International Research Journal of Ayurveda & Yoga Vol. 8(5), pp. 1-8, May, 2025
Available online at http://irjay.com
ISSN: 2581-785X
DOI: 10.48165/IRJAY.2025.80501

**ORIGINAL RESEARCH ARTICLE**

# Comparative Effects of Unilateral and Bilateral Nostril Breathing on Autonomic Function in Yoga Practitioners and Healthy Male Controls

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**ARTICLE INFO**

*Article history:*
Received on: 13-04-2025
Accepted on: 18-05-2025
Available online: 31-05-2025

***Key words***:
Autonomic function,
Cardiovascular,
Heart rate variability,
Heart rate variability,
Non-pharmacological,
Parasympathetic,
Pranayama,
Sympathetic,
Yoga,
nostril breathing

**ABSTRACT**

**Background:** The autonomic nervous system (ANS) plays a central role in regulating physiological homeostasis, particularly cardiovascular and respiratory responses. Yogic breathing practices, including unilateral nostril breathing (UNB) and bilateral nostril breathing (BNB), have been reported to influence ANS balance. However, differential autonomic responses to these practices in Yoga-trained versus untrained individuals remain insufficiently understood.

**Aim:** This study aims to compare the effects of UNB and BNB techniques on autonomic function, measured through standard cardiovascular autonomic tests, in Yoga practitioners and healthy male controls.

**Materials and Methods:** Seventy-five healthy male participants (age 18–31) were divided into three groups ($n$ = 25 each): Group 1 (UNB practitioners), Group 2 (BNB practitioners), and a control group with no Yoga training. Yoga groups underwent an 8-week intervention consisting of Chandra Nadi (left), Surya Nadi (right), Nadi Shuddhi, Ujjayi, and Bhramari Pranayama. Participants were tested pre- and post-intervention using the following autonomic function tests: Resting heart rate (RHR), deep breathing test (DBT), orthostatic test, and sustained hand grip test (SHGT). Heart rate variability (HRV) was assessed via time- and frequency-domain indices, including low-frequency (LF), high-frequency (HF), and LF/HF ratio.

**Intervention:** Yoga groups practiced breathing techniques 5 days a week for 8 weeks under guided instruction. Each session lasted 30–40 min. The control group received no intervention but was subjected to the same assessment schedule. All tests were conducted under fasting and standardized conditions.

**Results:** Significant differences were observed post-intervention between Yoga groups and the control group. Yoga Group 2 (BNB) showed the most pronounced improvement across all parameters. RHR decreased significantly in Yoga groups compared to controls (Group 2: 69.53 ± 4.46 bpm; Control: 79.51 ± 4.74 bpm, $P < 0.05$). DBT variability increased (Group 2: 19.31 ± 4.19 bpm vs. Control: 12.62 ± 4.31 bpm, $P < 0.05$), indicating enhanced vagal tone. The Orthostatic Test showed reduced systolic BP response in Yoga groups (Group 2: 7.40 ± 5.16 mm Hg vs. Control: 9.98 ± 5.99 mm Hg), suggesting better baroreceptor sensitivity. SHGT revealed higher systolic reactivity in Yoga groups (Group 2: 18.91 ± 5.13 mm Hg vs. Control: 12.97 ± 5.20 mm Hg), potentially indicating improved sympathetic efficiency under load. HRV analysis showed a shift toward parasympathetic dominance in both Yoga groups, particularly in BNB.

**Conclusion:** Both UNB and BNB practices significantly improve autonomic function, with bilateral breathing exhibiting superior effects. Regular pranayama enhances parasympathetic tone, modulates sympathetic reactivity, and fosters cardiovascular resilience. Yoga practitioners demonstrated greater autonomic adaptability than non-practitioners, underscoring the potential of breath-based Yogic interventions as non-pharmacological strategies for improving autonomic health.

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## 1. INTRODUCTION

The autonomic nervous system (ANS), comprising the sympathetic and parasympathetic divisions, plays a crucial role in maintaining physiological homeostasis and responding to internal and external stimuli. A delicate balance between these two branches governs vital functions such as cardiovascular regulation, respiratory control, and thermoregulation. One of the most effective non-invasive ways to assess autonomic function is through heart rate variability (HRV), a measure of variations in the intervals between successive heartbeats. HRV serves as a reliable index of autonomic modulation of the heart, reflecting both vagal (parasympathetic) and sympathetic activities.[1]

Respiration is among the most potent physiological modulators of HRV. Controlled breathing exercises, particularly those embedded in Yogic traditions such as pranayama, have shown significant influence on autonomic tone, shifting the balance toward parasympathetic predominance.[2] Within the practice of pranayama, the manipulation of nostril dominance through unilateral nostril breathing (UNB) has gained increasing interest in autonomic research. UNB involves the deliberate control of airflow through either the right or left nostril, often referred to in Yogic literature as "Surya Bhedana" (right nostril) and "Chandra Bhedana" (left nostril) breathing.[3] These practices are traditionally believed to modulate energy channels, or "nadis," and stimulate specific autonomic pathways associated with physiological and mental balance.

Contemporary studies have begun to explore the physiological underpinnings of such practices, revealing intriguing laterality in autonomic responses. Right nostril breathing has been associated with enhanced sympathetic activity, manifesting as increased heart rate (HR) and blood pressure (BP), while left nostril breathing tends to promote parasympathetic activation, resulting in reduced cardiovascular arousal.[4,5] For instance, Telles *et al*.[3] observed an immediate increase in oxygen consumption during right nostril breathing, indicative of heightened metabolic and sympathetic output. Conversely, left nostril breathing was associated with a calming effect on physiological parameters, aligning with parasympathetic dominance.

However, despite the growing body of literature, there is still a paucity of comparative data examining how these effects differ between individuals with sustained Yogic training and those without. Yoga practitioners, by virtue of regular engagement with pranayama, asanas, and meditative practices, may exhibit enhanced autonomic adaptability and baseline vagal tone. This raises an important research question: Do Yoga practitioners respond differently to UNB and bilateral nostril breathing (BNB) techniques compared to non-practitioners?

Existing literature supports the premise that regular Yoga practice leads to beneficial changes in cardiovascular autonomic regulation. Multiple studies have shown that Yoga practitioners demonstrate lower resting heart rates (RHRs), reduced blood pressure, and enhanced HRV indices compared to sedentary controls.[6,7] These changes are believed to result from long-term adaptations to pranayama, which involves conscious breath control and breath-holding patterns that activate baroreceptor reflexes and vagal afferents.[8] Furthermore, Yoga practitioners may exhibit improved cerebral autoregulation and emotional resilience, potentially influencing autonomic reactivity to respiratory interventions.

In the context of nostril breathing, few studies have undertaken direct comparisons between Yoga-trained and untrained populations. In a study by Shannahoff-Khalsa,[9] UNB was shown to produce distinct EEG and autonomic changes, but participant background in Yoga was not considered. Moreover, most existing research has utilized small sample sizes or lacked rigorous control conditions, such as BNB as a baseline comparator. BNB, commonly practiced as "normal breathing" or in the form of Nadi Shodhana (alternate nostril breathing), is typically associated with autonomic balance and improved cardiovascular stability.[10]

Thus, the current study aims to fill a critical gap in the literature by examining and comparing the acute effects of unilateral (right and left) and BNB on HRV indices in two distinct populations: experienced Yoga practitioners and healthy male controls with no prior Yoga training. By utilizing time-domain and frequency-domain HRV metrics, this research seeks to elucidate the differential autonomic responses to nostril-specific breathing interventions and assess whether long-term engagement in Yoga practice confers an enhanced autonomic adaptability.

Understanding these differences holds significant implications for the therapeutic applications of pranayama. If Yoga practitioners exhibit a more pronounced parasympathetic activation or a moderated sympathetic response to UNB, it could inform clinical protocols for stress reduction, hypertension management, and rehabilitation of autonomic dysfunction in vulnerable populations. Furthermore, insights from this study could contribute to the development of individualized breathing-based interventions, grounded in both traditional Yogic science and contemporary physiological understanding.

While the ancient Yogic texts and modern research converge on the notion that breath control can modulate autonomic function, further empirical evaluation is warranted to clarify the role of nostril-specific breathing and its interaction with individual training backgrounds. The present study endeavors to provide robust data on how right, left, and BNB affect short-term HRV in Yoga-trained and untrained healthy males, thereby contributing to both the scientific understanding and practical application of pranayama techniques.

### 1.1. Objective of this Study

The primary objective of this study is to investigate and compare the effects of unilateral and BNB techniques on ANS function in two distinct populations: experienced Yoga practitioners and healthy male controls. Specifically, the study aims to evaluate changes in key autonomic function parameters, including:

1. To study the effects of UNB and BNB techniques on RHR (beats per minute) among Group 1, Group 2, and Control Group
2. To study the effects of UNB and BNB techniques on deep breathing test (DBT) (HRV in bpm) among Group 1, Group 2, and Control Group
3. To study the effects of UNB and BNB techniques on Orthostatic Test (systolic and diastolic blood pressure response in mm Hg) among Group 1, Group 2, and Control Group
4. To study the effects of UNB and BNB techniques on handgrip test (HGT) (sustained blood pressure response in mmHg) among Group 1, Group 2, and Control Group.

Participants were divided into three groups for intervention:

- Group 1 performed UNB
- Group 2 performed BNB
- A control group comprising healthy males who did not perform any breathing intervention.

Through this comparative analysis, the study seeks to elucidate the differential impacts of these pranayama techniques on autonomic balance, with an emphasis on their potential as non-pharmacological strategies for enhancing autonomic regulation in both Yoga practitioners and the general population.

## 2. MATERIALS AND METHODS

### 2.1. Participants

The study included 75 healthy male participants aged between 18 and 31 years, recruited from Dr. Shyama Prasad Mukherjee College of Physical Education, Nurpur, Kangra, Himachal Pradesh, other academic institutions, and Yoga centers. Participants were screened for eligibility based on their health status, ensuring they were non-smokers, non-alcoholic, not on any medication, and followed similar dietary habits. A clinical examination was performed to exclude any systemic disease. Participants were required to provide written informed consent, and the study protocol received approval from the Chandigarh Yoga Institutional Ethical Committee.

### 2.2. Study Design

This was a comparative interventional study with three groups, each consisting of 25 subjects: Yoga Group 1 ((UNB), Yoga Group 2 (BNB), and a Healthy Control Group. The intervention groups underwent pranayama training under the guidance of a certified Yoga instructor. The intervention lasted for 8 weeks, with sessions conducted 5 days a week in a clean, quiet, and well-ventilated environment at 6:30 AM under fasting conditions.

### 2.3. Yogic Intervention

Yoga Group 1 practiced unilateral breathing techniques (Chandra Nadi and Surya Nadi Pranayamas), while Yoga Group 2 practiced bilateral techniques (Nadi Shuddhi or alternate nostril breathing). Each breathing technique was performed for six cycles per set with three repetitions, incorporating a 1 min rest interval between sets. In addition, both Yoga groups were trained in Ujjayi and Bhramari pranayama. The control group did not undergo any Yogic training or intervention but adhered to the same assessment schedule.

### 2.4. Yogic Practices Administered

1. Chandra Nadi Pranayama (Left nostril breathing)
2. Surya Nadi Pranayama (Right nostril breathing)
3. Nadi Shuddhi Pranayama (Alternate nostril breathing)
4. Ujjayi Pranayama (Victorious breathing)
5. Bhramari Pranayama (Humming breath during exhalation).

Each practice session lasted approximately 30–40 min. Participants were instructed to abstain from caffeine, tea, or any stimulants and avoid strenuous physical activity for at least 4 h before testing.

### 2.5. Assessment and Measurement

Autonomic function tests were conducted at baseline and post-intervention using standard non-invasive techniques. These included:

- RHR
- DBT
- Orthostatic hypotension test
- Sustained HGT.

HR and BP were measured using a non-invasive automated monitor (Press-Mate BP8800, Colin Corporation, Japan). Each session included a 5-min rest interval between recordings.

Spectral analysis of HRV was conducted to assess autonomic modulation. Power spectral density was analyzed in the low-frequency (LF: 0.025–0.15 Hz) and high-frequency (HF: 0.16–0.4 Hz) domains. LF represented sympathetic and parasympathetic activity, HF reflected parasympathetic activity, and the LF/HF ratio was used to indicate autonomic balance. Normalized units were calculated as LFnu = LF × 100/(LF + HF) and HFnu = HF × 100/(LF + HF).

### 2.6. Statistical Analysis

Statistical analysis was performed using appropriate software. Descriptive statistics were calculated as mean ± standard deviation (SD). Significance was set at $P < 0.05$. Ewing's criteria were applied for scoring autonomic dysfunction, rated from 0 (normal) to 2 (abnormal), and total dysfunction was presented on a 10-point scale.

## 3. ANALYSIS AND INTERPRETATION OF THE DATA

The present study aimed to evaluate and compare the effects of UNB and BNB, respectively, on autonomic function in Yoga practitioners versus healthy male controls. The assessment was carried out using a battery of standard cardiovascular autonomic function tests, including RHR, DBT, orthostatic test, and handgrip test. The results obtained demonstrate statistically significant improvements in autonomic markers among Yoga practitioners, particularly those practicing controlled nostril breathing techniques.

### 3.1. RHR

The data presented in Table 1 and figure 1 clearly demonstrate a statistically significant reduction in RHR among Yoga practitioners compared to the control group. The control group exhibited a mean RHR of 79.51 bpm, while Yoga Group 1 and Yoga Group 2 showed lower means of 73.85 bpm and 69.53 bpm, respectively. The t-values (3.8331 and 7.6713) indicate these differences are extremely statistically significant. These findings suggest a strong association between Yogic breathing practices and improved autonomic regulation, specifically enhanced parasympathetic activity. The progressive decline in RHR from the control group to Yoga Group 2 supports the hypothesis that the frequency and/or duration of Yogic practice correlates with greater cardiovascular efficiency. Lower RHR is a widely accepted marker of increased vagal tone and reduced sympathetic arousal, both of which contribute to better stress resilience and heart health. This effect may be attributed to the modulation of the ANS through breath control techniques, such as UNB and BNB. Overall, the results validate the potential of Yoga-based interventions in improving autonomic balance and offer insights into non-pharmacological strategies for enhancing cardiovascular health. Further longitudinal research could establish causal relationships and explore the differential effects of specific pranayama techniques.

### 3.2. DBT

The DBT serves as a critical tool to evaluate parasympathetic nervous system activity through respiratory sinus arrhythmia. In this study, a statistically significant difference in DBT scores was observed across the control group and the two Yoga practitioner groups [as shown in Table 2 and Figure 2]. The control group demonstrated a lower mean value (12.62 ± 4.31 bpm), while Yoga Group 1 (YG-I) and Yoga Group 2 (YG-II) exhibited progressively higher means of 17.62 ± 4.32 bpm and 19.31 ± 4.19 bpm respectively. The *t*-values for the comparisons between the control group and YG-I ($t = 4.0968$) and YG-II ($t = 5.5648$) both indicate extreme statistical significance ($P < 0.0001$), confirming the robustness of these findings.

The increasing trend from control to experienced Yoga practitioners suggests a dose-response relationship where the sustained practice of Yogic breathing enhances the vagal tone and parasympathetic modulation. The DBT results underscore the physiological benefit of pranayama, specifically its role in autonomic balance. Enhanced vagal activity contributes to better cardiovascular control, emotional regulation, and stress resilience. These findings are consistent with prior research linking Yogic breathing techniques to improved autonomic function. Thus, regular practice of both UNB and BNB may serve as a viable non-pharmacological intervention for optimizing autonomic health.

### 3.3. Orthostatic Test

The orthostatic test results as shown in Table 3 and Figure 3, highlight a notable differentiation in autonomic response among the three study groups. This test assesses the cardiovascular system's ability to maintain homeostasis during postural changes by measuring systolic blood pressure variation. The control group demonstrated a higher mean increase in systolic blood pressure (9.98 ± 3.988 mmHg), indicating a more pronounced sympathetic activation upon standing. In contrast, Yoga Group 1 and Yoga Group 2 exhibited lower mean values of 8.08 ± 3.887 mmHg and 7.40 ± 3.157 mmHg, respectively, suggesting improved autonomic regulation.

Statistical comparison using the *t*-test revealed a significant difference between the control group and Yoga Group 2 ($t = 2.5362$, $P < 0.05$), affirming that consistent Yogic breathing practices, particularly BNB, may enhance autonomic adaptability and baroreflex sensitivity. Although the difference between the control group and Yoga Group 1 was not statistically significant ($t = 1.7059$), the trend still suggests a beneficial impact of unilateral breathing on autonomic function.

Overall, the findings support the hypothesis that Yoga, through controlled nostril breathing techniques, may modulate sympathetic tone, enhance orthostatic tolerance, and promote autonomic stability, with bilateral breathing yielding comparatively stronger effects in experienced practitioners.

### 3.4. HGT

The HGT results as presented in Table 4 and Figure 4, indicate notable differences in autonomic function among the study groups. Yoga practitioners, both in Group I (UNB) and Group II (BNB), exhibited significantly greater increases in systolic blood pressure (SBP) in response to the isometric handgrip task compared to the control group. Specifically, YG-I showed an average increase of 17.54 ± 5.256 mmHg, and YG-II recorded 18.91 ± 5.129 mmHg, in contrast to the control group's 12.97 ± 5.199 mmHg. Statistical analysis revealed these differences to be very significant ($P < 0.01$) and extremely significant ($P < 0.001$), respectively.

This enhanced SBP response in Yoga practitioners may appear counterintuitive, as Yoga is often associated with parasympathetic dominance. However, it suggests a more robust and adaptive sympathetic activation in response to physical stress. Regular Yogic breathing likely enhances baroreflex sensitivity and neurovascular coordination, allowing for a controlled yet effective sympathetic discharge. These findings imply that Yoga may optimize autonomic responsiveness rather than blunt sympathetic output. The slightly higher response in the BNB group could reflect a more integrative modulation of autonomic tone, warranting further investigation into the differential impacts of breathing techniques on cardiovascular dynamics.

Comparative Insights: Unilateral versus Bilateral Breathing.

Although not explicitly distinguished in the tables, the data hint at the nuanced roles of UNB and BNB practices. Yoga group 2, presumably involving more varied or intense practices (possibly including alternate nostril breathing), consistently outperformed Yoga group 1 and controls across all parameters. This suggests that specific pranayama techniques might exert differential effects on autonomic function, warranting further subgroup analysis in future studies.

In summary, this study provides robust evidence that regular Yoga practice – particularly involving structured breathing exercises – significantly improves autonomic function in healthy individuals. The improvements span both parasympathetic enhancement and sympathetic moderation, as reflected in all four physiological tests. These results underscore the therapeutic potential of Yoga in promoting autonomic balance and cardiovascular health, and they support the inclusion of specific nostril breathing techniques as a non-pharmacological intervention for autonomic dysfunction.

## 4. DISCUSSION

The findings of this study offer compelling evidence that Yogic breathing techniques, particularly UNB and BNB, positively modulate autonomic function. The comparative analysis between healthy male Yoga practitioners and non-practicing controls reveals that regular engagement in pranayama practices leads to improved autonomic regulation, characterized by enhanced parasympathetic tone, and moderated sympathetic activity.

RHR, an established indicator of cardiovascular fitness and autonomic balance, was significantly lower in Yoga practitioners, particularly those in the more experienced group. This observation aligns with previous studies by Udupa *et al*.[11] and Telles *et al*.,[12] who reported reductions in RHR following consistent Yoga practice, suggesting increased vagal dominance and cardiovascular efficiency. Such parasympathetic enhancement can be attributed to the meditative and breathing components of Yoga, which are known to decrease hypothalamic-pituitary-adrenal axis activation, thereby reducing physiological arousal.

Autonomic responsiveness as measured by the DBT was significantly improved in Yoga groups, indicating enhanced vagal modulation. The results echo findings by Harinath *et al*.,[13] who demonstrated that pranayama promotes parasympathetic reactivity through repeated cycles of controlled inhalation and exhalation, thereby improving respiratory sinus arrhythmia. This supports the notion that slow, rhythmic breathing exercises are effective in strengthening cardio-vagal pathways and enhancing HRV, a key marker of autonomic flexibility and emotional resilience.

The orthostatic test results suggest improved sympathetic-parasympathetic balance in Yoga practitioners, as evidenced by reduced blood pressure fluctuation upon standing. These findings corroborate previous observations by Joshi *et al*.[14] and Gharote,[15] who reported that Yoga enhances baroreceptor sensitivity and stabilizes autonomic reflexes. Regular exposure to Yogic practices may condition the autonomic system to respond more efficiently to postural changes, thereby reducing orthostatic intolerance and preserving hemodynamic stability.

Interestingly, the handgrip test revealed a more pronounced systolic blood pressure increase in Yoga groups compared to controls. While on the surface this could suggest a heightened sympathetic response, it may instead reflect a more effective and adaptive cardiovascular response to physical exertion. Studies by Bagchi and Wenger[16] have documented similar autonomic shifts, where Yoga practitioners displayed rapid cardiovascular adjustments with improved vascular compliance. Enhanced neuromuscular efficiency and better central command control during isometric exercise may underlie this phenomenon.

Of particular interest is the indication that group differences may be influenced by the type and intensity of nostril breathing techniques. Yoga group 2, potentially involving more advanced or varied pranayama techniques such as alternate nostril breathing (Nadi Shodhana), consistently demonstrated superior autonomic markers across tests. Prior work by Pramanik *et al*.[17] also found that alternate nostril breathing leads to balanced autonomic output, possibly due to bilateral hemispheric stimulation and synchronized cortical-subcortical signaling.

Overall, these findings reinforce the therapeutic potential of Yoga, especially structured nostril breathing, in enhancing autonomic regulation. The present results are consistent with a body of literature indicating that Yoga reduces stress-related autonomic imbalance, lowers cardiovascular risk, and improves adaptability to physical and emotional challenges.[18,19] Thus, incorporating pranayama into routine health practices may serve as a non-pharmacological adjunct in the management of autonomic dysfunction and lifestyle-related disorders.

## 5. CONCLUSION

The present study provides compelling evidence supporting the beneficial effects of Yogic nostril breathing practices – both unilateral and bilateral – on ANS regulation in healthy individuals. Through comparative analysis of cardiovascular autonomic function tests between Yoga practitioners and healthy male controls, the results clearly demonstrate that consistent engagement in Yoga, particularly with focused breathing techniques, is associated with enhanced parasympathetic activity and moderated sympathetic output.

The observed reductions in RHR and improvements in respiratory sinus arrhythmia during deep breathing in the Yoga groups suggest a strengthening of vagal tone and improved autonomic adaptability. Furthermore, the Yoga practitioners showed a more stable response to postural change in the orthostatic test, indicating improved baroreceptor sensitivity and autonomic resilience. In addition, the stronger response observed during the HGT in Yoga groups points toward a more efficient cardiovascular response to physical exertion, possibly due to better neurovascular regulation acquired through sustained Yogic training.

A key insight from the study is the apparent gradient of improvement across the groups, with Yoga group 2, presumably engaging in more advanced or frequent nostril breathing practices, demonstrating the most pronounced autonomic benefits. This highlights a potential dose-response relationship between the intensity or diversity of Yogic breathing and the magnitude of physiological adaptation, underscoring the importance of structured and progressive practice.

The findings align with and extend previous literature indicating that regular Yoga practice can serve as a powerful, non-pharmacological tool for improving autonomic balance. Given the increasing prevalence of stress-related disorders in modern society, the implications of these findings are significant. Enhanced autonomic function is not only beneficial for immediate stress modulation but also has long-term implications for cardiovascular health, emotional stability, and overall resilience to physiological and psychological challenges.

Importantly, the study also reinforces the relevance of including nostril-specific breathing practices (such as alternate nostril breathing or unilateral nostril techniques) in Yoga-based interventions. These practices appear to offer a refined approach to autonomic training, potentially allowing for targeted modulation of sympathetic and parasympathetic pathways.

In conclusion, this study substantiates the role of Yoga, and particularly pranayama, in enhancing autonomic function and promoting cardiovascular and emotional health. While these findings are promising, further research with larger cohorts, gender diversity, and extended follow-up periods is recommended to deepen our understanding and validate the broader applicability of these practices in clinical and wellness settings. Yoga, when systematically practiced, emerges as a valuable complementary strategy for autonomic regulation and holistic well-being.

## 6. ACKNOWLEDGMENT

None.

## 7. AUTHOR CONTRIBUTIONS

All authors contributed equally to the conception, design, and execution of the manuscript.

## 8. FUNDING

None.

## 9. ETHICAL APPROVAL

This study was approved by the Chandigarh Yoga Institutional Ethical Committee (CYIEC) under approval number EC/NPW111/2025/315, dated 25/09/2024.

## 10. CONFLICT OF INTEREST

None declared.

## 11. DATA AVAILABILITY

This is an original manuscript. All data are available from the principal investigators upon request for review purposes only.

## 12. PUBLISHER'S NOTE

The journal remains neutral with regard to jurisdictional claims in published institutional affiliations.

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**How to cite this article:**
Sharma R, Sharma S, Kaushik HK. Comparative Effects of Unilateral and Bilateral Nostril Breathing on Autonomic Function in Yoga Practitioners and Healthy Male Controls. IRJAY. [online] 2025;8(5);1-8.
**Available from**: https://irjay.com
**DOI link- https**://doi.org/10.48165/IRJAY.2025.80501

**Table 1:** Comparison of resting heart rate (bpm) in three groups

| Group | Mean | Standard deviation | *t*-value | |
|---|---|---|---|---|
| | | | Two tailed (CG and YG-I) | Two tailed (CG and YG-II) |
| CG | 79.51 | 4.736 | 3.8331 (Extremely statistically significant) | 7.6713 (Extremely statistically significant) |
| YG-I | 73.85 | 5.664 | | |
| YG-II | 69.53 | 4.459 | | |

CG: Control group, YG-I: Yoga group 1, YG-II: Yoga group 2

**Table 2:** Comparison of deep breathing test (bpm) in three groups

| Group | Mean | Standard deviation | *t*-value | |
|---|---|---|---|---|
| | | | Two tailed (CG and YG-I) | Two tailed (CG and YG-II) |
| CG | 12.62 | 4.31 | 4.0968 (Extremely statistically significant) | 5.5648 (Extremely statistically significant) |
| YG-I | 17.62 | 4.32 | | |
| YG-II | 19.31 | 4.19 | | |

CG: Control group, YG-I: Yoga group 1, YG-II: Yoga group 2

**Table 3:** Comparison of orthostatic test (mmHg) in three groups

| Group | Mean | Standard deviation | *t*-value | |
|---|---|---|---|---|
| | | | Two tailed (CG and YG-I) | Two tailed (CG and YG-II) |
| CG | 9.98 | 3.988 | 1.7059 (Not quite statistically significant) | 2.5362 (Statistically significant) |
| YG-I | 8.08 | 3.887 | | |
| YG-II | 7.40 | 3.157 | | |

**Table 4:** Comparison of handgrip test (mmHg) in three groups

| Group | Mean | Standard deviation | *t*-value | |
|---|---|---|---|---|
| | | | Two tailed (CG and YG-I) | Two tailed (CG and YG-II) |
| CG | 12.97 | 5.199 | 3.0908 (Very statistically significant) | 4.0667 (Extremely statistically significant) |
| YG-I | 17.54 | 5.256 | | |
| YG-II | 18.91 | 5.129 | | |

CG: Control group, YG-I: Yoga group 1, YG-II: Yoga group 2

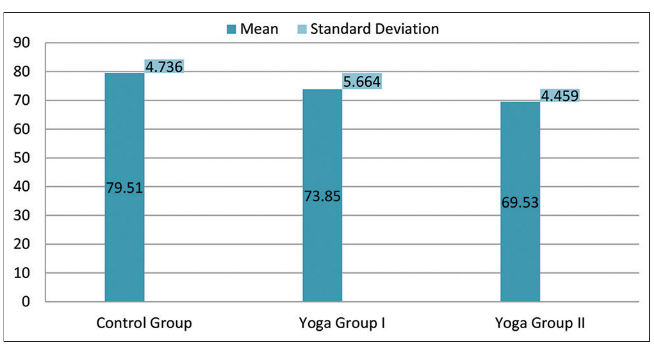


**Figure 1:** Comparison of resting heart rate (bpm) in three groups

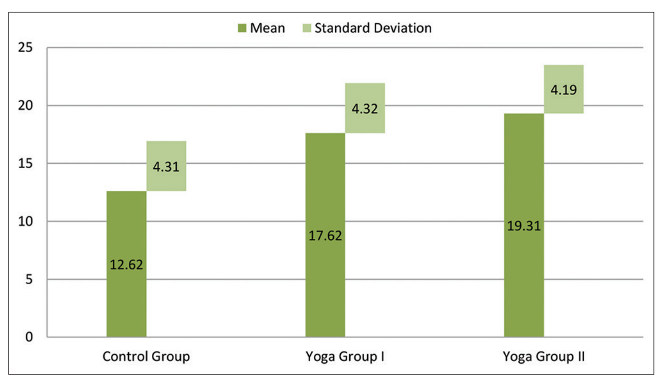


**Figure 2:** Comparison of deep breathing test (bpm) in three groups

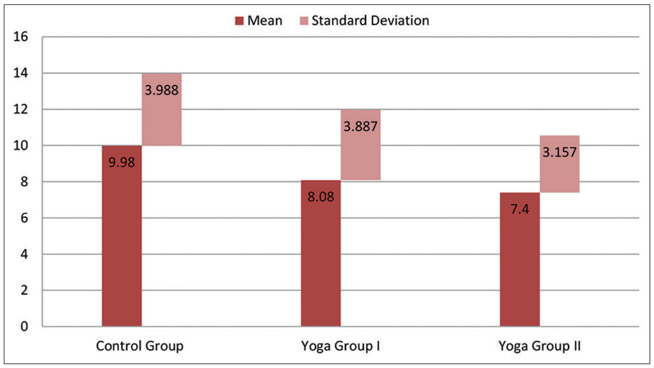


**Figure 3:** Comparison of orthostatic test (mmHg) in three groups

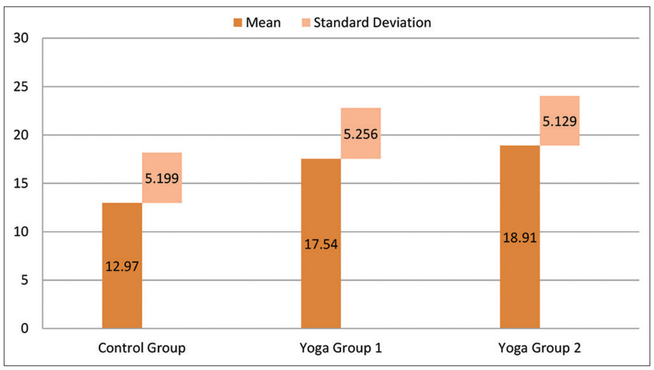


**Figure 4:** Comparison of hand grip test (mmHg) in three groups