The effect of plant-based dietary patterns on blood pressure: a systematic review and meta-analysis of controlled interventional trials

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Introduction

The Global Burden of Disease (GBD) study identified hypertension (high blood pressure) as the global number one risk factor for deaths and disability-adjusted life years.[1] Hypertension is accountable for the death of nine million people worldwide every year.[2] Some epidemiological evidence supports an inverse association between fruit and vegetable consumption and blood pressure (BP).[3] There is also evidence of a positive association between meat consumption and hypertension risk.[4] The consumption of strict vegetarian diets is associated with reductions in systolic and diastolic BP,[5] however, the effect of less strict plant-based diets (PBDs) on BP is less well understood.

Objective

To conduct a systematic review of the literature and meta-analyses of controlled clinical trials to determine whether less strict PBDs exert a similar BP lowering effect as strict vegetarian diets.

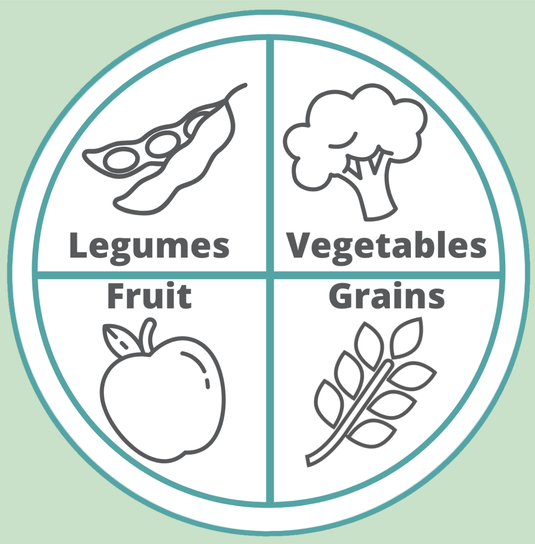

Figure 1. Main components of PBDs

Methods

We performed a systematic search of publications using MEDLINE, EMBASE, CINHAL, and Web of Science.

Inclusion criteria: (1) original published article; (2) age of participants ≥ 18 years; (3) PBD as intervention, defined as dietary patterns that support high consumption of fruits, vegetables, whole grains, legumes, nuts and seeds, and avoid the consumption of most or all animal products (Fig. 1); (4) mean differences in systolic/diastolic BP between PBD and control diet; (5) randomised controlled trial or controlled trial study design.

Data extraction and quality assessment: Standardised mean differences in BP and 95% C.I. were pooled using a random effect model. Quality, sensitivity, heterogeneity and publication bias were assessed.

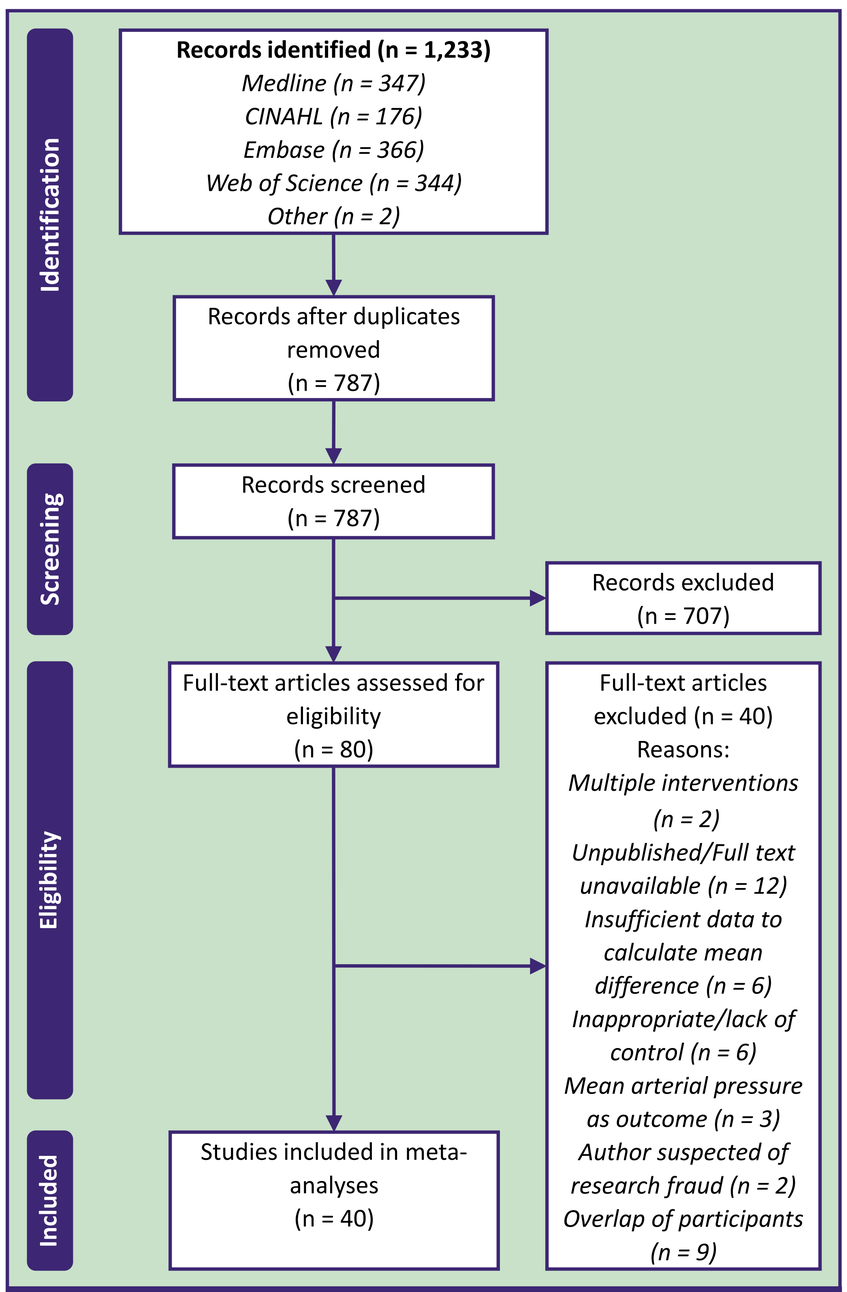

Figure 2. PRISMA flow chart

Results

40 studies met the inclusion criteria (Fig. 2). They included 8,203 participants (4,333 in intervention; 3,870 in control group). Median sample size was n=65 (range 11-4,717) and mean age of the participants 50.5 yrs (range 25.6-71.0). In the pooled analysis, PBDs were associated with lower systolic BP (DASH -5.53 mmHg [-7.95,-3.12], Mediterranean -0.95 mmHg [-1.70,-0.20], Vegan -1.61 mmHg [-4.53,1.31], Lacto-ovo vegetarian -5.47 mmHg [-7.60,-3.34], Nordic -4.47 mmHg [-7.14,-1.81], high-fiber -0.65 mmHg [-1.83,053], high fruit and vegetable -0.57 mmHg [-7.45,6.32] (Fig. 3). Similar effects were seen on diastolic BP. There was no evidence of publication bias and some heterogeneity was detected. Secondary analysis found that, compared with the consumption of a standardised control diet, the consumption of PBDs was associated with a mean reduction in systolic BP (-4.62 mm Hg [-6.65, -2.58] (Fig. 4) and diastolic BP (-2.99 mm Hg [-4.62, -1.36]).

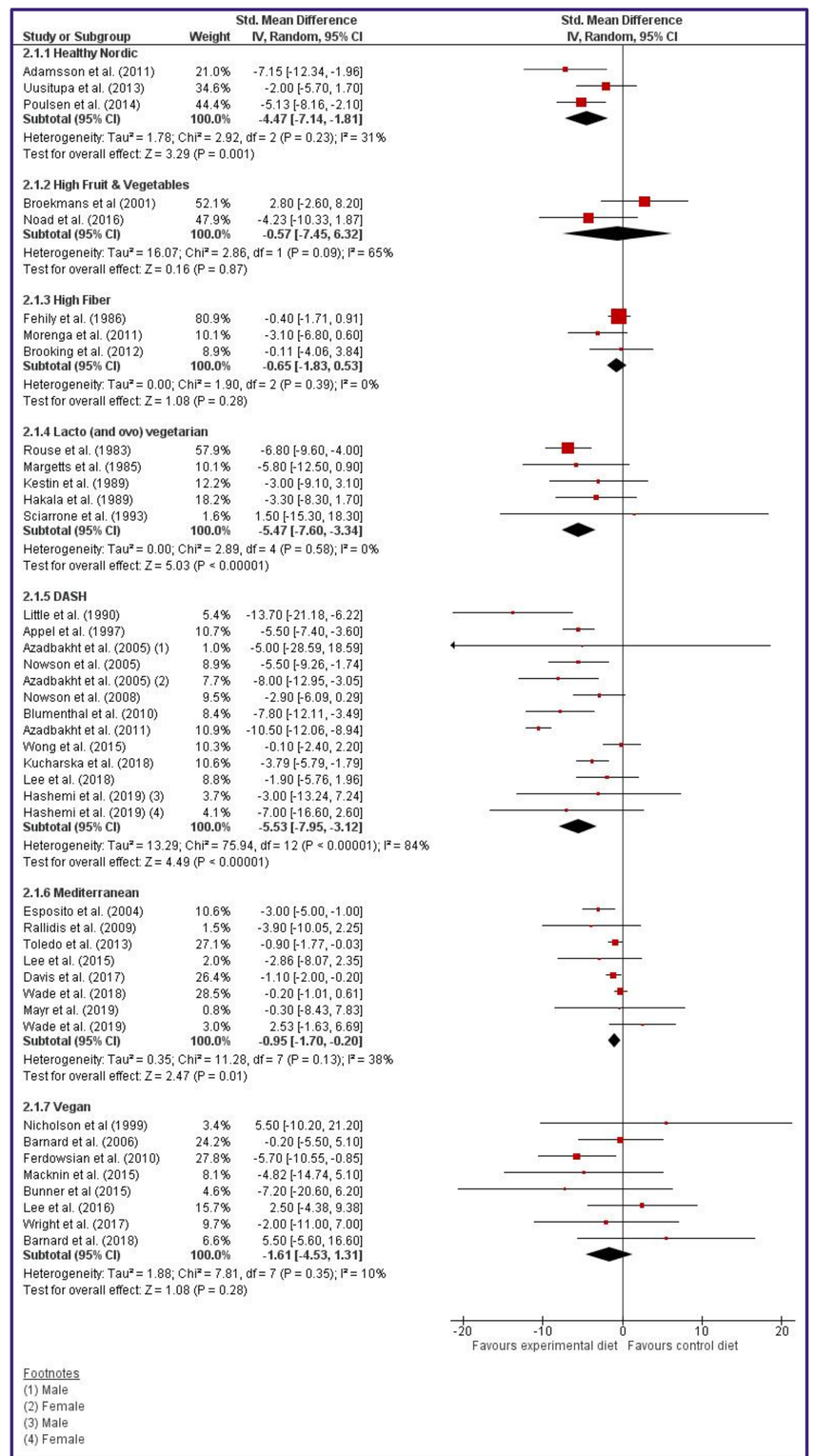

Figure 3. Forest plot for main analysis

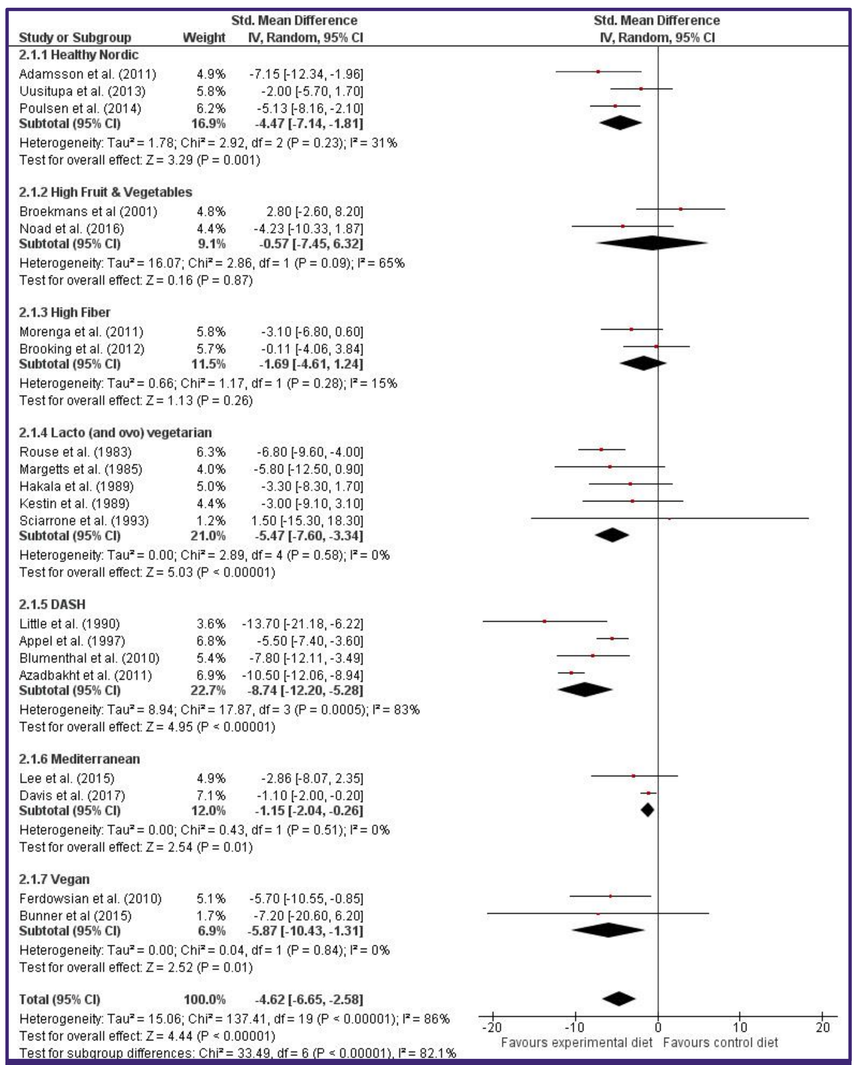

Figure 4. Standardised control diet analysis (SBP)

Conclusion

A shift towards healthy diets globally requires focus on environmental sustainability of food production and health consequences of final consumption, requiring multisectoral actions, science and evidence-gathering and a full range of policy changes. A healthy reference diet has been suggested.[6] It would largely consist of an increase in plant-based foods with limited or no animal products. Our study provides new comprehensive evidence to support this pledge, indicating that such diets would significantly lower both systolic and diastolic BP, across sex, age and body mass index, with likely health benefits on a global scale.

References

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