Biomarker-estimated flavan-3-ol intake is associated with lower blood pressure in cross-sectional analysis in EPIC Norfolk

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BACKGROUND

- High blood pressure is a leading disease risk factor and cardiovascular disease (CVD) is a main cause of death worldwide.
- Diet plays a very important role in the development of CVD.
- Flavan-3-ols are bioactive compounds, belonging to the group of polyphenols that are thought to modulate disease risk.
- Flavan-3-ols are commonly found in tea, pome fruits, berries, cocoa-derived foods and nuts.
- Previous studies showed that flavan-3-ol intake improved vascular function in healthy adults.
- gVLMB is a biomarker based on the flavan-3-ol-derived microbial metabolite 5-3’,4’-dihydroxyphenyl-γ-valerolactone (gVLM), used to measure flavan-3-ol intake.
- SREMB is a biomarker based on structurally related (–)-epicatechin metabolites (SREM), used to measure epicatechin intake.

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AIM / OBJECTIVES

The primary objective of this study was to investigate cross-sectional associations between biomarker-estimated flavan-3-ol intake and blood pressure. The secondary objective of the study was to investigate cross-sectional associations with other cardiovascular disease risk factors and prospective associations with cardiovascular disease risk.

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METHODS

Study population:

25.618 women and men aged 40-75

Parameters assessed

- Health and lifestyle characteristics including data on smoking, social class, family medical history and physical activity
- Height, weight and blood pressure (BP)
- Serum levels of total cholesterol + plasma levels of Vitamin C
- Non-fasting spot urine samples taken throughout the day to assess flavan-3-ol and epicatechin metabolites (gVLMB and SREMB respectively)
- Diet assessed by a 7-day diary
- Minimum and maximum flavan-3-ol intake, using the minimum and maximum food content provided by Phenol Explorer and USDA databases

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METHODS II

In this cross-sectional analysis, 6 different adjustment models were used. These included adjustment parameters like age, BMI, smoking status, physical activity, social class, plasma Vitamin C level, tea and coffee intake, health status, family history of myocardial infarction, use of anti-hypertensive or lipid-lowering medication and menopausal status in women.

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RESULTS I

Cross sectional associations between flavan-3-ol biomarker and blood pressure

- An inverse association between biomarkers of flavan-3-ol (gVLMB) and epicatechin (SREMB) intake and systolic BP was found.
- Systolic BP between bottom and top decile of gVLMB concentrations differed by -1.9 mmHg in men and -2.5 mmHg in women.
- The systolic BP differences between bottom and top deciles of SREMB concentrations were even higher, resulting in -2.4 mmHg in men and -2.5mmHg in women.
- Similar associations were found for diastolic blood pressure and biomarker-estimated flavan-3-ol intake, with a difference between the bottom and top decile of approximately 1 mmHg.
- Hypertensive participants had a stronger inverse association between flavan-3-ol biomarker and systolic BP when compared to normotensive participants, particularly when using SREMB as biomarker.
- Similar associations were found between hypertensive and normotensive women, when using gVLMB as a biomarker of flavan-3-ol intake.
- The differences in systolic BP between the top and the bottom decile of gVLMB- and SREMB- estimated flavan-3-ol intake in older men (>60 years) was greater than in younger men.

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RESULTS II

Association between flavanol intake and other cardiovascular disease risk markers & Association with CVD incidence and mortality

- Small differences in blood lipids were found between the bottom and the top decile of flavan-3-ol intake assessed with gVLMB and SREMB, where participants in the top decile of biomarker concentration had lower blood cholesterol and LDL-cholesterol, but higher triglycerides.
- High flavan-3-ol intake was associated with lower blood pressure and an overall better blood lipid profile and may therefore affect CVD risk and mortality.
- Secondary analysis, showed no consistent, statistically significant associations between flavan-3-ol biomarker (gVLMB) and other cardio-vascular disease risk factors in this specific cross-sectional analysis.

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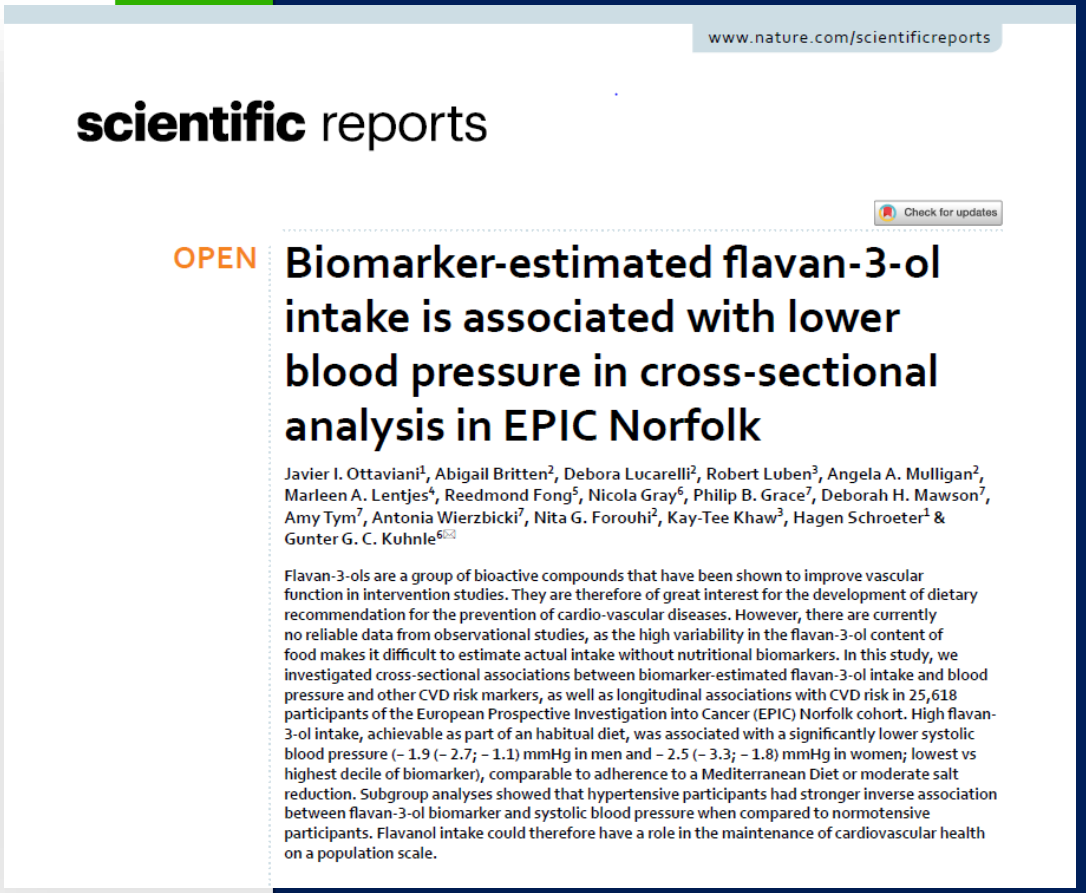
CONCLUSION

“The results of this study show a significant and biomedically relevant inverse association between biomarkers of flavan-3-ol intake and blood pressure in a general population with a wide range of flavan-3-ol intake from their habitual diet.”.



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Biomarker-estimated flavan-3-ol intake is associated with lower blood pressure in cross-sectional analysis in EPIC Norfolk

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Flavan-3-ols are a group of bioactive compounds that have been shown to improve vascular function in intervention studies. They are therefore of great interest for the development of dietary recommendation for the prevention of cardio-vascular diseases. However, there are currently no reliable data from observational studies, as the high variability in the flavan-3-ol content of food makes it difficult to estimate actual intake without nutritional biomarkers. In this study, we investigated cross-sectional associations between biomarker-estimated flavan-3-ol intake and blood pressure and other CVD risk markers, as well as longitudinal associations with CVD risk in 25,618 participants of the European Prospective Investigation into Cancer (EPIC) Norfolk cohort. High flavan-3-ol intake, achievable as part of an habitual diet, was associated with a significantly lower systolic blood pressure (− 1.9 (− 2.7; − 1.1) mmHg in men and − 2.5 (− 3.3; − 1.8) mmHg in women; lowest vs highest decile of biomarker), comparable to adherence to a Mediterranean Diet or moderate salt reduction. Subgroup analyses showed that hypertensive participants had stronger inverse association between flavan-3-ol biomarker and systolic blood pressure when compared to normotensive participants. Flavanol intake could therefore have a role in the maintenance of cardiovascular health on a population scale.

Article available at: ttps://pubmed.ncbi.nlm.nih.gov/33087825/