

An Evidence-Based Narrative Review of Holistic Methods for Managing Hypertension

Dr Shruti Sharma
Assistant Professor
Government Dhanwantri Ayurvedic College Ujjain

Abstract

An estimated 10.8 million fatalities annually are linked to hypertension, a major risk factor for cardiovascular morbidity and mortality and a significant public health concern. Even with successful pharmaceutical treatments, long-term use is frequently linked to adverse effects and low compliance. Ayurveda provides a comprehensive method. This review's goal was to evaluate the evidence supporting current Ayurvedic treatments for the treatment of hypertension. Supplies and techniques: Using the electronic databases PubMed, Scopus, and Web of Science, a narrative review of research published up until December 2024 was conducted. Randomized controlled trials, observational studies, and case reports that assessed ayurvedic treatments, herbal remedies, Panchakarma treatments, and lifestyle changes were all considered eligible. Predetermined eligible criteria were used to select study participants. Results: Twenty studies in all that met the predetermined inclusion criteria were included. Systolic and diastolic blood pressure were significantly lowered by herbal formulations, such as Sarpagandha-based medicines, Brahmi Vati, and polyherbal combinations. Blood pressure and other cardiovascular parameters were positively impacted by panchakarma treatments such as Basti, Virechana, and Shirodhara. Yoga, pranayama, and dietary changes are examples of lifestyle treatments that have improved blood pressure regulation, reduced stress, and enhanced general wellbeing. Ayurvedic treatments present encouraging supplementary methods for controlling hypertension. However, there were a number of drawbacks, such as limited sample sizes, inconsistent study designs, and heterogeneity in interventions. To verify their effectiveness and integrate them into standard practice, more extensive, well planned clinical trials are required.

Keywords: Hypertension, Ayurveda, Essential Hypertension, Yoga, Diet

Introduction

One of the most important and changeable risk factors for a number of cardiovascular disorders is high blood pressure, or hypertension (HTN). It is considered a serious worldwide health issue that causes over 10.8 million deaths a year (1,2). The number of persons with high blood pressure has doubled in recent years, from 650 million in 1990 to 1.3 billion in 2019. Today, this illness affects about one in three persons worldwide (3,4).

In a similar vein, hypertension is shown to be highly prevalent in India. The National Family Health Survey (NFHS-5) for 2019–2020 found that the prevalence of hypertension was 24% in males and 21% in women, up from 19% and 17%, respectively, in the previous round (2015–16) (5).

Pre-HTN values are between 130-139 mm Hg and 85-89 mm Hg for systolic and diastolic blood pressure, respectively. HTN is diagnosed when systolic blood pressure is greater than 140 mm Hg and diastolic blood pressure is greater than 90 mm Hg (6). Even pre-HTN is thought to be linked to a risk of cardiovascular disease that is more than twice as high as that of people whose blood pressure is within the normal range, or less than 120/80 mmHg (7).

There are two forms of hypertension, depending on the underlying etiology.

HTN, both primary and secondary. Primary hypertension, commonly referred to as essential hypertension, is defined as high blood pressure without a known underlying cause. While the majority of instances are caused by primary hypertension, 5–10% of cases are caused by secondary hypertension, which is secondary to a known cause such as endocrine, renal, aortic

coarctation, pregnancy, drug-induced hypertension, etc. (8). Primary HTN's precise mechanism is still unknown. Nonetheless, a well acknowledged theory suggests that altered sympathetic nervous system activity may play a role in the pathophysiology of primary hypertension. It is recognized that lifestyle factors like physical inactivity, psychosocial factors like stress, and genetic factors like family history can change sympathetic activity (9).

Despite being instrumentally identified, HTN is frequently characterized to as a "silent killer" since it is usually asymptomatic in the majority of cases (10). It can occasionally cause symptoms like fatigue, palpitations, headaches, and giddiness. In extreme situations, it manifests as symptoms including confusion, severe headaches, chest pain, and impaired vision, among others (11).

A variety of pharmacological medications, including beta-blockers, calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II receptor blockers (ARBs), and thiazide-type diuretics, are used in the current therapy approach in modern science. Even though these traditional treatments have been shown to be effective, they frequently need to be used continuously. Poor adherence to antihypertensive drugs and adverse effects are frequently linked to this lifetime use (12–14). Finding a safer and more effective alternative therapy is therefore necessary. According to studies, up to 48% of patients with chronic illnesses use complementary and alternative medicine (15).

Reducing cardiovascular morbidity and mortality is the ultimate goal of controlling hypertension. Medication, dietary adjustments, and lifestyle changes (such as stress reduction and weight loss) can all help with this (16). Ayurveda can help achieve this since it emphasizes the significance of diet, lifestyle, and medical intervention for the prevention and treatment of diseases linked to lifestyle choices.

Even so, the traditional Ayurvedic literature makes no explicit mention of hypertension. Numerous Ayurvedic views, such as Vyana Bala Vaishmya, Raktagata Vata, Dhamani Pratichaya, etc., have been used to explain and link hypertension (17). Ayurvedic methods for managing hypertension have been described in a number of studies and publications. Therefore, the purpose of this review is to give Ayurvedic practitioners a succinct summary and recommendations for the efficient treatment of hypertension from an Ayurvedic standpoint.

This review's goal was to evaluate the available evidence. Using Ayurveda to treat hypertension

Methodology

All of the sources that satisfied the selection criteria and were published within 15 years up until December 2024 were found through a thorough electronic literature search conducted on the electronic databases PubMed and Scopus. Based on their eligibility, English-language published studies of RCTs, pre- and post-clinical trials, case reports, and observational clinical trials were taken into consideration. Using Boolean operators like OR and AND, the literature was iteratively searched using pertinent keywords including hypertension, prehypertension, essential hypertension, blood pressure, yoga, diet, and Ayurveda. Clinical trials were isolated using pertinent filters.

33 items were found through the search of the different databases. A single file contained the results of searches conducted utilizing many databases. Two researchers thoroughly screened titles and abstracts to find studies that should be included in this article based on language, full-text content, accessibility, outcome/dataset, failure to reach the necessary baseline BP values, and year of article publication. During the screening process, three duplicate studies were eliminated from the 33 publications that were shortlisted. Nine of the thirty remaining papers were eliminated because the entire manuscript was only available in abstract form. Sitting variance in the results was excluded from the remaining 21 publications and one article.

Twenty articles that met our inclusion criteria were ultimately retrieved. Using a predefined data extraction template that contained basic study characteristics (such as author, study design, etc.), participant characteristics, intervention

characteristics, outcome measures, analysis, and other details, two review authors independently extracted the data. The PRISMA flow chart [Figure 01] describes the process of selecting the recognized articles from many databases based on inclusion and exclusion criteria. The articles that are part of this review are summarized in a table [Table 01].

Figure 01. PRISMA flow chart

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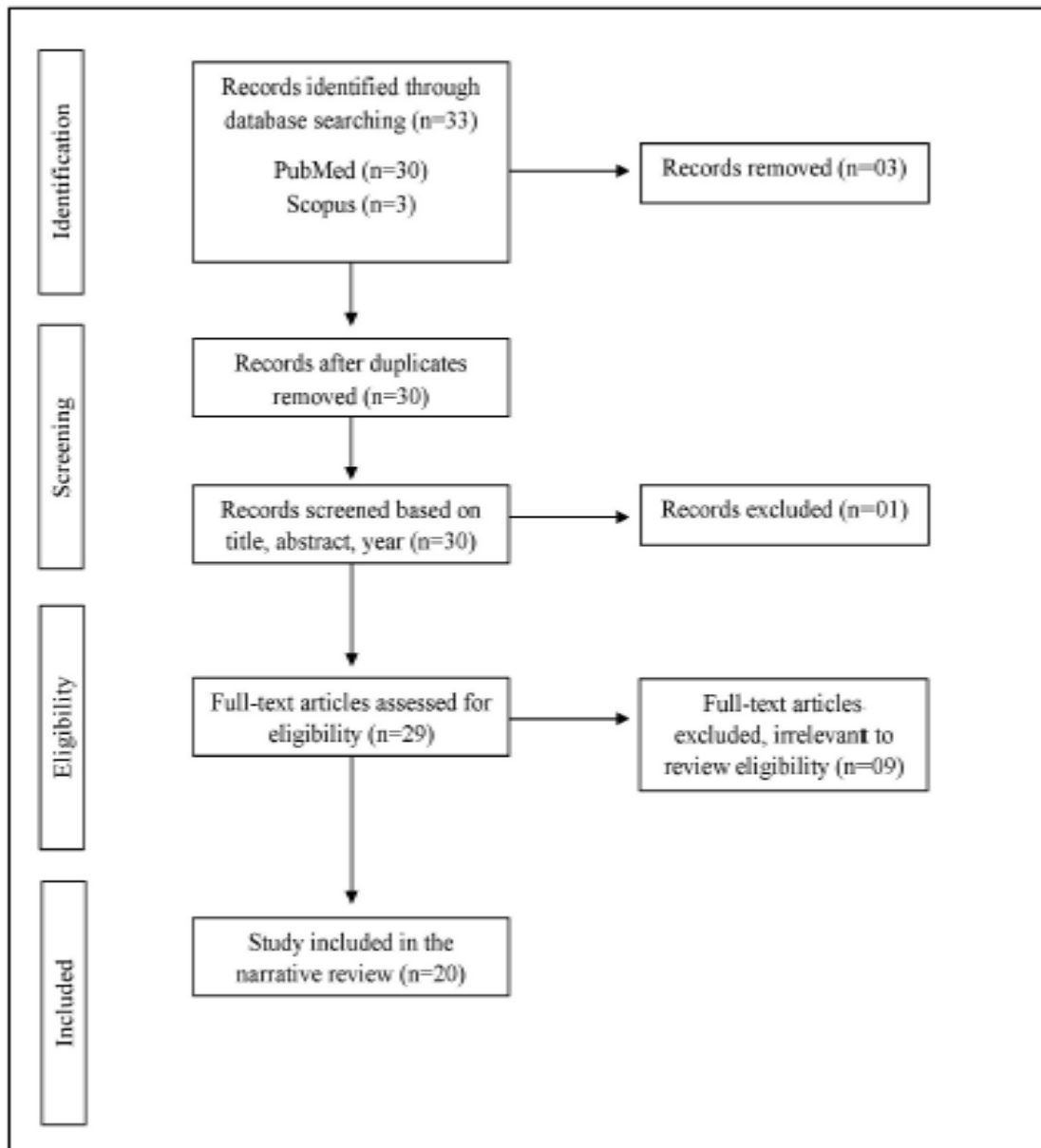


Table 01: Summary of the articles included in this review

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Title of Paper	Study Design	Author	Year	Sample Participants	Intervention	Duration	Result
Effect of Ayurveda intervention in the integrated management of essential hypertension (18)	Retrospective observational	Sharma R et al.	2021	1938	Group I: Received standard care (conventional antihypertensive medications) along with lifestyle modifications and Yoga. Group II: Received standard care, lifestyle modifications, Yoga and additional Ayurveda medications: M-Sarpagandha Mishran (250 mg) – a polyherbal formulation containing Sarpagandha, Jatamansi, Vacha, Punarnava, Brahmi, Shankhpushpi and Guduchi. Pravala Pishti (250 mg) – a mineral preparation made from purified coral and rose water.	3 months	Study showed that integrating Ayurveda (M-Sarpagandha Mishran and Pravala Pishti) with Yoga and lifestyle changes led to significantly better blood pressure control. In the Ayurveda group, 36.7% of patients were able to completely stop conventional antihypertensive medications, and 30.4% reduced their dosage
Effect of Brahmi vati and Sarpagandha Ghana vati in management of essential hypertension (19)	Randomized Double-Blind Clinical Study	Mishra D et al.	2019	60	Group I: Received Brahmi Vati 500 mg twice a day Group II: Received Sarpagandha Ghana Vati 500 mg twice a day	30 days	Both Brahmi Vati and Sarpagandha Ghana Vati significantly improved SBP, DBP, MAP, anxiety, sleep profile and total cholesterol. Brahmi Vati increased weight and BMI, while Sarpagandha Ghana Vati reduced total cholesterol and LDL. Both had a good safety profile.
A comparative study of Shankhapushpyadi Ghana Vati and Sarpagandhadi Ghana Vati (20)	Comparative Clinical Study	Mishra J et al.	2012	40	Group I: Received Shankhapushpyadi ghana vati 2gm/daily Group II: Received Sarpagandha Ghana Vati 2gm/daily	30 days	Both Shankhapushpyadi Ghana Vati and Sarpagandhadi Ghana Vati improved symptoms and lowered BP. Group B (Sarpagandhadi) showed slightly better BP reduction (12% SBP, 11.02% DBP) compared to Group A. Overall, both were found equally effective
Clinical evaluation of herbomineral compound 'Rakatchap Har' (21)	Open-label pilot study	Nandha R et al.	2011	30	Rakatchap Har 500mg twice daily (contains Sarpagandha, Jatamansi, Shankhapushpi, Johar Mohra Pishti, Moti Pishti, Ras Sindoor)	60 days	After 8 weeks of treatment with Rakatchaphar (500 mg twice daily), patients showed a significant reduction in blood pressure: SBP dropped from 164.16 to 122.98 mmHg, DBP from 101.88 to 80.90 mmHg, MBP from 122.27 to 94.86 mmHg (P < 0.0001). The formulation was found to be effective and safe for managing essential hypertension.
Efficacy of Heart Revival, an Ayurvedic Formulation (22)	Single-arm open-label Exploratory trial	Pandit S et al.	2024	50	5 ml of Heart Revival once daily, orally at the time of bed Contains Arjuna (Terminalia arjuna (Roxb.) Wight & Arn.), Ashwagandha (Withania somnifera (L.) Dunal), Lahsun (Allium sativum L.), Anar (Punica granatum L.), Giloy (Tinospora cordifolia (Willd.) Hook. f. & Thomson), Amla (Phyllanthus emblica L.), Guggulu (Commiphora wightii (Arn.) Bhandari) and Dasmula (a group of ten Ayurvedic medicinal plants)	3 Months	Heart Revival, a polyherbal formulation, significantly reduced blood pressure, lipid levels, and symptoms like fatigue, chest discomfort, and breathlessness within 8 weeks. It was found to be safe and effective for managing hypertension and hypercholesterolemia, with potential benefits in cardiovascular disease management
Management of Essential Hypertension with Raktadushtihar Yoga (23)	Prospective Open labelled Observational Study	Avhad AD et al.	2019	50	Raktadushtihar Yoga (tablet) was given in the dose of 2 grams twice a day (containing Sariva, Musta, Katuka, Patha and Patola)	30 day	After one month of treatment with Raktadushtihar Yoga, systolic BP decreased by 12.90% and diastolic BP by 11.19%. Significant improvement was also observed in symptoms like headache, blurred vision, dizziness and irritability. The formulation proved effective in reducing both systolic and diastolic blood pressure in hypertensive patients.

Clinical efficacy of <i>Coleus forskohlii</i> (Willd.) Briq. (Makandi) in hypertension (24)	Open-label Clinical trial	Jagtap M et al.	2011	41	Group I received <i>Makandi Ghana vati</i> 500mg thrice daily Group II received <i>Makandi Churna</i> tablet 700mg thrice daily	60 days	Both forms of <i>Makandi</i> (<i>Ghanavati</i> and <i>Churna</i> tablet) were effective in managing hypertension, with improvements in blood pressure, psychological factors, and geriatric symptoms. Overall, Group I showed slightly better results, with 76.19% of patients mildly improved compared to 75% in Group II.
Efficacy of <i>Nardostachys jatamansi</i> in Essential Hypertension (25)	Single blind randomized, placebo controlled study	Bhat MDA et al.	2020	60	Participants were randomly assigned to receive 3 grams of <i>Nardostachys jatamansi</i> (D. Don) DC daily (1 capsule taken three times a day) or a placebo for a duration of 4 weeks.	6 weeks	After 4 weeks of treatment, <i>Nardostachys jatamansi</i> significantly reduced both systolic and diastolic blood pressure in patients with essential hypertension, while no significant changes were observed in the placebo group. It also improved quality of life, as shown by reduced MINICHAL scores. The findings support its effectiveness.
The role of psychic factors in pathogenesis of essential hypertension and its management by <i>Shirodhara</i> and <i>Sarpagandha Vati</i> (26)	Randomized Open clinical controlled trial	Kundu C et al.	2010	40	Group A: <i>Shirodhara</i> by <i>Bala Taila</i> was administered for 30 min each day for 7 days; there were three such sessions, with 3-day intervals between sessions. Thus the total period of treatment was for 21 days. Group B: <i>Sarpagandha Vati</i> (each 250 mg), two Vati twice daily for a total duration of 30 days.	30 days	The impact of the treatment on primary and associated symptoms was assessed, revealing that the <i>Shirodhara</i> group showed greater improvement compared to the <i>Sarpagandha Vati</i> group. While both interventions were effective in lowering systolic and diastolic blood pressure, <i>Shirodhara</i> demonstrated a more pronounced effect.
A clinical study on the effect of <i>Triphaladi Kala Basti</i> with <i>Arjuna Punarnavadi Ghanavati</i> (27)	Single-arm clinical study	Hivale US et al.	2018	30	Fifteen patients diagnosed with essential hypertension based on JNC 7 and WHO guidelines were treated using <i>Triphaladi Basti</i> , followed by oral administration of <i>Arjuna Punarnavadi Ghanavati</i> .	24 days	Administration of <i>Basti</i> and <i>Arjuna Punarnavadi Ghanavati</i> were effective in reducing both systolic and diastolic blood pressure level which was highly significant ($P < 0.001$).
Efficacy of <i>Virechana</i> and <i>Basti Karma</i> with <i>Shamana</i> therapy in the management of essential hypertension: A comparative study (28)	Comparative clinical trial	Shukla G et al.	2013	60	A randomized open clinical trial was carried out on 33 patients with uncomplicated essential hypertension. Participants were divided into two groups: Group A (16 patients) received <i>Virechana Karma</i> using <i>Trivrita</i> , <i>Aragvadha</i> , <i>Eranda Taila</i> , and <i>Draksha Kwatha</i> ; Group B (17 patients) received <i>Dashmoola Kala Basti</i> — <i>Niruha Basti</i> with <i>Dashmoola Kwatha</i> and <i>Anuvasana Basti</i> with <i>Dashmoola Taila</i> . After these therapies, both groups were given <i>Arjunadi Ghanavati</i> as follow-up treatment.	30 days	The overall effect of the therapies on systolic and diastolic blood pressure showed that <i>Virechana</i> proved better relief (43.75%) as compared to <i>Basti</i> (29.41%). Although both the groups showed significant reduction in blood pressure.
Effect of om chanting and <i>yoga nidra</i> on blood pressure and lipid profile in hypertension (29)	Randomized Controlled Trial	Anjana K et al.	2022	60	Eighty hypertension patients were randomly assigned to two groups. The experimental group practiced OM chanting and <i>Yoga Nidra</i> five days a week for two months, while the control group continued their usual medications. Blood pressure and lipid profile were measured at the start, 30 days, and 60 days.	8 weeks	After 2 months, the group practicing OM chanting and <i>Yoga Nidra</i> showed a significant drop in blood pressure and LDL, along with an increase in HDL, compared to the control group. No side effects were reported. The study suggests these yoga practices are effective and safe as supportive therapy for managing hypertension.
Effect of <i>Yoganidra</i> on Blood Pressure, Hs-CRP and Lipid Profile of Hypertensive Subjects: A Pilot Study (30)	Pilot Study	Devraj JP et al.	2021	74	The experimental group (n=31) practiced <i>Yoga Nidra</i> for 45 minutes daily over 12 weeks under supervision, while the control group (n=43) received no intervention.	12 weeks	After 12 weeks of <i>Yoga Nidra</i> , the experimental group showed a significant reduction in both systolic and diastolic blood pressure, along with a marked decrease in Hs-CRP levels. While changes in triglycerides and total cholesterol were not significant, LDL-C and HDL-C showed improvement. No adverse effects were reported.

Effects of <i>Nadishodhana</i> and <i>Bhramari Pranayama</i> on HRV, ART and BP (31)		<i>Upadhyay J et al.</i>	2023	100	In a study of 100 pre-diagnosed hypertension patients, Group 1 practiced <i>Nadi Shodhana Pranayama</i> and Group 2 practiced <i>Bhramari Pranayama</i> for 20 minutes. Heart rate variability and auditory reaction time were measured before and after the intervention.	4 weeks	The study found that both <i>Nadi Shodhana</i> and <i>Bhramari Pranayama</i> significantly reduced auditory reaction time, with <i>Bhramari</i> showing a stronger effect. Though heart rate variability didn't change significantly, both practices may help regulate autonomic balance and support hypertension management
Effect of slow breathing and PMR technique in essential hypertension (32)	Randomized Control Trial	<i>Pathan FKM et al.</i>	2023	60	Sixty-four participants diagnosed with essential hypertension were randomly allocated into Slow breathing exercise, Progressive muscle relaxation, Slow breathing exercise-Progressive muscle relaxation and Control groups received no treatment, with 16 subjects each.		The study found that combining Slow breathing Exercise (SBE) and Progressive Muscle Relaxation (PMR) significantly reduced heart rate, respiratory rate, blood pressure and anxiety in hypertensive patients. While individual techniques also showed improvements, the combination of SBE and PMR was more effective than either alone.
BP normalizing effect of <i>Talahridaya marma</i> therapy: A case report (33)	Case Report	<i>Gautam AS et al.</i>	2021	1	The volunteer received <i>Talahridaya marma</i> therapy, where the <i>Talahridaya marma</i> point on the left upper limb was stimulated for 10 days. The patient was also taught how to perform the therapy on themselves.	10 days	Rapid normalization of BP; immediate calming effect observed; case suggests promising neural-cardiac link via marma stimulation.
Comparison of the DASH diet and a higher-fat DASH diet on blood pressure and lipids and lipoproteins (34)	Randomized Control Trial	<i>Chiu S et al.</i>	2016	36	DASH vs high-fat DASH	12 weeks	Both diets lowered BP significantly; high-fat DASH diet improved HDL without negative lipid effects offering flexibility for dietary preference.
Effects of the DASH Diet and Walking on Blood Pressure in Patients With Type 2 Diabetes (35)	Randomized Control Trial	<i>Paula TP et al.</i>	2015	55	DASH diet along with Walking	8 weeks	Combined intervention significantly reduced systolic and diastolic BP along with improved glycemic control
Effectiveness of a multifactorial intervention: The MEDICHY study (36)	Randomized Control Trial	<i>Unda Villafuerte F et al.</i>	2020	123	Self-monitoring, diet, exercise, medication adherence.	12 months	Multifactorial intervention resulted in better long-term BP control and medication compliance

Results

Overview of Studies

Out of the twenty studies that were part of the evaluation, fourteen were RCTs, one was a case report, three were pre- and post-clinical trials, and two were observational trials. Two single-blind studies, one single-blind study, and one pilot trial were among the 14 included RCTs; the remaining studies were non-blind. One of the two observational studies was retrospective, and the other was prospective. Eleven of the twenty included trials involved pharmaceutical interventions, while nine did not. Of the eleven pharmacological research, two were based on classical formulation, five on polyherbal formulation, three on panchakarma modalities, and one on integrative.

Three of the nine non-pharmacological intervention trials were based on modified diet-based interventions, and six were based on yoga interventions. An overview of this intervention is provided in Table 02.

Table 02: Classification of Studies based on the type of Intervention		
Type of Intervention		Number of Studies
Pharmacological		-
	<i>Panchakarma and External therapies</i>	3
	<i>Virechana</i>	1
	<i>Basti</i>	2
	<i>Shirodhara</i>	1
	<i>Shamana</i>	7
	<i>M Sarpagandha Mishran</i>	1
	<i>Praval Pishti</i>	1
	<i>Shankhapushpyadi Ghana Vati</i>	1
	<i>Sarpagandha Ghana Vati</i>	3
	<i>Rakatchap Har</i>	1
	<i>Heart Revival Suspension</i>	1
	<i>Brahmi Vati</i>	1
	<i>Arjuna Punarnavadi Ghanavati</i>	1
	<i>Raktadushtihar Yoga</i>	1
	<i>Makandi</i>	1
Non-pharmacological		9
	<i>Yoga</i>	3
	<i>Asana</i>	1
	<i>Pranayama</i>	2
	<i>Om Chanting</i>	1
	<i>Yoga Nidra</i>	2
<i>Talahridaya marma</i>		1
	Diet	2
	<i>DASH diet</i>	1
	<i>Less sodium diet</i>	1

Based on the 7th JNC guidelines, the diagnostic criteria for hypertension were found to be identical in the majority of the studies. While some research adhered to ESC/AHA criteria, some mentioned WHO criteria. All of the studies had comparable primary inclusion criteria, such as diagnosed instances of hypertension (blood pressure greater than 140 mm Hg systolic and 90 mm Hg diastolic), prehypertension criteria, and cases between the ages of 30 and 70. The exclusion criteria, which included anyone with any systemic illness and comorbidities, were nearly identical. All of the research used similar primary assessment criteria, such as systolic and diastolic blood pressure with mean arterial pressure, which was also used in certain articles.

Twenty studies in all were found. The number of participants in the sample varied from one to two thousand. Herbal remedies, Panchakarma treatments, and lifestyle changes were the three categories of interventions.

Herbal Formulations

The results of the studied interventional trials show that the various Ayurvedic herbal medications significantly lowered blood pressure. The following is a summary of the findings from several clinical designs, including case studies and randomized controlled trials:

M-Sarpagandha Mishran, Praval Pishti

Patients who received Ayurvedic medicines as supportive drugs in addition to conventional medication with lifestyle modification and yoga (Group II) demonstrated a significant difference in systolic and diastolic blood pressure ($p < 0.01$) in a retrospective observational study involving 1,938 participants in an integrated project of NPCDCS and Ayurvedic practices.

Additionally, compared to 15.1% in the usual treatment group, 36.7% of people in this group had the potential to stop taking normal antihypertensive medications (18).

Sarpagandha Ghana Vati and Brahmi Vati

Brahmi Vati and Sarpagandha Ghana Vati's actions were compared in a double-blind, randomized clinical experiment with 68 participants. After 30 days of use, both formulations had amazing benefits in lowering mean arterial pressure, DBP, and SBP. Sarpagandha Ghana Vati shown further lipid-lowering effects, while Brahmi Vati enhanced both the quantity and quality of sleep and reduced anxiety. Neither group experienced any negative consequences (19).

Shankhapushpyadi Ghana Vati and Sarpagandhadi Ghana Vati

After eight weeks, both formulations significantly reduced blood pressure, according to a single-blind, randomized controlled experiment ($N=20$). The Sarpagandhadi Ghana Vati group's systolic blood pressure decreased by 12.00, whereas the Shankhapushpyadi Ghana Vati group's decreased by 8.91.

Diastolic blood pressure decreased by 8.44 percent and 11.02 percent, respectively. Subject symptoms improved in both groups without any negative consequences (20).

Rakatchap Har (Herbo-mineral Formulation)

The effectiveness of a polyherbal herbal-mineral compound called Rakatchap Har was assessed in a prospective observational trial with 98 participants. The mean DBP dropped from 101.88 mmHg to 80.90 mmHg and the mean SBP from 164.16 mmHg to 122.98 mmHg after eight weeks ($p < 0.0001$). The combination, which contains Jatamansi, Shankhapushpi, and Sarpagandha, among other ingredients, was well tolerated (21).

Heart Revival Suspension

The current arm of the study is a single-arm open-label trial in which patients with mild to moderate cardiovascular risks, including hypertension, were treated with a polyherbal formulation (Heart Revival) made of cardioprotective herbs, such as Arjuna, Ashwagandha, Lahsun, etc. The study revealed a significant improvement in heart functioning parameters, blood pressure, and cholesterol. Despite the lack of quantitative blood pressure data, overall outcomes supported the intervention (22).

Raktadushtihar Yoga

After one month of practicing Raktadushtihar Yoga (2 gm twice daily), the systolic and diastolic blood pressure of 47 newly diagnosed hypertension patients in a single-arm clinical trial dropped by 12.90 percent and 11.19 percent, respectively, compared to the baseline. Sariva, Musta, Katuki, Patha, and Patola make up the compound. It was shown to alleviate headache, giddiness, and blackout symptoms (23).

Coleus forskohlii (Willd.) Briq. (Makandi)

To assess Makandi root in Ghana Vati and Churna tablet preparations in elderly patients ($n=41$), a clinical status comparison study was carried out. Both the diastolic and systolic blood pressure were successfully lowered by these two kinds. A slightly superior improvement was made by Group I (Ghanavati). In Groups I and II, respectively, 76.19 and 75.00 percent of the patients showed some improvement. There were no reports of potential adverse events (24).

Nardostachys Jatamansi

Forty individuals with hypertension who received *Nardostachys jatamansi* (3 g/day for four weeks) in a single-blind, placebo-controlled experiment saw notable reductions in their systolic and diastolic blood pressure as well as their quality of life (MINICHAL score). There were no discernible differences in the placebo group. According to the findings, *N. jatamansi* may be a useful natural antihypertensive medication (25).

Panchakarma Therapies

Few Panchakarma techniques have undergone clinical testing for the treatment of essential hypertension. The majority of the therapies included internal medication together with Shirodhara, Basti, and Virechana techniques. The following are summaries of the results from certain, chosen interventional studies:

Shirodhara using Sarpagandha Vati

A randomized clinical study was conducted on 40 volunteers to assess the efficacy of medicinal oil-based Shirodhara with Sarpagandha Vati. Systolic and diastolic blood pressure levels considerably dropped in both groups ($p < 0.05$).

Additionally, Shirodhara group participants' anxiety ratings on the Hamilton Anxiety Rating Scale dramatically decreased, indicating that therapy is successful in lowering sympathetic hyperfunction brought on by stress (26).

Triphaladi Kala Basti with Arjuna Punarnavadi Ghanavati

One was Arjuna Punarnavadi Ghanavati, wherein Triphaladi Kala Basti was given orally for a predefined amount of time following delivery in a clinical investigation involving fifteen patients. Additionally, the study discovered that following the intervention, systolic and diastolic blood pressure values were significantly lower ($p < 0.001$).

Detoxification and oral therapy can work in concert, as evidenced by wonders like the demonstrated reduction of headache, giddiness, and fatigue-like symptoms (27).

Basti Karma, Virechana and Shamana therapy

Because Virechana Karma (therapeutic purgation) and Basti Karma (medicated enema) were tested for efficacy in conjunction with Shamana therapy, the study was comparative and clinical in character. Blood pressure significantly decreased in the Basti and Virechana groups (29.41 and 43.75, respectively).

Additionally, both groups showed improvements in the related symptoms of heaviness, irritability, and difficulties sleeping (28).

Lifestyle modifications (Yoga and meditation)

Yoga combined with meditation may help manage high blood pressure, according to a previous study. People who use practices like Yoga Nidra and Om chanting, which help to reduce raised blood pressure, had lower diastolic and systolic blood pressure levels (Anjana et al. 2022). In a related study, Hadaye et al. (2021) discovered that consistent yoga practice improved blood pressure maintenance, opening the door to stress reduction as a hypertension management technique (29, 30).

Discussion

The review's conclusions highlight the tremendous potential of Ayurvedic techniques in conjunction with dietary, yoga, and lifestyle modifications for the treatment of hypertension. Every method, including lifestyle changes, panchakarma treatments, and herbal cures, offers a unique manner to promote blood pressure control. Together, they represent Ayurveda's all-

encompassing and holistic approach to treating hypertension as a problem influenced by several facets of health rather than merely a physical one.

Herbal Preparations

Numerous studies support the effectiveness of an Ayurvedic herb-based combination in managing hypertension. Strong bioactive compounds found in herbs like M-Sarpagandha Mishra, Sarpagandha Ghana Vati, and Raktachap Har Yoga, which have all been shown to significantly lower both systolic and diastolic blood pressure, are responsible for these medicines' effectiveness. Sarpagandha (*Rauvolfia serpentina*), one of its main ingredients, contains the alkaloid reserpine, which lowers blood pressure by lowering norepinephrine levels and calming the hyperactive sympathetic nervous system. Because of their calming and vasodilating qualities that reduce vascular resistance, other herbs like Shankhapushpi and Jatamansi are frequently added to these formulations and help regulate blood pressure. Additionally, the herbal mixture helps lower anxiety and promote restful sleep, two things that can increase the risk of high blood pressure. These herbs have a number of therapeutic effects based on endothelial functioning, oxidative stress inhibition, and autonomic nervous system control. The good news is that the majority of research revealed few or no adverse effects, suggesting that herbal remedies can readily coexist with traditional hypertension medications (18–19).

External modalities, *Panchakarma*

Numerous studies have shown that external treatments like Shirodhara and Panchakarma therapies, particularly Basti and Virechana, can be helpful in managing hypertension.

The goal of all these methods is to cleanse and restore proper physiological functioning in order to balance doshas, or bodily humors.

Shirodhara in particular is said to induce deep relaxation and reduce tension by balancing the nerve system. It has been shown to lower both diastolic and systolic blood pressure, potentially boosting parasympathetic activity to counteract excessive sympathetic nervous system activity and boosting blood flow (26).

It is believed that virechana and basti directly affect the removal of toxins and the reduction of inflammation, both of which lower blood pressure. which both result in a drop in blood pressure. According to some research on the treatment, it may lessen the burden of hypertension by improving metabolic activity, reducing excessive fluid retention, and alleviating capillary stasis. This is further enhanced by the use of internal medications that can prevent the recurrence of hypertension and preserve cardiovascular health following Panchakarma (27, 28).

These therapeutic qualities stem from the basic ideas of Ayurveda, which emphasize the significance of detoxifying and reestablishing the body's equilibrium. Panchakarma techniques, which address both the physiological and subtle aspects of the illness, provide a comprehensive treatment for high blood pressure that goes beyond symptomatic alleviation to include long-term health restoration.

Lifestyle Modifications

A key component of Ayurvedic medicine, lifestyle alterations have shown promise in treating hypertension, particularly when combined with dietary and yoga adjustments. Studies show that yoga nidra and Om chanting lower blood pressure. Because they lower stress levels, induce a parasympathetic response that reduces blood pressure, and alleviate sympathetic hyperactivity, these methods are probably going to be successful. These techniques improve cardiovascular health and have a calming influence on general wellbeing. [29, 30]

High blood pressure can be effectively treated with pranayama techniques that can regulate the autonomic nervous system, such as Nadishodhana and Bhramari. These breathing techniques assist lower blood pressure to normal because they lower heart rate, improve heart rate variability, and help eliminate stress. By increasing importance and lowering stress, the Pranayama balances the hypophysiological processes that regulate blood pressure (31, 32).

Indicative dietary strategies, including limiting salt and encouraging more foods high in potassium, have also been demonstrated to be essential for controlling hypertension. The DASH diet, which has been shown to dramatically lower blood pressure by reducing the amount of fluid retained and enhancing blood vessel ventilation, heavily emphasizes Ayurvedic dietary concepts. While the consumption of salt and saturated fat will be decreased, fruits, vegetables, whole grains, and low-fat dairy products will support vascular health since they contain nutrients like calcium, magnesium, and potassium. Reducing salt consumption also lowers blood pressure by preventing an increase in water retention, but when combined with the DASH diet, the effect is much more pronounced when it helps lower blood pressure by more than 20 mmHg in people whose SBP is higher than 150 mmHg. Given that nutrition is a crucial component of managing hypertension, this could have a synergistic effect similar to the effectiveness of antihypertensive drugs. This demonstrates how important nutrition is in reducing blood pressure (34, 35).

It has been demonstrated that a multimodal strategy that incorporates dietary and lifestyle modifications, such as yoga, Ayurvedic treatments, and herbomineral supplements, is very successful in controlling hypertension.

Conclusion

Ayurveda is a holistic method to managing hypertension that includes medicines, panchakarma, and lifestyle modifications to treat its causes. This review focuses specifically on multifaceted interventions for the management of hypertension, including biopurification techniques like Virechana and Basti, external applications, Shirodhara, and herbs/herbo-mineral preparations in addition to some dietary changes and yoga practices. Despite encouraging results, the clinical data that is currently available has been constrained by small sample sizes, methodological variability, and a lack of follow-up.

Randomized controlled studies with good designs and sufficiently big sample numbers utilizing validated measures of outcome and cardiovascular parameters must be thoroughly conducted in order to strengthen the body of evidence. Future research should examine the psychophysiological mechanisms behind Ayurvedic practices and how they affect long-term cardiovascular results. A successful long-term management of hypertension may lead to an improved blend of Ayurveda and contemporary scientific techniques.

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