Garlic as a lipid lowering agent: a meta-analysis
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Authors' objectives
To determine the effect of garlic on serum lipids and lipoproteins, relative to placebo and other lipid-lowering agents.

Searching
MEDLINE, using the terms 'garlic' and 'lipids' or 'blood pressure', and AMED were searched. Additional material was obtained by examining reference citations and conference abstracts, and by contacting manufacturers of garlic compounds and authors of published reports.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) lasting at least 4 weeks, with random allocation to at least two treatment groups, which measured serum lipids. Trials using historic controls were excluded.

Specific interventions included in the review
Garlic supplements: fresh, oil, extract, spray and dried.

Participants included in the review
Men and women: a broad range of entry criteria including healthy, diabetic, hyperlipidaemic and hypertensive participants.

Outcomes assessed in the review
Serum cholesterol, serum triglyceride and serum high-density lipoprotein cholesterol.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The methodological quality of each study was assessed by examining the quality of random allocation, by analysis based on intention-to-treat, and by blinding of outcome assessment. The authors do not state how the papers were assessed for quality, or how many of the authors performed the quality assessment.

Data extraction
The data were extracted by two independent authors using a checklist, and any disagreements were resolved by discussion.

Methods of synthesis
How were the studies combined?
A fixed-effect model was used to pool effect sizes, and a Mantel-Haenszel test was used to test for heterogeneity.

How were differences between studies investigated?
The results of the studies were examined by type of garlic preparation, type of participants, dosage and duration of treatment, and methodological quality. Trials of non-powder preparations showed significant heterogeneity and were excluded from some analyses.
**Results of the review**
Sixteen RCTs were included: 5 of non-powder garlic preparations and 11 of garlic powder preparations.

Mean difference in reduction of serum total cholesterol (mmol/l) between garlic-treated patients and those receiving a placebo or avoiding garlic.

All preparations: -0.77 (95% confidence interval, CI: -0.65, -0.89); 12% reduction with garlic. Garlic powder preparations: -0.51 (95% CI: -0.33, -0.69); 8% reduction with garlic. Non-powder preparations: -0.99 (95% CI: -0.83, -1.16), but significant heterogeneity was observed; 15% reduction with garlic.

The reduction in cholesterol appears to increase with the duration of the trial.

No increase in adverse effects was observed in the garlic groups.

**Authors' conclusions**
Garlic, in powder or non-powder form, can significantly lower serum lipid levels over a 1- to 3-month period. Garlic is not a licensed medication, and there is insufficient evidence to recommend garlic therapy as an effective lipid-lowering treatment for routine clinical use. More rigorously-designed and analysed trials are required.

**CRD commentary**
The authors note that the total number of patients involved in RCTs of garlic therapy is only 1,365. The methodological quality of the primary studies reported in this review was generally quite poor. The direction of the findings of this review is consistent with that reported in RCTs excluded from this review because of insufficient duration or insufficient data.

**Implications of the review for practice and research**
The available data suggest that garlic therapy, at least over a few months, may have beneficial effects on coronary heart disease due to its effect on cholesterol levels.

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