



Unlocking the Therapeutic Potential of Garlic: A Comprehensive Review

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ABSTRACT:

Garlic (*Allium sativum* Linn) belongs to the family Amaryllidaceae it is the second most important bulb crop after onion. The plant is native to central Asia but grows wild in Italy and Southern France, it is a classic ingredient in many national cuisines. Garlic products are used as sources of medicine in many ways in human beings in their day today's life. Garlic is among the oldest known horticultural crops. In the old world, Egyptian and Indian cultures referred to garlic 5000 years ago and there is clear historical evidence for its use by the Babylonians 4500 years ago and by the Chinese 2000 years ago. Garlic is most commonly promoted as a dietary supplement for conditions related to the heart and blood vessels, including high blood cholesterol and high blood pressure. Fresh garlic, garlic powder and garlic oil are used to flavour foods. Garlic is applied on the skin. Garlic extract has antimicrobial activity against many genera of bacteria, fungi and viruses. Garlic contains antioxidant, anti-inflammatory, lipid-lowering, allicin properties, and higher concentration of sulphur compounds which are responsible for its medicinal effects. The chemical constituents of garlic have also been investigated for treatment of cardiovascular disease, cancer, diabetes, blood pressure and atherosclerosis. This review paper describes the health benefits of the Garlic and its Therapeutic Potential.

Keywords: Garlic Antibacterial, Antifungal, Antioxidant, Anti-cancer, properties.

[1] INTRODUCTION

The botanical name of garlic is "*Allium sativum*". Garlic is the edible bulb from a perennial plant in the Amaryllis family (Amaryllidaceae) grown for its flavourful bulbs. It was traditionally used for health purposes by people in many parts of the world, including the Egyptians, west of the Himalayas, Greeks, Romans and Japanese. It is now widely cultivated all over the world. The plant is native to central Asia but grows wild in Italy and southern France and is a classic ingredient in many national cuisines. Garlic is a common food for flavour, spice and it is one of the herbs most commonly used in modern folkloric medicine. The early Egyptians used garlic to treat diarrhoea and its medical power was described on the walls of ancient temples and on papyrus dating to 1500 BC. Garlic is considered as pungent bulb we use in cooking, which is more than just a flavour enhancer. It's packed with a variety of interesting compounds. When you crush garlic, it releases allicin, a sulphur-containing amino acid. This is what gives garlic its characteristic strong odour. And, importantly, allicin is believed to be responsible for many of garlic's beneficial pharmacological properties. Garlic also provides essential minerals like germanium, magnesium, selenium, and zinc. And it contains vitamins, specifically vitamin A and vitamin C. In 1858, Pasteur noted garlic's antibacterial activity, and it was used as an antiseptic to prevent gangrene during World War I and World War II. Garlic's current principal medicinal uses are to prevent and treat cardiovascular disease by lowering blood pressure and cholesterol, as an antimicrobial and as a preventive agent for cancer. The active constituents are several complex sulphur-containing compounds that are rapidly absorbed, transformed and metabolised. Garlic is a bulbous perennial herb, closely related to the onion. The plant has pink or purple flowers that bloom in mid to late summer. It has tall, erect flowering stem that reaches two-three feet high. The part used medicinally is the bulb. European standards specify that garlic supplements contain not less than 0.45% allicin. (Bradley, 1992).

GEOGRAPHICAL SOURCE: Central Asia, Southern Europe, India, USA.

CHEMICAL CONSTITUENTS

Garlic is a complex mix of water, carbohydrates, sulfur compounds, minerals and vitamins, all working together to give it its unique character and potential health benefits. S-propyl-cysteine-sulfoxide (PCSO) allicin and S-methyl cysteine-sulfoxide (MCSO) are the main odoriferous molecules of freshly milled garlic homogenates. Alliin is odorless sulfur containing chemicals which is derived from the amino acid cysteine. When garlic bulbs are crushed, Alliin is converted into another compound called Allicin. Garlic is a valuable source of macro- and microelements, especially potassium, calcium, magnesium, phosphorus, ferrum, manganese, selenium, vanadium, copper and zinc. Diallyl sulphide and allyl mercaptan have anticancer properties, garlic bulb have Antibacterial, Antifungal, Antiinflammatory, Antioxidant properties. Although allicin is considered the major antioxidant and scavenging compound, recent studies showing that other compounds may play stronger roles, such as polar compounds of phenolic and steroidal

origin, which offer various pharmacological properties without odour and are also heat stable. Allicin, which was first chemically isolated in the 1940, has antimicrobial effects against many viruses, bacteria, fungi and parasites. Beyond allicin, garlic contains a range of other substances. It's mostly water, about 65%, with carbohydrates making up a significant portion, around 28%. You'll also find about 2.3% organosulfur compounds, which contribute to its distinctive smell and potential health benefits. There's also a small amount of volatile oil, about 0.5%, which is a mixture of sulfur-containing compounds. Additionally, garlic contains about 2% proteins, 1.2% free amino acids, mostly arginine, 1.5% fiber, 0.15% lipids, 0.08% phytic acid, and 0.07% saponins.

[2] HEALTH BENEFITS:

Garlic has been part of the kitchens for centuries. This herb has curative and medicinal properties because of its antibacterial and antiseptic nature. The beneficial properties of garlic are because of a compound, Allicin. It is rich in minerals like phosphorus, zinc, potassium, and magnesium. Vitamins C, K, Folate, niacin and thiamine also are found abundantly in garlic.

2.1) The Role of Garlic in Cardiovascular disease:-

Garlic has a beneficial effect on platelet adhesion or aggregation, a potential risk factor for cardiovascular disease. Allicin is odorless sulfur which is converted into another compound called Allicin and Allicin further broken down to another compound called Ajoene, which may be the substance that inhibits blockage in blood vessels from clots and atherosclerosis. The self-condensation products of allicin and ajoenes are said to have antithrombotic action, in addition to its potential effect in the inhibition of platelet aggregation. The two greatest means of heart disease are high blood pressure and high blood serum cholesterol levels, which are directly impacted by the therapeutic action of garlic. The relevant role of garlic in coronary heart disease was done on rabbits and found that even pre-existing athero-sclerotic deposits and lesions could actually be reversed if garlic was consistently consumed. Regular consumption of garlic reduces the incidence of blood clots and thus helps prevent thromboembolism. Garlic also lowers blood pressure so is good for patients with hypertension. (Bordia, 1981)

2.2) Anticancer:-

Garlic and its derived components potentially reduced the progression of tumour in animal models and suppressed cancer cell growth. In conventional medicine, *Allium sativum* is used to prevent, and treat a number of malignancies, including cancers of blood, breast, prostate, ovarian, gastrointestinal. Human population studies have shown that regular intake of garlic reduces the risk of esophageal, stomach and colon cancer and plays a great role in cancer prevention especially in relation to digestive tract cancers. Dutch research in the Netherlands cohort study found a significant decrease in the development of stomach cancer in those consuming garlic close relatives of onions. Garlic reduces the risk of patients with prostate cancer, especially those with localised disease. A very important epidemiological study for Americans has been published in which the intake of 127 foods (including 44 vegetables and fruits) was determined in 41,387 women (ages 55 to 69) followed by a five year monitoring of colon cancer incidence. The most striking result of this "Iowa Women's Health Study" was the finding that garlic was the only food which showed a statistically significant association with decreased colon cancer risk. (Dorant et al., 1996)

2.3) Antibacterial:-

The antibacterial activity of garlic is widely attributed to allicin. It is known that allicin has sulfhydryl modifying activity and is capable of inhibiting sulfhydryl enzymes. Allicin is not present in raw garlic. It is formed rapidly by the action of the enzyme, alliinase. Generally garlic is a potential antibiotic and shows an effective performance against the bacteria resistant to pharmaceutical antibiotics. In 1970's, Europeans tested the garlic extract on 10 species resistant to bacteria and yeasts and found it very resistant to Salmonella, S. Garlic extract inhibits the growth of Gram positive and Gram negative bacteria such as Staphylococcus, Streptococcus, Micrococcus, Enterobacter, Escherichia, Klebsiella, Lactobacillus, Pseudomonas, Shigella, Salmonella, Proteus and Helicobacter pylori. The antibacterial activity was also shown against other types of pathogenic bacteria such as methicillin-resistant Staphylococcus aureus (MRSA), Salmonella enteritidis and Candida albicans. Thus, the practical use of garlic powder is expected to prevent bacteria-caused food poisoning. The disadvantage of this approach is that allicin can react with water to form diallyl disulphide, which does not exhibit the same level of antibacterial activity of allicin (Lawson and Wang, 1996).

2.4) Antioxidant:-

Garlic is known to contain natural antioxidants that can remove reactive oxygen species (ROS) and reduce lipid peroxides and low-density lipoprotein (LDL) oxidation. Researchers have widely believed that the organic compound allicin – which gives garlic its aroma and flavour – acts as the world's most powerful antioxidant. Garlic contains antioxidants that support your body's protective mechanisms against oxidative damage. Research suggests these antioxidants may significantly reduce oxidative stress and lower your risk of related diseases like Alzheimer's disease, the most common form of dementia. Other garlic constituents such as S-allyl cysteine also confirmed significant antioxidant effects. The sulphur compounds found in fresh garlic appear to be nearly 1000 times more potent as antioxidants than crude, aged garlic extract.

2.5) Immunity Booster:-

Garlic has been used as an antiseptic, antibacterial and antifungal agent. It may help the body resist or destroy viruses and other microorganisms. It does this by boosting the immune system. Garlic is also claimed to fight infections. Garlic protects against free radicals and prevents damage to the DNA. Zinc in garlic promotes immunity. Vitamin C helps to fight off infections. It is very beneficial against eye and ear infections as it has antimicrobial properties. Garlic's high sulphur content explains the bulb's benefit as a cold and flu fighter. The sulphur in garlic helps your body absorb the trace element zinc, which is an immunity booster. Preliminary studies in humans using an alliin standardized garlic powder preparation have demonstrated positive effects on immune reactions and phagocytosis.

2.6) Improves Digestion:-

Eating raw garlic helps to clear out intestinal worms. The good thing is that it destroys the bad bacteria and protects the good bacteria in the gut. It is beneficial for the intestine and reduces inflammation. People take garlic to assist with indigestion, irritable bowel syndrome (IBS), gastroesophageal reflux disease (GERD), nausea and several other issues. Although garlic has many health benefits, doctors generally don't recommend eating garlic if you have acid reflux. Simran Saini, Delhi-based nutritionist and weight loss consultant says, "The high sulphur content in garlic gives it antibiotic properties, helping keep the digestive system clean by flushing out toxins. It also builds the immunity against common cold and prevents heart ailments by clearing up blocked arteries.

2.7) Improves Brain Functioning:-

Garlic promotes brain health because of its antioxidant and anti-inflammatory, anticancer properties. It is effective against neurodegenerative diseases like Alzheimer's and dementia. Chronic garlic administration has been shown to enhance memory function. Evidence also shows that garlic administration in rats affects brain serotonin (5-hydroxytryptamine [5-HT]) levels. 5-HT, a neurotransmitter involved in a number of physiological functions. It is also known to enhance cognitive performance. The sulphur in garlic makes it a metabolic stimulant while the oil in garlic is nutritive. This nutritive quality makes garlic a go-to for cases of sympathetic excess where there is nervousness, anxiety, insomnia and weight loss.

2.8) Reduce Stress and Anxiety:-

Among the many uses of garlic, it appears to have the fortunate capacity for protecting against the negative effects of stress that affects the autonomic nervous and neuroendocrine system. The sulphur of Garlic reduces anxiety, stress. Garlic is high in sulphur compounds that help increase levels of glutathione. This antioxidant is part of your body's first line of defence against stress, reduces the symptoms of anxiety and depression. Garlic may reduce stress in the brain. A promising 2018 study conducted in animals (Archives of Physiology and Biochemistry) found that after a 10-day diet of added garlic, the rats in the trial showed less physical symptoms of depression and anxiety and lower levels of stress markers in the brain.

[3]CONCLUSION:

Garlic has been used as a food and as a medicinal herb for thousands of years, because of its antioxidant, antibacterial, anti-inflammatory, anticancer properties. As per the study on current trends, garlic use can be expected to continue to expand. This review paper demonstrated some of the health benefits of garlic for its potential uses in preventing and curing different diseases, and acting as antioxidant for many radicals. The unique flavour and aroma of garlic have inspired countless culinary dishes and remedies for treating numerous medical conditions.

So, garlic is more than just a flavorful addition to your food. Research tells us it actually has some pretty interesting health benefits. The main reason for this is a compound called allicin, which is what gives garlic its distinctive smell. Basically, studies have shown that garlic can be really good for your heart. It seems to help lower blood pressure and cholesterol, which can reduce your risk of heart disease. We can think of it as a natural way to support your cardiovascular system. Also, it can give your immune system a boost. So, we might find you're less likely to catch a cold or the flu if we regularly include garlic in your diet. It's like a little natural shield, garlic's also packed with antioxidants. These help protect your cells from damage, which can contribute to long-term health. Now, some research even suggests that garlic might have some anticancer properties, but we definitely need more studies to confirm that. And there's some evidence that it might be good for your bones and brain too, but again, more research is needed. But here's the important thing: garlic is not a replacement for medicine. If we have a health condition, we absolutely need to see a doctor. And everyone reacts differently to garlic, so what works for one person might not work for another. If we're thinking about taking garlic supplements, it's always best to talk to your doctor first. So, in short, garlic is a promising natural food with some great potential health benefits. It's best incorporated into a balanced diet, and not relied on as a cure-all.

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