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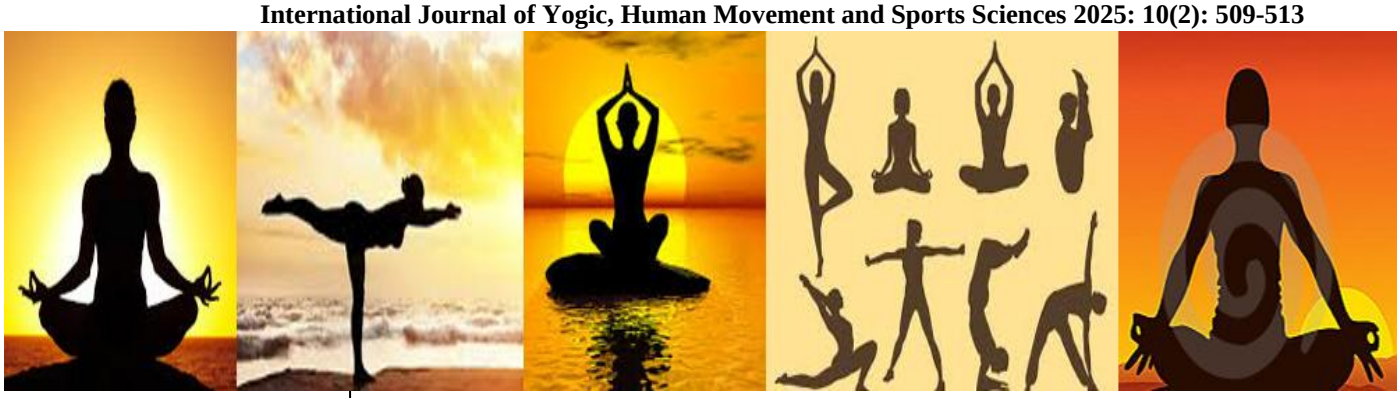

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A pre-post assessment of Yoga Nidra on autonomic function via heart rate variability in young adults: A pilot study

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Abstract
Background: The autonomic nervous system (ANS) regulates vital functions such as heart rate, respiration, and blood pressure. Heart rate variability (HRV) serves as a non-invasive marker of autonomic balance. Yoga Nidra, a guided relaxation technique, is known to promote parasympathetic activity and stress reduction. However, limited evidence exists on its immediate effects on cardiac autonomic regulation in young healthy adults.
Aim: To evaluate the immediate effect of a single Yoga Nidra session on heart rate variability among young healthy adults.
Materials and Methods: A pre-post single-group quasi-experimental design was adopted. Twenty healthy participants (5 males, 15 females; mean age 21.00±1.34 years) were recruited through convenience sampling. Baseline HRV was recorded for 5 minutes after 15 minutes of rest, followed by a 20-minute guided Yoga Nidra session in Shavasana. Post-intervention HRV was then recorded using STREME ECG and analyzed with Kubios HRV software. Time-and frequency-domain parameters were compared using paired t-test or Wilcoxon Signed-Rank Test ($p<0.05$).
Results: Yoga Nidra produced significant autonomic modulation. Heart rate decreased ($p<.001$) and RR interval increased (p = .001). Time-domain indices SDNN (p = .022), NN50 (p = .012), and pNN50 (p = .007) increased significantly, while RMSSD showed a positive trend (p = .056). In the frequency domain, HF power increased significantly (p = .044), with no significant change in LF power (p = .430) or LF/HF ratio (p = .869).
Conclusion: A single 20-minute session of Yoga Nidra elicits an immediate enhancement in parasympathetic activity and overall HRV among young adults. The findings suggest that Yoga Nidra is an effective, non-invasive relaxation technique for promoting autonomic balance and cardiovascular well-being. Further studies with larger samples and longitudinal follow-up are warranted.

Keywords: Yoga Nidra, heart rate variability, autonomic nervous system, parasympathetic activity, relaxation technique, young adults

1. Introduction
The autonomic nervous system (ANS) is a vital system that regulates important involuntary functions, including cardiac activity, digestion, respiration, and blood pressure, without conscious effort. It consists of the sympathetic, parasympathetic, and enteric systems, which work together to maintain physiological stability and appropriate responses to internal and external demands [1]. Optimal coordination between sympathetic and parasympathetic outflow is fundamental for maintaining cardiovascular homeostasis, effective gastrointestinal function, and appropriate stress reactivity. Dysregulation of this autonomic interplay has been implicated in the development of cardiovascular pathology, metabolic imbalance, and stress-related psychological disturbances, underscoring the importance of maintaining autonomic stability for overall physiological well-being [2]. Heart Rate Variability (HRV) reflects autonomic modulation of cardiac function. Time-and frequency-domain indices assess sympathetic-parasympathetic balance, making HRV a reliable non-invasive marker of vagal

tone and stress adaptability. HRV indicates impaired autonomic regulation and higher stress vulnerability [3, 4, 5].

Yoga Nidra is a guided relaxation practice rooted in ancient Tantric tradition and later systematized by Swami Satyananda Saraswati. Practised in Shavasana, it induces a state between wakefulness and sleep while maintaining inner awareness. Its therapeutic goal is deep relaxation at physical, mental, and emotional levels, promoting better stress management and self-regulation [6].

Evidence suggests that Yoga Nidra provides significant psychological benefits. A school-based intervention among 10th-grade students demonstrated that Yoga Nidra significantly reduced psychosocial stress [7]. Broader research on yoga practices also shows improved autonomic regulation and HRV following regular engagement, suggesting enhanced parasympathetic activity and improved resilience against stress [8, 9, 10]. Acute improvements have been observed even after short-duration yoga sessions among college students [11], and longer interventions (10-12 weeks) have demonstrated sustained improvements in HRV across young adults and mental health professionals [12, 13].

Young adulthood (18-23 years) represents a vulnerable developmental period marked by increasing academic demands, expanding social expectations, and emerging career pressures. Stressful experiences during this stage can lead to transient autonomic dysregulation, which may adversely affect stress reactivity and initiate early trajectories of cardiovascular and psychological vulnerability. Strengthening rapid autonomic recovery and short-term stress-adaptation capacity thus becomes an important preventive focus in this age group. Yoga Nidra offers a practical solution, as it requires minimal physical effort, demonstrates high acceptability in institutional and community environments, and can be delivered within short, structured time frames.

Despite the broader evidence supporting the autonomic benefits of yoga-based interventions, research specifically isolating the acute influence of Yoga Nidra on heart rate variability (HRV) in young healthy adults remains scarce. Many previous studies have implemented Yoga Nidra alongside asanas or pranayama, making it difficult to distinguish its independent physiological contribution. Additionally, only limited investigations have evaluated short-term autonomic responses to a single session of Yoga Nidra using robust HRV parameters as the primary outcome. This presents a notable gap in understanding the immediate parasympathetic activation and stress-regulatory effects attributable exclusively to Yoga Nidra.

Pilot pre-post studies play an important role in testing the feasibility of interventions and understanding their early physiological effects. This pilot trial explores whether a single, structured session of Yoga Nidra can bring about measurable changes in HRV among young healthy adults. Observing even short-term improvements in HRV could highlight Yoga Nidra's potential as a simple, affordable, and accessible practice to strengthen autonomic balance, build stress resilience, and support cardiovascular health during early adulthood.

2. Materials and Methods

2.1 Study Design and Participants

This study adopted a pre-post single-group intervention design (non-randomised), classified under the broader quasi-experimental study framework. A total of 20 participants were recruited through a convenience sampling method, including 5 males and 15 females, with a mean age of 21.00±1.34 years.

Eligible participants were men and women aged 18-24 years, free from major illnesses and willing to participate in the study. Individuals with severe medical conditions, lack of interest or consent, inability to attend sessions, or outside the specified age range were excluded from the study (Figure 1).

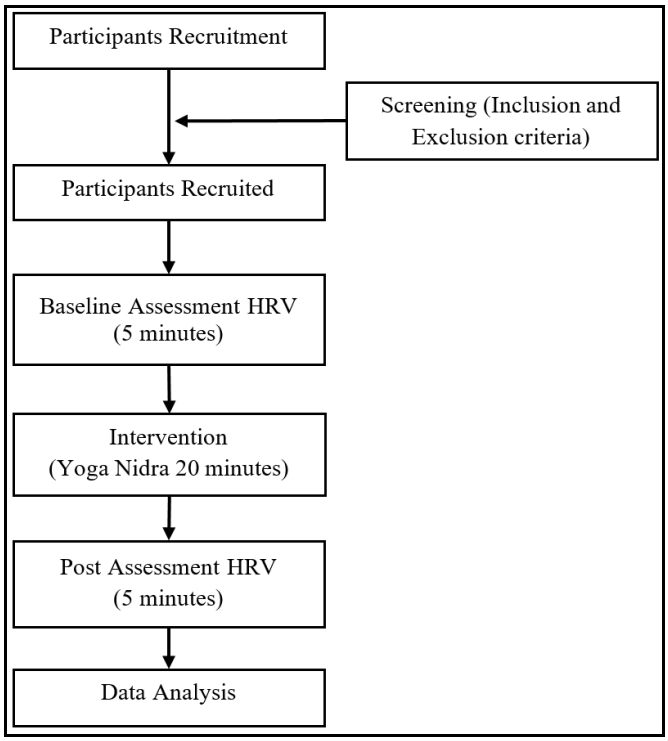

Fig 1: Schematic Diagram for the pre-post Pilot study.

2.2 Outcome Measures

The HRV is the standard method to assess the autonomic function. Short-term HRV is typically taken for five minutes or less; however, it can include time-domain and frequency-domain analysis that evaluates the autonomic balance. In the time domain, the following parameters were analysed: the standard deviation of all NN intervals (SDNN), the root mean square of successive differences between adjacent NN intervals (RMSSD), the count of successive NN interval differences exceeding 50 ms (NN50), and the percentage of NN50 relative to the total NN intervals (pNN50). In the frequency domain, low-frequency (LF, 0.04-0.15 Hz) and high-frequency (HF, 0.15-0.40 Hz) components were assessed in power log units, along with the LF/HF ratio [14].

2.3 Experimental Procedures:

All participants were instructed not to take any beverages which contain alcohol or caffeine and not to engage in any physical exercise for 24 hours before the study, and advised to take breakfast 2 hours before evaluation. The study was conducted between 10 am to 12.30 pm to avoid diurnal variations.

After 15 minutes of supine rest on a couch, an ECG was recorded for 5 minutes with normal breathing using a portable HRV analysis system-STREME, and Kubios HRV software 4.1 to extract the data.

2.4 Intervention

After the Participant recruitment, all participants underwent a baseline assessment (HRV) in the supine position. Followed by Yoga Nidra, which consists of a structured sequence of stages. It begins with preparation for the practice, followed by setting a personal intention or resolution (Sankalpa). The

process then moves through systematic awareness of different parts of the body, focus on the breath, observation of sensations and emotions, and guided mental imagery. The practice concludes with a repetition of the Sankalpa and a gradual return to wakeful awareness [15]. The detailed procedure is summarised in Table 1. The Yoga Nidra session was conducted for a duration of 20 minutes. After the Yoga Nidra, the post-assessment was taken in the supine position.

Table 1: Procedure of Yoga Nidra (14).

Stage	Description
Preparation	Participants assumed *Shavasana* (corpse pose), lying supine with arms and legs slightly apart and palms facing upward. This posture minimized sensory input and promoted physical relaxation and mental alertness.
Sankalpa (Resolution)	A short, clear, and positive personal affirmation (*Sankalpa*) was mentally repeated three times with full awareness and determination to promote subconscious integration.
Rotation of Consciousness	Awareness was systematically guided through different body parts in a structured sequence—from the right side to the left, followed by the posterior and anterior regions—enhancing sensory awareness and relaxation.
Breath Awareness	Participants focused on the natural rhythm of breathing without alteration, visualizing the breath through the nostrils, chest, and abdomen, often accompanied by mental counting from 21 to 0.
Opposite Feelings and Sensations	Contrasting sensations and emotions (e.g., heaviness-lightness, heat-cold) were recalled vividly to balance autonomic and emotional responses.
Visualization	Awareness was directed toward the internal mental space (*Chidākāsha*) behind closed eyes, visualizing various scenes or symbolic images to deepen mental relaxation.
Repetition of Sankalpa	The initial *Sankalpa* was mentally restated three times with faith and conviction to reinforce the intended goal or transformation.
Ending the Practice	Awareness was gradually externalized toward external sounds and sensations. Participants slowly moved the body, turned to one side, and sat up calmly to conclude the session.

2.5 Statistical Analysis

Data is expressed as mean±standard deviation (SD). Pre and Post comparison was done using paired t-test or Wilcoxon Signed-Rank Test. A significant level was set at $p<0.05$ by SPSS version 26, which was used for the statistical analysis.

3. Results

20 participants are involved in this study, and detailed anthropometric measurements (Table 2) indicate a physiologically homogeneous group with minimal age-related autonomic variability. All resting vital parameters were within clinically normal limits, indicating an appropriate physiological baseline for HRV analysis without effects of underlying pathology.

Table 2: Detailed Physiological Parameters of the participants.

Parameter	Mean ± SD
Age (years)	21.00±1.34
Height (cm)	168.5±7.2
Weight (kg)	64.3±8.5
BMI (kg/m²)	22.6±1.9
SBP (mmHg)	121.85±8.77
DBP (mmHg)	70.65±8.60

BMI = Body Mass Index; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure

Table 3: Pre and Post Yoga Nidra HRV Parameters (Mean ± SD), t-statistics and P-value

Parameter	Pre-intervention	Post-intervention	Test statistic	p-value
Mean HR (bpm)	83.90±10.32	78.50±8.10	t(19) = 4.713	< .001***
Mean RR (ms)	719.15±81.89	771.80±82.34	z = −3.260	.001**
SDNN (ms)	44.53±17.04	54.32±21.02	t(19) = −2.497	.022*
RMSSD (ms)	50.12±25.13	59.29±27.86	z = −1.932	.056
NN50 (beats)	87.10±58.65	106.55±55.48	t(19) = −2.762	.012*
pNN50 (%)	23.01±17.89	28.35±19.47	t(19) = −3.043	.007**
LF power (log)	6.16±0.82	6.40±0.95	t(19) = −0.806	.430
HF power (log)	6.41±1.12	7.01±0.97	t(19) = −2.155	.044*
LF/HF ratio	0.99±0.18	0.98±0.22	z = 0.187	.869

Significant autonomic modulation was observed following the Yoga Nidra session. Heart rate decreased significantly ($p<.001$), while mean RR interval increased significantly (p = .001), indicating enhanced vagal outflow. Time-domain HRV indices, including SDNN, increased (p = .022). NN50 and pNN50 also demonstrated significant improvements (p = 0.012 and p = 0.007, respectively), reflecting enhanced parasympathetic activation. RMSSD improved, although not statistically significant (p = .056); this trend remains physiologically meaningful. Frequency-domain analysis revealed a significant rise in HF power (p = .044), indicating increased vagal-mediated respiratory sinus arrhythmia, while LF power (p = .430) and LF/HF ratio (p = .869) did not show significant changes (Table 3). The pre-and post-HRV difference has been shown in Figures 2 and 3.

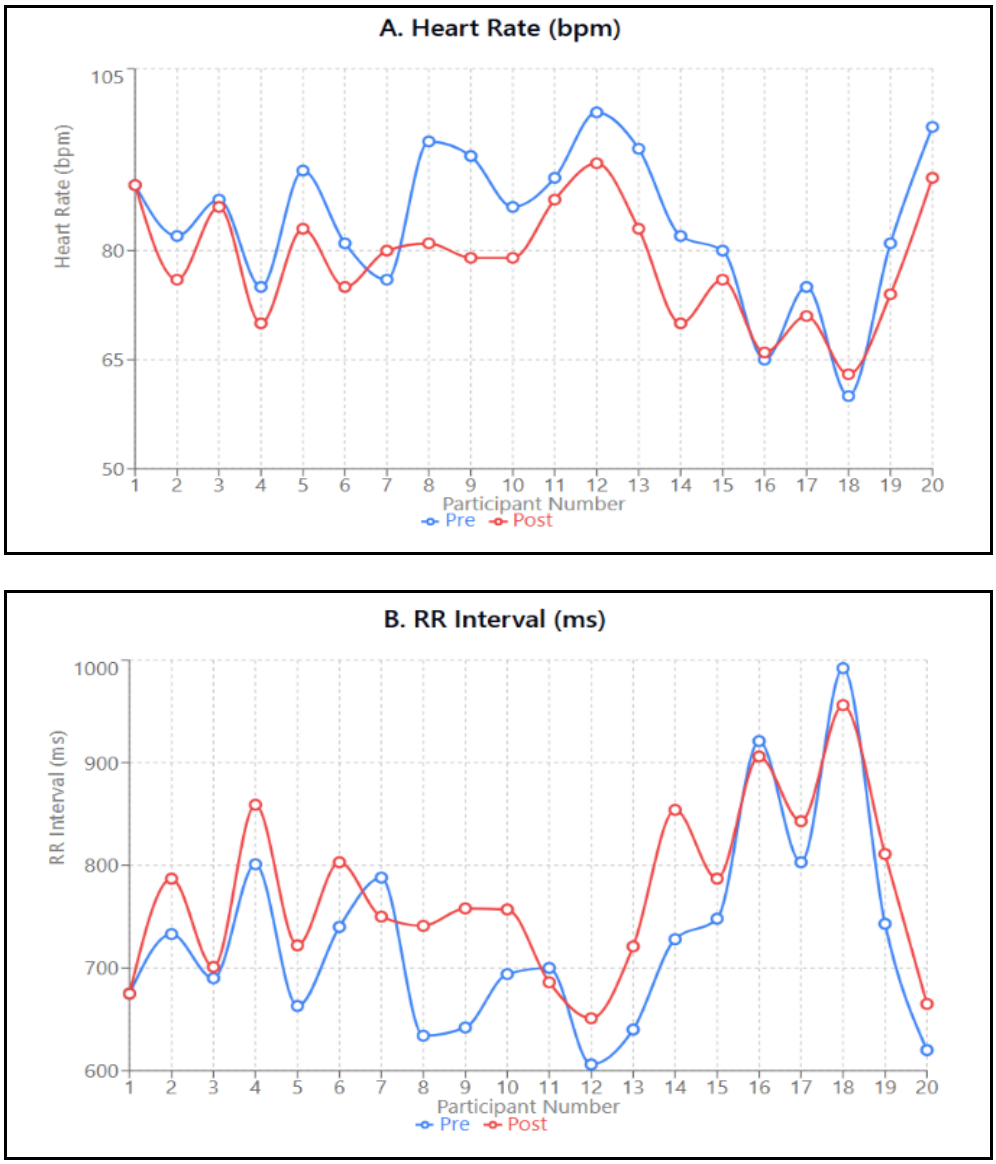

Fig 2: Paired-line plot for Heart Rate (A) & RR Interval (B).

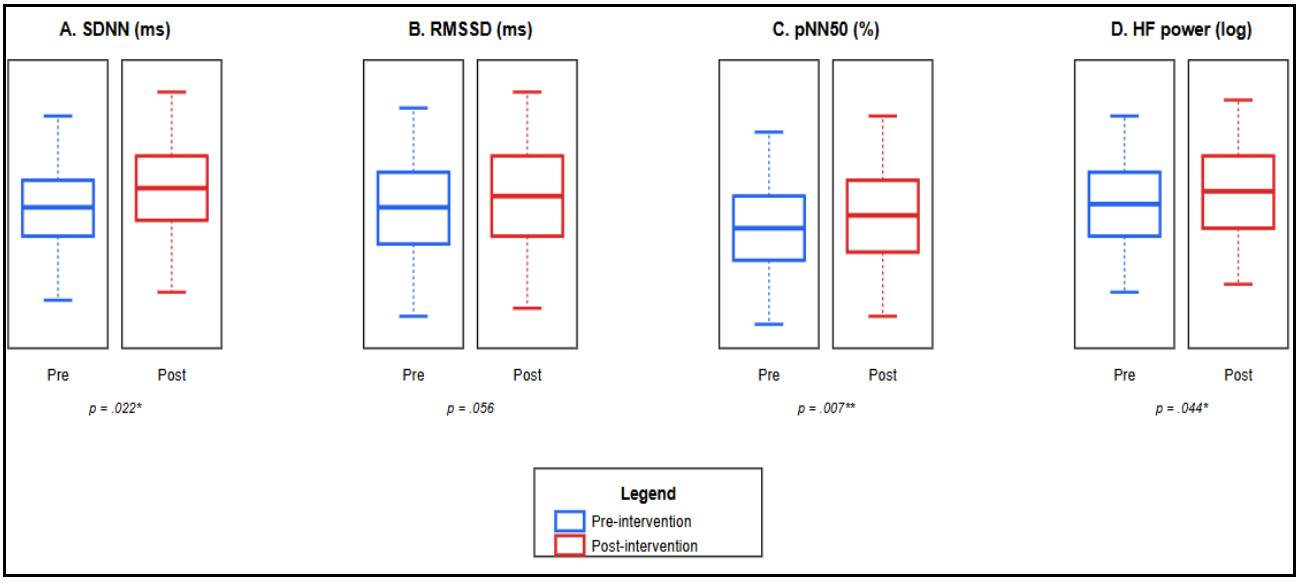

Fig 3: Boxplot for SDNN (A), RMSSD (B), pNN50 (C), and High Frequency (D).

Test statistics: t-values from paired samples t-test; z-values from Wilcoxon signed-rank test.
HR = Heart Rate; RR = RR interval; SDNN = Standard deviation of NN intervals; RMSSD = Root mean square of successive differences; NN50 = Number of successive NN intervals differing by >50 ms; pNN50 = Percentage of NN50; LF = Low frequency; HF = High frequency

4. Discussion

This pilot study demonstrates that a single session of Yoga Nidra produces immediate, measurable improvements in cardiac autonomic regulation among young healthy adults. The significant decrease in heart rate and increase in RR interval strongly indicate enhanced parasympathetic (vagal) tone. The significant improvements in SDNN, NN50, and pNN50 confirm better overall HRV and strengthened beat-to-beat variability, demonstrating increased cardiac autonomic flexibility. Although RMSSD did not achieve significance, the observable increase is physiologically relevant and likely to reach significance in a larger sample due to reduced variance. Frequency-domain results further support parasympathetic activation, as HF power, a marker of respiratory-driven vagal modulation, increased significantly. In contrast, unchanged LF and LF/HF ratio values suggest that the autonomic adjustment was mediated predominantly through enhanced parasympathetic response rather than sympathetic withdrawal.

These findings align with those of Tanna and Khatri, and Ragavee *et al.*, who reported significant reductions in perceived stress and blood pressure in hypertensive individuals after 12 Yoga Nidra sessions. Despite differences in age and health status, both studies indicate that Yoga Nidra enhances parasympathetic activity and promotes autonomic balance. The present study extends this evidence by showing that even a single session can induce measurable autonomic improvements in healthy young adults [16, 17].

These results suggest that Yoga Nidra facilitates a rapid shift toward parasympathetic dominance, reflecting an effective relaxation response even after a single practice. Such autonomic modulation may contribute to improved stress resilience, emotional stability, and cardiovascular regulation in young adults. The findings underscore Yoga Nidra's potential not only as a therapeutic adjunct for individuals with hypertension, as shown in previous studies, but also as a preventive tool for maintaining autonomic balance in healthy populations. Future studies with larger samples, repeated sessions, and follow-up assessments are warranted to confirm the persistence and long-term benefits of these autonomic changes.

5. Conclusion

This pilot study demonstrates that a single 20-minute session of Yoga Nidra produces immediate and meaningful enhancement in cardiac autonomic regulation among young healthy adults. The significant decrease in heart rate and increase in RR interval and HRV indices (SDNN, NN50, pNN50) indicate a shift toward parasympathetic dominance and improved cardiac variability. Although RMSSD showed a positive trend without statistical significance, increased HF power confirmed enhanced vagal activity. These findings suggest that Yoga Nidra effectively promotes autonomic relaxation without altering sympathetic tone, supporting its role as a simple, non-pharmacological approach for stress reduction and cardiovascular well-being. Further large-scale and longitudinal studies are recommended to validate and extend these findings.

6. Acknowledgement

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7. References

1. Waxenbaum JA, Reddy V, Varacallo MA. Anatomy, autonomic nervous system. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jul 24 [cited 2025 Nov 11]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK539845/
2. Valenti VE, Vanderlei LCM, Godoy MF. Editorial: Understanding the role of the autonomic nervous system in health and disease. Front Neurosci. 2024;18:1446832. https://doi.org/10.3389/fnins.2024.1446832
3. Tiwari R, Kumar R, Malik S, Raj T, Kumar P. Analysis of heart rate variability and implication of different factors on heart rate variability. Curr Cardiol Rev. 2021;17(5):453-460. https://doi.org/10.2174/1573403x16999201231203854
4. Shaffer F, Ginsberg JP. An overview of heart rate variability metrics and norms. Front Public Health. 2017;5:258-270. https://doi.org/10.3389/fpubh.2017.00258
5. Tsao J, Evans S, Seidman L, Lung N, Zeltzer L, Naliboff B. Heart rate variability as a biomarker for autonomic nervous system response differences between children with chronic pain and healthy control children. J Pain Res. 2013;6:449-457. https://doi.org/10.2147/jpr.s43849
6. Pandi-Perumal SR, Spence DW, Srivastava N, Kanchibhotla D, Kumar K, Sharma GS, *et al*. The origin and clinical relevance of Yoga Nidra. Sleep Vigil. 2022;6(1):61-84. https://doi.org/10.1007/s41782-022-00202-7
7. D'souza OL, Jose AE, Suresh S, Baliga MS. Effectiveness of Yoga Nidra in reducing stress in school going adolescents: An experimental study. Complement Ther Clin Pract. 2021;45:101462-101467. https://doi.org/10.1016/j.ctcp.2021.101462
8. Lin S, Huang C, Shiu S, Yeh S. Effects of Yoga on stress, stress adaption, and heart rate variability among mental health professionals—A randomized controlled trial. Worldviews Evid Based Nurs. 2015;12(4):236-245. https://doi.org/10.1111/wvn.12097
9. Frank J, Seifert G, Schroeder R, Gruhn B, Stritter W, Jeitler M, *et al*. Yoga in school sports improves functioning of autonomic nervous system in young adults: A non-randomized controlled pilot study. PLoS One. 2020;15(4):e0231299. https://doi.org/10.1371/journal.pone.0231299
10. Zou L, Sasaki JE, Wei G, Huang T, Yeung AS, Neto OB, *et al*. Effects of mind-body exercises (Tai Chi/Yoga) on heart rate variability parameters and perceived stress: A systematic review with meta-analysis of randomized controlled trials. J Clin Med. 2018;7(11):404-418. https://doi.org/10.3390/jcm7110404
11. Fountaine CJ, Garrett H, Phillips K. The acute effects of yoga on physiological and psychological measures of stress in college students. Med Sci Sports Exerc. 2019;51(6S):651-656. https://doi.org/10.1249/01.mss.0000562445.74343.8e
12. Dharuman A, Ramesh R, Krishnan A, Sundar G. Clinical evaluation of the time-effect relationship of auriculoacupuncture at Point Zero on autonomic function among healthy volunteers: An exploratory three-arm study. J Integr Med. 2025;13(4):237-243.
13. Tanna K, Khatri S. Effect of Yoga Nidra on perceived stress in individuals with high blood pressure: A quasi-experimental study. J Clin Diagn Res. 2024;18(1):45-50. https://doi.org/10.7860/JCDR/2024/65
14. Ragavee S, Prashanth S, Priyanka S, Maheshkumar K. Immediate effect of Yoga Nidra (a yogic relaxation) on cardio-autonomic function in hypertensive patients: A case report. J Indian Syst Med. 2024;12(4):188-191. https://doi.org/10.4103/jism.jism_44_24