

Original research article

A comparative research to determine the impact of daily yogic exercise on the autonomic nervous system functioning**Dr. Bipin Kumar****Assistant Professor, Department of Physiology, ICARE Institute of Medical Science and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India.****Corresponding Author: Dr. Bipin Kumar****Abstract**

Aims: to know the influence of yoga on autonomic functions of the body.

Material and Methods: The present prospective case control study was conducted among patients visited the OPD, ICARE Institute of Medical Science and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India. 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

Introduction

Stress and anxiety, as significant contributors to morbidity, cause a slew of chronic diseases and are believed to reduce quality of life and even life expectancy. Stress and altered feelings, which have a definite and well-established function in precipitating cardio-vascular cases, are recognised causes caused by socio-economic factors and industrialization, as well as pollutants.ⁱ

Chronic stress induces a transition in the fixed point of hypothalamo-pituitary axis function, resulting in a rapid effect on heart rhythm, blood pressure, temperature, respiratory rate, catechol amines, and corticosteroids. As a result, sympathetic over activity hyper a prolonged span of time is associated to elevated coronary morbidity and mortality.ⁱⁱ 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.ⁱⁱⁱ

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 influence of yoga on autonomic functions of the body.

Materials and Methods

The present prospective case control study was conducted among patients visited the OPD, ICARE Institute of Medical Science and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India for 1 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

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance.

Sample selection

The sample size was calculated using a prior type of power analysis by G* Power Software Version 3.0.1.0 (Franz Faul, Universitat Kiel, Germany). The minimum sample size was calculated, following these input conditions: power of 0.80 and $P \leq 0.05$ and sample size arrived were 30 participants per group.

Grouping

Case group: subjects who were performing regular yoga asanas and relaxation techniques for at least 5 years

Control group: 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±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.^{iv} This was followed by series of studies on Transcendental meditation, suggesting that the long-term practitioners were physiologically distinct compared to non-practitioners.^v

The results found in our study are in conformity with some findings of the previous workers like Bharashankar et al.^{vi} 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.^{vii} and Sundar S et al.^{viii} 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.^{ix}

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.^x

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.^{xi}

Conclusion

According to the findings, yogic activity has an important impact on sympathetic activity, such as heart rate and blood pressure. With improved mindfulness and passion for fitness, non-pharmacological interventions such as Yoga practice, meditation, and behavioral improvements can be used to monitor the modifiable risk factors that affect cardiovascular morbidity and mortality. Yogic approaches, it can be argued, can affect autonomic function and thereby aid in the reduction of psychosomatic problems.

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