JBP
Journal of Biochemicals and Phytomedicine
eISSN: 2958-8561

Herbal Treatment of Hypertension: A Literature Review

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ARTICLE INFO

Article Type:
Review

Article History:
Recived: 03 Aug 2022
Revised: 29 Aug 2022
Accepted: 12 Jan 2023
Available online: 1 March 2023

Keywords:
Hypertension
Lifestyle modification
Natural plants
Remedy

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ABSTRACT

Hypertension becomes the main reason behind various deaths. About 20% of the American population is suffering from hypertension and 33% of these Americans are unaware that they are hypertensive. Consequently, hypertension is sometimes known as a silent killer as well. Hypertension is mostly without any symptoms till the destructive consequences of high blood pressure like myocardial infarction, stroke, renal disorders and visual issues are detected. It's a major risk factor that describes heart attacks and coronary artery disease which sometimes needs coronary artery bypass surgery. High blood pressure is defined as constantly high blood pressure increasing from 140/90 mm HG or even more than this, nowadays it's a very common problem faced by almost everyone and almost billions of dollars are consumed every year to investigate cardiovascular ailments and may dollars are utilized for their medication as well Because high blood pressure majorly causes cardiovascular and cerebrovascular ailments. Recently, traditional medicine has managed little to decrease the patient ratio with this dangerous ailment. Natural remedies provide very useful ways to reduce the increasing patient ratio with hypertension. Taking supplements such as magnesium, omega-3 fatty acids, CoQ10, potassium, amino acids, taurine, and vitamins C and E have been efficiently utilized in dealing with cardiovascular ailments involving hypertension. The mentioned medicinal plants were effective against blood pressure and other cardiovascular diseases. This review highlights the herbs proven scientifically for the treatment of hypertension.

Please cite this paper as:
Akram M, Rashid A, Khalil MT, Anwar H, Siddique A, Shahid N, et al. Herbal treatment of hypertension: A literature review. Journal of Biochemicals and Phytomedicine. 2023; 2(1): 20-24. doi: 10.34172/jbp.2023.6.

Intorduction

High blood pressure is a widespread disease that is called hypertension, which is described as a persistently high blood pressure that rises from 140/90 mm Hg or even higher (Pradeep Singh et al., 2015). Cardiovascular diseases are widespread problem that affects nearly every human being. The study and treatment of these conditions costs billions of dollars annually (Manish Agrawal et al., 2010). The main cause of cardiovascular and

cerebrovascular disease is high blood pressure (Xingjiang et al., 2013).

High blood pressure is one of the leading causes of death around the world. Hypertension affects approximately one-fifth of the American population, and over a third of those affected are unaware of their condition. Hypertension is sometimes referred to as the silent killer due to its lack of noticeable symptoms. High blood pressure is often asymptomatic until it leads to serious complications such as heart attack, stroke, kidney disease, and vision problems. High blood pressure is an important predictor of myocardial infarction or coronary heart disease, sometimes requiring coronary bypass surgery (Jawaid et al., 2011).

In the past two years, significant progress has been made in the treatment of hypertension as researchers have reached a consensus on the medical standards for hypertension. It has been found that oral antihypertensive drugs are of great importance in the control of high blood pressure. However, targeting blood pressure in hypertensive patients is still far from ideal. Considerable attention has been paid to research on the use of Chinese herbal medicine for the treatment of hypertension (Xingjiang et al.,2013).

In recent years, traditional medicine has had only limited success in reducing the incidence of this dangerous disease in its patients. There are several natural remedies that can be helpful in reducing the incidence of hypertension among patients. Research shows that diet, exercise, stress management, supplements, and herbs are all successful ways to treat high blood pressure. Every year there are numerous studies on natural remedies for the treatment of high blood pressure (Manish et al., 2010). The development of industrial medicine formulations has been greatly influenced by natural medicines. However, new synthetic drugs, marketed as more effective and reliable by researchers and health care professionals, have caused traditional medicines to lose ground (Jawaid et al.,2011). Several natural plants like Barberry, Garlic, Ginger, Ginseng, and Arjuna have been cautiously used to treat high blood pressure (Manish Agrawal et al., 2010). This review highlights herbs that have been scientifically shown to treat high blood pressure.

Types of Hypertension

Primary Hypertension

Primary high blood pressure, also known as essential high blood pressure, affects about 90 to 95 percent of people and has no specific trigger. It is the reason for the high volume of blood in the body (Taler, 2008).

Secondary Hypertension

Approximately 5% to 10% of people have secondary hypertension. This is caused by underlying conditions such as kidney disease and muscle disease that affect the kidneys, arteries, and endocrine system (Taler, 2008).

Causes

The most common causes of high blood volume are:

- Cardiovascular disease (CVD) (Talha et al., 2011)
- Increased production of hormones that retain sodium and cause vasoconstriction
- Elevated sympathetic nervous system (SNS) activity
- Abnormal and increased secretion of renin due to elevated production of angiotensin-II and aldosterone
- Insufficient vasodilators like prostacyclin and nitric oxide
- Genetic predisposition (Kaplan, 2002; Reddy, 1996).

The following conditions can also lead to high blood pressure, but they are less frequent:

- Cushing syndrome
- Brain tumors
- Encephalitis
- Polycystic disease
- Increased intracranial pressure
- Thyrotoxicosis
- Congenital adrenal hyperplasia
- Respiratory acidosis
- Diabetic nephropathy

Hydronephrosis (Kaplan, 2002; Reddy , 1996).

Symptoms

The following are the most important signs and symptoms of this disease;

- Headaches
- Ears ringing
- Blurred vision
- Cardiac palpitations
- Urine retention
- Exertion
- Flushed face
- Bleeding of the nose
- Fatigue

Dizziness (http://www.vitapharmica.com/benefits.html)

Treatment

There are various types of treatments and a wide range of drugs available in the market, including central-2 α-adrenergic agonists, beta-adrenergic, thiazide, potassium-sparing diuretics, α1/β-adrenergic antagonists, central adrenergic neuronal-blocking agents, peripheral α1-adrenergic antagonists, peripheral adrenergic neuronal blocking agents, calcium antagonists, direct-acting vasodilators, tyrosine hydroxylase inhibitors, angiotensin-converting enzyme inhibitors, and angiotensin II receptor antagonists.

Although all of the above medications are used for the treatment of high blood pressure, they may also have side effects. For example, diuretics can cause muscle cramps, dizziness, fatigue, loss of fluid, blurred vision, irregular heartbeat, and skin rashes. Angiotensin converting enzyme inhibitors may cause side effects including renal failure, cough, vomiting, fever, diarrhea, sore throat, and skin rash. Calcium channel blockers may cause side effects such as fatigue, headache, diarrhea, constipation, and edema. Specific lifestyle changes and appropriate natural remedies are recommended to manage hypertension according to the research.

There are some lifestyle changes that can help reduce high blood pressure, including

- Reducing stress
- Limiting alcohol intake

- Exercising regularly
- Reducing salt intake
- Adopting proper dietary habits
- Quitting smoking

Using appropriate natural remedies (Bauer and Reams, 1995).

Herbal Medicine Used for The Treatment of Hypertension

Products from plant, animal and mineral sources are used for the treatment of various ailments. According to a recent estimate, nearly 80% of people in developing countries rely on natural herbs for the treatment of various ailments. Recently, there has been an increase in the demand for natural remedies and their acceptance is gradually on the rise. Nearly 500 plants were used medicinally in antiquity, and about 800 plants were used in local medical systems (Conlin et al., 2000).

Due to the negative effects of allopathic medicine, the demand for natural products is increasing in Western countries. Consequently, many pharmaceutical companies now focus on natural (phytopharmaceutical) drug synthesis (Chopra et al.,1956). There are about 20,000 plants with documented medicinal benefits. The development of new drugs derived from plants with medicinal properties has been greatly influenced by the simplification of chemical standards for herbal resources (P. A. Cox,1990) (Richard and Jurgens, 2005). There are a number of natural remedies which have been used in the treatment of high blood pressure, and some of these are discussed below.

Arjuna bark (*Terminalia arjuna*)

Arjuna Bark comes from the deciduous Arjuna tree, which is native to India and found throughout the country. The bark of this tree has been in use for nearly three centuries as a medicinal treatment for a wide range of ailments. Its chemical components consist of, gallic acid, triterpenoid saponins, magnesium, ellagic acid, phytosterols, zinc, flavonoids, calcium, and copper (Singh et al., 1982). Arjuna bark has been used to treat a variety of heart conditions, including coronary artery disease (CAD), high blood pressure, congestive heart failure (CHF), and stable angina pectoris. It has also been shown to be effective in the reduction of systolic blood pressure (Dwivedi and Agarwal, 1994). It has no hepatic, kidney failure and hematological side effects (Dwivedi and Jauhari, 1997).

Hawthorne (*Crataegus*)

Hawthorne is a group of plants from the *Crataegus* family. The plant extracts are a source of medicines thatare conventionally utilized for heart diseases. Flavonoids, catechins, triterpene saponins and amines are the main components of Hawthorne. It acts in lowering blood pressure (Leuchtgens, 1993) and it lowers blood pressure by dilating the coronary artery (Schussler et al., 1995).

Black Cumin Seed (*Nigella sativa*)

It has been in use for a long time as a natural diuretic and antihypertensive agent. An in vivo study showed that its 0.6 mL/kg/day extract and 5 mg/kg/day frusemide dosage were diuretic, increasing diuresis by 16%-30% after 15 days of medication (Zaoui et al.,2000). It has been used in the treatment of various heart diseases due to its antioxidant properties. Thymoquinone, thymol 32, carvacrol, t-anethole and 4-terpineol are some of its chemical components (Ghosheh et al.,1999). The blood pressure-lowering effect is due to the essential oils in these seeds. Because in-vivo studies reveal that essential oils are effective and centrally-acting antihypertensive agents (Tahir et al.,1993).

Rauwolfia serpentina

This herb is considered one of the most important medicinal plants. It contains nearly 30 alkaloids. Reserpine is a chemical compound that is extracted from the roots of Rauwolfia serpentina and R. vomitoria. It is the most important active agent in these roots and has been used to reduce blood pressure and treat various heart diseases (Duke, 1985). And the constituents that are used for these purposes are ajmaline, rescinnamine, serpentinine, and sarpagine. Its alkaloids work by manipulating nerve impulses along with particular pathways that affect cardiac and vessels carrying blood and reduce blood pressure as well. It also reduces catecholamines and serotonin from nerves in CNS (Obayashi et al.,1976).

Ginseng (Panax ginseng)

Ginseng is commonly grown in China, Japan, Korea and North America. It is commonly used as an adaptogen. It is used to combat fatigue, lack of sleep, anxiety and stress. It also acts as a boost to the immune system, increasing the body's ability to cope with environmental stressors (Attele et al.,1999). Ginseng is utilized to develop somatic and muscular concerts, improving cognitive functions like focus and memory. Its chemical constituents mainly consist of ginsenoside& saponins. It may use as a single drug or with a combination of another plant in the form of polyherbal formulation (Vuksan et al.,2000).

Ginkgo Biloba

In the early stages of Alzheimer's disease, vascular dementia and mixed dementia, *Ginkgo biloba* is commonly used. Its leaves and fruits are used for this purpose. Ginkgo biloba leaves are used to treat conditions associated with blood vessel weakness in the brain, especially in the elderly, such as memory loss, headaches, dizziness, lightheadedness, difficulty concentrating, and hearing problems (Le Bars et al.,1997). *Ginkgo biloba* is taken orally to treat ischemic stroke. *Ginkgo biloba* is used in patients with anxiety, depression, and chronic fatigue syndrome to treat cognitive disorders secondary to depression and to improve sleep patterns. It has also been used in the treatment of eye problems such as muscle degeneration, glaucoma, and attention deficit hyperactivity disorder (Jung et al.,1990) Thrombosis, heart disease, atherosclerosis, and angina pectoris have also been shown to be treated effectively. Its chemical components are flavonoids and glycosides. Ginkgo biloba is marketed as a herbal supplement alone or in combination with other herbs. It can be used in the form of a multi-herb formulation or as a single herb (Maitra et al.,1995).

Allium sativum

The bulb of *Allium sativum* is used to treat a variety of conditions. These include hypertension, hyperlipidemia, atherosclerosis, and menstrual disorders. Allicin, ajoene, and organosulfur compounds such as S-allyl cysteine are among its major chemical constituents. Fresh garlic contains nearly 1% alliin (Siegel et al., 1999). Garlic reduces high blood pressure through smooth muscle relaxation and vasodilation (Apitz-Castro et al., 1986).

Conclusion

In recent years, high blood pressure (hypertension) has become a life-threatening disease and one of the leading causes of death. Taking beneficial steps such as changing our lifestyle by consuming a healthy and low-fat diet, exercising daily, avoiding stress, cigarette smoking and alcohol consumption is essential to combat this disease. Blood pressure can also be reduced by adding natural herbs to our diet and using them as medicine. In addition, for cardiovascular conditions associated with hypertension, taking supplements such as magnesium, omega-3 fatty acids, potassium, CoQ10, taurine, and vitamins B and C has been shown to be effective.

Conflict of interest

There is no conflict of interest among the authors.

Acknowledgement

Authors thank you from Department of Eastern Medicine, Govt. College University Faisalabad, Pakistan.

Consent for publications

The authors approved the manuscript for publication.

Funding/support

None.

Authors' contributions

The authors have contributed equally to the writing and publication of the article.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the author.

References

Agrawal M, Nandini D, Sharma V, Chauhan NS. Herbal remedies for treatment of hypertension. International Journal of Pharmaceutical Sciences and Research. 2010; 1(5): 1-21. doi: 10.13040/IJPSR.0975-8232.1(5).1-21.

Apitz-Castro R, Escalante J, Vargas R, Jain MK. Ajoene, the antiplatelet principle of garlic, synergistically potentiates the antiaggregatory action of prostacyclin, forskolin, indomethacin and dypiridamole on human platelets. Thrombosis Research. 1986; 1;42(3):303-11. https://doi.org/10.1016/0049-3848(86)90259-8.

Attele AS, Wu JA, Yuan CS. Ginseng pharmacology: multiple constituents and multiple actions. Biochemical Pharmacology. 1999;58(11):1685-93.

Bauer JH, Reams GP. Mechanisms of action, pharmacology, and use of antihypertensive drugs, In The Principles and Practice of Nephrology, Edited by Jacobson HR, Striker GE, Klahr S. St. Louis: Mosby 1995; 399–415.

Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plants Council of Scientific and Industrial Research. New Delhi. 1956;89. https://doi.org/10.1016/S0006-2952(99)00212-9.

Conlin PR, Chow D, Miller ER, Svetkey LP, Lin PH, Harsha DW, et al. The effect of dietary patterns on blood pressure control in hypertensive patients: results from the Dietary Approaches to Stop Hypertension (DASH) trial. American Journal of Hypertension. 2000;13(9):949-55. doi: 10.1056/NEJM199704173361601.

Cox PA. Ciba Foundation Symposium 154. Chichester, John Wiley & Sons. 1990;40:23-7.

Duke JA. Handbook of Medicinal Herbs. Boca Raton, FL: CRC Press Inc; 1985: 401.

Dwivedi S, Agarwal MP. Antianginal and cardioprotective effects of Terminalia arjuna, an indigenous drug, in coronary artery disease. The Journal of the Association of Physicians of India. 1994;42(4):287-9.

Dwivedi S, Jauhari R. Beneficial effects of Terminalia arjuna in coronary artery disease. Indian Heart Journal. 1997;49(5):507-10.

El Tahir KE, Ashour MM, Al-Harbi MM. The cardiovascular actions of the volatile oil of the black seed (Nigella sativa) in rats: elucidation of the mechanism of action. General Pharmacology: The Vascular System. 1993;24(5):1123-31. doi: 10.1016/0306-3623(93)90359-6.

Ghosheh OA, Houdi AA, Crooks PA. High performance liquid chromatographic analysis of the pharmacologically active quinones and related compounds in the oil of the black seed (*Nigella sativa* L.). Journal of pharmaceutical and biomedical analysis. 1999;19(5):757-62. http://www.vitapharmica.com/benefits.html.

Jung F, Mrowietz C, Kiesewetter H, Wenzel E. Effect of Ginkgo biloba on fluidity of blood and peripheral microcirculation in volunteers. Arzneimittel-Forschung. 1990;40(5):589-93. PMID: 2383302 .

Kaplan NM. Kaplan's clinical hypertension. Lippincott Williams & Wilkins; 2010. PMCID: PMC2650769.

Le Bars PL, Kieser M, Itil KZ. A 26-week analysis of a double-blind, placebo-controlled trial of the *Ginkgo biloba* extract EGb 761® in dementia. Dementia and Geriatric Cognitive Disorders. 2000;11(4):230-7. doi: 10.1159/000017242.

Leuchtgens H. Crataegus Special Extract WS 1442 in NYHA II heart failure. A placebo controlled randomized double-blind study. Fortschritte der Medizin. 1993; 111(20-21):352-4. PMID: 8375791.

Maitra I, Marcocci L, Droy-Lefaix MT, Packer L. Peroxyl radical scavenging activity of *Ginkgo biloba* extract EGb 761. Biochemical Pharmacology. 1995;49(11):1649-55. doi: 10.1016/0006-2952(95)00089-i.

Obayashi K, Nagasawa K, Mandel WJ, Vyden JK, Parmley WW. Cardiovascular effects of ajmaline. American Heart Journal. 1976 Oct 1;92(4):487-96. doi: 10.1016/s0002-8703(76)80049-x.

Reddy KS. Hypertension control in developing countries: generic issues. Journal of Human Hypertension. 1996;10:S33-8. PMID: 8965285.

Richard CL, Jurgens TM. Effects of natural health products on blood pressure. Annals of Pharmacotherapy. 2005;39(4):712-20. doi: 10.1345/aph.1D067.

Schüssler M, Hölzl J, Fricke U. Myocardial effects of flavonoids from Crataegus species. Arzneimittel-Forschung. 1995; 45(8):842-5. PMID: 7575743.

Siegel G, Walter A, Engel S, Walper A, Michel F. Pleiotropic effects of garlic. Wiener medizinische Wochenschrift (1946). 1999;149(8-10):217-24.

Singh P, Mishra A, Singh P, Goswami S, Singh A, Tiwari KD. Diabetes mellitus and use of medicinal plants for its treatment. Indian Journal of Research in Pharmacy and Biotechnology. 2015;3(5):351.

Sinha M, Manna P, Sil PC. Terminalia arjuna protects mouse hearts against sodium fluoride-induced oxidative stress. Journal of Medicinal Food. 2008;11(4):733-40. doi: 10.1089/jmf.2007.0130.

Taler SJ. Secondary causes of hypertension. Prim Care. 2008;35(3):489-500. doi: 10.1016/j.pop.2008.06.001.

Talha J, Priyanka M, Akanksha A. Hypertension and herbal plants. International Research Journal of Pharmacy. 2011;2(8):26-30.

Vuksan V, Sievenpiper JL, Koo VY, Francis T, Beljan-Zdravkovic U, Xu Z, Vidgen E. American ginseng (Panax quinquefolius L) reduces postprandial glycemia in nondiabetic subjects and subjects with type 2 diabetes mellitus. Archives of Internal Medicine. 2000; 160(7):1009-13. doi: 10.1001/archinte.160.7.1009.

Xiong X, Yang X, Liu Y, Zhang Y, Wang P, Wang J. Chinese herbal formulas for treating hypertension in traditional Chinese medicine: perspective of modern science. Hypertension Research. 2013;36(7):570-9. doi: 10.1038/hr.2013.18.

Zaoui A, Cherrah Y, Lacaille-Dubois MA, Settaf A, Amarouch H, Hassar M. Effets diurétiques et hypotenseurs de Nigella sativa chez le rat spontanément hypertendu [Diuretic and hypotensive effects of *Nigella sativa* in the spontaneously hypertensive rat]. Therapie. 2000;55(3):379-82. French. PMID: 10967716.