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Effectiveness Of Integrated Ayurveda And Allopathybased Lifestyle Interventions In The Management Of Hypertension Among Adults: A Public Health Perspective

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Abstract

Hypertension is one of the most important preventable contributors to cardiovascular disease, stroke, renal disease and premature mortality. The public health challenge is more serious in adult populations because hypertension is frequently asymptomatic, influenced by modifiable lifestyle factors and often detected late. A combined approach that integrates allopathy-based lifestyle counselling with Ayurveda-based daily regimen, diet, yoga, pranayama and stress-reduction practices may improve adherence by connecting biomedical risk reduction with culturally familiar health practices. The present study assessed the effectiveness of an integrated Ayurveda and allopathy-based lifestyle intervention for the management of hypertension among adults from a public health perspective. A quantitative pre-experimental one-group pre-test and post-test design was used. The study included 120 adults aged 30-65 years with diagnosed or newly detected hypertension. The intervention included allopathy-based counselling on salt restriction, DASH-like dietary practices, physical activity and weight management along with Ayurveda based recommendations on Dinacharya, Ahara, Vihara, yoga, pranayama, meditation, stress management and sleep hygiene. The mean systolic blood pressure decreased from 152.4 mmHg to 139.2 mmHg and mean diastolic blood pressure decreased from 94.8 mmHg to 86.7 mmHg after the intervention. Lifestyle practice score, dietary practice score, physical activity status and stress score showed improvement.

Keywords: Hypertension; Ayurveda; Allopathy; Integrated lifestyle intervention

I. INTRODUCTION

Hypertension is a major non-communicable disease and one of the leading modifiable risk factors for cardiovascular morbidity and mortality. The World Health Organization describes uncontrolled hypertension as a cause of heart attacks, strokes, premature death and economic loss for families and health systems.1 In adult populations, raised blood pressure is often hidden until complications occur; therefore, prevention, early identification and adherence to lifestyle measures are essential. Public health management of hypertension requires more than medicine alone. It requires dietary change, physical activity, sleep regulation, stress reduction, family participation and repeated follow-up at community and primary-care levels.

Hypertension, commonly known as high blood pressure, is one of the most prevalent non-communicable diseases and a major public health concern worldwide. It significantly contributes to cardiovascular diseases, stroke, kidney failure, and premature mortality.

According to the World Health Organization, hypertension affects more than one billion people globally, with a substantial proportion remaining undiagnosed or inadequately treated. Rapid urbanization, sedentary lifestyles, unhealthy dietary habits, obesity, stress, tobacco consumption, and alcohol use have contributed to the increasing burden of hypertension, particularly in developing countries such as India.

In India, hypertension has emerged as a critical public health challenge due to changing lifestyles and demographic transitions. The prevalence of hypertension has increased among both urban and rural populations, leading to considerable healthcare expenditures and reduced quality of life. Despite the availability of effective antihypertensive medications, many patients experience poor treatment adherence, adverse drug effects, and inadequate blood pressure control. These challenges highlight the need for comprehensive and sustainable approaches that address not only pharmacological management but also lifestyle modification and behavioral changes.

Lifestyle interventions play a crucial role in the prevention and management of hypertension. Evidence suggests that regular physical activity, a balanced diet, weight management, stress reduction, adequate sleep, and avoidance of tobacco and excessive alcohol consumption can significantly reduce blood pressure levels and improve cardiovascular health. Conventional allopathic medicine emphasizes evidence-based pharmacological treatment along with lifestyle recommendations. However, increasing attention has been directed toward complementary and traditional healthcare systems, particularly Ayurveda, for their potential role in promoting holistic health and preventing chronic diseases.

Ayurveda, the traditional system of medicine practiced in India for thousands of years, emphasizes the maintenance of health through balanced nutrition, daily routines (Dinacharya), seasonal regimens (Ritucharya), herbal therapies, yoga, meditation, and stress management techniques. From an Ayurvedic perspective, hypertension is associated with imbalances in bodily doshas, particularly Vata and Pitta, and is influenced by mental and emotional stress. Ayurvedic interventions aim to restore physiological balance and enhance overall well-being rather than focusing solely on symptom control. Practices such as yoga, pranayama, meditation, dietary regulation, and herbal supplementation have shown promising effects in reducing blood pressure and improving cardiovascular function.

The integration of Ayurveda and allopathy has gained considerable interest as a patient-centered approach to chronic disease management. Integrated healthcare combines the strengths of modern medical science, including accurate diagnosis and pharmacological treatment, with the preventive, holistic, and lifestyle-oriented principles of Ayurveda. Such an approach may provide synergistic benefits by improving blood pressure control, enhancing treatment adherence, reducing stress, minimizing medication-related side effects, and promoting long-term health outcomes.

From a public health perspective, integrated Ayurveda and allopathy-based lifestyle interventions offer a cost-effective and culturally acceptable strategy for addressing the growing burden of hypertension. These interventions can be implemented through community health programs, primary healthcare centers, wellness clinics, and workplace health promotion

initiatives. By encouraging healthy behaviors and empowering individuals to take an active role in managing their health, integrated approaches have the potential to reduce the incidence of hypertension-related complications and improve population health outcomes.

II. LITERATURE REVIEW

Concept and Classification of Hypertension

Hypertension is classified according to blood pressure thresholds, target organ risk and overall cardiovascular risk. Accurate classification depends on standardized measurement, appropriate cuff size, repeated readings and interpretation in relation to age, comorbidities and medication status. The WHO guideline focuses on adult non-pregnant patients diagnosed with hypertension and counselled about lifestyle modification before and during pharmacological treatment.2 Classification is important for selecting follow-up intervals and deciding whether lifestyle management alone or in combination with drugs is indicated.

Epidemiology of Hypertension

The epidemiology of hypertension shows increasing prevalence in low- and middleincome countries, urban and rural communities, and younger adult groups. WHO reported global and regional burden data and described hypertension as a silent killer because it frequently remains undetected until severe complications appear.1 In India, hypertension control remains low compared with its prevalence. NFHS-5 analyses and ICMR-INDIAB data demonstrate that hypertension is a major national health challenge with variation by sex, age, region, body weight and socioeconomic conditions.

Complications of Uncontrolled Hypertension

Uncontrolled hypertension is associated with ischemic heart disease, heart failure, stroke, chronic kidney disease, retinopathy, vascular dementia and premature mortality. It damages arteries through sustained pressure load and contributes to atherosclerosis, left ventricular hypertrophy and microvascular injury. The burden of complications places financial pressure on households and health services. Public health control of hypertension therefore prevents both individual disability and system-level expenditure.

Lifestyle Modification in Hypertension Management

Lifestyle modification is recommended across hypertension categories because it addresses the behavioural drivers of elevated blood pressure. It includes healthy diet, salt reduction, weight management, regular physical activity, tobacco cessation, avoidance of harmful alcohol use, adequate sleep and stress management. Guidelines emphasise prevention and standardized care, while community programmes emphasise feasible, repeatable actions that adults can sustain at home and work.

Dietary Approaches for Blood Pressure Control

Appel et al.(1997) conducted the DASH trial and concluded that a diet rich in fruits, vegetables and low-fat dairy foods with reduced saturated and total fat substantially lowered blood pressure. Sacks et al. (2001) further demonstrated that reduced sodium intake combined with the DASH dietary pattern lowered systolic blood pressure across sodium levels. He and colleagues showed that longer-term modest salt reduction produced important falls in blood

pressure in hypertensive and normotensive individuals. These studies support dietary counselling as a core component of hypertension management.

Physical Activity and Exercise in Hypertension Management

Exercise improves blood pressure through vascular, autonomic, metabolic and weightrelated mechanisms. Edwards et al.(2023) reviewed exercise training and resting blood pressure and found that several training modes reduce systolic and diastolic blood pressure, with isometric and aerobic modalities showing important effects. Cornelissen and Smart also reported reductions in blood pressure with endurance, dynamic resistance and isometric resistance training.13 For public health settings, brisk walking and moderate activity remain practical, low-cost options.

Stress, Sleep and Mental Health in Hypertension

Stress and poor sleep contribute to blood pressure elevation through sympathetic activation, hormonal pathways and unhealthy coping behaviours. Mindfulness-based and relaxation interventions have been studied as adjuncts in hypertension management. Chen et al. (2024) found evidence supporting the positive role of mindfulness-based interventions in hypertension management, although more large trials were recommended. Sleep hygiene and stress-reduction counselling are therefore important elements in an integrated plan.

Allopathy-Based Lifestyle Intervention Guidelines

Allopathy-based guidelines emphasise accurate diagnosis, cardiovascular risk assessment, lifestyle modification, pharmacological treatment thresholds, follow-up and treatment targets. The WHO guideline provides recommendations on initiation of drug therapy, target blood pressure and health worker roles while acknowledging lifestyle modification as part of management.2 The 2025 high blood pressure guideline highlighted prevention, home monitoring, team-based care and standardized treatment approaches for adults with high blood pressure.

III. RESEARCH METHODLOGY

Research Approach

A quantitative research approach was adopted because the study measured blood pressure, BMI, lifestyle scores, dietary scores and stress levels before and after the intervention. Quantitative methods allowed statistical testing of change and association.

Research Design

A pre-experimental one-group pre-test and post-test design was used. Baseline assessment was conducted before the intervention and post-test assessment was performed after completion of the intervention period. This design was selected for public health feasibility in a community/primary-care setting.

Study Setting

The study setting was a community health and primary-care field area where adults with hypertension could be screened, counselled and followed. The setting was selected because lifestyle modification is most effective when linked to routine community and primary healthcare services.

Study Population

The study population consisted of adults with diagnosed or newly detected hypertension who were willing to participate in an integrated lifestyle intervention and follow-up assessment.

Target Population

The target population included adults aged 30-65 years with hypertension residing in the selected community or attending the selected primary-care setting.

Accessible Population

The accessible population included adults with hypertension who were available during data collection, met the eligibility criteria and provided informed consent.

Sample Size

The sample size was 120 adults. This number was considered feasible for pre-test and post-test comparison, community counselling sessions and follow-up assessment within the study period.

Sampling Technique

A non-probability purposive sampling technique was used. Adults meeting the inclusion criteria were enrolled until the required sample size was achieved.

Selection Criteria

Selection criteria ensured that participants were appropriate for the intervention and that confounding conditions requiring specialist care were excluded.

Inclusion Criteria

Adults aged 30-65 years; diagnosed or newly detected hypertension; ability to understand intervention instructions; willingness to follow lifestyle advice; and written informed consent were included.

Exclusion Criteria

Adults with hypertensive emergency, severe cardiac disease requiring immediate specialist care, advanced kidney disease, pregnancy, severe psychiatric illness, inability to perform mild physical activity, or unwillingness for follow-up were excluded.

Data Collection Procedure

Eligible adults were screened and enrolled after informed consent. Baseline data were collected, intervention counselling was given, follow-up reinforcement was provided and post-intervention data were recorded after 12 weeks.

Ethical Considerations

articipants were informed about the purpose, procedure, benefits and voluntary nature of the study. Confidentiality was maintained. Participants with uncontrolled BP or warning symptoms were referred for medical care.

Plan for Data Analysis

Data were coded and analysed using descriptive and inferential statistics. Frequency, percentage, mean and standard deviation were used. Paired t-test assessed pre-post change. Chi-square test assessed association between selected variables and BP control.

IV. DATA ANALYSIS AND INTERPRETATION

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The findings are organized according to demographic profile, clinical profile, lifestyle factors, dietary habits, physical activity, stress and sleep pattern, pre-post blood pressure change, BMI change, scores and hypothesis testing. Frequencies and percentages are used for categorical variables. Mean, standard deviation and paired t-test are used for continuous outcomes, and chi-square test is used for association analysis.

Table 1: Age distribution of adults

Age group (years)	Frequency	Percentage
30-39	18	15.0
40-49	34	28.3
50-59	38	31.7
60-65	30	25.0
Total	120	100.0

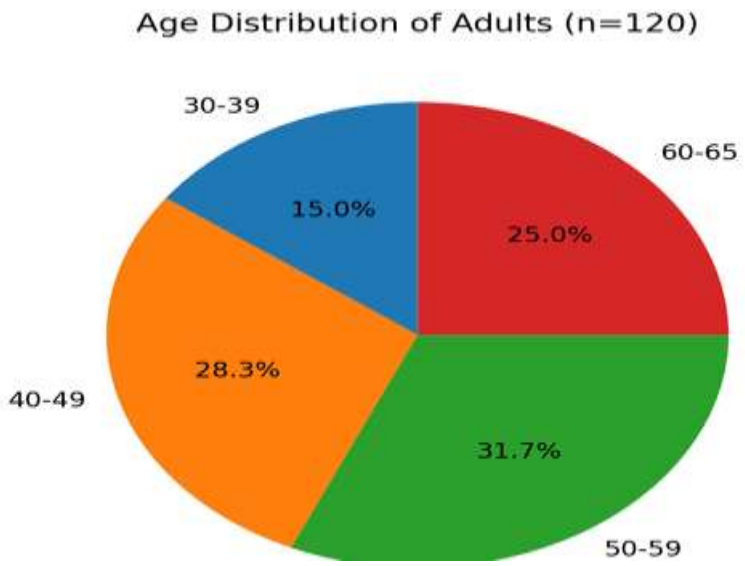

Figure 1 Age distribution of adults

The largest proportion of adults belonged to the age group of 50-59 years, followed by 40-49 years and 60-65 years. This pattern shows that hypertension was common in middle and older adulthood, which is consistent with the biological effect of ageing and cumulative exposure to lifestyle risk factors.

Table 2 Gender distribution of adults

Gender	Frequency	Percentage
Male	62	51.7
Female	58	48.3
Total	120	100.0

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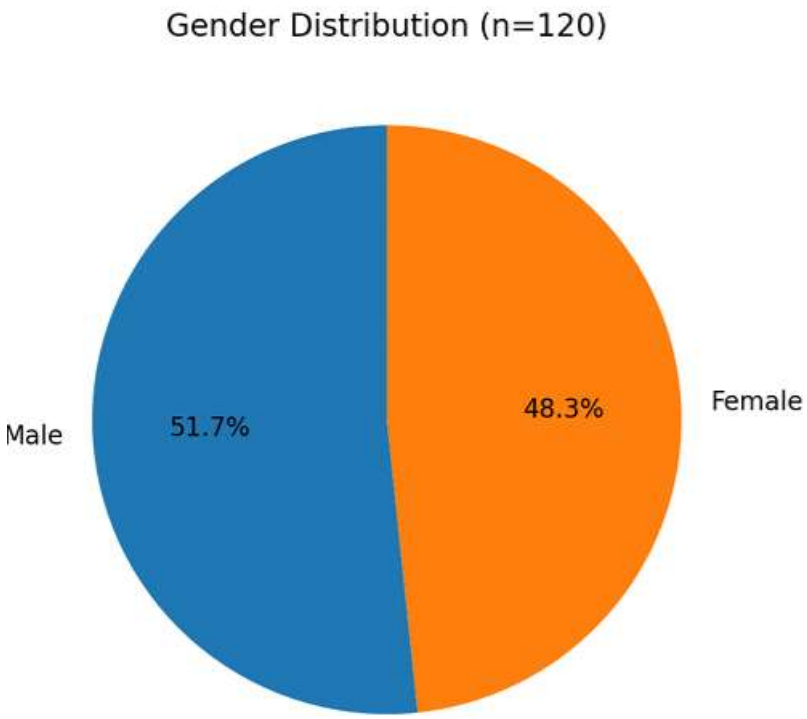

Figure 2 Gender distribution of adults

The gender distribution was nearly equal, with a slight predominance of males. Inclusion of both men and women increased the public health relevance of the findings because lifestyle intervention is needed across gender groups.

Table 3 Educational status of adults

Education	Frequency	Percentage
No formal education	14	11.7
Primary/Upper primary	28	23.3
High school	34	28.3
Graduate and above	44	36.7

More than one-third of participants were graduates or above, but a substantial proportion had school-level or no formal education. This indicates that hypertension counselling should use simple language, pictorial materials and repeated demonstrations to be understandable for all educational groups.

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Table 4 Occupation of adults

Occupation	Frequency	Percentage
Homemaker	28	23.3
Service	36	30.0
Business/Self-employed	24	20.0
Manual worker	18	15.0
Retired/Other	14	11.7

V. RESULTS AND DISCUSSION

Summary of Key Results

The study found statistically significant reductions in systolic and diastolic blood pressure after the integrated intervention. Lifestyle practice score, dietary practice score and stress score also improved. These findings indicate that a structured combination of allopathy-based and Ayurveda-based lifestyle counselling can be useful for hypertension management among adults.

Discussion on Socio-demographic Characteristics

Most participants belonged to the age group of 40 years and above, which reflects the increasing burden of hypertension with advancing age. Gender distribution was almost equal. Education showed association with BP control, suggesting that health literacy may influence adherence and understanding of lifestyle advice.

Discussion on Clinical Profile of Participants

A considerable proportion of participants had a family history of hypertension, comorbidities and regular medicine use. This indicates that hypertension management must include risk assessment, medication adherence and lifestyle reinforcement. Integrated counselling can support adults who are already on medicines but require behavioural change for better control.

Discussion on Baseline Blood Pressure Status

The baseline findings showed that many adults had Grade 2 hypertension. This supports WHO and Indian public health concerns that hypertension is often detected late and controlled inadequately. Screening and follow-up should therefore be routine components of primary healthcare.

Discussion on Lifestyle Risk Factors

Poor dietary habits, sedentary routine, high stress and inadequate sleep were common before intervention. These factors are consistent with known determinants of hypertension. Public health programmes should address these behaviours through repeated counselling rather than one-time advice.

Discussion on Effect of Integrated Intervention on Systolic Blood Pressure

The reduction in systolic blood pressure was statistically significant. The finding aligns with evidence that diet, salt reduction, physical activity and stress management lower blood pressure. Because systolic pressure is strongly related to stroke and cardiovascular risk, this improvement has public health significance.

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Discussion on Effect of Integrated Intervention on Diastolic Blood Pressure

Diastolic blood pressure also decreased significantly. The reduction may be due to improved vascular relaxation, reduced sodium intake, increased physical activity and stress reduction. Even moderate reductions can contribute to lower cardiovascular risk when implemented at population level.

Discussion on Effect of Dietary Modification

Dietary score improved markedly. The DASH trial and DASH-sodium trial provide strong evidence that dietary pattern and sodium reduction improve blood pressure.9,10 In the present intervention, these messages were reinforced using Ahara-based counselling, which may have increased cultural acceptability.

Discussion on Effect of Physical Activity and Exercise

Regular moderate activity increased after intervention. Exercise meta-analyses support reductions in resting blood pressure through aerobic, resistance and isometric exercise modalities. For community settings, walking and simple yoga-based movement are feasible and low-cost.

Discussion on Effect of Yoga, Pranayama and Meditation

Yoga, pranayama and meditation were included as supportive practices for stress reduction and routine formation. Evidence suggests that mindfulness and yoga-based interventions can help reduce blood pressure and improve self-regulation. These practices should be taught safely and adapted to age, comorbidities and physical ability.

Discussion on Stress Reduction and Sleep Improvement

Stress score decreased and sleep duration improved after intervention. Stress management is relevant because chronic stress can increase sympathetic activity and unhealthy behaviours. Pranayama, meditation, relaxation and sleep hygiene may support improved blood pressure control through both physiological and behavioural pathways.

Discussion on Public Health Importance of Integrated Intervention

The intervention is important from a public health perspective because it is low-cost, culturally familiar and feasible at primary care or community level. It can be delivered through group education, health workers, lifestyle clinics and follow-up cards. Integration also supports patient-centred care without replacing standard medical treatment.

VI. CONCLUSION

The study concluded that integrated Ayurveda and allopathy-based lifestyle intervention was effective in reducing systolic and diastolic blood pressure among adults with hypertension. It also improved lifestyle practices, dietary habits, physical activity, sleep and stress level. The findings support integrated, culturally acceptable and primary-care-linked lifestyle counselling as a useful public health approach for hypertension management.

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