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How frequent yogic activity affects the autonomic nervous system's role: a comparative assessment

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Abstract

Aim: 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, Mamata Medical College, Khammam from October 2019 to March 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: There was a statistically important difference between cases and controls for Resting Heart Rate, Resting Diastolic Blood Pressure, and Hand grip systolic blood pressure ($p \leq 0.05$) among the sympathetic nervous system parameters.

Conclusion: yogic activity significantly alters the sympathetic activity like heart rate and blood pressure.

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

Introduction

As major contributors to morbidity, stress and anxiety cause a few of chronic diseases and are thought to lower quality of life and even life expectancy. Stress and altered emotions, both of which play a clear and well-established role in the onset of cardio-vascular disease, are well-known triggers brought about by socioeconomic influences and industrialization, as well as contaminants^[1]

Chronic stress causes a shift in the hypothalamo-pituitary axis' fixed point of control, resulting in rapid changes in heart rate, blood pressure, temperature, respiratory rate, catecholamines, and corticosteroids. As a consequence, sympathetic hyperactivity over a long period of time is linked to an increased risk of coronary morbidity and mortality. Simple lifestyle changes, such as diet, exercise, and yoga, will help dealing with this situation^[2]

Yoga is an ancient Indian science known throughout the world for its possible physical and mental restorative benefits. It regularly combines the act of physical stances (Asanas), breathing practises (Pranayama), and reflection (Dhyana) and has been practised in India for a long time to achieve utilitarian concordance between body and brain. With so much evidence of the beneficial effects of fast and momentary yoga practises on autonomic capacities, tension, sadness, hypertension, and other stress-related morbidities, a need to comprehend the administrative role of yoga in long-term 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 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, Mamata Medical College, Khammam from October 2019 to March 2020.

Inclusion Criteria:

- Patients between 20-40 years of age of either sex
- Practicing yogic exercises and meditation for at least 5 years
- Those who give informed consent

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Exclusion Criteria

- Patients suffering any acute or chronic systemic illness
- Patients taking anti-hypertensive or asthmatic medication
- Patients showing any kind of physical disability
- 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: 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

A systematic clinical review of each patient was performed after taking a thorough history and documenting demographic data. The non-invasive experiments that were performed were as follows: Omron Healthcare Ltd, Singapore, used an OMRON automated blood pressure monitor HEM-7111 to test blood pressure. A standard Sphygmomanometer was used to take blood pressure readings for the orthostasis exam. BPL Ltd. used a CARDIART 108T/MK-VI ECG system to record heart rate and ECG. Lead II was used for the recordings.

Statistical Analysis

The information was coded and entered into a spreadsheet in Microsoft Excel. The analysis was carried out using the Windows software application SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA). Percentages, means, and standard deviations were also part of descriptive statistics. The study used the student t-test as a statistical test. The significance level was set at $p \leq 0.05$.

Results

Table 1: demographic and clinical profile

Variables	Mean±SD		p-value
	Case	Control	
Age	27.44	27.21	0.218 (NS)
Weight	65.11	64.29	0.441 (NS)
Height	160.43	161.11	0.527 (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	75.01±2.10	79.18±3.21	0.034 (Sig.)
QT interval	0.42	0.46	0.429 (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	118.11±11.31	119.04±9.61	0.427 (NS)
Resting Diastolic Blood Pressure	68.13±6.01	76.61±4.78	0.003 (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	11.10±3.04	14.02±4.10	0.011 (Sig.)
Hand grip systolic blood pressure	8.01±3.30	10.19±3.92	0.041 (Sig.)

Test applied: student t-test

Discussion

Yoga has been shown to be beneficial in regulating involuntary functions. Long-term yoga practice has been shown to have the potential to achieve extraordinary physiological feats, according to studies [4]. A series of experiments on Transcendental meditation followed, with findings showing that long-term practitioners differ physiologically from 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].

The blood pressure reaction to repeated hand grip exercise differed significantly between the case and control groups in our research. Among the two Sympathetic function measures, the blood pressure response to sustained hand grip tends to be the more sensitive parameter for detecting autonomic function. Khadka R *et al.* investigated the impact of yoga on cardiovascular autonomic reactivity in critical hypertensive patients, which was similar to our research. They concluded that yogic activities resulted in a substantial reduction in SBP 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

Yoga has a significant effect on sympathetic function, such as heart rate and blood pressure, according to the findings. Non-pharmacological approaches such as Yoga exercise, therapy, and lifestyle changes can be used to track modifiable risk factors that impact cardiovascular morbidity and mortality with enhanced mindfulness and zeal for health. Yogic practices, it is claimed, will influence

autonomic activity and thereby help in the reduction of psychosomatic issues.

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