

Garlic (*Allium sativum*)

History

- Garlic is one of the oldest herbal remedies. Ancient Egyptians' use of garlic is described on the walls of ancient temples and papyrus dating to 1500B.C.
- In the Middle Ages garlic was used to ward off the evil eye, witches and vampires.
- The English word garlic is derived from the Anglo-Saxon 'gar-leac' or spear plant, referring to it's flowering stalk. The bulb is the part used medicinally.

Most studied use

Cholesterol lowering, treatment of hypertension.

Other common uses

Ear infections, URI's, topical fungal infections, diarrhea, arthritis.

Summary of the evidence

- Garlic is probably superior to placebo in reducing cholesterol, although the size of the effect is likely modest, and it may not be durable with long-term use. Its clinical usefulness is limited by malodorous breath.
- The effectiveness of using garlic for peripheral vascular disease, hypertension, and the prevention of myocardial infarction has not been supported by solid scientific research.
- May increase bleeding in patients undergoing surgery or in those on anticoagulants.
- Other potential drug interactions include the loss of efficacy of cyclosporine and lower levels of antiviral HIV drugs.

Pharmacology

- Effects have been most attributed to allicin, ajoene and other organo-sulfur constituents e.g. S-allyl cysteine.
- Dried powdered garlic contains approximately 1% alliin which is broken down to allicin when the garlic bulb is crushed or cut. (Allicin gives the garlic odor). Further conversion yields ajoene.
- Aged garlic (to reduce the odor) or steam-distilled garlic (to produce garlic oil) denatures allicin and thus decreases activity. Aged garlic and garlic oil do not contain significant amounts of alliin or allicin and as a result do not have as much physiologic activity as fresh garlic or garlic powder.

Mechanism of action

- Garlic's lipid lowering effects are thought to be due to diallyl disulfide, a decomposition product of allicin, which might lower cholesterol levels by acting as a HMG-CoA reductase inhibitor (statin).
- Garlic powder and aged garlic have been found to increase fibrinolysis and decrease platelet aggregation. Raw garlic has more potent antiplatelet effects than cooked garlic.

Clinical studies

- A large RCT published in JAMA (Berthold 1998) tested garlic oil for cholesterol lowering and showed no effect. Garlic oil does not contain allicin, however, which is the active ingredient in garlic powder.
- One recent meta-analysis found 13 trials which met inclusion criteria. (Stevinson 2000). Garlic significantly reduced total cholesterol by a mean of -16 mg/dL. Several of these studies had serious methodological flaws, however.
- Another recent meta-analysis also found that garlic led to small reductions in total cholesterol at 1-3 months (range 1-25 mg/dL), but not at 6 months. Parallel reductions were seen in LDL with no change in HDL. (Ackermann 2001)
- The magnitude of cholesterol lowering seen in these trials is only a fraction of the lipid lowering typically found with statin drugs.
- Trials have reported much more mixed effects on blood pressure and no effects on serum glucose. (Ackermann 2001)

Adverse effects

- By far the most common and bothersome side effect is malodorous breath and body odor, both of which are quite pronounced at the doses needed to see significant cholesterol lowering effects.
- Methods of preparation designed to lessen malodor also lessen effectiveness.
- Other possible adverse effects are heartburn, flatulence, nausea, and diarrhea.

Contraindications/cautions

- High doses of garlic can cause prolonged bleeding so repeated high doses should be avoided for 2 weeks prior to surgery.

Important drug/herb interactions

- Warfarin: anticoagulant activity may be enhanced.
- Cytochrome P450 3A4: may cause induction of this enzyme resulting in enhanced metabolism and so decreased effectiveness of many drugs including:
 - Cyclosporine with subsequent organ transplant rejection
 - Antiviral HIV drugs such as protease inhibitors with subsequent development of viral resistance.

Formulation and dosage

- Garlic tablets standardized to 0.5% to 1.35 alliin: 600-900 mg daily divided tid.
- Garlic powder: 0.4-1.2 grams daily divided into three doses.
- Kwai is a brand most tested in studies.
- Aging of preparations designed to reduce odor also likely significantly reduces efficacy.

References

1. Berthold HK, et al. Effect of a garlic oil preparation on serum lipoproteins and cholesterol metabolism: a randomized controlled trial. *JAMA* 1998;279:1900-2.
2. Stevinson C, et al. Garlic for treating hypercholesterolemia. A meta-analysis of randomized clinical trials. *Ann Intern Med.* 2000 Sep 19;133(6):420-9 9.
3. Ackermann RT, et al. Garlic shows promise for improving some cardiovascular risk factors. *Arch Intern Med.* 2001 Mar 26;161(6):813-24

For Additional Information

1. Natural Medicines Comprehensive Database. Available through UW Healthlinks.
2. About Herbs. <http://www.fammed.washington.edu/predoctoral/CAM/sites.html>.
3. Herbmed.org for more general background.
4. For information about the quality of specific brands, check Consumerlabs.com.

