Effects of garlic on blood pressure in patients with and without systolic hypertension: a meta-analysis

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CRD summary
The review concluded that garlic was associated with blood pressure reductions in patients with an elevated systolic blood pressure, but not in patients without elevated systolic blood pressure. The authors' conclusions appeared to reflect the evidence presented, but their reliability is uncertain due to a lack of validity assessment and the small number of included studies with small sample sizes.

Authors' objectives
To evaluate the effect of garlic on blood pressure in patients with and without elevated systolic blood pressure.

Searching
MEDLINE, CINAHL and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from inception through to June 2008. Search terms were reported. Only studies written in English or German were eligible for inclusion. Reference lists of retrieved articles were scanned for additional studies.

Study selection
Randomised double-blind placebo controlled trials (RCTs) that evaluated the effect of garlic on blood pressure in patients with and without elevated systolic blood pressure were eligible for inclusion. Included studies had to report baseline systolic blood pressure. The primary outcome of interest was systolic blood pressure or diastolic blood pressure.

The type of garlic used in the included studies was garlic powder, aged garlic extract or garlic oil. Daily dosage varied between studies; half of the studies reported using 900mg garlic powder.

Two reviewers independently assessed papers for inclusion. Disagreements were resolved through discussion with a third reviewer.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Data were extracted for baseline and last reported systolic blood pressure and diastolic blood pressure values and used to calculate the mean in garlic and placebo groups. For parallel trials, net changes in each study were calculated as the differences in mean values. For crossover trials, net changes were calculated as the mean difference in values at the end of the garlic and placebo periods, together with measures of variance.

Three reviewers independently extracted data. Disagreements were resolved through discussion. Extracted data were verified by a fourth reviewer.

Methods of synthesis
Studies were grouped into those with participants with a mean baseline systolic blood pressure greater than 140mmHg (hypertensive) and those with a lower baseline blood pressure (normotensive); the groups were analysed separately. Weighted mean difference (WMD) and 95% confidence intervals were calculated using a Der Simonian and Laird random-effects model. Statistical heterogeneity was assessed using the Cochran Q statistic and inspection of the $I^2$ value. Publication bias was assessed through visual inspection of funnel plots and calculation of Egger's weighted statistic.
Results of the review
Ten RCTs (n=401) were included in the review: two crossover RCTs and eight parallel RCTs. Three RCTs (n=139) evaluated hypertensive participants and seven RCTs (n=262) evaluated normotensive participants.

In patients with elevated baseline systolic blood pressure (hypertensive), garlic reduced systolic blood pressure by -16.3mmHg (95% CI -26.45 to -6.22) and diastolic blood pressure by -9.3mmHg (95% CI -13.30 to -5.25; three studies) in comparison with placebo.

In participants without elevated baseline systolic blood pressure (normotensive), there were no statistically significant differences between garlic and placebo for systolic blood pressure (WMD -0.5mmHg, 95% CI -3.11 to 2.05) or diastolic blood pressure (WMD -0.89, 95% CI -2.69 to 0.92).

Heterogeneity did not reach statistical significance (data not reported). There was no evidence of publication bias for studies of normotensive participants (data not reported); the number of studies was too few to allow analysis of publication bias for studies of hypertensive participants.

Authors' conclusions
Garlic was associated with blood pressure reductions in patients with an elevated systolic blood pressure, but not in patients without elevated systolic blood pressure.

CRD commentary
The review question was clear and supported by detailed inclusion criteria. Several relevant sources were searched and formal assessment of publication bias suggested that this was not present in the review. However, restriction of studies to those in English or German may have resulted in the loss of some relevant data. Appropriate methods were used to reduce reviewer error and bias in the selection of studies and extraction of data. Study validity was not assessed, so the results of the studies and any synthesis may not have been reliable. The studies were appropriately combined in a meta-analysis and statistical heterogeneity was assessed. However, it was unclear why the authors calculated their effect sizes by first subtracting baseline data from follow-up data, rather than by simply comparing group follow-up data. The authors appropriately discussed limitations of the review. The authors' conclusions appeared to reflect the evidence presented in the review, but their reliability are uncertain due to a lack of validity assessment and the small sample sizes of the included studies.

The authors reported that most included studies were funded by product manufacturers.

Implications of the review for practice and research
Practice: The authors stated that lack of outcome data should preclude the use of garlic instead of standard antihypertensive treatment.

Research: The authors stated that future large-scale clinical trials were needed to focus on the impact of garlic on cardiovascular and cerebrovascular events and assessment of long-term risk of harm.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.