

## Garlic (*Allium sativum* L.)

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While some complementary and alternative techniques have been studied scientifically, high-quality data regarding safety, effectiveness, and mechanism of action are limited or controversial for most therapies. Whenever possible, it is recommended that practitioners be licensed by a recognized professional organization that adheres to clearly published standards. In addition, before starting a new technique or engaging a practitioner, it is recommended that patients speak with their primary healthcare provider(s). Potential benefits, risks (including financial costs), and alternatives should be carefully considered. The below monograph is designed to provide historical background and an overview of clinically-oriented research, and neither advocates for or against the use of a particular therapy.

### Related Terms:

- Aged garlic extract (AGE), ajoene, alisat, alk(en)yl thiosulfates, allicin, Allicor®, Allii sativi bulbus, alliinase, allium, allitridium, allyl mercaptan, alubosa elewe, *Amaryllidaceae* (family), ayo-ishi, ayu, banlasun, camphor of the poor, clove garlic, da-suan, dai toan, dasuan, dawang, diallyl, diallyl disulphide (DADS), diallyl sulfide (DAS), diallyl sulphide, diethyl disulfide, diethyl hexasulfide, diethyl monosulfide, diethyl pentasulfide, diethyl tetrasulfide, diethyl trisulfide, dipropyl disulphide, dipropyl sulphide, dra thiam, (E)-ajoene, foom, garlic clove, garlic corns, garlic extract, garlic oil, garlic powder extract, Gartenlauch, hom khaao, hom kia, hom thiam, hua thiam, Karinat® (beta-carotene 2.5mg, alpha-tocopherol 5mg, ascorbic acid 30mg and garlic powder 150mg per tablet), kesumphin, kitunguu-sumu, knoblauch, kra thiam, Krathiam, krathiam cheen, krathiam khaao, Kwai®, Kyolic®, l'ail, lahsun, lai, la-juan, lasan, lashun, la-suan, lasun, lasuna, lauch, lay, layi, lehsun, lesun, Liliaceae (family), lobha, majo, methyl allyl, naharu, nectar of the gods, Ninniku, pa-se-waa, poor man's treacle, rason, rasonam, rasun, rust treacle, rustic treacles, S-alk(en)yl cysteine sulfoxide, S-allylcysteine (SAC), seer, skordo, sluon, stinking rose, sudulunu, tafanuwa, ta-suam, ta-suan, tellagada, Tellagaddalu, thiam, thioallyl derivative, thiosulfates, toi thum, tum, umbi bawang putih, vallaippundu, Velluli, vellulli, verum, vinyl dithiin, vinylthiin, (Z)-ajoene.

### BACKGROUND

- Numerous controlled trials have examined the effects of oral garlic on serum lipids. Long-term effects on lipids or cardiovascular morbidity and mortality remain unknown. Other preparations (such as enteric-coated or raw garlic) have not been well studied.
- Small reductions in blood pressure (<10mmHg), inhibition of platelet aggregation, and enhancement of fibrinolytic activity have been reported, and may exert effects on cardiovascular outcomes, although evidence is preliminary in these areas.
- Numerous case-control/population-based studies suggest that regular consumption of garlic

(particularly unprocessed garlic) may reduce the risk of developing several types of cancer, including gastric and colorectal malignancies. However, prospective controlled trials are lacking.

- Multiple cases of bleeding have been associated with garlic use, and caution is warranted in patients at risk of bleeding or prior to some surgical/dental procedures. Garlic does not appear to significantly affect blood glucose levels.

**SCIENTIFIC EVIDENCE**

<b>Uses</b>	<b>Grade*</b>

<p><a href="#"><u>Cryptococcal meningitis</u></a></p> <p>Preliminary study documented potential benefits of oral plus intravenous garlic in the management of cryptococcal meningitis. Further research is needed before recommending for or against the use of garlic in the treatment of this potentially serious condition, for which other treatments are available.</p>	<u>C</u>
<p><a href="#"><u>Familial hypercholesterolemia</u></a></p> <p>Familial hypercholesterolemia is a genetic disorder in which very high cholesterol levels run in families. Research in children with an inherited form of high cholesterol suggests that garlic does not have a large effect in lowering cholesterol levels in these patients.</p>	<u>C</u>
<p><a href="#"><u>Heart attack prevention in patients with known heart disease</u></a></p> <p>It is not clear if garlic prevents future heart attacks in people who have already had a heart attack. The effects of garlic on cholesterol levels may be beneficial in such patients.</p>	<u>C</u>
<p><a href="#"><u>High blood pressure</u></a></p> <p>Numerous human studies report that garlic can lower blood pressure by a small amount, but larger, well-designed studies are needed to confirm this possible effect.</p>	<u>C</u>
<p><a href="#"><u>Peripheral vascular disease (blocked arteries in the legs)</u></a></p> <p>Some human studies suggest that garlic may improve circulation in the legs by a small amount, but this issue remains unclear. Better-designed studies are needed.</p>	<u>C</u>
<p><a href="#"><u>Tick repellent</u></a></p> <p>In early study, self-reports of tick bites were significantly less in people receiving garlic over a placebo "sugar" pill. Further well designed study is needed to confirm these results.</p>	<u>C</u>
<p><a href="#"><u>Upper respiratory tract infection</u></a></p> <p>Preliminary reports suggest that garlic may reduce the severity of upper respiratory tract infections. However, this has not been demonstrated in well-designed human studies.</p>	<u>C</u>
<p><a href="#"><u>Diabetes</u></a></p> <p>Animal studies suggest that garlic may lower blood sugar and increase the release of insulin, but studies in humans do not confirm this effect.</p>	<u>D</u>
<p><a href="#"><u>Stomach ulcers caused by Helicobacter pylori bacteria</u></a></p>	<u>n</u>

Early studies in humans show no effect of garlic on gastric or duodenal ulcers.

\*[Key to grades](#): **A**: Strong scientific evidence for this use; **B**: Good scientific evidence for this use; **C**: Unclear scientific evidence for this use; **D**: Fair scientific evidence against this use (it may not work); **F**: Strong scientific evidence against this use (it likely does not work).

## TRADITION/THEORY

The below uses are based on tradition, scientific theories, or limited research. They often have not been thoroughly tested in humans, and safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider. There may be other proposed uses that are not listed below.

- Abortion, age-related memory problems, AIDS, allergies, amoeba infections, anti-bacterial, antioxidant, antitoxin, anti-viral, aphrodisiac, atrophic gastritis, arthritis, ascariasis (worms in the gut or liver), asthma, athlete's foot, benign breast disease, bile secretion problems, bladder cancer, bloody urine, breast fibromatosis, bronchitis, cholera, claudication (leg pain due to poor blood flow), colds, cough, cytomegalovirus infection, dental pain, digestive aid, diphtheria, diuretic (water pill), dysentery, dysmenorrhea (painful menstruation), earache, fatigue, fever, gallstones, hair growth, headache, heart rhythm disorders, hemorrhoids, hepatopulmonary syndrome, HIV, hormonal effects, immune system stimulation, improved digestion, induction of vomiting, inflammation, inflammatory bowel disease, influenza, kidney problems, kidney damage from antibiotics, leukemia, liver health, liver tumors, malaria, mucous thinning, muscle spasms, nephrotic syndrome, obesity, parasites and worms, perspiration, pneumonia, premenstrual syndrome (PMS), psoriasis, Raynaud's disease, ringworm (*Tinea corpori*, *Tinea cruris*), sedative, sinus decongestant, snake venom protection, spermicide, stomach ache, stomach acid reduction, stomach lining protection, stress (anxiety), stroke, thrush, toothache, traveler's diarrhea, tuberculosis, urinary tract infections, vaginal trichomoniasis, typhus, urinary tract infections, vaginal irritation, warts, well-being, whooping cough.

## DOSING

The below doses are based on scientific research, publications, traditional use, or expert opinion. Many herbs and supplements have not been thoroughly tested, and safety and effectiveness may not be proven. Brands may be made differently, with variable ingredients, even within the same brand. The below doses may not apply to all products. You should read product labels, and discuss doses with a qualified healthcare provider before starting therapy.

### Adults (18 years and older)

- Human studies report the use of 4-12.3 milligrams of garlic oil by mouth daily. Some sources report that steam-distilled oils, oil from crushed garlic, and aged-garlic in alcohol may be less effective for some uses, particularly as a blood thinner.
- 600 to 900 milligrams daily of non-coated, dehydrated garlic powder in three divided doses,

standardized to 1.3% allicin content, has been used in human studies. The European Scientific Cooperative on Phytotherapy (ESCOP) recommends 3 to 5 milligrams allicin daily (1 clove or 0.5 to 1.0 gram dried powder) for prevention of atherosclerosis. The World Health Organization (WHO) recommends 2 to 5 grams fresh garlic, 0.4 to 1.2 grams of dried powder, 2 to 5 milligrams oil, 300 to 1,000 milligrams of extract, or other formulations that are equal to 2 to 5 milligrams of allicin daily.

- The European Scientific Cooperative on Phytotherapy (ESCOP) recommends 2 to 4 grams of dried bulb or 2 to 4 milliliters of tincture (1:5 dilution in 45% ethanol), by mouth three times a day for upper respiratory tract infections.

### **Children (younger than 18 years)**

- Safety or effectiveness of garlic supplements has not been proven in children. Garlic in amounts found in food is likely safe in most children.

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## **SAFETY**

The U.S. Food and Drug Administration does not strictly regulate herbs and supplements. There is no guarantee of strength, purity or safety of products, and effects may vary. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy. Consult a healthcare provider immediately if you experience side effects.

### **Allergies**

- People with a known allergy to garlic, any of its ingredients, or to other members of the Liliaceae (lily) family, including hyacinth, tulip, onion, leek, and chives, should avoid garlic. Allergic reactions have been reported with garlic taken by mouth, inhaled, or applied to the skin. Some of these reactions are severe including throat swelling and difficulty breathing (anaphylaxis). It has been suggested that some cases of asthma from inhaling garlic may be due to mites on the garlic. Fresh garlic applied to the skin may be more likely to cause rashes than garlic extract.

### **Side Effects and Warnings**

- Bad breath, body odor, and allergic reactions are the most common reported side effects of garlic. Fresh garlic has caused rash or skin burns, both in people taking garlic therapy and in food preparers handling garlic. Most reactions improve after stopping garlic therapy. Garlic products should not be applied to the skin of infants or children due to multiple reports of skin burns, and should be used cautiously in adults. Other reported side effects include dizziness, increased sweating, headache, itching, fever, chills, asthma flares, and runny nose.
- Bleeding is a potentially serious side effect of garlic use, including bleeding after surgery and spontaneous bleeding. Several cases of bleeding are reported, which may be due to effects of garlic on blood platelets, or to increased breakdown of blood clots (fibrinolysis). There is debate about the effects of garlic in people treated with warfarin (Coumadin®), but studies suggest that garlic does not alter the International Normalized Ratio (INR) values that are used to measure the effect of warfarin on blood thinning. Garlic should be stopped prior to some surgical or dental procedures due to an increased risk of bleeding. Caution is urged for

people who have bleeding disorders or who take blood thinning medications (anticoagulants, aspirin/anti-platelet agents, non-steroidal anti-inflammatory drugs such as ibuprofen or naproxen) or herbs/supplements that may increase the risk of bleeding. Dosing adjustments may be necessary.

- Garlic or its ingredients may lower blood sugar levels and increase the release of insulin. However, studies in humans do not show changes in blood sugar control in people with or without diabetes. Nonetheless, caution is advised in people with diabetes or hypoglycemia, and in those taking drugs, herbs, or supplements that affect blood sugar. Blood sugar levels may need to be monitored by a healthcare professional, and medication adjustments may be necessary. Informal reports describe low iodine absorption in the thyroid and low levels of thyroid hormone (hypothyroidism) with garlic supplementation. A few reports suggest that garlic and garlic-like plants may be linked to nodules or tumors of the thyroid. Reduced sperm counts have been reported in rats.
- Dehydrated garlic preparations or raw garlic taken by mouth may cause burning of the mouth, bad breath, abdominal pain or fullness, poor appetite, gas, belching, nausea, vomiting, irritation of the stomach lining, changes in the bacteria in the gut, heartburn, diarrhea, or constipation. One report describes bowel obstruction in a man who ate a whole garlic bulb. Garlic should be used cautiously by people with stomach ulcers or who are prone to stomach irritation.
- Multiple studies show a small reduction in blood cholesterol levels after garlic supplements are taken by mouth. Small reductions in blood pressure are also commonly reported. One case of heart attack is noted in a healthy man after taking a large amount of garlic by mouth.
- Contamination of garlic products has been reported.
- In Vancouver, British Columbia, a commercial preparation of chopped garlic was linked to botulism. One report describes overdose of colchicine and even death after meadow saffron (*Colchicum autumnale*) was mistaken for wild garlic (*Allium ursinum*).
- Garlic and pycnogenol have been shown to increase human growth hormone secretion in laboratory experiments.

### **Pregnancy and Breastfeeding**

- Garlic is likely safe during pregnancy in amounts usually eaten in food, based on historical use. However, garlic supplements or large amounts of garlic should be avoided during pregnancy due to a possible increased risk of bleeding. In addition, early animal studies suggest that garlic may cause contraction of the uterus. Many tinctures contain high levels of alcohol, and should be avoided during pregnancy.
- Garlic is likely safe during breastfeeding in amounts usually eaten in food, based on historical use. However, some mothers who take garlic supplements report increased nursing time, milk odor, and reduced feeding by the infant. The safety of garlic supplements during breastfeeding is not known.

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### **INTERACTIONS**

Most herbs and supplements have not been thoroughly tested for interactions with other herbs, supplements, drugs, or foods. The interactions listed below are based on reports in scientific publications,

laboratory experiments, or traditional use. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy.

### **Interactions with Drugs**

- Human reports suggest that garlic may increase the risk of bleeding when taken with drugs that also increase the risk of bleeding. Examples include aspirin, anticoagulants ("blood thinners") such as warfarin (Coumadin®) or heparin, anti-platelet drugs such as clopidogrel

### **Interactions with Herbs and Dietary Supplements**

- Garlic and pycnogenol have been shown to increase human growth hormone secretion in laboratory experiments. Effects of herbs and supplements that act on the thyroid may be affected by garlic.

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#### AUTHOR INFORMATION

- This information is based on a systematic review of scientific literature edited and peer-reviewed by contributors to the Natural Standard Research Collaboration ([www.naturalstandard.com](http://www.naturalstandard.com)).

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#### REFERENCES

Natural Standard developed the above evidence-based information based on a thorough systematic review of the available scientific articles. For comprehensive information about alternative and complementary therapies on the professional level, go to [www.naturalstandard.com](http://www.naturalstandard.com). Selected references are listed below.

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