (>20 g/d) vs. low-moderate (<20 g/d) alcohol consumers. These findings highlight the potential to reduce mortality through recommendations to increase intakes of flavonoid-rich foods, particularly in smokers and high alcohol consumers.

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