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Original Research Article

# Comparison of Cardiovascular Parameters before and after Short-Term Yoga Training

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**Abstract:**

**Background:** Yoga has been increasingly recognized as a complementary lifestyle intervention with potential benefits on cardiovascular regulation. However, evidence evaluating short-term yoga practice on objective cardiovascular parameters remains limited. This study was undertaken to assess changes in resting heart rate and blood pressure following a structured short-term yoga training program.

**Material and Methods:** A prospective interventional study was conducted among 136 apparently healthy adults aged 18–40 years. Baseline cardiovascular parameters, including resting heart rate, systolic blood pressure, and diastolic blood pressure, were recorded under standardized conditions. Participants then underwent a supervised yoga training program for six weeks, with sessions conducted five days per week. Post-intervention measurements were obtained using the same protocol. Pre- and post-intervention values were compared using paired t-tests, and results were expressed as mean ± standard deviation.

**Results:** The mean age of participants was 27.4 ± 5.6 years, with a mean body mass index of 22.6 ± 2.8 kg/m². Resting heart rate decreased significantly from 76.8 ± 7.9 beats/min at baseline to 71.2 ± 6.8 beats/min after yoga training ($p < 0.001$). Systolic blood pressure showed a significant reduction from 118.6 ± 9.7 mmHg to 112.4 ± 8.6 mmHg ($p < 0.001$), while diastolic blood pressure declined from 76.9 ± 7.4 mmHg to 72.1 ± 6.5 mmHg ($p < 0.001$). The mean reductions were 5.6 beats/min for heart rate, 6.2 mmHg for systolic blood pressure, and 4.8 mmHg for diastolic blood pressure.

**Conclusion:** Short-term yoga training produced significant improvements in resting cardiovascular parameters in healthy adults, suggesting its potential role as an effective non-pharmacological approach for cardiovascular health promotion.

**Keywords:** Yoga, Cardiovascular parameters, Blood pressure, Heart rate, Lifestyle intervention.



## Introduction

Cardiovascular diseases (CVD) remain the leading cause of mortality and morbidity globally, with elevated blood pressure and resting heart rate recognized as important modifiable risk factors in both healthy and at-risk populations [1]. Lifestyle interventions that can favorably influence these parameters are a key focus of preventive cardiology. Yoga, a mind-body practice integrating physical postures, controlled breathing, and meditation, has been increasingly investigated for its potential effects on cardiovascular regulation [1,2].

Several systematic reviews and meta-analyses have demonstrated that yoga interventions can lead to significant reductions in systolic and diastolic blood pressure, as well as resting heart rate, when compared with no intervention or usual care [1,2,3]. In one large synthesis of 44 randomized controlled trials, yoga was associated with mean reductions in systolic blood pressure of approximately 5.85 mmHg and diastolic blood pressure of about 4.12 mmHg, alongside a mean decrease in heart rate of 6.59 beats/min, suggesting clinically relevant improvements in key cardiovascular risk markers [1]. Another meta-analysis focused specifically on blood pressure outcomes reported consistent reductions in both systolic and diastolic pressures among prehypertensive and hypertensive individuals practicing yoga versus control groups [2].

The mechanisms by which yoga may exert these effects include modulation of autonomic nervous system balance with enhanced parasympathetic tone, decreased sympathetic drive, and reduced stress hormone levels, all of which may contribute

to improved vascular function and cardiovascular homeostasis [1,2]. These physiological adaptations have been observed even with relatively short intervention periods, indicating that yoga may have utility as an early, non-pharmacological strategy to promote cardiovascular health [4,5].

Despite growing evidence supporting the beneficial effects of yoga on cardiovascular parameters, heterogeneity in intervention duration, practice components, and study populations persists, and further research is needed to clarify optimal training prescriptions. This study was therefore designed to assess the impact of a structured, short-term yoga training program on resting heart rate and blood pressure in healthy adults.

## Material and Methods

**Study Design and Setting:** This prospective, interventional, before–after study was conducted to evaluate changes in selected cardiovascular parameters following short-term yoga training. The study was carried out in a controlled institutional setting. All procedures adhered to standard methodological and ethical principles for human research.

**Study Population and Sample Size:** A total of 136 apparently healthy adult participants were enrolled in the study. The sample size was determined pragmatically based on feasibility, availability of participants, and prior physiological intervention studies demonstrating measurable cardiovascular changes with similar group sizes. This number was considered adequate to detect within-subject differences in cardiovascular parameters before and after intervention.

**Inclusion criteria** were:

- Age between 18 and 40 years
- Both males and females
- Apparently healthy individuals with no known chronic medical illness
- Willingness to participate and comply with the yoga training protocol

**Exclusion criteria** were:

- History of cardiovascular, respiratory, endocrine, or neurological disorders
- Current use of medications affecting cardiovascular function
- Prior formal training or regular practice of yoga within the past six months
- Acute illness or musculoskeletal conditions limiting physical activity

**Baseline Assessment:** At enrollment, demographic details including age, sex, height, weight, and body mass index (BMI) were recorded. Baseline cardiovascular parameters were measured after participants had rested in a seated position for at least 10 minutes in a quiet environment. All measurements were performed at the same time of day to minimize diurnal variation.

The cardiovascular parameters assessed included:

- Resting heart rate
- Systolic blood pressure
- Diastolic blood pressure

Blood pressure was measured using a calibrated sphygmomanometer following standard guidelines. Two readings were taken at an interval of five minutes, and the average value was used for analysis. Heart rate was recorded manually by palpation of the radial pulse over one full minute.

**Yoga Training Intervention:** Participants underwent a short-term structured yoga training program of six weeks' duration, with sessions conducted five days per week. Each session lasted approximately 45 minutes and was supervised by a trained yoga instructor to ensure uniformity and correct practice.

The yoga module included:

- A brief preparatory phase with loosening exercises
- Selected asanas focusing on flexibility and postural stability
- Pranayama techniques emphasizing slow, controlled breathing
- A short relaxation phase at the end of each session

The sequence and duration of practices were standardized for all participants. Attendance was monitored, and participants who missed more than 20% of sessions were excluded from final analysis.

**Post-Intervention Assessment:** At the end of the six-week yoga training period, cardiovascular parameters were reassessed using the same instruments, procedures, and conditions as the baseline assessment. Measurements were performed by the same investigator to reduce inter-observer variability.

**Statistical Analysis:** Data were entered into a spreadsheet and analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation. Pre- and post-intervention values were compared using a paired t-test after confirming normal distribution of data. A p-value of less than 0.05 was considered statistically significant.

## Results

The baseline demographic and anthropometric profile of the study population is presented in Table 1. The mean age of participants was 27.4 ± 5.6 years, with an average body mass index of 22.6 ± 2.8 kg/m², indicating a predominantly normal-weight

cohort. Mean height and weight were 165.8 ± 8.9 cm and 62.3 ± 9.4 kg, respectively.

A comparison of cardiovascular variables measured before and after the yoga training intervention is summarized in Table 2. Resting heart rate demonstrated a statistically significant reduction following the intervention, decreasing from 76.8 ± 7.9 beats/min at baseline to 71.2 ± 6.8 beats/min post-intervention ($p < 0.001$). Systolic blood pressure also showed a marked decline after yoga training, with mean values reducing from 118.6 ± 9.7 mmHg prior to intervention to 112.4 ± 8.6 mmHg at follow-up ($p < 0.001$). Similarly, diastolic blood pressure decreased significantly from 76.9 ± 7.4 mmHg at baseline to 72.1 ± 6.5 mmHg after completion of the training program ($p < 0.001$).

The extent of change in cardiovascular variables is detailed in Table 3. The mean reduction in resting heart rate was 5.6 beats/min, with a standard deviation of 4.1, and the 95% confidence interval ranged from −6.3 to −4.9 beats/min. Systolic blood pressure exhibited a mean decrease of 6.2 mmHg (SD 5.3), while diastolic blood pressure declined by 4.8 mmHg (SD 4.6). The confidence intervals for all parameters did not cross zero, indicating consistent directional change across participants.

As shown in Table 4, paired t-test analysis confirmed that the observed reductions in resting heart rate, systolic blood pressure, and diastolic blood pressure were statistically significant. The calculated t-values were 14.9 for heart rate, 13.2 for systolic blood pressure, and 12.1 for diastolic blood pressure, supporting a significant effect of short-term yoga training on cardiovascular parameters.

**Table 1: Baseline Characteristics of the Study Participants (n = 136)**

| Variable | Mean ± SD |
|---|---|
| Age (years) | 27.4 ± 5.6 |
| Height (cm) | 165.8 ± 8.9 |
| Weight (kg) | 62.3 ± 9.4 |
| Body Mass Index (kg/m²) | 22.6 ± 2.8 |

**Table 2: Comparison of Cardiovascular Parameters Before and After Yoga (n = 136)**

| Parameter | Before Yoga Training (Mean ± SD) | After Yoga Training (Mean ± SD) | p-value |
|---|---|---|---|
| Resting Heart Rate (beats/min) | 76.8 ± 7.9 | 71.2 ± 6.8 | <0.001 |
| Systolic Blood Pressure (mmHg) | 118.6 ± 9.7 | 112.4 ± 8.6 | <0.001 |
| Diastolic Blood Pressure (mmHg) | 76.9 ± 7.4 | 72.1 ± 6.5 | <0.001 |

**Table 3: Mean Change in Cardiovascular Parameters Following Yoga Training (n = 136)**

| Parameter | Mean Difference (post−Pre) | Standard Deviation | 95% Confidence Interval |
|---|---|---|---|
| Resting Heart Rate (beats/min) | −5.6 | 4.1 | −6.3 to −4.9 |
| Systolic Blood Pressure (mmHg) | −6.2 | 5.3 | −7.1 to −5.3 |
| Diastolic Blood Pressure (mmHg) | −4.8 | 4.6 | −5.6 to −4.0 |

**Table 4: Statistical Analysis of Pre- and Post-Intervention Cardiovascular Parameters**

| Parameter | Test Applied | Test Statistic | Significance |
|---|---|---|---|
| Resting Heart Rate | Paired t-test | t = 14.9 | Significant |
| Systolic Blood Pressure | Paired t-test | t = 13.2 | Significant |
| Diastolic Blood Pressure | Paired t-test | t = 12.1 | Significant |

## Discussion

In this study, short-term yoga training was associated with significant reductions in resting heart rate, systolic blood pressure, and diastolic blood pressure among healthy adults. These improvements align with findings from previous interventional studies indicating that yoga can modulate cardiovascular risk factors even in non-clinical populations. For example, short-term yoga practice in healthy volunteers has been shown to reduce resting heart rate and both systolic and diastolic blood pressure after a defined period of regular practice, supporting the present findings of favorable cardiovascular adaptations following a structured regimen [6].

Yoga's influence on autonomic function is a plausible mechanistic pathway for the observed cardiovascular effects. Multiple studies have reported that yoga practices, including asanas and controlled breathing techniques, can enhance parasympathetic activity while attenuating sympathetic drive, as evidenced by changes in heart

rate variability indices and reductions in heart rate and blood pressure in clinical and non-clinical settings [7,8]. These autonomic shifts are thought to contribute to decreased cardiac workload and improved vascular regulation, which may explain the magnitude of reductions observed in this study.

Consistent with systematic reviews, the present results reinforce the cardioprotective potential of yoga in reducing blood pressure. Meta-analyses have found that yoga interventions, especially those combining physical postures, breathing exercises, and mindfulness components, are effective in lowering blood pressure across diverse participant groups [9-13]. This supports the notion that even short training periods can induce meaningful changes in key cardiovascular markers among healthy individuals, a finding that extends evidence beyond populations with hypertension or disease.

The implications of these results extend to preventive health strategies, where yoga may serve as an accessible and low-risk lifestyle modification for reducing cardiovascular risk burden. Nonetheless, heterogeneity in intervention protocols across studies underscores the need for further research to determine optimal yoga modalities, intensity, and duration for maximizing cardiovascular benefits in different populations.

## Conclusion

The findings of the present study indicate that short-term yoga training is associated with significant improvements in resting cardiovascular parameters among apparently healthy adults. These changes suggest a favorable shift toward autonomic balance and improved cardiovascular efficiency even after a relatively brief period of structured yoga practice. Incorporation of short-term yoga training into routine lifestyle practices may therefore serve as an effective strategy for early cardiovascular risk modulation. Further studies with longer follow-up periods and controlled comparative designs are warranted to confirm the durability of these effects and to explore underlying physiological mechanisms.

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