Fruit intake and reduced risk of hypertension: Are there any forbidden fruits?

European Journal of Preventive Cardiology

ESC European Society of Cardiology

Invited editorial

European Journal of Preventive Cardiology
0(00) 1–3

DOI: 10.1177/2047487319876767
journals.sagepub.com/home/cpr

SAGE

Fruit intake and reduced risk of hypertension: are there any forbidden fruits?

Aletta E Schutte

All major dietary guidelines and recommendations for the prevention of hypertension and cardiovascular disease strongly advocate for a diet high in fruit. The World Health Organization (WHO) recommends a minimum daily intake of five servings of fruit and vegetables (400 g per day) to prevent non-communicable diseases. This was echoed by several other organisations such as the Centers for Disease Control (5-A-Day for Better Health) and the United Kingdom's National Health Service (5 A Day campaign). However, the challenge to reach the five a day target was recently shown in the UK, where only 17% of hospital staff succeeded.[1] These recommendations are based on a solid foundation of evidence from longitudinal and interventional studies indicating that a high intake of fruit is associated with a lower risk of hypertension and associated outcomes.[2–6] When the Global Burden of Disease Study collaborators ranked 84 different metabolic, environmental and behavioural risk factors by risk-attributable disability adjusted life years (DALYs), a diet low in fruit was ranked 13th – climbing seven positions from being ranked 20th in 1990.[6]

The cardioprotective effects of fruit are wide-ranging and involve multiple beneficial effects due to a high content of fibre, minerals (potassium, magnesium), vitamins, phytochemicals (polyphenols and carotenoids), antioxidants and unidentified compounds which are likely to act synergistically to reduce cardiovascular risk.[4] Despite fruits containing high concentrations of fructose, sucrose and glucose, epidemiological evidence suggests an anti-obesity effect of whole fruit intake[7] – with many ascribing this to the high fibre content. Flowing from this argument, 100% fruit juices were targeted as culprits for the obesity epidemic in youth. Yet, a recent meta-analysis involving 34,470 individual children aged 1–18 years found fruit juice to be associated with a small amount of weight gain in those aged 1–6 years which was not clinically significant. They found no association of 100% fruit juice consumption with weight gain in children aged 7–18 years.[8] This is supported by a study suggesting a greater intake of fruit in middle-aged and older women to be associated with a lower risk of becoming obese.[7] Where large prospective cohorts in adults found no association between fruit juices and hypertension,[2] a meta-analysis found fruit juice intake to be inversely associated with coronary heart disease, ischaemic stroke and all-cause mortality.[4]

Although there seems to be more clarity in terms of the pros and cons of fruit juice intake, the question remains unanswered as to whether all fruits were created equally. Is a general recommendation of 5-a-day appropriate for all fruit? There is a plethora of evidence on fruit consumption and cardioprotective benefits, but usually all fruits are grouped into a single category. Very few large-scale prospective studies have evaluated individual fruit intake and the risk of hypertension or cardiovascular disease. Making use of more than 20 years of prospective data from the Nurses' Health Study I and II, and Health Professional Follow-up Study, Borgi et al. analysed individual fruits and incident hypertension.[2] When including grapes/raisins, apples/pears, bananas, strawberries, blueberries, oranges, peaches/apricots/plums, prunes, avocoado and cantaloupe, the authors found a high intake of raisins/grapes and apples/pears to individually associate with reduced hypertension risk, whereas avocado and blueberries also associated with a significant trend towards lower hypertension risk. Cantaloupe intake was associated with an increased risk of hypertension.[2] The beneficial results for apples and raisins replicated earlier findings from the more than 28,000 participants from the Women's Health Study,[9] which also indicated oranges – but not bananas, strawberries or blueberries – to be associated with a reduced risk of hypertension. In a systematic review and meta-analysis including 95 studies, Aune et al. also reviewed single

Hypertension in Africa Research Team (HART), South African Medical Research Council Unit for Hypertension and Cardiovascular Disease, North-West University, South Africa

Corresponding author:
Aletta E Schutte, Hypertension in Africa Research Team, North-West University, Private Bag X6001, Potchefstroom 2520, South Africa.
Email: Alta.Schutte@nwu.ac.za

fruits and observed inverse associations between apples/pears and citrus fruits with cardiovascular disease and mortality.[4] The authors found tinned fruits to be associated positively with cardiovascular disease and mortality.[4]

These studies share some commonalities. A cross-cutting finding seems to be the cardiovascular benefit of apples (and pears) in all studies[2,4,9] – with some overlap in terms of citrus[4,9] and raisins.[2,9] Another similarity is the inclusion of very specific fruits in these analyses, namely fruits that are traditionally consumed in westernised countries (as the studies were mainly conducted in the USA), such as apples, pears, bananas, oranges, strawberries, blueberries and grapes.

A recent paper by Nguyen et al.[10] in the *European Journal of Preventive Cardiology* reported a finding in contrast to a plethora of scientific evidence, namely a positive association between the DASH score for fruit intake and hypertension in Vietnamese adults. The study was cross-sectional and included a relatively small sample of over 2400 adults when compared with other reports on fruit intake.[2,9] However, the study had a high response rate, and is one of only a few studies evaluating fruit and vegetable consumption from this country with over 95 million people. Findings may also be relevant to other Southeast Asian countries with large populations and similar diets to the Vietnamese.

Although it is challenging to make sense of this finding, it should not be swept under the carpet, and needs to be replicated by further studies. When reviewing the list of fruits reported by the authors,[10] and other publications on fruits from Vietnam,[11] one realises that there is an exceptional variety of fruits consumed all over the world. The authors report consumption of fruit also consumed in the west (such as apples, oranges and bananas), but also list fruits that were not included in any previous large-scale prospective studies such as persimmon, mangosteen, jackfruit, longan, mandarin, rambutan, durian and jujube. Based on a 2004 report from the Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific,[11] the major classes of fruit consumed in Vietnam include 44 different fruit, where they highlight six fruits having the highest priority in development, namely longan, lychee, mandarin, mango, orange and pummelo. Nguyen et al.[10] found that women in particular had a high DASH score for fruit intake, in which 43% of the total sample and 47% of women met the WHO dietary recommendations.[10] This compares well with the INTERMAP study[12] indicating a higher fruit consumption in East Asian than western countries, where it was also found that apple intake was positively associated with diastolic blood pressure only in East Asian countries. Nguyen et al. speculate that perhaps a high fructose intake may be accountable for the positive association with hypertension,[10] but this is unlikely when considering previous negative findings on fruit (and fruit juice) intake and the risk of hypertension development.[2,4] Whether ethnic-specific sensitivity towards high fruit consumption and cardiovascular risk is at play also needs consideration.

What should be taken from this study and previous large-scale studies investigating individual fruits, is that all fruits were not created equally and there is potential to identify specific fruits that seem to be more cardioprotective than others, such as apples and pears. Evaluating all fruit types is an insurmountable task, but taking into account regional differences in types of fruit and volumes of fruit consumed, it may be a worthy target of investigation to strengthen public health efforts to counteract the global escalation of hypertension and its consequences.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: AES receives financial support from the South African Medical Research Council and the National Research Foundation (SARChI UID 86895).

References

1. Mittal TK, Cleghorn CL, Cade JE, et al. A cross-sectional survey of cardiovascular health and lifestyle habits of hospital staff in the UK: Do we look after ourselves? *Eur J Prev Cardiol* 2018; 25: 543–550.
2. Borgi L, Muraki I, Satija A, et al. Fruit and vegetable consumption and the incidence of hypertension in three prospective cohort studies. *Hypertension* 2016; 67: 288–293.
3. Appel LJ, Moore TJ, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *N Engl J Med* 1997; 336: 1117–1124.
4. Aune D, Giovannucci E, Boffetta P, et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality – a systematic review and dose-response meta-analysis of prospective studies. *Int J Epidemiol* 2017; 46: 1029–1056.
5. Li B, Li F, Wang L, et al. Fruit and vegetables consumption and risk of hypertension: a meta-analysis. *J Clin Hypertens (Greenwich)* 2016; 18: 468–476.
6. GBD 2017 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; 392: 1923–1994.

7. Rautiainen S, Wang L, Lee IM, et al. Higher intake of fruit, but not vegetables or fiber, at baseline is associated with lower risk of becoming overweight or obese in middle-aged and older women of normal BMI at baseline. *J Nutr* 2015; 145: 960–968.
8. Auerbach BJ, Wolf FM, Hikida A, et al. Fruit juice and change in BMI: a meta-analysis. *Pediatrics* 2017; 139: e20162454.
9. Wang L, Manson JE, Gaziano JM, et al. Fruit and vegetable intake and the risk of hypertension in middle-aged and older women. *Am J Hypertens* 2012; 25: 180–189.
10. Nguyen SM, Tran HTT, Tran BQ, et al. Compliance to dietary guidelines on fruit and vegetable intake and prevalence of hypertension among Vietnamese adults, 2015. *Eur J Prev Cardiol*. Epub ahead of print 5 August 2019. DOI: 10.1177/2047487319867500.
11. Food and Agriculture Organization of the United Nations. *Fruits of Vietnam, Bangkok, Thailand*. Bangkok, Thailand: FAO Regional Office for Asia and the Pacific, 2004.
12. Oude Griep LM, Stamler J, Chan Q, et al. Association of raw fruit and fruit juice consumption with blood pressure: the INTERMAP Study. *Am J Clin Nutr* 2013; 97: 1083–1091.