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Original Research Article

Comparative Study of the Immediate Effects of Several Yoga Asana on the Cardiac Autonomic Rhythm in Young, Healthy Volunteers

Dinesh Prasad[1], Vishwajit Kumar[2], Kamakhya Kumar[3]

[1]Tutor, Department of Physiology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar
[2]Tutor, Department of Physiology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar
[3]Associate Professor, Department of Physiology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar

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Corresponding Author: Dr. Vishwajit Kumar
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Abstract:

Background: Among its many health benefits, yoga is a mind-body practice that has been connected to enhanced cardiac autonomic function. It is yet unknown how different yoga postures affect young, healthy individuals' heart autonomic rhythm immediately. This study aims to measure the cardiovascular autonomic nervous system response to various yogic asanas and to investigate the complex mind-body mechanisms with particular reference to the immediate effect of Padahastasana (PD) and Ardha Chakrasana (AD) on cardiac autonomic nervous system.

Methods: This cross-sectional study was carried out at the physiology department of JLNMCH, Bhagalpur, Bihar. Thirty experienced yoga practitioners (EYP) with an average age of 32.9±9.71 years had their heart rate variability (HRV) examined. Everybody who took part was in good health. The heart rate variability was assessed using the interventions of Padahastasana and Ardhachakrasana.

Results: The parasympathetic component (SDNN, RMSSD, and SD2) is significantly elevated in the time domain parameters following Padahastasana and Ardha chakrasana, with the rise being greater after Ardha chakrasana. Though not statistically significant, sympathovagal balance was interestingly reduced after Padahastasana and increased after Ardha Chakrasana. This reaction could result from an increase in parasympathetic components following an instantaneous Ardha Chakrasana.

Conclusion: According to our research, the HRV is a good tool for assessing the autonomic response of Ardha chakrasana and Padahastasana, with both positive predictive value and good specificity. Bending backwards is a better lifestyle intervention than bending forwards, and it should be used to lessen worry and tension.

Keywords: Padahastasana (PD) and Ardha Chakrasana (AD), Heart Rate Variability (HRV).

Introduction

Yoga is a mind-body practice that originated in ancient India and is now well-known throughout the globe. Yoga is a type of exercise that incorporates breathing techniques, physical postures, and meditation techniques [1].

Yoga has been shown to offer many health benefits, such as lowering stress and anxiety, improving flexibility and balance, and enhancing overall wellbeing [2]. Furthermore, studies on yoga have demonstrated that it enhances cardiovascular health [3, 4].

The autonomic nerve system (ANS) regulates the cardiovascular system in addition to other functions. The two branches of the ANS, the parasympathetic and sympathetic nervous systems, work together to preserve homeostasis[5]. A range of cardiovascular illnesses have been related to an imbalance in the ANS, and maintaining the balance between these two branches is essential for maintaining cardiovascular health [6, 7].

Heart rate variability (HRV) measures the beat-to-beat variation in heart rate, which is indicative of the activity of the autonomic nervous system (ANS). A higher HRV indicates a better balance between the sympathetic and parasympathetic branches of the ANS and is associated with better cardiovascular health [8].

Yoga has been shown to enhance heart rate variability (HRV), an indicator of better cardiac autonomic function. Numerous studies have reported increased heart rate following yoga practice [9,10,11]. It is yet unknown how different yoga postures affect young, healthy individuals' heart autonomic rhythm immediately.

Material and Methods

This cross-sectional study was carried out at the physiology department of Jawaharlal Nehru Medical College, Bhagalpur, Bihar. Thirty healthy male individuals, aged between eighteen and thirty, participated in the study.

All subjects had normal resting electrocardiograms (ECGs), were in good health, and had normotension. Smokers and alcoholics are not allowed to participate in the study, nor are subjects suffering from cardiovascular, pulmonary, or other systemic illnesses.

Due to respiratory and autonomic variables related to the menstrual cycle, female subjects were not allowed. normal clinical evaluation, and they did not have a drug regimen. According to their self-reports, they were plant-based eaters and had practiced yoga for between 16 and 72 months. Heart rate ≥100, systolic and diastolic blood pressure of ≥160 and ≥100 mm Hg, respectively, were the respective set points to end the workout.

Prior to and following the Padahastasana [P.D.] and Ardhachakrasana [A.D.], the participants underwent assessments. Each yoga pose took a total of 12 minutes to complete during the assessment. Prior to data collection, every participant was required to unwind while lying supine for fifteen minutes.

One minute of the "during" period, during which the participants practiced the Forward Bending [F.B.] and Backward Bending [B.B.], came after the first five minutes of "pre" F.B. and B.B. Moreover, five minutes of "post" F.B. & B.B. come after it. There was no need for controls because the goal of this study is to comprehend the cardiac modulation both before and after the F.B. & B.B. Following Task Force (1996) criteria, the heart rate variability (H.R.V.) was calculated across the course of the recorded ECG. To quantify sympathetic and parasympathetic tone, at least 5 minutes of ECG should be recorded.

The participants were also instructed to refrain from eating for two hours prior to the test and not consume any coffee, nicotine, or alcohol 24 hours beforehand. (3) Dress comfortably and loosely. After giving the patients a 15-minute rest interval, resting measures such as blood pressure, heart rate, and respiration were assessed for the short-term analysis of H.R.V. A lead II electrocardiogram (E.C.G.) was used to continually monitor H.R.V. Respiration and ECG will be documented.

Data was analyzed using SPSS 21.0 Version. Every session's data was examined independently. For every session, the HRV's frequency domain and time domain components were examined independently.

Results

Table 1 provides P.D.'s frequency and temporal domain parameters. According to the Mann-Whitney U test, there was no discernible variation in the frequency domain parameters, including LH/HF, L.F. Power, and H.F. power.

However, after P.D., the temporal domain factors (SDNN, RMSSD, and SD2) considerably enhance the parasympathetic component.

Table 1: Mean BMI, weight, and Height of the study population

Parameters	Mean±SD
Age (years)	32.9±9.71
Weight (kg)	6621±9.34
Height (cm)	169.13±8.58
BMI (kg/m2)	22.89±1.96

Table 2 provides the frequency and time domain parameters for A.D. According to the Mann-Whitney U test, there was no discernible variation in the frequency domain parameters, including LH/HF, L.F. Power, and H.F. power. The parasympathetic component (SDNN, RMSSD, and SD2) has considerably risen in the time domain parameters after A.D.

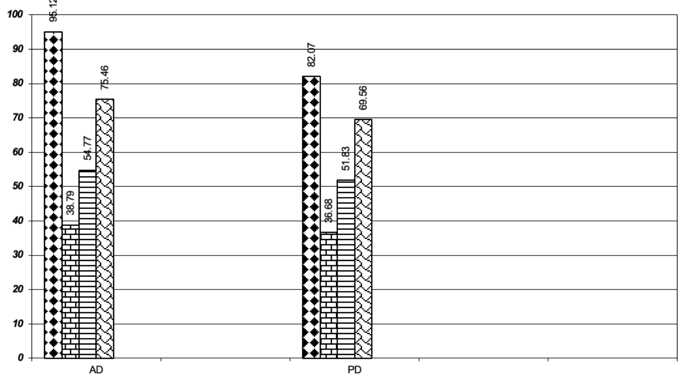

Figure 1: Time domain analysis after Yogaasans

Table 2: Heart Rate Variability after Ardha Chakrasana

Parameters	Baseline (n=30)	After Ardha Chakrasana (n=30)	p-value
LF/HF (n.u.)	1.053 (0.79-1.30)	1.42 (0.49-1.75)	Not significant
LF power (n.u.)	50.78 (42.52-55.94)	57.07 (28.18-63.26)	Not significant
HF power (n.u.)	48.2 (43.30-56.25)	39.94 (36.2-64.6)	Not significant
SDNN (ms)	37.08 (28.26-28.52)	75.46 (65.08-17.68)	0.021*
RMSDD (ms)	30.08 (23.07-57.08)	54.77 (41.46-71.15)	0.037*
SD1 (ms)	22.55 (16.54-40.33)	38.79 (29.26-50.42)	Not significant
SD2 (ms)	47.34 (31.38-66.12)	95.12 (83.60-119.2)	0.012*

*Significant

Discussion

Research has demonstrated the positive predictive value and strong specificity of the HRV in measuring the autonomic response in Parkinson's disease and Alzheimer's disease. A similar between-group difference in HF power was noted by Christa E. et al. [12] in their investigation in frequency domain indices (yoga vs. control: 44.96 [21.94] vs. -19.55 [15.42], p = 0.01), with higher HF power and total power (nu) in the yoga group. It is important to remember that these findings do not apply to people who are at high risk.

In appropriately treated post-MI patients, this brief yoga-based cardiac rehabilitation program increased overall heart rate (HRV) and shifted the sympathovagal balance towards parasympathetic predominance.The results of our study demonstrate that backward bending is a better lifestyle intervention than forward bending, and it should be used to treat anxiety disorders and stress. Chu I.H et al. [13] also found that a 12-week yoga program effectively increased parasympathetic tone, decreased depressive symptoms, and reduced perceived stress in women with elevated depressive symptoms. A 16-week Bikram Yoga program did not raise the high-frequency power components of HRV, according to Prevesioly Hewett ZL et al. [14]

Sheiko et al. [15] discovered that breathing gymnastics yoga, practiced for 15 minutes a day, increases heart rate variability by suppressing the central link (very low frequency components) of cardiac rhythm regulation, increasing parasympathetic influence, and redistributing the central nervous system's regulatory activity between the peripheral and central links of cardiac rhythm regulation in favor of the latter.However, HRV has only employed a small number of studies to measure the impact of yoga poses right away. We suggested that the HRV is a great and precise way to measure the immediate autonomic reaction of the Ardha and Padahastasana poses. Bending backwards is a better lifestyle intervention than bending forwards, and it should be used to lessen worry and tension.

Conclusion

To rebalance the autonomic nervous system in favor of greater vagal activity during cardiac rehabilitation, AD may be an appropriate strategy. Our research suggests that, in contrast to PD, AD arouses both limbs of the ANS with a parasympathetic preponderance.

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