

## Cardiac Health Benefits of Garlic by Clinical Trials

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### ABSTRACT

Garlic from very ancient times has been using by man in removing many ailments of body without knowing scientifically exact therapeutic effects. As time passed out clinically trials of benefits of garlic over animals including man happened from time to time and even now some practices going on to know how garlic has a broad spectrum health benefits. In this review article, a survey of works done from then to now by different researchers across the globe has been studied by author to help him prepare this review article on current experimental as well as clinical studies about the preventive and therapeutic effects of garlic in different diseases and physiological disorders like gastric trouble, cough, allergy, arthritis, cardio-vascular defect, hypertension, hypercholesterolemia, dyslipidemia, parasitic & microbial infections, inflammation, toxification, hepatic malfunction, carcinomic conditions and many others. However author wrote such review article considering cardiac health benefits of garlic. The investigations which were based on clinical trials of garlic over cardio-vascular system were taken into account by the author while writing such a review contexts. In different years different scientists have done their experiments over the beasts and human. They fixed the doses of chopped or dried or raw garlic for the different age people among different number of people including placebo in the different period (days). The parameters they selected were like total cholesterol, lipid, triglycerides, LDL, VLDL, HDL, platelet aggregation, fibrinogen activity, arterial plaques, plasma viscosity, capillary perfusion etc. All those parameters which were found at higher side as observed by series of scientists, got came down to different numerical values after administration of garlic extracts.

Keywords: LDL, Lipid Profile, Garlic, Cardiac Health

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### INTRODUCTION

Garlic was introduced into various regions of the world by migrating cultural tribes and explorers. By the 6th century BC, garlic was known for both Chinese and Indians. Meanwhile they started using it for therapeutic purposes. Garlic is a bulbous plant, grows up to 1.2 m in height. Garlic is easy to grow and can be grown in mild climates. *Allicin* (allyl 2-propenethiosulfonate or diallyl thiosulfonate) is the principal bioactive compound present in the aqueous extract of garlic or raw garlic homogenate. When garlic is chopped or crushed, allinase enzyme is activated and produce *allicin*. Other important compounds present in garlic homogenate are 1-propenyl allyl thiosulfonate, allyl methyl thiosulfonate, 4,5,9-trithiadodeca-1,6,11-triene 9-oxide (ajoene), and Y-L-glutamyl-S-alkyl-L-cysteine [1].

The cardio-vascular protective benefits of garlic may partially because of the production of hydrogen sulfide (H<sub>2</sub>S) gas. Our R.B.Cs. can take sulfur-containing molecules in garlic i.e, polysulfides and use them to produce H<sub>2</sub>S. This H<sub>2</sub>S in turn can help our blood vessels expand and keep our blood pressure controlled. When the space inside our blood vessels expands, our blood pressure gets reduced. H<sub>2</sub>S works as a "gasotransmitter" and placed in the same category as nitric oxide (NO) as a messaging molecule that can help expand and relax our blood vessel walls. However our R.B.Cs. do not appear to use processed garlic extracts in the same way that they use polysulfides in food-form garlic.

Garlic is clearly able to lower our blood triglycerides and total cholesterol. But cholesterol and triglyceride reduction are by no means garlic's most compelling benefits when it comes to cardioprotection. The real benefits come across when blood cell and blood vessel get protected from inflammatory and oxidative stress. Damage to blood vessel linings by highly reactive oxygen molecules is a key factor for increasing our risk of cardiovascular problems, including heart attack and atherosclerosis. Oxidative damage is responsible for crucial inflammation, and it is this combination of unwanted

inflammation and oxidative stress that puts our blood vessels at risk of unwanted plaque formation and clogging. Garlic unique set of sulfur-containing compounds helps protect us against both possibilities—oxidative stress and unwanted inflammation. [2].

#### **CLINICAL TRIALS AND EXPERIMENTS DONE BY RESEARCHERS AND SCIENTISTS:**

Chandekar and Jain did experiment on animals in 1973 by giving oral doses of garlic extract in hypertensive animals and found that it took the blood pressure back and made them normotensive [3]. Long term application of garlic extracts on experimental atherosclerosis done by Jain in 1977 induced by a high cholesterol diet, showed almost half reductions in atherosclerotic plaques, mainly in the aorta [4]. According to study of Petkov in 1979 it was almost confirmed that garlic could decline blood pressure in more than 80% of hypertensive people [5]. In another trial on rats Kamanna and Chandrasekhara in 1982 confirmed that garlic dose in rats suffering from hypercholesterolemia, (induced by a high-cholesterol diet) appreciably reduced serum cholesterol, triglyceride, and LDL, but neutral on serum HDL [6]. Rashid and Khan in 1985 [7] investigated that the mechanism of antihypertensive actions of garlic is due to its prostaglandin-like effects.

However, in other study Luley and other researchers in 1986, demonstrated that using garlic powder, which had low allicin, not revealed any lipid lowering effects [8]. Avicenna in 1988, in his well-known book, *Al Qanoon Fil Tib*, prescribed garlic has a useful chemical for many ailment like arthritis, toothache, chronic cough, gastric trouble, parasitic infestation & infections, snake bites, gynecologic diseases etc [9]. Furthermore, it was reported by Sumiyoshi and Wargovich in 1990, that garlic lowers the risk of peripheral arterial occlusive diseases, plasma viscosity, and unstable angina and up elastic property of blood vessels and capillary perfusion [10]. In one trial, assessment done on 47 hypertensive patients by Auer *et al.*, 1990 showed that garlic significantly decreased the mean systolic pressure (MSP) and the mean diastolic pressure (MDP) by 12 mmHg / 9 mmHg respectively with respect to placebo. The authors aforesaid wrote that garlic had not side effects [11]. Mirhadi *et al.*, in 1991 had investigated plasma fibrinolytic activity over animals, which got down when were fed on cholesterol. Same activities raised up when were supplemented with garlic in diet [12].

Defensive effect of garlic on atherosclerosis observed by Gebhardt and Beck in 1996. They attributed that to its ability in diminishing lipid profile in arteries. Allicin, S-allyl cysteine, available in mature garlic extract and diallyl di-sulfide, present in garlic oil were the active compounds meant for in atherosclerotic effect [13]. Some evidence justifies that during the earliest Olympics in Greece, garlic was given to the athletes for increasing stamina as performed by Lawson and Bauer, 1998 [14]. Rivlrm in 1998 explored that ancient Indian medicine recommended garlic boosting respiration and digestion and in parasitic infestation [15].

Jepson *et al.*, in year 2000 did a big trial over 78 patients with peripheral arterial occlusive diseases were randomized to receive garlic or a placebo medication. The dose of garlic was 400 mg oral standardized garlic powder twice daily. Both men and women aged 40 to 75 years were enrolled in the study. After twelve weeks of treatment, pain-free walking distance increased similarly whether receiving garlic or placebo. Similarly there was no difference in the changes in blood pressure, heart rate, and pressure differences between the ankle and brachial pressures. No severe side effects were observed although more people taking garlic (28%) than placebo (12%) complained of a noticeable garlic smell. This indicates that any improvements in symptoms of peripheral arterial occlusive disease with garlic may require longer-term treatment and follow up than in this study [16]. In other demonstration, observations and results traced by Yu-Yah and Liu in 2001 [17] were almost corroborated with findings of Gebhardt and Beck, 1996. Garlic's anti-lipidemic effect in human investigated by Gardner *et al.*, in 2001 [18] and Ziaei *et al.*, in 2001 [19] who demonstrated significant decrease in total serum cholesterol and triglyceride. In other experiment, Rahman and Lowe in 2006 concluded that garlic administration got down LDL oxidation and uplifted HDL, which is protective mechanism in better cardiovascular health [20].

Several experiments done by Aviello, 2009 and claimed that many health benefits of garlic in raw and cooked forms. These are as 1. Lessen of risk factors for cardiovascular diseases. 2. Anti-cancer property. 3. Antioxidant effect. 4. Antimicrobial effect and 5. Enhancement of detoxification foreign compound and liver protective [21].

Garlic has also been shown to inhibit platelet aggregation over human researches. It was revealed that the aged garlic extract inhibited the binding of ADP-activated platelets to immobilized fibrinogen. It was concluded by Allison *et al.*, in 2012 that aged garlic extract checks ability of the GPIIb/IIIa receptor and an increase in cAMP which led to inhibition of platelet aggregation [22]. From research point of view the Vishwakant, in 2012 investigated some persons who were well known to him. They were suffering from

Hypertension, Dyslipidemia, and Arthritis. However author stressed more his piece of research upon Hypertension. They were on medicines. After discussion with their physicians author advised them to take 6 cloves of garlic as fried with 6 drops of mustard oil for 3 months. Surprisingly author found their B.P., lipid profile, R.A. factor were at optimum range, and however they had been taking medicines [23]. Properties of garlic as cardio-protector, anti-inflammatory, anti-carcinogenic, antibiotic and to boom detoxification of foreign compound and protection and safety of liver also practically approved by Colín-González in 2012 [24].

Chan *et al.*, in 2013 had proven in his experimentation that garlic consumption have significant effects on heart profile as blood pressure to reduce, to stop atherosclerosis, reduction of serum cholesterol, other lipid forms and triglyceride, inhibition of platelet aggregation, and increasing fibrinolytic activity [25]. In a longer experiment which was done by Stabler *et al.*, in 2012 [26] and almost repeatedly by Omar in 2013 [27]. By both these trials it was shown that garlic lowered blood pressure in more than 80% of hypertensive's. In an application, a dose of 240-960 mg of aged garlic extract containing 0.6-2.4 of S-allylcysteine notably lowered blood pressure by about 12 mmHg over 12 weeks. This trial was performed by Ried *et al.*, 2013 [28].

A superior investigation done by Ried *et al.*, in 2013 taking 39 primary trials of the effect of 60 days administration of garlic preparations on total cholesterol, low-density lipoprotein cholesterol (LDL), high-density lipoprotein cholesterol (HDL), and triglycerides. The results came out as garlic was effective in reduction of total serum cholesterol by  $17 \pm 6$  mg/dL and LDL cholesterol by  $9 \pm 6$  mg/dL in people with higher total cholesterol levels ( $>200$  mg/dL). There also was found 8% reduction in total serum cholesterol is of clinical relevance and is associated with a 38% reduction in risk of coronary events at 50 years of age. However HDL cholesterol went up a bit [29]. In 2013 Zeng *et al.*, opined that different people might have different responses to garlic. That could leave more benefits to one sample than other samples of people [30].

## CONCLUSION

As described the works of different researchers based on clinical trials in aforesaid review article it is concluded that garlic has 100% health benefits especially in the case of cardiac health. The potency of effect may be different in different people. Although many scientists in their trials mentioned above set different amount of doses for a group of persons but till now a prescribed dose is not confirmed as fixed for allopathic medicines. Garlic pills are available in market but how much dose of them is required it is still questionable. No physician recommends the garlic doses as seen in practice in society. It means that more research is required in this field to reach on final affirmative conclusion. On the other side of coin it seems by showing the results of scientists on garlic versus cardiac health that giving garlic to cardiac ill people definitely improves those bad cardiac parameters.

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