International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
ISSN: 2456-5067
Received: 29-09-2025, Accepted: 29-10-2025, Published: 13-11-2025
Volume 10, Issue 4, 2025, Page No. 58-60

Effect of yoga and pranayama on blood pressure and pulse rate in prehypertensive adults

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Abstract
Background and Objectives: Prehypertension increases the risk of cardiovascular diseases. Non-pharmacological interventions like Yoga and Pranayama may help reduce blood pressure (BP) and pulse rate (PR).
Materials and Methods: Fifty prehypertensive adults (32 females, 18 males; age 30–60 years) participated in 21 days of Yoga and Pranayama sessions (30 minutes/day, 6 days/week). SBP, DBP, and PR were measured before and after intervention. Paired t-test was used for analysis ($p < 0.01$).
Results: Significant reductions were observed in SBP ($130.20 \pm 5.36 \rightarrow 127.22 \pm 6.55$ mmHg; $p < 0.001$), DBP ($83.40 \pm 3.69 \rightarrow 80.52 \pm 7.92$ mmHg; $p = 0.009$), and PR ($76.60 \pm 6.63 \rightarrow 73.74 \pm 7.06$ bpm; $p < 0.001$).
Conclusion: Daily Yoga and Pranayama significantly improve BP and PR in prehypertensive adults, supporting its use as a safe, non-pharmacological intervention.

Keywords: Systolic blood pressure, diastolic blood pressure, pulse rate, yoga, pranayama

Introduction

Prehypertension, defined as systolic blood pressure (SBP) between 120–139 mmHg or diastolic blood pressure (DBP) between 80–89 mmHg, is increasingly recognized as a critical stage in the progression toward hypertension and cardiovascular diseases (CVD) [1, 2]. Globally, the prevalence of prehypertension is high, with estimates suggesting that up to 30% of adults are affected [2]. In India, lifestyle changes due to urbanization, sedentary behavior, dietary changes, and stress contribute to early onset of elevated blood pressure in adults aged 20–40 years [3, 4].

Prehypertension is associated with an increased risk of developing coronary artery disease, stroke, heart failure, and renal impairment [5]. Importantly, early intervention at this stage may prevent progression to overt hypertension and reduce long-term cardiovascular morbidity and mortality. Non-pharmacological interventions, such as dietary modifications, exercise, and stress management, are recommended as first-line approaches [6].

Yoga, an ancient mind-body practice originating in India, combines physical postures (asanas), breathing techniques (pranayama), and meditation. It has been increasingly studied for its beneficial effects on cardiovascular and autonomic functions [7, 8]. Yoga may reduce blood pressure and heart rate by enhancing parasympathetic activity, reducing sympathetic overactivity, and improving vascular function [9, 10].

Pranayama, the controlled regulation of breathing, directly influences autonomic nervous system balance and promotes relaxation [10]. Slow, deep breathing has been shown to modulate baroreceptor sensitivity and decrease stress-related activation of the hypothalamic-pituitary-adrenal axis, both of which are important in blood pressure regulation [11].

While pharmacological therapy is effective in reducing blood pressure, lifestyle-based interventions like Yoga and Pranayama are safe, low-cost, and carry minimal side effects. Evidence suggests that even short-term Yoga practice can reduce systolic and diastolic blood pressure by 2–10 mmHg, which is clinically significant [12].

The present study aims to investigate the effect of a structured 21-day Yoga and Pranayama program on blood pressure and pulse rate in prehypertensive adults, contributing to the growing evidence of Yoga as a non-pharmacological intervention for cardiovascular risk reduction.

Materials and Methods

Study Design: Single-group pre–post experimental study.

Participants: Fifty prehypertensive adults (32 females, 18 males), age 30–60 years, recruited via purposive sampling. Written informed consent obtained.

Inclusion Criteria: SBP 120–139 mmHg and/or DBP 80–89 mmHg, no prior Yoga experience.

Exclusion Criteria: Smoking, alcohol use, pregnancy, pulmonary disease, diabetes mellitus, recent surgery, obesity class II/III, recent exercise regimen, or non-cooperative participants.

Intervention: The program consisted of 21 days, 30 min/day, 6 days/week. The total session included Yoga asanas (24 min: Tadasana, Ardhachakrasana, Trikonasna, Paschimottanasana, Vakrasana, Shashank Bhujangasana, Marjaysana-bitilasana, Pavamuktasana, Setubandhasana, Savasana) and Pranayama (6 min: Anulom Vilom, Bhramari pranayama).

Measurements: SBP and DBP using a standardized sphygmomanometer, PR by radial pulse palpation, before and after intervention.
Statistical Analysis: Paired t-test comparing pre- and post-values ($p < 0.01$).

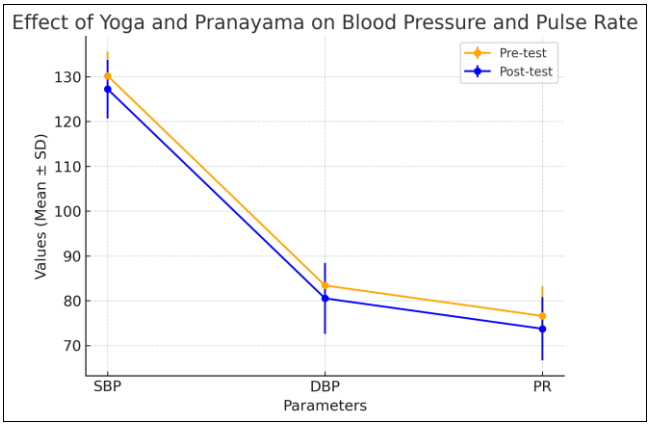
Results

Participant Characteristics: 32 females (64%), 18 males (36%), mean age 45 ± 8.7 years.

Table 1: Pre and Post Intervention Data

Parameter	Pre-test Mean ± SD	Post-test Mean ± SD	t-value	p-value	% Change
SBP (mmHg)	130.20 ± 5.36	127.22 ± 6.55	4.947	<0.001	2.29%
DBP (mmHg)	83.40 ± 3.69	80.52 ± 7.92	2.737	0.009	3.45%
PR (bpm)	76.60 ± 6.63	73.74 ± 7.06	4.007	<0.001	3.73%

Graph showing effect of Yoga and Pranayama on SBP, DBP, and PR:



Discussion

The findings are consistent with previous research. For instance, Pal *et al*. (2004) [10] reported reductions in SBP, DBP, and heart rate after short-term Yoga interventions [9]. Cramer *et al*. (2014) [6] in a systematic review concluded that Yoga interventions can significantly reduce blood pressure in both hypertensive and prehypertensive individuals [6].

The physiological mechanisms underlying these effects are multifactorial. Yoga and Pranayama may modulate the autonomic nervous system, increase parasympathetic tone while reduce sympathetic activity. This autonomic shift lowers heart rate and promotes vasodilation, leading to reduced blood pressure [9, 10]. The slow, controlled breathing in Pranayama may influence baroreflex sensitivity and improve vagal tone, contributing to cardiovascular homeostasis [11].

Stress reduction is another key mechanism. Chronic stress activates the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system, increasing cortisol and catecholamine release, which elevates blood pressure and heart rate [13]. Yoga and meditation reduce stress, lower cortisol levels, and improve psychological well-being, thereby indirectly contributing to cardiovascular health [9].

This study demonstrated that 21 days of structured Yoga and Pranayama practice significantly reduced SBP, DBP, and pulse rate in prehypertensive adults. The average reductions of 2.98 mmHg in SBP, 2.88 mmHg in DBP, and 2.86 bpm in pulse rate, though modest, are clinically meaningful. Studies have shown that even a 2-mmHg reduction in SBP can reduce the risk of coronary heart disease by 7% and stroke by 10% [12].

In conclusion, consistent practice of Yoga and Pranayama is effective in reducing blood pressure and pulse rate in prehypertensive adults, representing a safe, non-pharmacological approach to cardiovascular risk reduction.

Future Directions:

- Randomized controlled trials with larger sample sizes and longer intervention periods are needed to confirm findings.
- Comparing the effects of isolated Yoga, isolated Pranayama, and combined interventions may identify optimal protocols.

Limitations

- The study used a single-group pre-post design without a control group, limiting causal inference.
- Small sample size (n=50) reduces generalizability.
- The intervention duration was relatively short (21 days).
- Lifestyle factors (diet, physical activity) were not controlled, which may confound results.

Clinical Implications

- Yoga and Pranayama can be recommended as cost-effective, low-risk interventions for early management of prehypertension.
- Integration of Yoga into workplace wellness programs or community health initiatives could help reduce long-term cardiovascular risk.

Conclusion

Regular practice of Yoga and Pranayama significantly improves BP and PR in prehypertensive adults. It is a safe and effective non-pharmacological intervention, supporting early cardiovascular risk reduction.

References

1. World Health Organization. Global Health Observatory: Hypertension prevalence. World Health Organization, 2020.
2. Gupta R, Guptha S, Ram CV. Prevalence of hypertension in India. Journal of the Association of Physicians of India,2019:67:13–19.
3. Patel C, North WR. Randomised controlled trial of yoga and biofeedback in management of hypertension. The Lancet,1975:2:93–95.
4. Sharma H, Chandola HM, Singh G, Basisht G. Yoga in prevention and management of hypertension. Journal of Clinical and Diagnostic Research,2017:11:CC01–CC05.
5. McCraty R, Atkinson M, Tomasino D, Bradley RT. Effects of meditation and yoga on cardiovascular outcomes. International Journal of Cardiology,2015:190:98–105.
6. Cramer H, Lauche R, Haller H, Steckhan N, Michalsen A, Dobos G. Yoga for blood pressure reduction: A systematic review. European Journal of Preventive Cardiology,2014:21(3):281–293.
7. Jayasinghe SR. Yoga in cardiac health: A review. European Journal of Cardiovascular Nursing,2004:3:1–10.
8. Khalsa SB. Yoga as a therapeutic intervention: A bibliometric analysis of published research studies. Indian Journal of Physiology and Pharmacology,2004:48(3):269–285.
9. Hagins M, States R, Selfe T, Innes K. Effectiveness of yoga for hypertension: Systematic review and meta-analysis. Evidence-Based Complementary and Alternative Medicine,2013:2013:649836.

10. Pal GK, Velkumary S, Madanmohan. Effect of short-term practice of breathing exercises on autonomic functions in normal human volunteers. Indian Journal of Medical Research,2004:120:115–121.
11. Joseph B, Sridhar J. Influence of slow-paced breathing on heart rate variability and baroreflex sensitivity in prehypertensive and normotensive subjects. Journal of Clinical and Diagnostic Research,2014:8(7):BC01–BC04.
12. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R, *et al*. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. The Lancet,2002:360(9330):1903–1913.
13. Kandou K, Shima K, Morita K, Sato H. Effect of yoga on blood pressure and stress hormones in essential hypertension patients. Acta Medica Okayama,2012:66(5):379–385.