



## ROLE OF GARLIC IN CURE OF HYPERTENSION

Sunita Verma\*

Maharaja Ganga Singh University, Bikaner-334001, India.

\*Author for Correspondence: Sunita Verma

Maharaja Ganga Singh University, Bikaner-334001, India.

Article Received on 04/01/2016

Article Revised on 26/01/2016

Article Accepted on 15/02/2016

### ABSTRACT

Cardiovascular disease like heart attacks and strokes is a major threat for the developed as well as developing world. Garlic has been used as a medicine to prevent or treat a wide range of diseases and conditions. It is used for many conditions related to the heart and blood system. These conditions include high blood pressure, high cholesterol, coronary heart disease, heart attack. Garlic has been shown to inhibit enzymes involved in lipid synthesis, increase antioxidant status, and inhibit angiotension-converting enzyme. The aim of the present study is focus on the crucial role of the important plant of garlic in the cardiovascular diseases.

**KEYWORDS:** lipid synthesis, increase antioxidant status, and inhibit angiotension-converting enzyme.

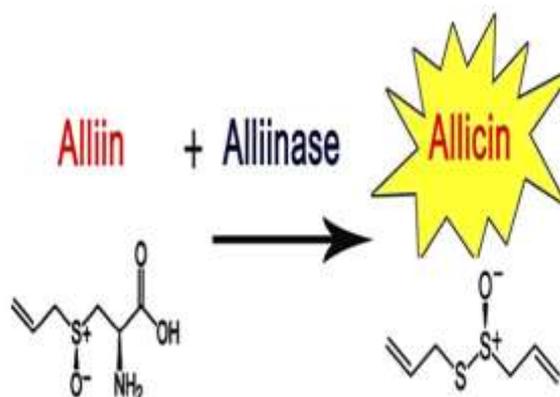
### INTRODUCTION

Hypertension (HTN) is the medical term for high blood pressure. It is dangerous because it makes the heart work too hard and contributes to atherosclerosis (hardening of arteries), besides increasing the risk of heart disease and stroke. Hypertension can also lead to other conditions such as congestive heart failure, kidney disease, and blindness. Currently, the world population is confronted with the rapid emergence of several chronic diseases, including diabetes and high blood pressure, which present economic, as well as a serious current and long-term health problems.<sup>[21]</sup> Worldwide, about 25% of adults have hypertension, and 7 million deaths per year may be contributed to hypertension.<sup>[8]</sup> The World Health Organization (WHO) estimates that 17 million people die of cardiovascular disease annually (MacKay and Mensah, 2004). WHO predicts that deaths due to circulatory system disease are projected to double by 2015.<sup>[17]</sup> Antihypertensive medicine has been widely used, but its high cost has caused heavy economic burden to countries and individuals. In addition, side effects and complications often affect treatment adherence of hypertension patients. As a result, alternative or complementary therapy for hypertension is being explored. Garlic (*Allium sativum* Linn.) is one of those plants that was seriously investigated over the years. Yeh and Liu<sup>[22]</sup> suggested that garlic inhibits the synthesis of cholesterol and fatty acids in the liver.

### CHEMICAL CONSTITUTE OF GARLIC

The garlic cloves were analyzed for its chemical study which revealed sulfur-containing amino acids (1-3%) named alliin which is the stable precursor.<sup>[6]</sup> The transformation of alliin into the biologically active alliin

molecule upon crushing of a garlic clove is extremely rapid, being complete in seconds. The enzyme responsible for the lysis is alliinase, or alliin-lyase (E.C.4.4.1.4), a pyridoxal 5-phosphate-dependent glycoprotein consisting of two subunits. Alliinase is present in unusually high amounts in garlic cloves: at least 10% of the total protein content (10 mg/g fresh weight). The gene coding for the enzyme has been cloned, and upon translation, found to consist of 448 amino acids with a protein molecular mass of 51.45 kDa and together with a carbohydrate content of 5.5–6%, gives 55 000 kDa.<sup>[16]</sup> Allicin (diallylthiosulfinate) is the most abundant compound representing about 70% of all thiosulfates present, or formed in crushed garlic.<sup>[4,10]</sup> Pure allicin is a volatile molecule that is poorly miscible in aqueous solutions and which has the typical odor of freshly crushed garlic.<sup>[3]</sup>



**Figure 1: Role of allinase enzyme in formation of Allicin.**

## ROLE OF GARLIC

Garlic has been used for the treatment of many diseases since ancient times as reported in the Codex Ebers (1550 BC), where an Egyptian medical papyrus described several therapeutic formulas based on the garlic as a useful remedy for a variety of diseases such as heart problems, headache, bites, worms and tumors.<sup>[3]</sup>

### In cure of Cardiovascular disease

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 atherosclerotic deposits and lesions could actually be reversed if garlic was consistently consumed.

### As natural blood thinner

Platelets and fibrin play great role in blood clotting and higher amount of fibrin in blood can cause heart attack. Garlic constituents can reduce fibrin formation and also help reduce the fibrin existing in the blood even better than aspirin [9]. Ajoene, a sulfur compound found in garlic seems to be responsible for its anti-clotting effect; but ajoene is only viable at room temperature or above, it is not present in raw or freeze-dried garlic. It is believed that the addition of garlic to a diet can help to increase the breakdown of fibrin from 24 to 30% in people.<sup>[7]</sup>

### As antihypertension

In recent years, garlic has been thought to be effective in the treatment of hypertension. It is reported that allicin has angiotensin II-inhibiting and vasodilating effects (Sharifi *et al.*, 2003). A recent in vitro study has confirmed that, the vasoactive ability of garlic sulfur compounds whereby red blood cells convert garlic organic polysulfides into hydrogen sulfide, a known endogenous cardio-protective vascular cell signaling molecule.<sup>[1]</sup> Using 2400 mg garlic tablet containing 31.2 mg allicin has high dose reduced diastolic pressure by 16 mmHg after 5 h of administration.<sup>[13]</sup> A meta-analysis made on pooled data from 415 patients showed also reduction of 7.7 mmHg diastolic pressure.<sup>[19]</sup>

### As a antioxidant

Garlic also have antioxidant activity.<sup>[2]</sup> Garlic and its products have been reported to effectively prevent high lipid levels in experiments animal and humans and also to inhibit oxidation of low density lipo protein.<sup>[11]</sup> The high antioxidant potential of garlic may be a result of its high content of sulfur compound. Whole garlic and aged garlic extract exhibit direct antioxidant effects and enhance the serum levels of two antioxidant enzymes, catalase and glutathione peroxidase.<sup>[15]</sup> Garlic extract, allicin is efficiently scavenged exogenously generated hydroxyl radicals in a dose dependent fashion, but their effectiveness was reduced about 10% by heating to 100°C for 20 min. Other garlic constituents, such as S-allyl cysteine, also confirmed significant antioxidant effects. The sulfur compounds found in fresh garlic

appear to be nearly 1000 times more potent as antioxidants than crude, aged garlic extract.<sup>[20]</sup>

## CONCLUSION

The antioxidative and antihypertensive effect of garlic has been observed in 20 patients with HTN compared to 20 patients with normal pressure, who have been receiving garlic pearls preparation for a period of two months. The results have revealed decreased BP, significant reduction of 8-hydroxy-2-deoxyguanosin, level of nitric oxide, and lipid peroxidation, and an increased level of antioxidative vitamins (C and E). This study points to the beneficial cardioprotective action of garlic in essential hypertension.<sup>[5]</sup> Clearly more studies are needed to refine the use and improvement of the efficacy of this important medicinal plant.

## REFERENCE

1. Benavides GA, Squadrito GL, Mills RW, Patel HD, Isbell TS, Patel RP, Darley-USmar VM, Doeller JE, Kraus DW (2007). Hydrogen sulfide mediates the vasoactivity of garlic. *PNAS.*, 104: 17977-17982.
2. Banerjee S.K., Maulik M., Mancahanda S.C., Dinda S.K., Gupta A.K., and Maulik S.K. (2002). Dose dependent induction of endogenous antioxidants in rats heart by chronic administration of garlic. *Life Sci.*, 70: 1509-1518.
3. Block E (1985), "The Chemistry of Garlic and Onion", *Sci. Am.*, 252: 114-119.
4. Block E (1992), "The Organ Sulfur Chemistry of The Genus Allium Implications For The Organic Chemistry of Sulfur Angew", *Chem. Int. Ed.*, 31: 1135- 1178.
5. Dhawan V, Jain S. (2005). Garlic supplementation prevents oxidative DNA damage in essential hypertension. *Mol Cell Biochem.*, 275: 85-94.
6. Ellmore G S and R S Feldberg (1994), "Alliinylase Localization In Bundle Sheaths of Garlic Clove (*Allium Sativum*)", *American J. Bot.*, 81: 89-94.
7. Ernst E (1994). Fibrinogen: An important risk factor for atherothrombotic disease. *Ann Med.*, 26: 15-22.
8. Fagard RH. (2012). Resistant hypertension. *Heart.*, 98: 254-261.
9. Fukao H, Yoshida H, Tazawa YI, Hada T (2007). Antithrombotic Effects of Odorless Garlic Powder both in vitro and in vivo. *Biosci Biotechnol. Biochem.*, 7: 21.
10. Han J, L Lawson, G Han and P Han (1995), "A Spectrophotometric Method For Quantitative Determination on Allicin and Total Garlic Thiosulfates", *Anal. biochem.*, 225: 157-160.
11. Jain A.K., Vargas R., Gotzkowsky S., and McMahon F.G. (1993). Cargarlic reduces level of serum lipids? A controlled clinical study. *Am J Med.*, 94: 632-635.
12. MacKay J., and Mensah G. (2004). The atlas of heart disease and stroke. World Health Organization, Geneva. 79.

13. McMahon FG, Vargas R (1993). Can garlic lower blood pressure? A pilot study, *Pharmacotherapy*, 13: 406-407.
14. Nahida, T. and Ahmad, F. (2011). Role of natural herbs in the treatment of hypertension. *Pharmacognosy Review.*, 5(9): 30-40.
15. Prasad K., Laxdal, VA., Yu M and Raney B.L. (1995). Antioxidant activity of Allicin an active principle in garlic. *Moll Cell Biochem.*, 148: 183-189.
16. Rabinkov A., Xiao-Zhu Z., Grafi G., Galili G., Mirelman D. (1994). Alliin lyase (alliinase) from garlic (*Allium sativum*): Biochemical characterization and cDNA cloning, *Appl. Biochem. Biotechnol.*, 48: 149-171.
17. Reddy K.S. (1997). Cardiovascular disease in India. *World Health Stat, Q.*, 46: 101-107.
18. Sharifi AM, Darabi R, Akbarloo N. (2003). Investigation of antihypertensive mechanism of garlic in 2K1C hypertensive rat. *J Ethnopharmacol.*, 3: 219-224.
19. Silagy CA, Neil HA (1994). A meta-analysis of the effect of garlic on blood pressure. *J. Hypertens.* 12:463-468.
20. Torok B, Belagyi J, Rietz B, Jacob R (1994). Effectiveness of garlic on the radical activity in radical generating systems. *Arzneimittelforschung.*, 44: 608-611.
21. Tra Bi HF, Irié G M, Kohué CCN, Clejesson HBM (2008). Therapeutic studies of some plants used in the treatment of hypertension and diabetes: two emerging diseases in Côte d'Ivoire. *Science & Nature.*, 5: 39-48.
22. Yeh Y Y and L Liu (2001), "Cholesterol-lowering Effect of Garlic Extracts and Organosulfur Compounds: Human and Animal Studies", *J. Nutr.*, 131: 989s- 993.