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*Editorial*

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# Is Garlic a Wonder Plant?

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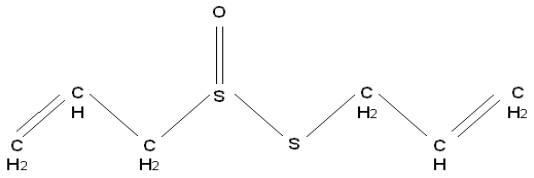
The term wonder drug was coined for aspirin, acetylsalicylic acid, for decades – because of its benefits in alleviating many health problems, conditions and symptoms. Aspirin is easily synthesized and its price is very affordable worldwide. Ancient cultures relied on the use of traditional medicines for alleviating and treatment of many human ailments. Most of these folkloric remedies utilized different types of plants as a whole or some of their parts. With advancements in analytical techniques, many compounds that are of bioactive properties; such as those containing sulfur, flavonoids, and other phenolic compounds, have been discovered in plants. Some of food items of a plant origin contain such compounds, thus became known as functional foods. Functional foods are described as: natural or processed foods that contain known or unknown biologically-active compounds – which, in defined amounts, provide clinically-proven and documented health benefits for the prevention, management, or treatment of chronic diseases. The pharmaceutical industry develops and manufactures drugs on which modern medicine relies for treating different ailments and diseases. The association between sound nutrition and general health has been established long ago; thus, dietary aspects can be viewed as the modifiable factor for healthy human existence. Recent trend indicates that functional foods of health-protective and medicinal value have caught the attention of nutritionists, physicians and many health care professionals. One of the most recognized functional food items is garlic.

Garlic (*Allium sativum*) is a perennial herb that belongs to the Liliaceae family, which shares relationship with onion (*Allium cepa*).[1] The fully-grown garlic plant reaches a height of 50-60 cm and bears underground bulbous root containing about 8-20 segments that are known as cloves, which constitute the edible part. Garlic is abundantly available and is considered to be a common ingredient in the human diet all over the world. It is can be eaten fresh, in salads and in the preparation of meals for its pungency and flavoring value. Garlic has always been mentioned in the literature of all ancient world cultures and kingdoms as having beneficial effects on health and was included in their medicinal remedies. Nowadays, for health-protective effects or for relief of some conditions and symptoms, several preparations of garlic are available in the market for the public, particularly in health food stores.

From a nutritional standpoint, garlic contains some amounts of the 3 energy generating nutrients and significant amounts of others - such as: manganese, calcium, phosphorus, copper, sodium, selenium, the amino acid tryptophan, and vitamins $B_1$, $B_6$ and vitamin C. It also possesses a number of compounds that are not classified as nutrients, but known as phytochemicals, for which reported health benefits are also attributed. The main phytochemicals in garlic are alliin, methiin and S-allylcysteine. When garlic is damaged or crushed, different organosulfur compounds result. For example, enzymes in fresh garlic convert alliin into another compound known as allicin, which is potent for a very short time when exposed to air - thus, it will lose its biological effectiveness.




**Structure of allicin**

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In contrast, the compound known as S-allylcysteine is more stable and can be bioavailable when properly preserved.

Garlic has been studied extensively; thus, the literature on many aspects of its composition, benefits and possible adverse effects is very vast.[2] Experimental studies either used commercially-available preparations or prepared their own for their purpose. In addition to aqueous garlic homogenates and aqueous extracts used in several studies, there are four main known preparations of garlic, with the following brief descriptions:

- Garlic oil: prepared by steam distillation processing, where water-soluble compounds are eliminated – including allicin.
- Garlic oil macerate: are made of encapsulated mixtures of whole cloves that are ground into vegetable oil. This preparation contains allicin and all other constituents of garlic.
- Garlic powder: where garlic cloves are sliced or crushed, dried and then pulverized into powder. The main sulfur compound in this preparation is allicin.
- Aged Garlic Extract (AGE)[3]: where sliced raw garlic is stored in 15-20% ethanol for 20 months. This process reduces the content of allicin, but preserves other effective sulfur-containing compounds.

Because of some discrepancy among research data, mainly attributed to the garlic preparation type used, there is a need to standardize such preparations for better-controlled experiments and clinical trials. While many benefits of garlic have been scientifically confirmed and reported, there is still more research to be carried out. In general, more clinical trials for considerable durations that cover many aspects of health and disease are to be conducted, so that the pool of data can be analyzed for conclusive evidence. Many researchers expressed the urge for clinical trials that involve long-term supplementation with garlic in relation to cancer of the stomach, colon and rectum in particular. In addition, pharmaceutical research can emphasize devising ointments and creams that have garlic as an active ingredient for topical applications in skin diseases, and in others that can be beneficial in different medical conditions and symptoms.

Many studies involving the health effects[4] of garlic involved mainly those that relate to cardiovascular diseases and their risk factors.[5] Garlic has been shown to reduce the following blood parameters: systolic and diastolic blood pressure, low-density lipoprotein (LDL) cholesterol, triglycerides, plasma viscosity, and increase red blood cell velocity of the skin. It is considered as an antiplatelet aggregation agent,[6] thus possesses antithrombotic property. Some studies suggested that garlic can be a substitute antithrombotic agent for people who are allergic to or do not tolerate aspirin. Garlic was shown to reduce blood glucose level, thus can be of significance to diabetic patients. Because of its many micronutrients, garlic is considered as an antioxidant agent that has a cell protective property.[7] Such a property involves protection of neural cells, thus can be of benefit to those who may be susceptible to degenerative neuronal diseases such as: Alzheimer's, Parkinson's and Huntington's. Some studies indicated that garlic has a beneficial effect in the protection against cancer and protects the liver from toxins. Additionally, among many of the reported health benefits of garlic are: being a natural antibiotic agent and a remedy for the treatments of colds, coughs, congestion, ear ache, tooth ache, and skin infections. Historically, it was recorded that garlic was used to overcome ring worms in infected individuals.

While many benefits of garlic are now known, it should be noted that those who are allergic to it and those with low blood pressure must refrain from consuming it. For all others, the question of what is the best way to derive the benefit(s) of garlic is posed? While it is now known that different preparations of garlic, as well as the common uses of it in cooking and preparation of meals, can provide benefits at varying degrees – the best is to consume it fresh. The World Health Organization (WHO-UN) and the European Scientific Cooperation on Phytotherapy recommend crushing and ingesting a fresh garlic clove daily, which contains 3-5 mg of allicin. Meanwhile, the National Cancer Institute (USA) does not recommend such - however, it recognizes that garlic as one of the vegetables that have potential anticancer properties. With such reported health benefits of garlic illustrated here in, is it not worthy of being referred to as: the wonder plant?

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