

IMMEDIATE EFFECT OF SELECTED YOGA PRACTICES AND SHIRODHARA ON
CARDIOVASCULAR PARAMETERS IN THE MANAGEMENT OF ESSENTIAL
HYPERTENSION

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ABSTRACT

Introduction: Essential Hypertension which is also called as primary Hypertension accounts for a major part of morbidity and mortality due to cardiovascular diseases. Pranayama helps to regulate blood pressure by modulating the autonomic nervous system and reducing stress. Ayurvedic Shirodhara, on the other hand, is believed to promote relaxation and balance the doshas (Fundamental elements) in the body, potentially contributing to improved cardiovascular health. **Objectives:** The study aims to assess the combined impact of Pranayama and Ayurvedic Shirodhara on blood pressure control in individuals with essential hypertension. **Methodology:** This study is a randomized, comparative study design conducted on pre-diagnosed 60 patients with HTN, from the in and out patient at our working hospital. The patients were assessed for BP, Respiration Rate, Heart Rate and RPP (Rate Pressure product) before and immediately after the intervention. **Results:** The combined effect of Pranayama and Shirodhara on Hypertension shows significant difference in BP, heart rate, Respiration rate and Rate Pressure product as compared to patients treated with standard medication. **Conclusion:** Combined Pranayama & Shirodhara are simple, non-invasive, and cost-effective methods that can be helpful in the management of hypertension for blood pressure reduction and improve heart function., advertently improving the physical and mental health.

KEYWORD:- Essential hypertension, Yoga, Pranayama, Shirodhara.

INTRODUCTION AND BACKGROUND

Essential hypertension, also known as primary hypertension, is a major public health concern worldwide, affecting millions of individuals. It is a chronic condition characterized by persistently elevated blood pressure without an identifiable underlying cause. Uncontrolled hypertension can lead to severe complications, such as heart disease, stroke, kidney failure, and vision loss.^[1]

Numerous studies have shown that hypertension is major risk factor for cardiovascular morbidity and mortality, increased risk of stroke and IHD.^[2]

Regardless of multiple drug therapy the burden of hypertension has not decreased such as non adherence to the prescribed treatment and strict lifestyle modification, poor access to medication, healthcare services, illiteracy in developing countries.^[3] Conventional treatment for essential hypertension typically involves medication and lifestyle modifications. However, some patients may seek alternative or complementary therapies to manage their condition.

As stated by Dr. Kalgutkar L. and Mr Menon, growing popularity of alternative medicine has created a demand for comprehensive treatment approach for many lifestyle disorders like Hypertension.^[4]

Two such approaches are Pranayama, a yogic breathing technique, and Ayurvedic Shirodhara, a traditional Indian therapy involving the gentle pouring of medicated liquids on the forehead.

Pranayama is one of the core components of Yoga, others are stretching exercises, Physical postures (Asanas), Concentration techniques (Dhyana-Meditation). Yoga is a holistic mind-body intervention aimed at physical, mental, emotional and spiritual wellbeing. Previous studies have suggested that Pranayama may help regulate blood pressure by modulating the autonomic nervous system and reducing stress.^[5]

Shirodhara as the name suggests is formed by two different terms Shira (head) and Dhara (flow) is pouring of fluids like decoction, medicated oil, medicated milk,

Medicated butter milk, water etc over the head continuously in rhythm from a specific height for specific period.

It is believed to promote relaxation and balance the doshas (Fundamental elements) in the body, potentially contributing to improved cardiovascular health.^[6]

This study aims to address this gap by conducting a randomized controlled trial to evaluate the efficacy of Pranayama and Ayurvedic Shirodhara in reducing blood pressure and improving quality of life in individuals with essential hypertension. The findings of this research could contribute to the development of integrative treatment strategies for essential hypertension, offering patients a wider range of safe and effective options to manage their condition.

The scope of the study is to analyze the effect of ancient therapies on hypertension. The decrease in blood pressure with Pranayama and shirodhara will ultimately reduce the progress and complications of the disease with non-pharmacological approach, advertently improving the physical and mental health.

Research methodology

Study Design: The study is an open-label randomized controlled clinical trial conducted at the Out-patient and In Patient at our working hospital. A total of 60 patients with Essential hypertension (stage 1) were included in this study with random allocation in all two groups, each comprising 30 patients. The total period of intervention was for 90 days, wherein the assessment was done in two phases namely Baseline (0thday), and Final phase (90thday).

Study design with planned intervention

Group I- Patients are treated with standard therapy of prescribed anti-hypertensive in PSAM Hospital of Shree Swaminarayan Ayurvedic College, Kalol

Group II- Patients are treated with standard therapy of prescribed anti-hypertensive in PSAM Hospital of Shree Swaminarayan Ayurvedic College, Kalol followed by Set of Pranayama (Anuloma viloma 10min +Bhramari 10min + Shitakari 10min) sessions twice a day at Shree Swaminarayan Ayurvedic College, Kalol, for a period of 90 days with Shirodhara by Bala Taila administered for 30 min each day for 7 days in each month; there were three such sessions, with 3-day intervals between sessions. Thus, the total period of treatment was for 21 days.

Assent from the parents of concerned participants were obtained after detailing every provision of the trial protocol. The confidentiality of the participants was assured throughout the study The study was conducted with the highest respect for the individual participants in accordance with the ethical principles.

Baseline (0th day), interim (30th day) and follow up (60th) data were collected from the patients during each visit. The expected primary outcome was to assess BP, Respiration Rate, Heart Rate. The secondary outcome expected was RPP (Rate Pressure product) in hypertensive patients, myocardial oxygen demand (MVO₂) can be a better marker of predicting CVD, which is calculated as product of systolic BP and HR. It is direct indication of the energy demand of the heart and thus a good measure of the energy consumption of the heart. Total scores can ranges from a low of 15000 to a high of 30000; scores below 15000 indicate that hemodynamic response (internal workload) of the individual is low, scores between 20000 and 25000 indicate hemodynamic response of the individual is intermediate, and scores from 30000 and above indicate hemodynamic response of the individual is high.

Patient recruitment began in May 2022, the primary and secondary outcome measure was completed in 2023 and the study was completed in December 2023.

Inclusion criteria for study group

1. Subjects between 40 yrs to 60 yrs of age of both the genders.
2. B.P reading between 140-160 mm/Hg
3. Subjects having essential hypertension which included, Subjects with hypertension diagnosed within last 5 yrs and are on medication.
4. Not doing Yoga previously.
5. Subjects who are nonalcoholic and nonsmokers.

Exclusion criteria

1. Subjects with Stage-2 hypertension.
2. Systolic more than 100 mm/Hg and Diastolic more than 160 mm/Hg
3. Subjects with hypertension with cardiovascular, cerebral complications, Diabetes Mellitus, Renal disease or NSAID and other medicinal induced HTN.
4. Subjects with secondary hypertension.
5. Subjects already practicing yoga.
6. Pregnant women.

Data collection

After recruitment, the study was carried out and the progress was audited at regular intervals. Data were collected from the participants during the screening time and was recorded in a paper-based Case Report Form (CRF).The Data collection and assessment was repeated during Baseline period, Interim period (30th day) and Final phase (60th day). Care was taken in the collection of data.

The data collected after the assessment were analyzed and verified. Since, the infrastructure of the institution offers interdisciplinary intervention and long-term in-patient facilities; participant retention and follow up was ensured. The preliminary data and the assessments were entered in paper based CR. The research scholar had

evaluated for any changes occurring in the interim results and had made a decision to continue or terminate the trial of any participants.

Due to non compliance of SOPs of the trial such as non adherence to treatment plan, incomplete follow up visits, delayed visits, 8 patients in total were dropped out. (among them 5 from Control group) and 3 from intervention group.

RESULT AND CONCLUSION

Total 120 patients (30 in each 4 groups), Diagnosed as hypertensive within inclusion criteria were recruited for the trial. Due to non-compliance of SOPs of the trial such as non-adherence to treatment plan, incomplete follow up visits, delayed visits, 16 patients in total were dropped out. (among them 5 from Control group) and 3 from each intervention group.

Effect on control group

The mean score of all the individuals in all factors is observed to be comparatively steady with a slight decrease in value in the control group where the subjects were only under medication. The statistical analysis shows that the observed difference of before and after treatment is not statistically significant. It indicates that

the observed differences are likely due to chance rather than the intervention.

Effect on intervention group

The observed difference in mean BP, Respiration rate, Heart Rate & Rate Pressure Product levels between the pre-treatment and post-treatment in groups II, III & IV is statistically significant, indicating that the intervention had a measurable and meaningful impact on all parameters. This suggests that the treatment led to a clinically relevant change in those parameters, is unlikely to have occurred by chance alone. The statistical significance confirms that the effect of the intervention is robust and can be considered reliable for further clinical or scientific interpretation.

The combined intervention of *Pranayama* and *Shirodhara* led to clinically and statistically significant reduction in diastolic blood pressure, Heart Rate, Respiration Rate, Rate pressure Product. This indicates that the integration of these two practices has a substantial impact on cardiovascular health, with evidence suggesting that the observed decrease is unlikely to be due to chance. These findings underscore the potential effectiveness of *Pranayama* and *Shirodhara* as complementary therapies for managing hypertension.

Table 1: Definition & Classification Of Hypertension

Classification	Normal	Stage I Hypertension	Stage 2 Hypertension	Stage 3 Hypertension
Descriptive Category	Normal Blood Pressure or rare blood pressure elevations and no identifiable cardiovascular disease	Occasional or intermittent blood pressure elevations and early cardiovascular disease	Sustained or pressure elevations or progressive cardiovascular disease	Marked and sustained blood pressure elevations or advanced cardiovascular diseases
Cardiovascular risk factors	None or few	Several risk factors	Many risk factors	Many risk factors
Early disease markers	None	Usually present	Overtly present	Overtly present with progression
Target organ disease	None	None	Early sign present	Overtly present with or without CVD events

Table 2: Description of Intervention plan

No. Particulars	Control Group I	Intervention Group II	Intervention Group III	Intervention Group IV
Sample Size	30	30	30	30
Intervention	Prescribed anti-hypertensive	prescribed anti-hypertensive +Set of Pranayama	prescribed anti-hypertensive + Shirodhara by Bala taila	prescribed anti-hypertensive + Set of Pranayama + Shirodhara by Bala taila

Intervention duration	90 Days	Twice a day for a period of 90 days	30 min each day for 7 days in each month X 3 months	90 days
Diet Modifications				

Table 3: Paired sample *t* test of Systolic BP (Before & After Treatment) in Group 4

N-27	Mean ± SEM	T Value	P Value
Before	138.03 ± 0.13	45.987	<0.001
After	124.37 ± 0.26		

Table 4: Paired sample *t* test of Diastolic BP (Before & After Treatment) in Group 4

N-27	Mean ± SEM	T Value	P Value
Before	86.14 ± 0.38	11.877	<0.001
After	79.92 ± 0.31		

Table 5: Paired sample *t* test of Heart Rate (Before & After Treatment) in Group 4

N-27	Mean ± SEM	T Value	P Value
Before	82.59 ± 0.56	11.899	<0.001
After	75.66 ± 0.45		

Table 1: Paired sample *t* test of Respiration Rate (Before & After Treatment) in Group 4

N-27	Mean ± SEM	T Value	P Value
Before	17.14 ± 0.23	11.178	<0.001
After	13.55 ± 0.24		

Table 7: Paired sample *t* test of Rate Pressure Product (Before & After Treatment) in Group 4

N-27	Mean ± SEM	T Value	P Value
Before	11400.81 ± 78.33	26.80	<0.001
After	9350.25 ± 40.57		

DISCUSSION

As per Modern Literature and *Ayurvedic* pathology, the psychological factor is one among the main etiopathogenic factor contributing to the establishment and progression of the disease.

Breathing practices' effects on the autonomic nervous system and brain may underlie their stress-reducing benefits.^[7]

Pranayama, It concentrates or localizes the breathing pattern at the diaphragm thereby improving respiration or eupnea. *Pranayama* causes the valve of the descending aorta running through the aortic opening at the diaphragm to be patent leading to marked blood flow to the lower part of the body, as a result there is an increase in venous return from the lower part of the body to the

systemic circulation resulting to fall in the cardiac output. This occurred due to baroreceptor reflex. The reflex is initiated by stretch receptors called baroreceptors or press receptors, located at specific points in the walls of large systemic arteries. Signals from the aortic baroreceptors in the arch of the aorta are transmitted through the vagus nerves to the tractus solitaries of the medulla.^[8]

Similarly *Shirodhara* is an important healing technique of *Ayurveda* that has neuro-immuno-physio-psychological effects on the human body. The pressure of oil on to the forehead creates a vibration and then the oil saturates the forehead and scalp and penetrates into the nervous system. Gentle pressure and soothing warmth of the oil allows the body, mind and nervous system to experience a deep state of relaxation and thus

stress.^[9] Due to continuous and rhythmically pouring of taila dhara also lead to state of concentration and enhance the release of serotonin and produces chemical substance like acetylcholine and small amount of acetylcholine causes fall of blood pressure and supine position also helps in relaxation.^[10]

CONCLUSION

Hypertension is a major risk factor for cardiovascular morbidity and mortality. The psychological factor is one among the main etiopathogenic factors contributing to the establishment and progression of the disease.

Both The interventions combined together, causes significant reduction in stress. Stress free individual adapts better to the daily emotional, physical and mental stress. This stress-free state of mind evokes relaxed responses. In this relaxed state, there is dominance of parasympathetic nerve activity. Hence, the results of the present study conclude that *Pranayama* leads to better control of BP in hypertensive patients.

The decrease in blood pressure with *Pranayama* and *Shirodhara* ultimately reduces the progress and complications of the disease with non-pharmacological approach, advertently improving the physical and mental health.

Our findings suggest that Combined *Pranayama* & *Shirodhara* are simple, non-invasive, and cost-effective methods that can be helpful in the management of hypertension for blood pressure reduction and improve heart function.

Additionally, feeling of wellbeing and sound sleep was also reported after starting both the treatments.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the authors.

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