

A Hospital Based Analytical Comparative Assessment of Yoga on Sympathetic Nervous System of Human Body

Shanta Kumari¹, Rajiva Kumar Singh²

¹Tutor, Department of Physiology, Patna Medical College, Patna Bihar, India

²Professor & HOD, Department of Physiology, Patna Medical College, Patna, Bihar, India

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Corresponding author: Dr. Shanta Kumari

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Abstract

Aim: The aim of the present study was to evaluate the effects of yoga on sympathetic nervous system in yoga practitioners.

Material and Methods: The present prospective case control study was conducted in the Department of Physiology, Patna Medical College, Patna, Bihar, India for the period of one year. The findings were tabulated and subjected to statistical analysis. Case group (N=30): subjects who were performing regular yoga asanas and relaxation techniques for at least 5 years. Control group (N=30): age and gender matched subject who were not performing yoga asanas and relaxation techniques or were not engaged with any other type of physical exercises.

Results: Amongst the sympathetic nervous system parameters, statistically significant difference existed between cases and controls for the Resting Heart Rate, Resting Diastolic Blood Pressure, Hand grip systolic blood pressure and Hand grip systolic blood pressure ($p < 0.05$) respectively.

Conclusion: The present study concluded that yogic activity significantly alters the sympathetic activity like heart rate and blood pressure. With expanded mindfulness and enthusiasm for wellbeing, one ought to embrace the non-pharmacological strategies like Yoga exercise, reflection and way of life alteration to control the modifiable hazard factors responsible for cardiovascular morbidity and mortality.

Keywords: Autonomic Nervous system, Yoga, Heart Rate, Blood Pressure

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Introduction

The main aim of autonomic system of is to maintain the optimal internal environment (Homeostasis) of the body. It governs various body functions which are normally carried out without conscious control. [1] Numerous studies indicate a strong association between compromised ANS (e.g. decreased vagal activity or increased sympathetic activity) and sudden cardiac and non-sudden cardiac death. Lifestyle modifications are also increasingly

recognized as important factors in the treatment, prevention and rehabilitation of cardiovascular disorders. One highly popular and currently researched lifestyle modification is yoga. Regular Yoga practice has been postulated to help in prevention of disease, in particular, to streamline autonomic functions, specifically by modulating vagal efferents. [2]

Yoga is an antiquated Indian science notable by and by everywhere throughout the world for its potential restorative advantages both physical and mental, which regularly incorporates the act of physical stances (Asanas), breathing practices (Pranayama) and contemplation (Dhyana) works on being drilled in India since a huge number of years to accomplish utilitarian concordance among body and brain. Having an immense proof of the useful job of prompt and momentary yoga rehearses over autonomic capacities, tension, sadness, hypertension and different morbidities of stress; a need to comprehend the administrative job of yoga in long haul experts is justified. [3]

Yoga stands superior to other forms of exercise as it comprises asanas (posture), pranayama (breathing techniques), and meditation. Yoga is the debilitating illnesses, such as arthritis, chronic low back pain, heart failure, can also practice yoga without any harm. [4-6] Besides, yoga does not require high-end equipment but will warrant consistent commitment towards its practice. Yoga with factually supported interventions that are almost available to everyone, maybe uniquely beneficial for individuals looking for ways to improve their mental and physical health. [7,8]

There are very few studies done till date to substantiate the gradual practice of yoga and its role on autonomic variables. Hence this study was conducted with an objective to evaluate the effects of yoga on sympathetic nervous system in yoga practitioners.

Materials and Methods

The present prospective case control study was conducted in the Department of Physiology, Patna Medical College, Patna, Bihar, India for the period of one year.

Inclusion Criteria:

1. Patients between 20-40 years of age of either sex

2. Practicing yogic exercises and meditation for at least 5 years
3. Those who give informed consent.

Exclusion Criteria

1. Patients suffering any acute or chronic systemic illness
2. Patients taking anti-hypertensive or asthmatic medication
3. Patients showing any kind of physical disability
4. Patients who have not signed the informed consent.

Ethical approval and Informed consent

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Grouping

Case group (N=30): subjects who were performing regular yoga asanas and relaxation techniques for at least 5 years

Control group (N=30): age and gender matched subject who were not performing yoga asanas and relaxation techniques or were not engaged with any other type of physical exercises.

Methodology

After taking detailed history and recording demographic data, a comprehensive clinical examination of each patient was done. The following non invasive tests were carried out – Blood pressure was measured using OMRON automatic blood pressure monitor HEM-7111, Omron Healthcare Ltd, Singapore. For orthostasis test, normal Sphygmomanometer was used to measure blood pressure readings. Heart rate and ECG were recorded by CARDIART 108T/MK-VI ECG machine; BPL Ltd. Recordings were carried out with lead II.

Statistical Analysis

The data was coded and entered into Microsoft Excel spreadsheet. Analysis was

done using SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program. The variables were assessed for normality using the Kolmogorov Smirnov test. Descriptive statistics included computation of

percentages, means and standard deviations. Statistical test applied for the analysis was student t-test. Level of significance was set at $p \leq 0.05$.

Results

Table 1: Demographic and clinical profile

Variables	Mean \pm SD		p-value
	Case	Control	
Age	26.74	26.01	0.891 (NS)
Weight	64.21	63.39	0.762 (NS)
Height	159.73	160.61	0.316 (NS)

Test applied: student t-test

Mean age, weight and height showed no statistical difference ($p > 0.05$).

Table 2: Comparison of mean resting heart rate and QT interval

Variables	Mean \pm SD		p-value
	Case	Control	
Resting Heart rate	74.61 \pm 2.27	79.38 \pm 3.01	0.021 (Sig.)
QT interval	0.41	0.43	0.617 (NS)

Test applied: student t-test

Resting heart rate showed statistically significant difference between the groups ($p = 0.02$).

Table 3: comparison of mean resting systolic and diastolic blood pressure

Variables	Mean \pm SD		p-value
	Case	Control	
Resting Systolic Blood Pressure	119.81 \pm 12.31	120.24 \pm 10.81	0.561 (NS)
Resting Diastolic Blood Pressure	69.23 \pm 7.18	77.79 \pm 6.41	0.001 (Sig.)

Test applied: student t-test

Resting Diastolic Blood Pressure showed statistically significant difference between the groups ($p = 0.001$).

Table 4: comparison of mean hand grip systolic and diastolic blood pressure

Variables	Mean \pm SD		p-value
	Case	Control	
Hand grip systolic blood pressure	11.39 \pm 4.24	14.32 \pm 4.71	0.021 (Sig.)
Hand grip diastolic blood pressure	8.56 \pm 3.39	10.91 \pm 4.02	0.049 (Sig.)

Test applied: student t-test

On statistical analysis significant difference was observed between the groups for both hand grip systolic and diastolic blood pressure ($p < 0.05$).

Discussion

Yoga has been used effectively for voluntarily controlling involuntary

functions. Studies have shown the possibilities of attaining exceptional feats physiologically following long term practice of yoga. [9] This was followed by series of studies on Transcendental meditation, suggesting that the long-term practitioners were physiologically distinct compared to non-practitioners. [10]

The results found in our study are in conformity with some findings of the previous workers like Bharashankar et al. [11] The results of present study show a significant lowering of resting heart rate (RHR) by yoga and relaxation techniques. Similar results have been noticed by Murugesan R et al. [12] and Sundar S et al. [13] These modulations of autonomic nervous system activity might have been brought about through the conditioning effects of Yoga on autonomic function involving limbic system and higher areas of central nervous system. [14]

In our study there is significant difference in the blood pressure response to sustained hand grip exercise between the case and control group. Blood pressure response to Sustained Hand Grip appears to be more sensitive parameters to detect autonomic function amongst the two Sympathetic function tests. Similar to our study Khadka R et al. studied the effect of yoga on cardiovascular autonomic reactivity in essential hypertensive patients. They concluded significant reduction in SBP was found after yogic practices in response to hand grip exercise. [15]

A recent report demonstrated that long term meditation practitioners had higher gray matter density in lower brain stem regions compared to age-matched non meditators. Lower heart rates in experienced yoga practitioners can hence be attributed to its influence on the autonomic nervous system through the brain stem region. [16,17]

Conclusion

The results of this study show that yogic activity greatly affects sympathetic activity, which includes the heart rate and blood pressure. A more conscientious and enthusiastic approach to health would encourage the use of non-pharmacological techniques, such as Yoga, in order to manage the modifiable risk factors that contribute to cardiovascular disease and death. It's reasonable to assume that using

Yogic practises can affect autonomic function and lessen the prevalence of psychosomatic health problems.

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