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A Literary Review on Herbs Used in Siddha Medicine for Hypertension

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ABSTRACT

Hypertension commonly referred to as 'high blood pressure', is a medical condition in which the blood pressure is chronically elevated. In this modern era several antihypertensive drugs are available. But these medicines have many side effects such as palpitation, tachycardia, hyponatremia, hyperkalemia, increased risk of developing diabetes, and reduced renal function and life threatening complications. Globally about 80% of the population using herbal medicines for their primary health care, particularly in developing countries. In herbal medicine the treatment for essential hypertension can bring the blood pressure level in to the normal range. WHO recently encourages, utilization of herbs and traditional herbal medicines, for national healthcare programs, as they are easily available at lower cost and comparatively safe medicines. In this article such herbs used in Siddha medicine have been studied and discussed for the therapeutic management for hypertension. In Siddha system the disease hypertension was described as *Raktha azhutham, Rakthathikkam, Azhutham. Raktha kothippu noi* and *Naadi irukkam.* All herbs reviewed in this article are useful in the treatment of hypertension. Among studied herbs, Rough chaff (*Acyranthes aspera*), Indian pennywort (*Centella asiatica*), Coriander (*Coriandrum sativum*), Cumin (*Cuminum cyminum*), Cardamom (*Elettaria cardamom*), Roughbryon (*Melotheria maderaspatn*), Pepper (*Piper nigrum*), Arjun tree (*Terminalia arjuna*), Land caltrops (*Tribulusterrestri*), Winter cherry (*Withania somnifera*), Ginger (*Zingiber officinalis*) has Antihypertensive effect and cardiac tonic. Ginger (*Allium sativum*) and Deodar (*Cedrus deodara*) reduces the blood cholesterol level and decreases the hypertension. Water lily (*Nymphea alba*) and Long pepper *Piper longum* showed ACE inhibitor activity and reduces the blood pressure.

Keywords: herbs, Siddha, *Rakthaazhutham*, Hypertension, Blood pressure.

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INTRODUCTION

In this fast growing world with constantly increasing population, diseases are also increasing parallel. In spite of the various achievements in the medical field, human being faces many challenging and life threatening problems such as cancer, cardiac diseases and metabolic disorders like diabetes. This is because of the food habits like eating packed, preserved tinned foods, fast foods adopted by the people. Also the society is passionate about smoking and drinking liquor and considers them as their status deciding criteria which finally leads to emergence of chronic diseases like diabetes and hypertension, resulting in cardiac problems. Globally there are one billion people affected by high blood pressure. Hypertension is the major cause for 7.5% million deaths, about 12.8% of total of all deaths WHO declares that hypertension is the direct cause for 57%of all stroke deaths and 24% of all coronary heart disease deaths in India[1]. Hypertension occurs in approximately 8-10% of pregnancies. Raised blood pressure may be the first sign of pre-eclampsia, a serious condition of the second half of pregnancy. It occurs in about 5% of pregnancies and responsible for approximately 16% of all maternal deaths globally[2]. In neonates and infants' failure to thrive, seizures, irritability, lack of energy and difficulty in breathing can be associated with hypertension. The currently widely practised modern medicine is not fulfilling all the criteria which are in need. They treat these diseases only symptomatically but not delivering a definite cure. Hence there is a need of alternative medicine to treat these diseases, and the attention of scientists all over the world is turned towards the traditional herbal remedies, like Siddha medicine. The WHO recently encourages, utilization of herbs and traditional herbal medicines, for national healthcare programs, as they are easily available at lower cost and comparatively safe medicines.

Hypertension

Hypertension is a condition that often shows no symptoms and hence it is known as the 'silent killer'. A blood pressure reading above 140/90 mm/Hg is considered as high blood pressure. Hypertension is diagnosed if readings on separate occasions consistently show blood pressure to be 140/90mmhg or higher[3]. Hypertension commonly referred to as "high blood pressure", is a medical condition in which the blood pressure is chronically elevated. Hypertension and related cardiovascular diseases are the major cause of death in many countries. Hypertension is a complex and multifactorial disease resulting from the interaction of multiple genetic and environmental factors Persistent hypertension is one of the risk factors for strokes, heart attacks, heart failure and arterial aneurysm and it is the leading cause of chronic renal failure[4].

Hypertension can be classified as either essential or idiopathic hypertension, secondary or symptomatic hypertension. Essential hypertension indicates underlines no specific medical cause. Secondary hypertension indicates that the high blood pressure may be due to other conditions such as kidney diseases, certain tumours etc[5]. Recently, the JNC 7 (The seventh report of the joint National Committee on prevention, Detection, Evaluation and treatment of high blood pressure) has defined blood pressure 120/80 mm/Hg to 139/89 mm/Hg as pre-hypertension, pre-hypertension is not a disease category rather it is a designation chosen to identify individuals at high risk of developing hypertension[6]. The clinical features of the disease are occipital morning head ache, insomnia, nocturia, tinnitus, floaters, nosebleeds, dizziness, irritability, fatigue, and lack of concentration, loss of memory, occasional palpitation, and breathlessness. The major complications of the disease are left ventricular failure, stroke, angina, heart attack and aortic dissection[7]. The cause for essential hypertension is largely unknown. Renal causes include acute nephritic syndrome, chronic nephritis, polycystic kidney and hydronephrosis, chronic pyelonephritis, renal artery stenosis, Renin secreting tumour, and renal embolism. Endocrine causes include thyrotoxicosis, myxoedema, acromegaly, Cushing's syndrome, primary aldosteronism (Conn's syndrome), and pheochromocytoma. Metabolic cause includes diabetes mellitus, chronic gout, toxemias of pregnancy, and atherosclerosis. Drugs like contraceptive pills, steroids, liquorice induce hypertension. Congenital cause includes coarctation of the aorta, and psychogenic and neurological cause includes encephalitis, brain tumour, cerebrovascular accidents, and diencephalic syndrome[7].

Pathophysiology of Essential Hypertension

This corresponds to approximately 90% of hypertension and its causes are not yet fully understood, however it is easy to suspect a multifactorial origin, with a participation of Renin-Angiotensin Aldosterone System, Autonomic Renal function, with sodium excretion with the likely role of hypothalamic-pituitary system deficit, through the intervention of anti diuretic hormone and vascular parietal factor, favouring an increase in peripheral vascular resistance. However, these inadequacies of regulatory mechanisms are minor, the primary cause of essential hypertension is consumption of beyond the recommended dosage of 6g sodium but the consumption is between 8 and 20 g per day in developed countries[8].

Treatment for Hypertension in Modern Medicine

However in some patients, life style modifications like changes in diet and exercise are not enough for the treatment of hypertension. For hypertension the first line of treatment is low-dose thiazides than beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE)

inhibitors, alpha blockers, and angiotensin II receptor blockers[9] (ARB). In the treatment of hypertension, the frequently facing side effects are increased risk of developing diabetes. Apresoline is effective against hypertension, but it shows adverse effects like head ache, tachycardia and palpitation, when the dose is exceeded more than 300mg per day[10]. Hydrochlorothiazide may cause severe Hyponatremia; ACE inhibitor can produce drug fever, skin rashes and altered sense of taste[11]. Angiotensin II receptor blockers produce adverse effects like hypotension, hyperkalemia, and reduced renal function[12]. More over these drugs are so expensive for the treatment of hypertension in under developing countries. So there is a need to extend the usage of alternate and herbal medicines for the treatment of hypertension.

Siddha Medicine

Siddha medical science which is very ancient in origin is as old as the earliest civilization. Siddha Medicine as everyone knows, is not merely a science but an art as well. It certainly deals with the different process of life. In Siddha system of medicine many physicians advanced with art of pediatrics, surgery, ophthalmology, cardiology, and other medical fields render their service to the society[13].

Hypertension in Siddha Medicine

In Siddha system the disease hypertension was described as *Raktha azhutham, Rakthathikkam, Azhutham. Raktha kothippu noi* and *Naadi irukkam.* The clinical features of the disease are breathlessness, respiratory obstruction, weakness, giddiness, fatigue, and oedema of legs, sometimes this disease cause death[14]. Eating of substances which excessively inducing vadhadosham, will cause vadha get stimulated, this result in excessive activity of the udhanavayu and viyanavayu which produces hypertension. In addition to the above, the disease may also be associated with congenital vadha disease[15].

Types of Hypertension in Siddha Medicine

In Siddha medicine vascular diseases and heart diseases are classified in *pitha* disease. The disease involving the blood vessels are mentioned under "*kuruthi azhal noi*". There are eight types of '*Kuruthi azhal noi'* mentioned in the Siddha literature '*Noi Nadal Noi Mudhal Nadal thirattu'* part II. One among the type was *Raktha kothippu noi*. The signs and symptoms of *Ratha kothippu noi* described in *Noinaadal Noi Muthal naadal* compared with hypertension of modern medicine.

Treatment of Hypertension in Siddha Medicine

The origin of Siddha system of medicine dates back to 10,000 years B.C. Tamil people used herbs as a primary health care dealing with various physical and mental illness. Siddha system of

medicine often recommends various lifestyle modifications, healthy diet plan and certain herbal, polyherbal preparations for treating hypertension. Most of the hypertensive patients are treated with single herb therapy. In some cases, if single herb therapy is not inadequate or ineffective they recommend poly herbal formulations for hypertension management. In Siddha system of medicine many plants are traditionally regarded as antihypertensive. As a significant increase in the number of hypertensive patients are in India, many researchers have evaluated the pharmacological action of these Siddha traditional plants and thus their interest in day to day practice where synthetic drugs are still quite expensive and so called adverse effects. Eventhough there are six classes of antihypertensive drugs available in modern medicine, hypertension management and quality of the life of hypertensive patients remain unsatisfactory because of their adverse effects. Herbal medicines have recently made a significant progress in regulating blood pressure. Several anti-hypertensive medicinal plants were identified through Siddha classical texts and manuscripts. Among these plants, some common single herb therapy and polyherbal formulation for treating hypertension are reviewed in detail.

Single Herbs Used for the Treatment of Hypertension

In Siddha medicine Rough chaff(*Naiyuruvi*), Garlic(*poondu*), Deodar wood, Indian pennywort(*Vallarai*), Coriander seeds, Saffron, Cumin seeds, Cardamom seeds, Water lilly flowers, Bark of Arjun tree, Land caltrops(*Nerunjil*), Long pepper, Pepper, Winter cherryand Ginger are used for the treatment of hypertension[16].These herbs are discussed one by one as follows:

Rough Chaff

Botanical name: *Achyranthes aspera*

Family: *Amaranthaceae*

Synonyms: *Achyranthes indica*

Common name: Tamil: Sirukadaladi, saramanjari, krishnapanni, kesarikam, Sans: Apamarga, Hin: Uttareni.

Source: It is commonly found as a weed throughout India.

Description: It is a stiff erect herb, 1-3inches in high. Branches spreading, leaves opposite, velvety-tomatoes and rigid. Flowers bisexual, greenish-white, borne in long spikes, inverted.

Parts used: whole plant

Active constituents: It contains alkaloids, glycosides, saponins, protein, free amino acids, lignin, vitamins, enzymes and a lot of inorganic compounds[17]

Indications: It is used as a diuretic in heart disease. In siddha medicine Whole plant dried powder decoction used for reduce hypertension.

Method of use and dosage: Rough chaff root powder decoction is used as diuretic. Whole plant dried powder decoction for hypertension. In 30ml dosage two times a day.

Research: Srivastav have found that the methanolic extract of the whole plant has strong diuretic effect and this diuretic activity of the herb, potentially acts as powerful anti hypertensive agent[18]. Natkarni has proved that the water, in which the plant has been boiled for 20-30 min, can be used as diuretic in renal dropsy and general anasarca.

Garlic

Botanical name: *Allium sativum*,

Family: *Liliaceae*

Synonym: *A. ursinum, A. vineale*

Common name: Tam: Vellai poondu, velluli; Sans: Lesuna; Hind: Lashan.

Source: Herb native to central Asia and cultivated all over India.

Description: Garlic is a hardy perennial, Bulbs made up of clove; flowers small, white, prolonged in to leafy points.

Part used: Bulb

Active constituents: It contains a lot of mineral, enzymes, amino acids, and about 33 sulphur compounds. Allicin, allisatin these two chemical components reduces the high blood pressssure[19].

Indication: Garlic juice used in hypertension and for reducing blood cholesterol level. Garlic juice also helps in reducing blood clotting.

Method of use and dose: Garlic juice mixed with honey 5-10ml two times a day.

Research:

Fallon and Pedraza chaverri have proved that garlic possesses antihypertensive and anticoagulant effects[20]. Garlic is being used in the treatment of hypertension it exerts vasodilatation effects on the carotid artery and aorta in case of atherosclerosis of carotid artery. Supplementation of garlic to cholesterol fed rabbit's revealed significant lower levels of total, free, ester cholesterol and phospholipids, thus resulting in a lower degree of atherosclerosis[21].

Cedar

Botanical name: *Cedrus deodara*

Family: *Pinaceae*

Synonyms: *Pinus deodara* Lamb, *Cedrus libani*

Common name: Tam: Devadaru; San: devadaru; Hindi: Deodar.

Source: In India this tree is mostly found in the western Himalayan hills. Forest of Deodar found in Kashmir, Chamba, Tehri-Garhwal, simla, Chakrata Almora and Mussoorie hill stations.

Description: A large evergreen tree, with spreading branches and dark green leaves having wavy margins. Bark thick, fissured at places. Cedar wood oil, aromatic, fine textured, fairly even-grained and straight; Sapwood white and heart wood light yellowish-brown or brown.

Parts used: Wood, Bark, resin and oil

Active constituents: It contains α-terpineol, linolool, limonene, himachalol, allohimachalol, himadarol, isocentdarol and centdarol anethole, coryophyllene and eugenol[22].

Indications: The bark powder decoction used for reduces the high blood pressure. Decoction also used as a diuretic. Bark is a diuretic, carminative and diaphoretic.

Method of use and dosage: Decoction of deodar bark powder 30ml two times a day.

Research: Sudhir patil found *Deodara* decreased serum glucose, total cholesterol and triglycerides, low density lipoprotein (LDL) and very low density lipoprotein (VLDL) levels and increased the HDL level. *Deodara* extracts exhibits anti-hyper lipidemic activity and anti-obesity properties in preclinical study [23].

Indian Pennywort

Botanical name: *Centella asiatica*

Family: *Umbelliferae*

Synonyms: *Hydrocotyle asiatica, Trisanthus cochinchinensis*

Common name: Tam: Vallarai, Yosanai valli; Sans: Brahmi; Hind: Khulakudi

Source: It is found in the wild throughout India and Celon.

Description: A prostrate, perennial, faintly aromatic herb, rooting at the nodes. Leaves are usually glabrous, orbicular-reniform, absolutely crenate or lobulate. Bracts are small and ovate in shape. Flowers white, borne in 3-6 flowered umbels. Fruits and seed laterally compressed.

Parts used: Whole plant and leaf.

Active constituents: The alcoholic extract of the herb contains essential oil, terpenoids, steroids, flavonoids, reducing sugar a fatty oil-sitosterol, tannin, hydrocotylin-alkaloid, vellarine, a glycoside-asiaticoside, and centelloside. Asiaticoside have been shown to be active in the treatment of leprosy[24]

Indications: Whole plant used to reduce high blood pressure in the form of poultice. It is also used as diuretic and tonic.

Method of use and dosage:whole plant poultice 5-10grams twice daily.

Research: Ahmad and Ismail has used this herb in powdered form and found that it lowered the blood pressure level and acts as antihypertensive agent[25].

Coriander

Botanical name: *Coriandrum sativum*

Family:*Umbelliferae*

Common name: Tamil: Malli, Taniya, Urularici; Hindi: Dhaniya; Sansk; Dhanyaka, Danya, VitunnaKa, Kustumburu.

Source: Herbaceous plant extensively cultivated in all parts of India for its seeds.

Description: It is an annual plant, 40-50 cm high, gabbros plant, leaves of two kinds.

Parts used: Whole plant, Fruits, leaves.

Active constituents: S–linolool, gnaphaloside A & B, quercetin, isohamnetin, rutin, luteolin, furoisocoumarins, coriandrin and dihydro coriandrin. coriandrones A-E, and coriandrinonediol isolated from seeds[26]

Indications: Coriander seed powder used in high blood pressure. Whole plant decoction used for diuretic action. It is a good carminative in combination with cardamom.

Method of use and dosage: Coriander seed powder 5grams with milk two times a day.

Research: Jabeen found that the seeds of coriander fruit exhibits GIT stimulatory and hypotensive effects mediating possibly through cholinergic, Ca (2+) antagonist and the combination of these mechanisms respectively. Diuretic activity of the seed adds value to its use in the treatment of hypertension[27].

Saffron

Botanical name: *Crocus sativus*

Family: *Iridaceae*

Common name: Tam: kunkumappu, kashmeeram; Sans: Bhavarakta, kunkuma; Hind: Kumkum, Kesar.

Source: The plant is native of south Europe and is cultivated in Spain, France, Italy, Greece, India and China.

Description: A small bulbous perennial, 6-10 in high, cultivated for its large, scented, blue or lavender flowers.

Parts used: Flower, stamens

Active constituents: Saffron contains the glycosides, crocin and picrocrosin together with lycopene and zigzantin, β-carotene, and zeaxathin[28].

Indications: Flowers used for reduce hypertension.

Method of use and dosage: decoction of flower 30ml twice daily.

Research: Imenshahidi.M, found in its preclinical trail that the aqueous extract of saffron flowers and its constituents safranol, crocin exerts hypotensive effects[29].

Cumin Seeds

Botanical name: *Cuminum cyminum*

Family: *Umbelliferae*

Common name: Tam:Asai, Nar cirakam, pittanacini, pocanakutari; Hindi: Jira, Safed jira; Sansk:Sveta jiraka, Ajaji, Jiraka, Ajajika

Source: Extensively cultivated as a cold-season crop on the plains and as summer crop on the hills in Northern India, Himalayas, Punjab, Baluchistan, Kashmir, kumarun, Garhwal, and Chamb.

Description: Cuminum is a small slender annul herb about 1 ft. height, The fruits are greyish, about ¼ inches long, tapering towards both base and apex.

Parts used: Seeds

Active constituents: The seeds contain thymene volatile oil, p-cymene, a-pinene, b-pinene, dipentene, cumene, cuminic alcohol, cuminoside A, cuminoside B,β-phellandrene, and α-terpeneol[30]

Indications: Cumin seeds used in the treatment of hypertension. Seed powder decoction also used in hypertension. It is a stimulant, carminative, astringent and useful in the treatment of dyspepsia.

Method of use and dosage: Seed powder 1-2 grams with warm water twice daily.

Research: The aquous extract of *Cuminum cyminum* seeds exhibits anti-hypertensive action in renal hypertensive rats. Renal hypertension was induced by the two-kidney one-clip (2K/1C) method in rats. The oral administration of *Cuminum cyminum* seeds (200 mg/kg B.wt) improved plasma nitric oxide and decreased the systolic blood pressure in hypertensive rats[31].

Cardamom

Botanical name: *Elettariacardamomum*

Family: *Zingiberaceae*

Synonyms:*Amomum cardamomum L. Amomum repens* Sonn.,

Common name: Tamil: Elam, Anji, Thudi; Hindi: Elachi; Sanskrit: Ela

Source: It occurs wild in southern India, particularly in the moist forests of hilly regions in Mysore and Kerala. It is also cultivated elsewhere in India.

Description: An herb with thick, fleshy branched rhizome and several erect stems, going sometimes up to 3 m high. Fruits are about 1.5cm long, pale green to yellow, ovoid; 3-celled, many-seeded. Seeds are triangular brownish-black.

Parts used: fruits and seeds

Active constituents: The major components identified in the essential oil are cineole, linalool, terpinyl acetate, d-limonene, alpha-terpineol, alpha- and beta- pinenes, terpene-4-ol, geraniol, and geranyl acetate. In addition, linalylacetate, sabinene, methyl heptanone, myrcene and alpha-terpinene are also present[32]

Indications: Seeds are used as antihypertensive,aromatic, carminative, cardiac tonic, digestive, diuretic, stimulant, and tonic.

Method of use and dosage: cardamom seed powder 500mg- 1gram with milk, twice daily.

Research: The evaluation of cardamom fruit powder for its antihypertensive potential and its effects on some of the cardiovascular risk factors in individuals with stage 1 hypertension shows significant blood pressure lowering action. Administration of cardamom in a dose of 1.5g twice daily showed significantly decreased systolic and diastolic pressure in stage 1 hypertensive individuals at the end of 1stmonth[33].

S.K.Verma found in his pre clinical study, that cardamom acts in the body in a similar way to a type of blood pressure regulating medication called calcium channel blockers, another study done in 2008 revels that the mechanism through which cardamom lowers blood pressure in experimental animals[34].

Rough bryon

Botanical name:*Melotheria maderaspatna*

Family: *cucurbitaceae*

Synonyms:*Bryonia scabrella*,

Common name: Hindi: Agumaki, aganaki, bilari, Tamil: musumuskkai, nagilangiai, Sanskrit: krtarandhrah, musimusikkay, trikosaki.

Source: found in Tropical Africa and from Asia through Malaya to tropical Australia.

Description: It is known as melon-Gobat. It is aperennial herb with tendrils, climber, long, slender, stem.

Parts used: Seeds, roots, leaves.

Active constituents: It contains coumarins, amino acids, phytochemical screening yielded flavonoids, saponins, and tannins. Phytochemistry of leaves shows presents of spinasterol, dihydrospinasterol, β-sitosterol,and glycosides[35].

Indications: Leaf tea and Leaf paste used to reduce hypertension. Root powder used in chest pain. It is also used for its expectorant and astringent action.

Method of use and dosage: Leaf tea used for hypertension. Leaf paste 5-10 grams two times a day also used for hypertension.

Research: study results of ethyl acetate fraction of melon-Gobat, leaves shows that good blood pressure control by enhancement of potassium and decrease of sodium levels, decrease epinephrine and catecholamines[36]. Meliothera leaf tea consumption gradually decrease blood pressure and showed beneficial effects on lipid profile, fibrinogen, bilirubin and body mass index in patients with hypertension. Study of an ethanolic extract of leaves on sham-operated and uninephrectomized DOCA-salt induced hypertensive male albino Wistar rats showed significant reduction of blood pressure[37]

Water Lilly

Botanical name: *Nymphea alba*

Family: *Nymphaeaceae*

Synonyms: *N. occidentalis. Castalia alba. C. speciosa.*

Common name: Tam: alli; san: Kumudam; Hindi: Kanva

Source: It is azhizomatus, submerged aquatic perennials found in the lakes of Kashmir, at altitudes below 1800m.

Description: Leaves rounded chordate, entire, rhizome flowers solitary. There leaves are rounded and floating. Berry like fruits present.

Parts used: Root; Seed.

Active constituents: Nymphaea leaves contain tannic acid, gallic acid, flavones glucoside, myricitrin[38].

Indications: Root decoction used in the treatment of high blood pressure. It has diuretic action.

Method of use and dosage: Root decoction 30- 60ml twice daily.

Research: An in vitro ACE inhibition activity study in *Nymphae alba* shows that n.alba acts with more than 50% that is 66.3% ACE inhibition activity at 330 µg/ml concentration thus it posses anti hypertensive activity[39].

Long Pepper

Botanical name: *Piper longum*

Family: *piperaceae*

Synonyms: *Piper sarmentum, Piper latifolium, Chavica roxburghii, Charvica sarmentosa*

Common name:Tam:Tippali, Ambu; Hindi :Pipar; Sanak :Pippali, Kana, Magadhi, Magadha, Krsna, Saund.

Source: It is cultivated in hotter parts of India from Central Himalayas to Assam upto the hills of West Bengal and evergreen forests of Western Ghats as wild.

Description: It is a slender, aromatic climber, with woody roots and occurring in hotter parts of India. Fruits are greenish-black to black in colour.

Parts used: Fruit, leaf

Active constituents: Piperine, piplartine, ß-caryophyllen, pipernonaline, piperundecalidine, alkaloid, starch, resin, gum, fat, triaconane, dihydrostifransterol, reducing sugars, and glycosides[40]

Indications: Fruit powder used for hypertension. Fruit powder decoction also used for hypertension. It has carminative, Expectorant, stomachic and aphrodisiac action.

Method of use and dosage: fruit powder 1-2grams with sugar twice daily.

Research: Hydro alcoholic extract of *Piper longum* showed ACE inhibitor activity in a concentration dependent manner, in liberation of hippuric acid from HHL catalyzed by the ACE method. Particularly Piperine extract showed most active[41].

Pepper

Botanical name:*Piper nigrum*

Family: *piperaceae*

Synonyms: *Piper aromaticum*

Common name: Tam:Kari, Kaayam, Maricham, Malayali, Milagu; Hin: Kalimirc, Mirc; San: Maricam

Source: It is cultivated in moist parts of India cultivated from Konkan southwards, especially in North Konkan Kerala and also in Karnataka, Maharashtra and Assam.

Description: A stout glabrous climbing perennial, rooting at the nodes.

Parts used: Fruit, leaf

Active constituents: Piperine, piperettine, piperolein A,B, ascorbic acid, carotene, ß-alanine piperidine, serine, threonine, piperyline, arginine, serine, glutamic acid, and cystine[42]

Indications: The fruit powder used to reduce high blood pressure. Fruit decoction used in the treatment of asthma.

Method of use and dosage: Fruit powder260- 390mg with honey twice daily.

Research: Piperine was administrated intravenously; it induced to decreased pressure in arteries in normotensive anesthetized rats[43].Piperine, in *in vitro* study on rabbit heart causes a partial

reduction of force, contraction of tissues and blood flow in coronary vessels. In rabbit aortic ring, piperine partially inhibited phenylephrine and inhibited high k^+ pre-contractions due to blockade Ca^{2+} -free medium, piperin in low doses exhibited vasoconstrictor effect[44]

Winter Cherry

Botanical name: *Withania somnifera*

Family: *Solanaceae*

Synonyms: *Physalis somnifera, P.arborescens, P. flexuosa*

Common name: Tam: Acuvakanti, Amukkara kilanku; Hindi :Asgandh; Sans :Aswagandha, Hayagandha, Vajigandha

Source: A perennial shrub, found in plains, cultivated in fields and open grounds throughout India. It is also cultivated in certain areas of Madhya Pradesh and Rajasthan.

Description: Withania is a short, tender perennial shrub growing 35-75cm (14-30 inch) tall. It branches extend radially from a central stem. The flowers are small and green. The ripe fruit is orange-red in colour. Roots straight, unbranched, thickness varying with age, roots bear fiber-like secondry roots, outer surface buff to grey-yellow with longitudinal wrinkles; crown consists of remains of variously thickened stem bases; fracture short and uneven; odour characteristic taste bitter and acrid.

Parts used: Root leaves

Active constituents: Withanolides- withaferin A, withanone, withanolides I, II, III, III A, C, D, E, F, G, H, I, J, K, L, M, WS-I, P and S, withasomidienone, cuscohygrine, anahygrine, tropine, pseudotropine, anaferine, isopellatierine, and 3-tropyltigloate[45].

Indications: The root powder decrease hypertension and blood cholesterol level. It is also reduce the blood sugar levels in diabetic patients.

Method of use and dosage: Root powder 2gm administered orally twice a day with milk.

Research: The constituents of withania structurally being similar to digoxin are demonstrated to exhibit cardiotonic activity and provide a salutary effect in CHF.Supplementation of 2gm of *Ashwagandha* root powder was givento group I and group II hypertensive subjects with milk and water respectively in morning. Blood pressure was also recorded over a period of threemonths. *Ashwagandha* with milk is more effective in decreasing blood pressure in hypertensive subjects than *Ashwagandha* with water[46].

Arjun Bark

Botanical name: *Terminali aarjuna*

Family:*combretaceae*

Common name: Tam: marudhu; Hindi : Arjuna, Kaipa; San: Arjuna

Source: Common on the banks of rivers, streams and dry water courses in sub-Himalayan tract, Central and south India and West Bengal; also planted for shade or ornament in avenues or parks.

Description: A large evergreen tree, 20-25m high, common in most parts of India. bark very thick, grey or pinkish green in colour.

Parts used: Bark, leaves and fruits.

Active constituents: Bark contains β-sitosterol, ellagic acid, arjunic acid and its saponin, and arjun glucosides I and II, arjunetin, fridelin[47].

Indications: Arjuna bark is very good cardiac stimulant, and cardiac tonic by blood pressure regulating and coronary threat modulating properties. Bark powder acts as adiuretic in cirrhosis of liver and gives relief in symptomatic hypertension.

Method of use and dosage: The powdered bark 2gm with warm water twice daily.

Research: Experimental studies done by Dwivedi.C revealed that the bark extract exerting significant antihypertensive effect, increasing coronary artery flow and protecting myocardium against ischemic damage[48].

Land Caltrops

Botanical name: *Tribuluste rrestris*

Family: *Zygophyllaceae*

Synonyms:*Tribulus langinosus*

Common name: Tam: Nerinji; Hind: Chhotagokhru; San: Gokshura

Source: Occasionally found in waste places and dry habitats the warmer regions of India including west Rajasthan and Gujarat.

Description: A small, prostrate, hirsute or silky hairy herb.

Parts used: Dried seeds

Active constituents: It contains alkaloids, resins, tannins, sugar, sterols, essential oil, peroxides, spirostanol saponin, furastanol saponin and glucosides[49].

Indications: It is used in hypertension and renal dropsy. Fruits are aphrodisiac, demulcent, diuretic and tonic.

Method of use and dosage: In Siddha system the dried seeds of *Tribulus terrestris*, *Piper cubeba* seeds, *Mesuaferrea* bud and *Rheum emodi* are taken equal parts and a powder is prepared, this powder is used in the treatment of hypertension. It reduce stachycardia in hypertension. Powder 500mg twice daily with warm water.

Research: Oludotun A Phillips found that the ethanolic extract of *Tribulus terrestris* posses significant antihypertensive activity in animal modle[50].

Ginger

Botanical name: *Zingiber officinalis*

Family: *Zingiberaceae*

Synonyms: *Zingiberis rhizoma,*

Common name: Tamil:Allam, Inji; Sanskrit:Adraka ; Hindi:Adrak, Ada.

Source: It is cultivated throughout India, run wild in some places in the Western Ghats.

Description: A slender, perennial, rhizomatous herb, linear leaves. The rhizomes are white to yellowish brown in colour, irregularly branched

Parts used: Rhizome.

Active constituents: Gingerols, shogaols, dihydrogingerol, gigerdione, hexahydrocurcumin and desmethyl hexahydrocurcumin, α-zingiberene, β-sesquiphellandrene, ar-curcumene, lipids, proteins, fats, waxes, starch, protein, fibre[51]

Indications: Dried Ginger powder used in hypertension. It is mixed with honey and use in asthma, bronchitis, and diseases of the heart.

Method of use and dosage: Dried Rhizome powder 1gm with honey taken twice daily.

Research: Ghayur has reported that the crude extract of ginger induces the ca2+ channel-Blocking (CCB) activity that lowers the blood pressure which ultimately reduces the hypertension in the patients[52].

CONCLUSION

All herbs reviewed in this article are useful in the treatment of hypertension. Among studied herbs, *Acyranthes aspera, Centella asiatica, Coriandrum sativum, Cuminum cyminum, Elettaria cardamomum, Melotheria maderaspatna, Piper nigrum, Terminalia arjuna, Tribulus terrestris, Withania somnifera, Zingiber officinalis,* has Antihypertensive effect and cardiac tonic, they showed considerable results and acts as antihypertensive as wells as anti oxidant. *Allium sativum* and *Cederus deodara* reduces the blood cholesterol level and decreases the hypertension. *Nymphea alba* and *Piper longum* showed ACE inhibitor activity and reduces the blood pressure. Nowadays Siddha medicines are getting more popular in south Asia because of their natural cure without any side effects. Therefore more research is required to explore the potential of Siddha medicines in the treatment of hypertension.

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REFERENCE

1. Global health Ricks, www.who.int/healthinfo/ diseases; 10,11
2. Prevention and control of Non communicable diseases (NCDs), WG-3(2): Non communicable diseases; 24,25
3. WHO fact sheet 2013 for high blood pressure www.euro.who.int/worldhealthday
4. Alagappan RMD Manual of practical medicine. 4th ed, Jaypee brothers medical publishers (p) ltd; 2011: 88-89.
5. John AA, Hunter, Davidson, Principles and Practice of Medicine.19th ed, Lupin Nicholas A Boom; 388.
6. Guptha SK, Drug screening methods (Preclinical evaluation of new drugs). 2nd ed, Jaypee brothers medical publisher (p) ltd; 258-259.
7. Das PC, Das PK, Text book Of Medicine. 5thed, Kolkata: Current books international; 2009: Reprint 2013, 68.
8. Laragh JH, Brenner BM Hypertension Pathophysiology. Diagnosis and management. 2nd ed, New York: Raven press, ltd;1995: 164 -2741
9. Padmaja Udayakumar, Medical Pharmacology. 4th ed, CBS Publishers (p) ltd; 168-179.
10. Edward, D. and M.D. Freis, 1954. Adverse effects of antihypertensive drugs. GP., 10: 32-33.
11. Goodman LS, Gilman A, Brunton LL, Lazo JS and Parker KL, Goodman and Gilman's the Pharmacological Basis of Therapeutics. New York: McGraw-Hill; 2006; 198.
12. Katzung, BG, Basic and Clinical Pharmacology. McGraw-Hill, New York. 198.
13. Subramanian SV, MadhavanVR, Heritage of Tamil siddha medicine. 1st edChennai, International institute of Tamil studies, Tharamani; 1983; 198.
14. Shanmugavel, *Noi Nadal Noi Mudhal Nadal thirattu* part II Chennai, Indian medicine and Homoepathy; 98
15. Govt. of India.Ministry of Health and Family Welfare.Siddha treatment guidelines for selected disease NIS Dep of AYUSH,New Delhi; 42
16. Murugesa mudhaliyarGS, Siddha Materia Medica (Medicinal plants division) Indian medicine and homeophathy, part-I;459

17. International Journal of Pharmacognosy and Phytochemical Research. Chennai. 2012; 4(3); 139-141
18. Srivastav S, Singh P, Jha KK, Mishra G, Srivastava S, Karchuli MS and Khosa RL, Diuretic activity of whole plant extract of *Achyranthes aspera* Linn. Europ. J. Exp. Biol.2011; 1: 97-102.
19. Kadam et al.,Pharmacognostic, Phytochemical and Physicochemical studies of *allium sativum* linn. bulb (liliaceae)*IJPSR, 2013; Vol. 4(9): 3524-3531.*
20. Fallon M, Abrams G, Abdel-Razek T, Dai J and Chen S*et al*., Garlic prevents hypoxic pulmonary hypertension in rats. Am. J. Physiol.1998; 275: L283-L287
21. Pedraza-Chaverri J, Tapia E, Medina-Campos OE, De los Angeles Granados M and Franco M,Garlic prevents hypertension induced by chronic inhibition of nitric oxide synthesis. Life Sci.1998; 62: 71-77
22. Gupta *et al.* Phytochemistry and pharmacology of *Cedrus deodera:* An overview, Int J Pharma Sci Res, 2011;. 2(8): 2010-2020
23. Sudhirpatil, Indian J Pharmacology. 2011;43:644-647
24. Thangavel arumugam *et al.* Phytochemical screening and antibacterial activity of leaf and callus extracts of *Centella asiatica* Bangladesh J Pharmacol 2011; 6: 55-60
25. Ahmad, B.F. and G. Ismail, Medicinal plants used by Kadazandusun communities around crocker range.2003. ASEAN Review of Biodiversity and Environmental Conservation (ARBEC). http://www.arbec.com.my/pdf/art1janmar03.pdf.
26. Nirmala Paul *et.al* Phytochemical and Biological investigations of *Coriandrum sativam* (Cilantro) leaves. *IJIPSR* 1(1), 2013, 170-184.
27. Jabeen Q, Dep of Biological and Biomedical science, Agakhan university medical college, Karachi 74800.s Journal of Ethnopharmacology.2009, Feb 25, 122(1), 123-30.
28. SMU Medical Journal. Review article, Volume -2; 2015
29. Imenshahidi.M, Hosseinzadeh.H, Javadpour.Y; Hypotensive effets of aqueous extract of saffron flowers in hypertensive rats; Phytochemical research 2010; 24; 990-994.
30. Gohari and Saeidnia, Phytochemistry and Standards of Cumin seeds. Pharmacognosy Journal. 2011;3(25).
31. Kalaivani P Cuminum cyminum, a dietary spice, attenuates hypertension via endothelial nitric oxide synthase and NO pathway in renovascular hypertensive rats. Epub.2013;35 (7):534-42.

32. The Wealth of India –Raw materials. New Delhi Publications and Information Directorate CSIR; 1952;vol-III : 149
33. Gilani AH, Gut modulatory, Blood pressure lowering, diuretic and sedative activities of *Elettaria cardamomum*, Journal of Ethnopharmacology, 2008
34. VermaSK, Blood Pressure lowering, fibrinolysis enhancing and antioxidant activities of cardamom (*Eletariacardamomum*) Indian journal of biochemistry and biophysics, 2009.
35. Philippine medicinal plants.www.stuartxchange.com/ melon-gubat.
36. Pub med.gov- Veeramani.c.at. J Nat med 2012; 66 (2): 302-10
37. Raja B, Kaviarasan K, Arjunan MM, Pugalenthi KV Altern J complement Med. 2007; 13 (13); 394-95
38. The Wealth of India- Raw materials. New delhi, CSIR; 1966; Vol-VII: 70.
39. Sharifi et al. Discovery of new angiotensin converting enzyme (ACE) inhibitors from medicinal plants to treat hypertension using an in vitro assay. DARU Journal of Pharmaceutical Sciences 2013; 21:74
40. Kirthikar KR& Basu BD. The Indian Medicinal Plants, India; International Book Distributors, Dehradun; 1225
41. Chaudhary *et al.* Angiotensin converting enzyme Inhibition of piper longum. Indian J Traditional Knowledge. 2013; 12(3) : 478-482
42. Gayatri Nahak *et al.* Phytochemical evaluation and Antioxidant activity of *piper cubeba* and *piper nigrum*. J Pharma Sci 2011; 01 (8): 153-157
43. Taqvi SI, Shah AJ, Gilani AH. Blood pressure lowering and effects of piperine. J. Cardiovasc Pharmacol 2008; 52: 452-458.
44. Sing A, Duggal S. Piperine – Review of Advances in Pharmacology. Int J. Pharma.Sci. Nanotech *2009;* 2: 615-620
45. Nadkarni K.M, The Indian Materia Medica with Ayurvedic, Unani Home remedies. 3rd ed; 250-251
46. Shalini Kushwaha. Effects of Aswagandha root powder supplementation in the treatment of Hypertension.Ethno Med, 2012; 6(2): 111-115
47. The Wealth of India-Raw materials New delhi, Publications and Information Directorate, CSIR. 1976; vol-X: 161
48. Dwivedi S, *Terminalia arjuna* Wight & Aru.- a useful drug for cardiovascular disorders. J Ethnopharmacol. 2007; 114(2): 114-29

49. Shima *et al:* Medicinal properties Phytochemistry and Pharmacology of *Tribulus terrestris*. Pak. J. Bot. 2014; 46(1): 399-404
50. Oludotun Phillips A.Antihypertensive and vasodilator effects of methanolic and Aquous extracts of *Tribulus terrestris*in rats. Journal of Ethnopharmacology 2006; 104: 351-355.
51. The Wealth of India, Raw materials. New delhi, P&ID CSIR.1976;vol-XI: 89.
52. Ghayur MN and GilaniAH. Ginger lowers blood pressure through blockade of voltage-dependent calcium channels. J. Cardiovasc. Pharmacol., 445: 74-80