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APPLICATION OF HERBAL PLANTS USED IN THE TREATMENT FOR HYPERTENSION DISEASE

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Abstract

Hypertension, commonly referred to as high blood pressure, is one of the leading risk factors for cardiovascular morbidity and mortality worldwide. Although several classes of synthetic antihypertensive agents are available, their long-term use is often associated with side effects, poor patient compliance, and economic burden. In recent years, herbal plants have gained significant attention as complementary and alternative therapies for the management of hypertension due to their affordability, safety profile, and rich phytoconstituents with diverse pharmacological actions. Various medicinal plants such as *Allium sativum, Moringa oleifera, Ocimum basilicum, Phyllanthus amarus, Punica granatum, Raphanus sativus, Rauwolfia serpentine, Sesamum indicum* and *Zingiber officinale* have demonstrated antihypertensive effects through mechanisms including vasodilation, diuresis, calcium channel blockade, ACE inhibition, antioxidant activity, and modulation of lipid metabolism. Scientific investigations, encompassing phytochemical screening, in vitro and in vivo studies, and clinical trials, have validated their potential role in lowering blood pressure and improving cardiovascular health. However, challenges remain in terms of standardization, dosage optimization, safety evaluation, and herb–drug interactions. This review highlights the therapeutic potential of herbal plants in hypertension management and emphasizes the need for further research to develop standardized, evidence-based phytopharmaceuticals for effective and safe clinical use.

Keywords: Hypertension, synthetic antihypertensive agents, herbal plants, calcium channel blockade, ACE inhibition, antioxidant activity, and modulation of lipid metabolism, phytochemical screening.

1. Introduction

Hypertension is defined as an abnormally high blood pressure (BP) and is one of the most important risk factors for cardiovascular disease and death. The limits that define hypertension are chosen to reflect the risk for disease related to the elevated BP although risk increases even within the 'normal' BP range. Hypertension is a risk factor for stroke, myocardial infarction (MI), left ventricular hypertrophy (LVH) and failure, renal disease, retinopathy, and peripheral arterial disease. Therefore, effective evaluation and treatment of hypertension remains an important medical goal, and understanding the pathogenesis of hypertension through animal models and clinical studies is a critical component.

Hypertension can be due to unknown causes, primary hypertension (previously called essential hypertension), or known causes, secondary hypertension. Primary hypertension accounts for about 85–90% of the cases of hypertension, which is lower than often quoted in most textbooks. The lower percentage is due to the recent appreciation of the role of primary aldosterone, which was once thought to be rare (< 1%) but is now known to constitute between 10% and 15% of hypertensive cases. Primary hypertension clusters in families and shows concordance in genetically related individuals illustrating the importance of genetic predisposition. The known inheritable syndromes regulating BP are caused by mutations regulating renal sodium handling. Hypertension is also commonly called high Blood Pressure i.e. above 140/90 and it is severe above 180/120. Hypertension symptoms are not known as such but a person should be carefully observed for the underlying problems or signs as it are a serious, long-term or chronic health problem that may occur due to other illnesses. Therefore, it is important to keep track of the warning signs of Hypertension as prevention is better than cure. It is a primary risk factor for various cardiovascular diseases including Stroke, Heart Failure, Heart Attack and Aneurysm. It is thus important to keep Blood Pressure under control and preserve a healthy body by preventing occurrence of other lifestyle diseases too. It is related to the Pressure or the force exerted by the Blood against the Blood vessels' walls. It is very common to occur in today's lifestyle and affects over one billion people worldwide.The two kinds of Hypertension are known, namely [1].

• **Primary Hypertension:** It is also known as essential Hypertension and it is the high Blood Pressure that doesn't occur through a known secondary cause.

Secondary Hypertension: It is the high Blood Pressure caused due to another medical condition and it can affect our kidneys, heart, arteries or endocrine system. Some of the medications or illegal drugs can also cause secondary Hypertension

Genetic factors interact with environmental factors to produce hypertension. Diet is an important determinant both in its salt content and in the increasing public health problem of obesity. Dietary salt may have chronic effects and relate to the observed increases in BP in Western societies with age. Obesity is now known to be a chronic inflammatory disease that increases the risk of hypertension and likely relates to the interaction of hypertension in increasing the risk of cardiovascular disease [2].

Abnormalities in a number of systems are seen in primary hypertension, yet the originating causes have remained elusive. Neural systems show an increased sympathetic flow with elevations of catecholamines. Central nervous system (CNS) interventions in a number of experimental systems can alter BP and prevent hypertension. The sympathetic system interacts with the hormonal systems that involve adrenal catecholamines and the important action of the renin–angiotensin–aldosterone system (RAAS). The RAAS involves multiple organs with the primary role of the kidney and adrenal cortex (glomerulosa layer producing aldosterone). It is the major hormonal regulator of sodium and volume homeostasis and hence a major regulator of BP. Many of the pharmacological interventions used clinically to treat hypertension target this system. Defects in the vascular endothelial and smooth muscle cell function have been described

Many people have high blood pressure (hypertension). But they usually don't notice it which means that over time it can damage blood vessels. Having blood pressure that is always too high can make you more likely to have a heart attack, a stroke or kidney problems. The higher your blood pressure is the greater your risk of developing these medical conditions [2, 3].

Blood pressure readings have two values that are always listed together: 128/85 mmHg, for example. The first number represents the pressure in the blood vessels when the heart muscles squeeze (systolic blood pressure). The second represents the pressure in the blood vessels when the heart muscles relax (diastolic blood pressure) [2, 3].

Blood pressure is considered to be too high if the systolic value is over 140 and/or the diastolic value is over 90. But these levels were set for practical reasons and act only as a general guide. Because of this, recommendations about when medication is needed to treat high blood pressure may vary [2, 3].

2. Symptoms of Hypertension

Generally, there are no symptoms or signs specific to Hypertension. However, one can observe headaches, shortness of breath, bleeding of nose and uneasiness in people starting with Hypertension. Until Hypertension reaches its severity, symptoms do not occur intensely.

It is best to prevent Hypertension and related problems by keeping an eye on your Blood Pressure. If you are 40 or older, it is necessary to track your Blood Pressure readings twice or thrice a month or more if you feel uneasiness about your health. Even young people are vulnerable towards it because of today's lifestyle and lack of exercise, so they are also advised to have knowledge about Hypertension, keep track of their BP and take all measures to keep oneself healthy. Besides manual BP machines, Digital BP machines are also easily available in the market, people can even buy and keep it at home for convenient tracking. Please do not neglect the following symptoms that can be due to development of Hypertension in a person

- Dizziness
- Bleeding Nose
- Chest Pain
- Heart attack
- Headaches
- Visual Changes
- Shortness of Breath
- Flushing or Blushing
- Narrowing of Blood vessels
- Formation of plagues in the Blood vessels [4].

3. Causes of Hypertension

Causes for Hypertension include various factors including Obesity, Hereditary (family history) and other lifestyle factors. It is manageable through proactive and consistent steps such as inculcating the habit of regular physical exercise, meditation and various stress reducing techniques, medications, preventing excess salt and junk food, etc

- Dizziness
- Bleeding Nose
- Chest Pain
- Heart attack
- Headaches

• Visual Changes
• Shortness of Breath
• Flushing or Blushing
• Narrowing of Blood vessels
• Formation of plagues in the Blood vessels

4. Various Factors Contributing to Cause Hypertension Include:

• Diabetes
• Pregnancy
• Cushing syndrome
• Hyperthyroidism
• Kidney problems
• Obesity
• Adrenal hyperplasia [5].

5. Risk factors

Our bodies are able to regulate blood pressure as needed. It's typically low when we relax or sleep. It increases when, for example, we do hard physical work and our muscles need more blood. Stress or fear can also cause your blood pressure to go up. It usually naturally increases with age in most people as well.

So it's normal for blood pressure readings to vary; that's just a sign of an active life. But if blood pressure is too high for too long, it can damage blood vessels over time and increase the risk of various health problems.

Often no specific cause is found for high blood pressure. Then doctors call it "essential" or "primary" hypertension.

Being overweight, eating a lot of salt, drinking too much alcohol and not getting enough exercise can increase your blood pressure. But slim, athletic people who watch what they eat may also develop high blood pressure – for example, because it runs in their family.

An exact cause is only found in 5 out of 100 people. Possible causes include an overactive thyroid gland (hyperthyroidism) or kidney disease. When the cause is known, doctors refer to it as "secondary" hypertension.

Sometimes medications can increase blood pressure as well. For example:

• Some medicines used to treat psychological illnesses
• Certain plant-based medications like St. John's wort

• Decongestant nasal sprays or drops

• Birth control pills [6].

6. Effects

Long-term high blood pressure can increase the likelihood of cardiovascular (heart and blood vessel) diseases and cause organ damage. The possible long-term effects of high blood pressure include the following:

• Poor blood circulation in the legs (PAD)

• Weak heart (myocardial insufficiency, heart failure)

• Heart attack

• Stroke

• Damage to the kidneys

Treatment can lower the risk of developing these kinds of problems.

7. Diagnosis

Blood pressure is measured in units of "millimeters of mercury," written "mmHg" for short. It is always measured while you are resting so that the readings can be compared and interpreted more easily. Blood pressure is measured on several days to get a more reliable result than a single reading can offer. It's also important to measure blood pressure on both arms because the pressures may differ. The highest systolic reading and the highest diastolic reading are then taken as the basis for determining your blood pressure.

An adult's blood pressure is considered to be normal if it is less than 140 over 90 (140/90). High blood pressure is diagnosed if

• The systolic reading is greater than 140 mmHg,

• The diastolic reading is greater than 90 mmHg, or

• Both readings are greater than these values.

Sometimes blood pressure is measured over a 24-hour period (ambulatory blood pressure monitoring). This might be done if individual measurements vary a lot. To do that, you carry a portable instrument with you that measure your blood pressure at regular intervals [7].

8. Screening

In Germany, statutory health insurers cover the cost of a general health check-up every three years from the age of 35 onwards. The aim of this check-up is to detect early signs of cardiovascular disease, diabetes and kidney problems. It includes taking your blood pressure.

So far, though, studies haven't proven that regular general health check-ups can protect healthy people from illness or increase their life expectancy.

9. Prevention of Hypertension

In today's era, it is important to keep oneself healthy and prevent chronic conditions such as Hypertension. By taking certain steps, one can prevent Hypertension from occurring and even manage it if it already exists. Following are some of the must do activities in day to day life:

• Reducing salt intake in diet

• No consumption of alcohol

• Consumption of plenty of fruits and vegetables

• Avoiding calorie-rich or junk food

• Walking for 30-40 minutes daily

• Alternative regular physical exercise program

• Meditation or other stress buster activities

• High Blood Pressure is another name for high Blood Pressure. It causes serious health complications and can increase the risk of heart disease, stroke, and sometimes death.

• Blood Pressure is the force that human Blood exerts on the walls of Blood vessels. This Pressure is working on the basis of the resistance of the Blood vessels and how hard the heart must work.

• Almost half of adults in the United States have high Blood Pressure, but many may not be aware of it.

• Hypertension is an important risk factor for cardiovascular diseases such as stroke, heart attack, heart failure and aneurysms. Controlling Blood Pressure is important for maintaining good health and reducing the risk of these dangerous conditions.

• Read below to find out why your Blood Pressure is rising, how to monitor your Blood Pressure, and how to keep your Blood Pressure within normal limits.

10. Management and Treatment

• Keeping a track of lifestyle is the standard first-line treatment for Hypertension. Here are some recommendations:

• Regular Exercise

• Current guidelines recommend that everyone, including those with high Blood Pressure, do at least 150 minutes of medium-intensity aerobic exercise or 75 minutes of high-intensity exercise each week. ..

• In addition to 150 minutes of exercise, most adults benefit from strength training at least twice a week.

• People need to exercise at least 5 days a week [8].

Examples of Suitable Activities are:

1. Walking
2. Jogging
3. Biking
4. Swimming

11. Relieving Stress

Learning to Avoid and Manage Stress Helps People Control Blood Pressure.

Here are some relaxation techniques that can help reduce stress.

1. Meditation
2. Hot bath
3. Yoga
4. Long walk

• Avoid alcohol and recreational drugs to manage stress. These can contribute to high Blood Pressure and complications of high Blood Pressure.

• Smoking can also increase Blood Pressure. Avoiding or quitting smoking reduces the risk of high Blood Pressure, serious heart disease, and other health problems.

12. Medications

• People may take certain medications to treat high Blood Pressure. Doctors often recommend low doses first. Antihypertensive drugs usually have few side effects.

• People with high Blood Pressure may need to combine two or more medications to control their Blood Pressure [6-9].

13. Antihypertensive Drugs Include:

Diuretics:

Loop diuretics: Bumetanide, Ethacrynic acid, Furosemide, Torsemide

Thiazide diuretics:, Epitizide, Hydrochlorothiazide, Chlorothiazide, Bendroflumethiazide

Thiazide-like diuretics: Indapamide, Chlorthalidone, Metolazone

Potassium-sparing diuretics: Amiloride, Triamterene, Spironolactone

Adrenergic receptor antagonists:

Beta blockers: Atenolol, Metoprolol, Nadolol, Oxprenolol, Pindolol, Propranolol, Timolo

Alpha blockers: Doxazosin, Phentolamine, Indoramin, Phenoxybenzamine, Prazosin, Terazosin, Tolazoline

Mixed Alpha + Beta blockers: Bucindolol, Carvedilol, Labetalol

Adrenergic receptor agonists:

Alpha-2 agonists: Clonidine, Methyldopa, Guanfacine

Calcium channel blockers:

Dihydropyridines: Amlodipine, Felodipine, Isradipine, Lercanidipine, Nicardipine, Nifedipine, Nimodipine, Nitrendipine

Non-dihydropyridines: Diltiazem, Verapamil

ACE inhibitors: Captopril, Enalapril, Fosinopril, Lisinopril, Perindopril, Quinapril, Ramipril, Trandolapril, Benazepril

Angiotensin II receptor antagonists: Valsartan, Candesartan, Eprosartan, Irbesartan, Losartan, Olmesartan, Telmisartan.

Aldosterone antagonists: Eplerenone, Spironolactone.

Vasodilators: Sodium nitroprusside, Hydralazine.

Centrally acting adrenergic drugs: Clonidine, Guanabenz, Methyldopa, Moxonidine [10].

14. Diet

People can prevent high Blood Pressure by eating good heart nutrition.

• Reduced salt intake

• High sodium consumption can lead to high Blood Pressure. The major source of sodium in food is salt.

• The American Heart Association recommends that people without high Blood Pressure consume less than 2,300 milligrams (mg) of sodium per day. This is about the right amount of a teaspoon. People with high Blood Pressure need less than 1,500 mg of sodium per day to control their condition.

• Reducing salt intake can benefit people with or without high Blood Pressure.

• Facilitating drinking

• Moderate to high doses can increase Blood Pressure.

Experts recommend that people with high Blood Pressure prefer foods that are good for heart health, such as

1. Various fruits and vegetables

2. Legumes such as chickpeas, legumes and lentils

3. Nuts

4. Omega 3 rich fish

4 Twice a week

5. Non-tropical plant oils such as olive oil

6. Skinless poultry and fish

7. Low-fat dairy products

• Avoid Trans fats, hydrogenated vegetable oils, animal fats, and processed fast foods when planning your diet if a person has high Blood Pressure or wants to maintain moderate Blood Pressure.

• Omega 3 fatty acids in oily fish and olive oil have a protective effect on the heart. But these are still bold. They are usually healthy, but people with high Blood Pressure still need to include them in their total fat intake. Weight Management

• Overweight can contribute to high Blood Pressure. A decrease in Blood Pressure usually follows a loss of weight. This is because the heart does not have to work hard to pump Blood around the body.

• It helps to have a balanced diet with calorie intake appropriate for your height, gender, and activity level [11].

Dietary modification

DASH-trial proved reductions in BP of 11.4/5.5 mmHg in persons having hypertension on a diet rich in fruits, vegetables, and low-fat dairy products, compared with those people who were on a so-called “usual American diet”. Dietary salt intake and weight were kept constant. Another two clinical trials, one with a comprehensive food plan that supplied the recommended dietary allowances of all major nutrients and the other with a diet rich in fruits, vegetables, and low-fat dairy products and reduction in saturated and total fat produced reductions in BP comparable to or greater than those usually seen with monotherapy for stage 1 hypertension. Dietary salt intakes have a linear association with blood pressure. Reduced sodium intake to approximately 100 mmol day-1 can prevent the development of hypertension [12].

Weight loss and physical activity

Overweight (body mass index >25 kg/m2) has been seen in epidemiologic studies to be an important risk factor for higher blood pressure, and there seems to be a linear relation between body weight and blood pressure. Clinical trials have shown that weight loss, specially when combined with dietary sodium restriction, lowers blood pressure in hypertensive and also in

normotensive patients. The Hypertension Prevention Trial showed that a 4 % reduction in body weight over 3 years was associated with a 2.4 mmHg reduction in SBP and a 1.8 mmHg reduction in DBP. 63 Increasing aerobic physical activity such as brisk walking, jogging, swimming or bicycling has been shown to lower BP. A meta-analysis of 54 randomized controlled trials showed a net reduction of 3.8 mmHg in SBP and 2.6 mmHg in DBP in individuals performing aerobic exercises, compared to controls [13].

13. Pharmacological treatment

As blood pressure increases, it become more difficult to control it at the target level through life style modifications alone and treatment with antihypertensive drugs becomes necessary. WHO guidelines also recommend the use of antihypertensive drugs in patients with grade 1 hypertension at low or moderate cardiovascular risk, that is, when BP is between 140 and 159 mmHg SBP and/or 90 and 99 mmHg DBP, provided non pharmacological treatment has proved unsuccessful. So, in these conditions the patient should move towards pharmacological treatment

Diuretics

The steady introduction of newer agents and their heavy promotion by the industry made physicians switch away from use of diuretics as first line agents in the treatment of mild to moderate hypertension but then also thiazide type of diuretics offer better reduction of blood pressure with lesser incidence of coronary revascularization and heart failure as compared to other drugs like CCB, ACEI or ARB. 66 The evidence from the SHEP study emphasizes the value of a low-dose thiazide-type drug as initial therapy for isolated systolic hypertension in older patients. 67 Clinical trial data also indicate that diuretics are generally well tolerated [14-16].

β-Blockers

β-drugs are decrease cardiac output and the slowing of heart rate and were originally thought to be of clinical importance, particularly in hypertensive patients with tachycardia. But, at the same time, peripheral resistance is increased slightly and sodium re absorption by the kidney is increased. The ability of β-blockers to inhibit activity of the RAS by reducing the release of renin from the juxtaglomerular cells of the kidney may contribute to their blood pressure lowering effects, especially in patients with medium or high levels of plasma renin activity. 69 Over time, they became widely accepted for the treatment of hypertension, and one of the

reasons for the acceptance of this drug class by clinicians was that these agents appeared to be better tolerated than many of the drugs previously available for treating hypertension [17].

Angiotensin-converting enzyme Inhibitors, angiotensin receptor antagonists and renin inhibitors Inhibitors of the renin-angiotensin system (RAS), including ACE-inhibitors, ARBs and now direct rennin inhibitor (DRI) are commonly used in the treatment of hypertension. ACE-inhibitors modulate blood pressure by inhibiting ACE mediated conversion of angiotensin I to angiotensin II. ARBs modulate blood pressure by inhibiting the activation of the AT1 receptor by angiotensin II. [18]. Aliskiren, a direct renin inhibitor, is the first of a new class of antihypertensive drugs that block the RAS further upstream. Its antihypertensive effect, safety, and tolerability are comparable with ARBs and ACE inhibitors; however, its long-term data is awaited [19].

Calcium channel blockers CCBs which include both dihydropyridines (DHPs) e.g., nifedipine and amlodipine and non-dihydropyridines, like verapamil and diltiazem, are among the most widely prescribed agents for the management of essential hypertension. Several large outcome risk trials and comprehensive meta-analyses have found that CCBs reduce the cardiovascular morbidity and mortality associated with uncontrolled hypertension, including stroke. [20] Conditions favoring the choice of a DHP CCB for hypertension include: advanced age, isolated systolic hypertension, angina pectoris, peripheral vascular disease, carotid atherosclerosis, and pregnancy. Diltiazem or verapamil is considered for use in patients with angina pectoris or supraventricular tachycardia.

Alpha-1 receptor antagonist A1-adrenergic blocking drugs are effective in reducing blood pressure and do so in a fashion comparable to most other antihypertensive drug classes. Initially, for many years α1-adrenergic antagonists had been considered suitable initial drugs for uncomplicated early-stage hypertension. But guidelines including the European Society of Hypertension/European Society of Cardiology and the authors of the JNC 7 no longer include α1-adrenergic antagonists as initial agents for the treatment of hypertension [21].

TRPV1 antagonists Transient Receptor Potential Vanilloid Receptor type 1 is the latest site for the antihypertensive action. The endocannabinoid, anandamide, can have depressor effects and its production is upregulated in certain pathophysiological states. TRPV1 receptor has been implicated in the hypotensive effects of anandamide. Oleamide (cis-9 10 octadecenoamide) is a fatty acid primary amide, which was originally derived from sleep-deprived cats and shares structural similarities with anandamide [22-26].

Trials of Hypertension Prevention Collaborative Research Group, Effects of weight loss and sodium reduction intervention on blood pressure and hypertension incidence in overweight people with high-normal blood pressure: the Trials of Hypertension Prevention, Phase II. Arch. Intern.

Table : Naturally occurring medicinal herbs having hypotensive/antihypertensive potential

Plant Name	Family & Common Name	Reference
Agathosma betulina	Rutaceae; Common name: Buchu	[27]
Allium sativum	Alliaceae/Liliaceae; Common name: Garlic	[28]
Annona muricata	Annonaceae; Common name: Prickly Custard Apple	[29]
Apium graveolens	Apiaceae; Common name: Celery	[27]
Aristolochia manshuriensis	Aristolochiaceae; Common name: Guan Mu Tong	[30]
Artocarpus altilis	Moraceae; Common name: Breadfruit	[29]
Avena sativa	Poaceae/Gramineae; Common names: Dietary Fiber, Green Oat	[32]
Blond psyllium	Plantaginaceae; Common name: Indian Plantago	[31]
Camellia sinensis	Theaceae; Common name: Tea	[33]
Capparis cartilaginea	Capparaceae; Common name: Lasaf	[34]
Carum copticum	Umbelliferae; Common name: Ajwain	[35]
Cassia absus	Caesalpiniaceae; Common name: Chaksu	[36]
Cassia occidentalis	Caesalpiniaceae; Common name: Coffee Weed	[37]
Castanospermum austral	Fabaceae; Common name: Black Bean	[38]
Coleus forskohlii	Lamiaceae; Common name: Karpurvali	[39]
Crataegus pinnatifida	Rosaceae; Common name: Chinese Hawthorn	[40]
Crinum glaucum	Amaryllidaceae; Common name: River Lily/Swamp Lily	[41]
Cuscuta reflexa	Cuscutaceae; Common name: Giant Dodder	[42]
Daucus carota	Umbelliferae; Common name: Carrot	[43]

Desmodium styracifolium	Leguminosae; Common name: Osbeck	[44]
Fuchsia magellanica	Onagraceae; Common names: Hardy Fuchsia, Chiko, Tilco	[45]
Glycine max	Fabaceae; Common name: Soybean	[46]
Gossypium barbadense	Malvaceae; Common name: Roselle	[47]
Hibiscus sabdariffa	Malvaceae; Common name: Roselle	[48]
Lavandula stoechas	Lamiaceae; Common name: French Lavender	[49]
Lepidium latifolium	Cruciferae; Common name: Rompepiedra/Stone Breaker	[50]
Linum usitatissimum	Linaceae; Common names: Linseed, Flaxseed	[51]
Lumnitzera racemosa	Combretaceae; Common name: Black Mangrove	[52]
Lycopersicon esculentum	Solanaceae; Common name: Tomato	[53]
Moringa oleifera	Moringaceae; Common name: Murungai	[54]
Musanga cecropiodes	Cecropiaceae; Common names: Umbrella Tree, Cork Wood	[55]
Ocimum basilicum	Lamiaceae; Common name: Basil	[56]
Peganum harmala	Nitrariaceae; Common name: Harmal	[57]
Phyllanthus amarus	Euphorbiaceae; Common name: Nela Nelli	[58]
Pinus pinaster	Pinaceae; Common name: Maritime Pine	[59]
Pueraria lobata	Fabaceae; Common name: Kudzu	[60]
Punica granatum	Lythraceae; Common name: Pomegranate	[61]
Raphanus sativus	Cruciferae; Common name: Radish	[62]
Rauwolfia serpentina	Apocynaceae; Common name: Rauwolfia	[63]
Rhaptopetalum coriaceum	Scytopetalaceae	[64]
Sesamum indicum	Pedaliaceae; Common name: Sesame	[65]
Solanum sisymbriifolium	Solanaceae; Common names: Sticky Nightshade, Wild Tomato	[66]

Theobroma cacao	Malvaceae; Common names: Chocolate, Cocoa Bean, Cocoa Butter	[67]
Triticum aestivum	Poaceae/Gramineae; Common names: Bran, Wheat Bran	[68]
Uncaria rhynchophylla	Rubiaceae; Common name: Cat's Claw Herb	[69]
Viscum album	Santalaceae; Common name: Mistletoe	[70]
Vitex doniana	Verbenaceae; Common name: Black Plum	[71]
Zingiber officinale	Zingiberaceae; Common name: Ginger	[27]

Human trials for hypotensive effect of ginger have been few and generally used a low dose with inconclusive results. The renewed interest in the search for new drugs from natural sources, especially from plant sources, has gained global attention during the last two decades. The tropical rain forests have become an important point of this activity, primarily due to the rich biodiversity they harbor, which promises a high diversity of chemicals with the potential novel structures. However, of this rich biodiversity, only a small portion has been studied for its medicinal potential. Thus, natural plants and herbs can be our source of drugs, with fewer side effects and better bioavailability for treatment of HTN in future.

Medicinal plants have been recognized as being effective in controlling and treating HTN. A small number of traditionally used plants have been confirmed precisely through animal studies and clinical trials, but the detailed mechanisms of action of these plants are still unknown. Medicinal plants are unsuccessful in attaining the anticipated scale due to a shortage of scientific data on their safety and efficiency. Thus, systematic validation studies are required [72-80]. Hypertension is a most common life style disease in India. Most of peoples are suffering hypertension and diabetic both of diseases, taking both type of drug, those peoples require alerting the fitness of body and the involved exercise, meditation, herbs, low diet and nutraceutical for the management diabetic syndrome [81-84].

14. Conclusion

Herbal plant therapy offers a possible substitute or addition to traditional treatment for hypertension. Numerous medicinal plants contain bioactive substances such alkaloids, flavonoids, terpenoids, tannins, and saponins that work through mechanisms like diuresis, vasodilation, antioxidation, and renin-angiotensin system regulation to reduce hypertension. Herbal treatments are useful for long-term care since they frequently have fewer adverse effects

and a more holistic effect than synthetic pharmaceuticals. Nevertheless, there are still issues with safety, clinical validation, dosage adjustment, and standardization despite their potential. The goal of future research should be to create evidence-based, standardized, and efficient herbal compositions by fusing traditional knowledge with contemporary pharmacological investigations. When used responsibly and backed by scientific evidence, herbal plants have the potential to significantly reduce the worldwide burden of hypertension and enhance patient quality of life.

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16. Conflict Of Interest

No authors declared Conflict of Interest.

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