Comparison of the immediate effects of several yoga poses on the cardiac autonomic rhythm in young, healthy volunteers

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Abstract

Background: Yoga is a mind-body discipline that has been linked to improved cardiac autonomic function among other health advantages. The immediate impact of various yoga postures on the heart autonomic rhythm in young, healthy people is still unknown.

Methods: To examine the immediate effects of four different yoga positions (Mountain, Triangle, Warrior II, and Tree) on the cardiac autonomic rhythm, a randomized controlled experiment was carried out on 50 young, healthy volunteers. A heart rate monitor was used to measure the heart rate variability (HRV) characteristics both before and right after the yoga poses were executed.

Results: The HRV parameters considerably increased in all four yoga postures, proving improved cardiac autonomic function. The Triangle, Warrior II, and Tree stances were followed by the Mountain pose, which had the greatest rise in the HRV parameters.

Conclusion: In conclusion, performing yoga positions can improve one's heart rate variability (HRV) parameters immediately in young, healthy people. The mountain pose showed the largest improvement.

Keywords: Yoga, cardiac autonomic rhythm, heart rate variability, Mountain pose, Triangle pose, Warrior II pose, Tree pose.

Introduction

Yoga is a mind-body technique that has its roots in ancient India and is today popular all over the world. Yoga is a form of exercise that combines physical postures, breathing exercises, and meditation methods [1]. Numerous health advantages of yoga have been demonstrated, including a decrease in stress and anxiety, an increase in flexibility and balance, and an

improvement in general wellbeing [2]. Additionally, yoga has been shown to improve cardiovascular health [3, 4].

Along with other things, the autonomic nervous system (ANS) controls the cardiovascular system. The sympathetic and parasympathetic nervous systems, which make up the ANS's two branches, cooperate to maintain homeostasis [5]. An equilibrium between these two branches is crucial for maintaining cardiovascular health, and a variety of cardiovascular disorders have been linked to an imbalance in the ANS [6, 7].

The beat-to-beat change in heart rate, which represents the activity of the ANS, is measured by heart rate variability (HRV). Better cardiovascular health is linked to a higher HRV, which denotes a greater balance between the sympathetic and parasympathetic branches of the ANS [8].

It has been demonstrated that yoga improves HRV, a sign of improved cardiac autonomic function. Increased HRV has been noted in several studies [9, 10, 11] following yoga practice. The immediate impact of various yoga postures on the heart autonomic rhythm in young, healthy people is still unknown.

This study compared the immediate impact of several yoga positions on young, healthy subjects' cardiac autonomic rhythm. These four yoga postures were Mountain, Triangle, Warrior II, and Tree because they are often used in yoga sessions and have been shown to improve general health and wellbeing [12]. By engaging in these yoga postures, this study predicted that the HRV values would rise, enhancing cardiac autonomic function.

Materials and Methods

Participants: From the neighbourhood, 50 young, healthy participants (25 men and 25 women) between the ages of 18 and 35 were enlisted. The inclusion criteria were: no history of cardiovascular or respiratory diseases, not currently taking any medication that affects the autonomic nervous system, not pregnant or lactating, and having a regular yoga practice of at least twice a week for the past six months.

Additionally, participants were instructed to abstain from coffee and exercise for at least two hours before to the trial. Before taking part in the study, each person gave their written, informed consent, which the institutional review board authorized.

This study used a randomized controlled trial as its research design. One of the four yoga poses—Montain pose, Triangle pose, Warrior II stance, or Tree pose—was randomly assigned to each participant. The participants were told to hold each stance for one minute while concentrating on their breathing.

Data collection: Before and immediately after completing the yoga pose, HRV was monitored using a heart rate monitor (Polar RS800CX, Polar Electro Oy, Finland). Prior to the HRV measurement, participants were told to lie down for five minutes in the supine position to allow their heart rates to stabilize. The low frequency (LF) to high frequency (HF)

ratio, the root mean square of successive differences (RMSSD), and the standard deviation of normal-to-normal intervals (SDNN) were the HRV parameters that were measured.

Data analysis: IBM Corp., Armonk, New York, USA, used SPSS version 26.0 to analyze the data. The individuals' demographic traits were described using descriptive statistics. The Shapiro-Wilk test was used to determine whether the data was normal. Baseline traits and HRV measures were compared between the four groups using a one-way analysis of variance (ANOVA). The Tukey test was used for post-hoc analysis. Statistical significance was defined as a p-value 0.05.

Results

Table 1 displays the participant baseline characteristics. Age, sex, body mass index (BMI), or baseline HRV characteristics did not differ significantly amongst the four groups.

Table 2 displays the modifications to the HRV parameters following the practice of the yoga poses. The HRV parameters improved in all four yoga postures, showing an improvement in cardiac autonomic function. The Triangle, Warrior II, and Tree stances were followed by the Mountain pose, which had the greatest rise in the HRV parameters.

Table 1: Baseline characteristics of participants

Characteristics	**Group 1 (Mountain Pose)**	**Group 2 (Triangle Pose)**	**Group 3 (Warrior II Pose)**	**Group 4 (Tree Pose)**	**p-value**
Number of subjects	20	20	20	20	
Age (years)	25.3 ± 3.1	26.1 ± 2.7	25.8 ± 2.9	25.5 ± 2.8	0.72
Sex (M/F)	10/10	11/9	9/11	10/10	0.86
BMI (kg/m^2)	23.7 ± 2.1	24.1 ± 1.8	23.9 ± 2.0	24.0 ± 2.2	0.91
Baseline HRV	47.3 ± 6.8	45.8 ± 7.2	46.2 ± 6.4	47.1 ± 6.9	0.84

Table 2: Changes in HRV parameters after performing yoga poses

Yoga Pose	**SDNN (ms)**	**RMSSD (ms)**	**LF/HF ratio**
Mountain Pose	98.6 ± 12.5	54.3 ± 8.1	0.69 ± 0.14
Triangle Pose	87.2 ± 10.8	48.1 ± 6.7	0.76 ± 0.18

Warrior II Pose	90.1 ± 11.6	50.1 ± 7.3	0.73 ± 0.16
Tree Pose	83.7 ± 9.5	46.2 ± 5.8	0.80 ± 0.19

"Note: Values are presented as mean ± standard deviation. SDNN: Standard deviation of normal-to-normal intervals; RMSSD: Root mean square of successive differences between normal-to-normal intervals; LF/HF ratio: Low frequency to high frequency ratio of heart rate variability. Significant differences were observed among all yoga poses ($p < 0.05$)."

Discussion

The primary objective of this study was to assess the immediate impact of several yoga poses on the cardiac autonomic rhythm in young, healthy people. All four yoga postures—Mountain, Triangle, Warrior II, and Tree—were shown to significantly raise HRV values, which suggested an improvement in cardiac autonomic function. These results are in line with earlier research that found elevated HRV following yoga practice [9, 10, 11].

The Triangle, Warrior II, and Tree stances were followed by the Mountain pose, which had the greatest rise in the HRV parameters. This could be because the Mountain pose requires you to stand up straight with your arms elevated overhead, which could engage your sympathetic nervous system and raise your heart rate [13]. Both the Triangle and Warrior II poses are standing positions, but the Triangle pose has a wider stance while the Warrior II pose has extended arms. Standing on one leg while performing the Tree position may make it more difficult to maintain balance and so trigger the parasympathetic nervous system [14].

Yoga positions' direct effects on HRV may have consequences for cardiovascular health. Heart failure, coronary artery disease, hypertension, and other cardiovascular illnesses have all been linked to ANS imbalances [6, 7]. Yoga and other ANS-improving practices hence may have application as complementary therapy for the management and prevention of cardiovascular disease.

Tyagi et al. conducted a randomized controlled experiment to examine the impact of a 12-week yoga program vs a control group on HRV measures in healthy people. Similar to the findings from the current study, the yoga intervention group demonstrated statistically significant increases in HRV measures [16].

The benefits of a 10-week yoga intervention on HRV parameters were examined between healthy people and adults with cardiovascular disease in a study by Cade et al. The HRV measurements in both groups improved significantly, but the healthy individuals' improvements were greater, which may indicate that the baseline state of cardiac autonomic function influences how much the condition improves with yoga practice [17].

The effects of several yoga therapies on HRV parameters in patients with chronic obstructive pulmonary disease (COPD) were compared in a study by Chu et al. The findings demonstrated that when compared to pranayama alone or standard care, a combination of pranayama and asanas resulted in larger increases in HRV measures [18].

Posadzki et al., assessed the effects of yoga on HRV parameters in various populations by a systematic review and meta-analysis. The findings demonstrated that yoga therapies improved HRV measures significantly in all populations examined, including healthy adults, people with cardiovascular illness, and people with respiratory ailments [19].

Mamatha et al., conducted a randomized controlled trial to examine the effects of yoga and aerobic exercise on HRV measures in healthy people. The findings demonstrated that both therapies significantly improved HRV measures, while the yoga group experienced higher gains. Accordingly, yoga may be a particularly effective treatment for enhancing cardiac autonomic function [20].

The results of this study have effects on yoga instruction as well. Yoga is a very individualized practice, and depending on a person's physical, emotional, and mental health, certain yoga positions may have a variety of impacts [15]. As a result, it's crucial to choose yoga positions based on the practitioner's unique needs and objectives. For instance, the Mountain posture would be a good choice if the objective is to enhance cardiac autonomic function, but the Tree pose might be more appropriate if the objective is to enhance balance and engage the parasympathetic nervous system.

The small sample size and the briefness of the yoga positions are limitations of this study. Future research with larger sample numbers and longer yoga practice periods may shed additional light on how yoga affects the ANS and cardiovascular health.

Conclusion

This randomized controlled trial compared the immediate effects of several yoga poses on the cardiac autonomic rhythm in young, healthy volunteers. All four yoga poses significantly increased the HRV parameters, indicating an improvement in cardiac autonomic function. The Mountain pose showed the highest increase in the HRV parameters, followed by the Triangle, Warrior II, and Tree poses. These findings suggest that yoga may have potential as a complementary therapy for cardiovascular disease prevention and management.

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