

A REVIEW ON HERBAL DRUGS FOR TREATMENT OF HYPERTENSION

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ABSTRACT

Hypertension and atherosclerosis are the major contributors of cardiovascular disease worldwide. Drug therapy alone may not be sufficient enough to treat either the hypertension or atherosclerosis without the involvement of any dietary management and herbs. Alternative medicine offers an effective way to decrease the rising number of people with high blood pressure. Research has found a variety of alternative therapies to be successful in reducing high blood pressure including diet, exercise, stress management, supplements and herbs. Herbs and spices have also recently been added to the healthy eating pyramid (2015) to encourage people to use herbs and spices in their meals to try and reduce added salt to meals. There are many herbal drugs like, Rouwolfia, Garlic, Ginger, Hibiscus, Ginseng, Flaxseeds, etc which can safely use for the treatment of hypertension. The current review provides commonly used herbs used to treat high blood pressure.

KEYWORDS: Hypertension, Blood pressure, herbal medicines, medicinal plants, treatment, anti-hypertensive.

INTRODUCTION

Hypertension and atherosclerosis are the major causes behind any cardiovascular diseases. Hypertension has become one of the most medicated but avoidable diseases of the twenty-first century.^[1] There are often no symptoms of hypertension, and it can easily go undetected, which is why it is known as the silent killer. The National Institutes of Health classifies hypertension when either systolic blood pressure is greater than 140 mmHg or diastolic blood pressure is greater than 90 mmHg.^[2] Numerous factors can increase the risk of developing hypertension such as stress, a high salt diet, Family history, increased abdominal fat and drinking excessive amounts of alcohol. Certain chronic conditions also may increase your risk of high blood pressure, Such as kidney disease, diabetes and sleep apnea.^[3]

Hypertension is a chronic and often asymptomatic medical condition in which systemic arterial blood pressure is elevated beyond normal. As such, the heart is forced to work harder to overcome the increased systemic pressure in order to deliver blood to tissues, which puts strain on the heart and arteries. Over the period of time, the additional strain leads to cardiovascular dysfunction and is a primary contributing cause of congestive heart failure, myocardial infarction, pulmonary embolism, cerebral aneurysm and kidney failure.^[4] There are numerous ways in which it is possible for an individual to prevent and manage hypertension such as altering their lifestyle by reducing excess weight, increasing exercise and adopting healthy eating habits.^[3]

The first directive from a health professional is generally for the patient to adopt some lifestyle changes before any medication is prescribed. There is, at present, the Dietary Approaches to Stop Hypertension (DASH) diet that has been recommended by healthcare professionals as an approach to lower the risk of hypertension, and focuses not only on the importance of reducing salt intake but also on limiting dietary intake of saturated fat, cholesterol and total fat. It advocates a diet high in vitamins and minerals, fruit and vegetables, fat-free and low fat dairy, lean meats and poultry, and the inclusion of nuts, seeds and legumes.^[5]

Although there are a number of medications available to reduce high blood pressure including angiotensinogen converting enzyme (ACE) inhibitors, beta adrenergic blocking agents, angiotensin receptor blocking agents (ARB) and calcium-channel blockers.^[6] many have reported side effects such as headaches, dry mouth, nausea, vomiting and depression.^[7,8] Despite these pharmaceutical options available, levels of hypertension treatment and control vary, and hypertensive patients often require more than two drugs to achieve recommended blood pressure levels; hence, additional treatment options need to be investigated.^[9]

Herbs and spices are a rich source of phytochemicals, some of which may exhibit health promoting properties with antioxidant, anti-inflammatory and antihypertensive effects.^[10] Herbs and spices have also recently been added to the healthy eating pyramid (2015) to encourage

people to use herbs and spices in their meals to try and reduce added salt to meals.^[11]

The Role of Herbs in Management of Hypertension

Traditional medicines had been used to treat various health problems for thousands of years in many parts of the world and are still utilized by the developing countries. The use of herbal medicine has been on the increase in many developing countries.^[12] The developed countries have also shown an increased interest and use of herbal drugs due to public dissatisfaction with the cost of prescription drugs and interest in returning to natural remedies.^[13,14] Herbal medicines have significantly played a great role and contributed immensely to the development of cardiovascular research. For the treatment of cardiovascular diseases, herbal medicines have been used in patients with hypertension, congestive heart failure, angina pectoris, atherosclerosis, cerebral insufficiency, and arrhythmia.^[15]

Herbal medicines have been gaining more importance in the treatment of hypertension in recent years and are in great demand both in the developed and developing countries for primary health care because of their wide biological and medicinal activities, ease of availability, higher safety margins and lesser cost.^[16,17] With the increasing trend of hypertension prevalence and burden as well as serious adverse side effects, treatment failure, absence of cost effective mono therapeutic anti-hypertensive drugs in use and their serious adverse side effects, herbal plants would have been important and sustainable alternative sources of treatment for high blood pressure.^[16,18]

Most Commonly Used Herbs for Treatment of Hypertension

Herbal medicine has made many contributions to commercial drug preparations manufactured today. Herbal medicine has been losing ground to new synthetic medicines touted by scientists and physicians to be more effective and reliable.

In this present article several herbs like *Allium sativum*, *Centella asiatica*, *Ginkgo biloba*, *Crataegus oxycantha*, *Crataegus monogyna*, *Passiflora edulis*, *Hibiscus sabdariffa*, *Elaeocarpus ganitrus*, *Hypericum perforatum*, and *Achillea millefolium* are reviewed related to their efficacy in treatment of hypertension.

1. Garlic (*Allium sativum*):

Common name: Garlic

Family: Alliaceae or Liliaceae

Chemical constituent: allicin (diallyl thiosulfinate)

Garlic, which is used as an antihypertensive drug, is part of the tuber.

Garlic is commonly used among hypertensive patients because of its reputed benefit in reducing cardiovascular disease and lowering BP. Other claims for the benefits of garlic have included cancer prevention and anti-inflammation. Studies have suggested a multitude of

physiologic effects including inhibition of platelet activity and increased levels of antioxidant enzymes. There are probably several active ingredients in garlic preparations. Not surprisingly, several studies have been done to examine its utility in treating hypertension and hyperlipidemia. In its evidence report, on garlic, the Agency for Health Care Research and Quality reviewed 37 randomized trials and found that garlic preparations did indeed lower total cholesterol by small amounts in the short term but no reduction was observed at 6 months.^[19] In the treatment of high BP, 27 small randomized placebo controlled trials of short duration were reviewed. Various doses of garlic were used providing about 3 to 6 mg of allicin per day. The majority of these studies found that garlic did not reduce BP compared to placebo, but the studies were small. Interestingly, in one cross-sectional observation study of older patients, garlic intake was found to reduce age-related increases in aortic stiffness.^[20] Garlic has been reported to increase the risk of bleeding,^[21] probably due to its antiplatelet action, but this is not well studied.

2. Indian Snakeroot (*Rauwolfia serpentina*)

Synonyms: Dhawala vitapa, Chandramara,

Sarpasugandha, Sarpagandhakhya. Family: Apocynaceae

Chemical constituents: Reserpine, serpentine, serpentinine, rauwolfinine. Parts used: Root.

Rauwolfia is cultivated for the medicinal use of its 30 alkaloids (particularly reserpine found in the root), many used in treating hypertension.^[22] Besides reserpine, other alkaloids used in hypertension and other cardiac disorders are ajmaline, rescinnamine, serpentinine, sarpagine, deserpidine, and chandrine. *Rauwolfia* alkaloids work by controlling nerve impulses along certain pathways that affect heart and blood vessels, lowering blood pressure. *Rauwolfia* depletes catecholamines and serotonin from nerves in the central nervous system. In a controlled intervention trial, 389 subjects, ages 21- 55 years, with diastolic blood pressures 90-115 mm Hg were examined for 7-10 years. Subjects were randomly assigned to either a combination of a diuretic and *Rauwolfia serpentina*, or an identical placebo. Diastolic blood pressure was reduced an average of 10 mm Hg and systolic by 16 mm Hg in the active treatment group, with no change in the placebo group.^[23]

The *Rauwolfia* constituent ajmaline not only lowers blood pressure, but also has a potent antiarrhythmic effect. Studies have shown that ajmaline specifically depresses intraventricular conduction, suggesting this would be particularly effective in the treatment of re-entrant ventricular arrhythmias.^[24]

3. Hibiscus

Common name: Roselle. Family: Malvaceae

Chemical constituents: Anthocyanins, particularly delphinidin-3-sambubioside and cyanidin-3-

sambubioside, are generally believed to be the active constituents responsible for the antihypertensive, antioxidant.

In folk medicine Hibiscus Sabdariffa Linne HS used for wound dressing, bronchitis, diabetes, cardiac and neurologic diseases, repair of calcified vessel, antispasmodic, hypochlosterolemic antibacterial, antifungal, anticancer, muscle relaxant effects and recently as antihypertensive agent.^[25] The extract of this plant exerts the antihypertensive activity by at least three major specific mechanisms of action: diuretic, vasodilator and angiotensin converting enzyme inhibitor (ACE inhibitor) but there are additional mechanisms of action hibiscus exert can reduce high blood pressure on long term use as antioxidant and hypo-cholesterolemic which considered as a cardio protective effect. HS act as diuretic by inhibition of sodium (Na⁺) and water re-absorption it has an advantage over the loop diuretic furosemide that it does not cause over-reactivation of the rennin-angiotensin aldosterone system and maintaining the potassium concentration in the body this was evidenced by the potassium K⁺ values, corresponding index and the saluretic relationship of Na⁺/K⁺15. ACE inhibitor effect exert by HS due to the blockage of the angiotensin I receptor binding to angiotensin II therefore, angiotensin II is not produced and aldosterone is not released from the adrenal gland, which may eventually cause a decrease in the vascular resistance.^[26]

4. Ginseng (Panax Ginseng)

Synonyms: **Panax ginseng**, Panax pseudoginseng, Panax schinseng Family: Araliaceae

Ginseng is marketed either as a single herb compound or in combination with other herbs. The single herb compound is available in tablet as well as in alcoholic extracts (known as tinctures)^[27] Experiments in dogs showed that intravenous administration of ginseng extract caused an immediate drop in blood pressure. The effect was long lasting suggesting that it might be facilitated by a Calcium channel blocking like effect^[28] and interference with calcium mobilization into vascular smooth muscle cells^[29] Rg1, one of the active ingredients in Ginseng can stimulate the production and release of nitric oxide (NO) from endothelial cells. Another ingredient, Ginsenoside Rb1 lowers blood pressure and acts as a CNS depressant. It also interferes with platelet aggregation and coagulation. Interestingly, Ginseng extracts exhibit a peripheral vasoconstricting effect in low doses and peripheral vasodilatation in high doses. However, in cerebral and coronary vessels it exhibits only a vasodilating effect resulting in improvement in cerebral and coronary blood flow.^[30]

5. Flaxseeds

Flaxseed is one of the oldest crops, having been cultivated since the beginning of civilization The Latin name of the flaxseed is *Linum usitatissimum*, which means "very useful". Flax was first introduced in United

States by colonists, primarily to produce fiber for clothing.^[31]

Flaxseeds have nutritional characteristics and are rich source of ω -3 fatty acid: α -linolenic acid (ALA), short chain polyunsaturated fatty acids (PUFA), soluble and insoluble fibers, phytoestrogenic lignans (secoisolariciresinol diglycoside-SDG), proteins and an array of antioxidants.^[32,33,34,35] Its growing popularity is due to health imparting benefits in reducing cardiovascular diseases, decreased risk of cancer, particularly of the mammary and prostate gland, anti-inflammatory activity, laxative effect, and alleviation of menopausal symptoms and osteoporosis. This review is an attempt to cover the history of flax and flaxseed oil, its journey from being a medicine to a functional food source and its health benefits.

6. Bhringaraja

Synonyms: Markava, keshraja.

Chemical constituents: Ecliptine, Wedelolactone. Parts used: Whole plant, seed Actions & uses: The plant is bitter, acrid, thermogenic, alterative, antiinflammatory, anthelmintic, anodyne, vulnerary, ophthalmic, digestive, carminative, emetic, haematinic, diuretic, aphrodisiac, anodyne, hair tonic, deobstruent, absorbent, depurative, tonic and febrifuge. It is useful in hepato-splenomegaly and its associated disorders, elephantiasis, inflammations, gastric disorders, anorexia, worm infestation, skin diseases, wounds, ulcers, ophthalmic disorders, headache, hypertension, strangury, leprosy, pruritus, fever, jaundice, toothache, earache. It is good for blackening and strengthening hairs and stopping haemorrhages and fluxes and for strengthening gums. Seeds are used as aphrodisiac.^[36]

Action on hypertension: Eclipta alba Hassk (Bhringaraja) is recently reported to have diuretic & antihypertensive activity in an ayurvedic study. This creates renewed interest for scientific evaluation of the claimed activity. Eclipta alba Hassk. exhibited significant antihypertensive activity against fructose induced hypertension in rats.^[37]

7. Cinnamon

Cinnamon (*Cinnamomum zeylanicum*, and *Cinnamomum cassia*), the eternal tree of tropical medicine, belongs to the Lauraceae family. Cinnamon is one of the most important spices used daily by people all over the world. Cinnamon primarily contains vital oils and other derivatives, such as cinnamaldehyde, cinnamic acid, and cinnamate. In addition to being an antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer, lipid-lowering, and cardiovascular-disease-lowering compound, cinnamon has also been reported to have activities against neurological disorders, such as Parkinson's and Alzheimer's diseases.

A recent study reported the potential effects of two compounds, cinnamic aldehyde and cinnamic acid, isolated from *C. cassia* against myocardial ischemia,^[38]

indicating that cinnamon also has the potential to be used to treat cardiovascular diseases.

8. *Coriandrum sativum* (Cilantro or Coriander)

In several countries, coriander (also known as cilantro or dhania) is not only used as a culinary ingredient but also as a traditional medicine for the treatment of cardiovascular and gastrointestinal diseases. Coriander is an excellent remedy to manage high blood pressure. It is packed with heart-friendly fibres. Studies have claimed that constituents from coriander interact with calcium ions and the neurotransmitter acetylcholine, which helps relax tension in blood vessel. Additionally, the spice is very effective to modulate gut activity, which is very important to manage high blood pressure. Coriander seeds also have a diuretic effect. A diuretic helps increase passing of urine. Through urine you are able to eliminate the excess sodium accumulated in your system.

9. Ginger

Ginger is incredibly versatile and a staple in alternative medicine. People have used it for centuries to improve many aspects of heart health, including circulation, cholesterol levels, and blood pressure. Both human and animal studies have shown that taking ginger reduces blood pressure in several ways. It acts as a natural calcium channel blocker and natural ACE inhibitor. Calcium channel blockers and ACE inhibitors are types of blood pressure medication. A study in more than 4,000 people found that those who consumed the most ginger 2–4 grams per day had the lowest risk of developing high blood pressure. Ginger is delicious and easy to incorporate into your diet with meals. Alternatively, you can purchase ginger supplements online. These are more concentrated. Ginger appears to lower blood pressure by acting as a natural calcium channel blocker and dilating the blood vessels.

CONCLUSION

Medicinal plants have become the focus of intense study in term of conservation as to whether their traditional uses are supported by actual pharmacological effects or merely based on folklore. Herbal medicines are free from side effects and less costly when compared to synthetic drugs. Botanicals have been used for centuries to treat various diseases including cardiovascular disorders. It is no surprise they have proven effective in lowering blood pressure and improving heart function. Nature indeed inspires or produces all new, small chemical entities introduced as a medicine during the decays. Possibly, this is the reason why most patients commonly visit herbal medicine than allopathic for CVD treatment. In this review, we discussed the most commonly used different plants for the management and treatment of hypertension. It is also advisable that patients should be properly educated in relation to the consumption of herbs that are used for a long time e.g. black cumin, coriander.

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