

Effect of yoga on autonomic nervous system of the human body: case-control studyAmiay Kumar^{1*}, Rajiva Kumar Singh²¹Tutor, Department of Physiology, Patna Medical College, Patna, Bihar, India²Professor and HOD, Department of Physiology, Patna Medical College, Patna, Bihar, India

Received: 20-10-2020 / Revised: 23-11-2020 / Accepted: 12-12-2020

Abstract

Aims: to know the effect of yoga on autonomic nervous system of the human body. **Material and Methods:** The present prospective case control study was conducted in the Department of Physiology, Patna Medical College, Patna, Bihar, India from January 2019 to February 2020. 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:** yogic activity significantly alters the sympathetic activity like heart rate and blood pressure.

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

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Introduction

Stress and anxiety, being the major contributors of morbidity, leads to many chronic diseases and is known to invariably decrease the quality of life and even life span. Socio-economic factors and industrialization along with pollution is a known factor towards causing stress and altered emotions, which carry a definite and well established role in precipitating cardio-vascular events[1]. Chronic stress increases sympathetic discharge for a longer time and is characterized by a change in the set point of hypothalamo-pituitary axis activity, prompting quick impact on heart rate, blood pressure, temperature, respiratory rate, catecholamines and corticosteroids. Thus sympathetic over activity for a more drawn out time is related to cardiovascular morbidity and mortality[2]. Such a circumstance can be handled by straightforward way of life alteration including diet,

exercise and yoga. 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]. 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 know the effect of yoga on autonomic nervous system of the body.

*Correspondence

Dr. Amiay Kumar

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

E-mail: amiaykumar@gmail.com

Materials and Methods

The present prospective case control study was conducted in the Department of Physiology, Patna Medical College, Patna, Bihar, India from January 2019 to February 2020.

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 orthostatic 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±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

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

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

Test applied: student t-test

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

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

Test applied: student t-test

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

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

Test applied: student t-test

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[4]. This was followed by series of studies on Transcendental meditation, suggesting that the long-term practitioners were physiologically distinct compared to non-practitioners[5]. The results found in our study are in conformity with some findings of the previous workers like Bharashankar et al[6]. 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[7] and Sundar S et al[8]. 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[9]. 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[10]. 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[11].

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. It can be reasoned that Yogic methods may influence the autonomic function and may help in decreasing psychosomatic issues

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Conflict of Interest: Nil

Source of support: Nil