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Original Research Article

Effect of Yoga on Pulse Rate and Blood Pressure in Medical Student of Darbhanga Medical College, Laheriasarai, Bihar

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Abstract:

Background: Cardiovascular disease risk has grown due to changes in lifestyle, infrastructure expansion, junk food consumption, and stress levels. Engaging in sports, aerobic workouts, and other activities might trigger sympathetic activation. However, consistent yoga practice raises vagal tone and tends to lower sympathetic reactions. We therefore attempted to determine how yoga affect cardiovascular parameters of medical student in DMC, Laheriasarai, Bihar, including pulse rate, systolic blood pressure, and diastolic blood pressure.

Methods: 50 healthy participants, of any gender, between the ages of 18 to 25 participated in this study from October 2021 to April 2022. Both before and after yoga, their blood pressure and pulse were measured.

Results: After statistical analysis of the data, we found a p-value < 0.001, indicating a highly significant drop in the patients' systolic and diastolic blood pressure, pulse rate, and blood pressure after practicing yoga.

Conclusion: Regular yoga practice improves cardiovascular function, which may help lower the risk of cardiovascular illnesses.

Keywords: Cardiovascular, Pulse rate (PR), Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Yoga, Pranayama, Meditation.

Introduction

In India, heart disease-related deaths are mostly caused by a confluence of factors including stress, a sedentary lifestyle, obesity, unhealthy food, poverty, ignorance, lack of access to appropriate care, alcohol consumption, and smoking. According to statistics, heart disease is the leading cause of mortality in India. The condition has been on the rise due to rapid changes in lifestyle brought about by the country's rapid industrialization, greater migration to cities, and economic expansion. Lifestyles and occupations that are sedentary, together with the intake of high-calorie, low-nutrient foods, alcohol, and tobacco products, have been linked to an increased death rate from cardiovascular illnesses. [1]

Heart failure continues to have a high rate of morbidity and death even with recent advancements in medication and device therapy. [2] Affected autonomic function is linked to heart failure. [3] Heart failure is characterized by noticeably heightened sympathetic activity over an extended length of time. Parasympathetic withdrawal is another significant aspect of heart failure, albeit one with less research. [4] High blood pressure is a strong indicator of the course of congestive heart failure and other cardiovascular illnesses. [5–7]

Yoga can help lower the risk of cardiovascular disease and even help regulate other conditions like diabetes mellitus and hypertension when practiced regularly along with dietary and lifestyle changes. [8]

India is where yoga's art and science first emerged thousands of years ago. The Sanskrit term "Yuj," which means "yoke" or "unite," is where the word yoga originates. Yoga is a practice that connects the soul with the supreme self, or universal awareness, in addition to being a physical and mental form of exercise for health.

In addition to improving mental and physical health, yoga, in its higher forms, allows practitioners to experience the unification of their internal energy, their body, and their mind with the universal energy, which improves mental stability, self-realization, and physical health. Exercises like athletics, gymnastics, and aerobics raise heart rates, provide a cardiovascular workout, and make people

sweat more, feel more weary, and exhale more than yoga poses. Yoga helps people feel physically and psychologically calm rather than exhausted. The primary objective of yoga is to enhance mental, physical, and spiritual well-being. [9] Certain yoga poses have an impact on particular bodily systems. Regular yoga practice helps manage and lower the risk of diabetes, hypertension, and a host of other conditions. Because yoga relaxes the body and breathing exercises tend to affect the heart-vascular system's regulating mechanism, it can help alleviate hypertension.

I have selected participants for this study who have practiced meditation and pranayama for at least a month. Ashtanga yoga includes meditation and pranayama. The practice of pranayama involves holding and regulating breath, which alters breathing patterns and habits and aids in raising conscious awareness of breathing. [10] When the mind is calmed during meditation, the body systems experience deep rest. Thus, it is regarded as a method of relaxation used to cure illnesses linked to stress and tension. [11]

Materials and Methods

The 50 healthy participants in the current study practiced yoga for at least three months, from October 2021 to April 2022. They ranged in age from eighteen to twenty-five. Participants with a history of diabetic, respiratory, cardiovascular, or renal disorders were not allowed to participate in the trial. Exclusion from the study was also applied to subjects who smoked, drank alcohol, or used drugs of any kind. Every subject's complete clinical history was recorded. Every member gave their informed consent. Blood pressure (BP) and pulse rate (PR) were measured both before and after the pranayama and meditation sessions.

The systemic arterial blood pressure in millimeters of mercury (Hg) and the pulse rate in beats per minute were measured in the right upper limb using a fully automated blood pressure monitor. To prevent circadian changes, all the measurements were recorded between 6 and 8 am.

Every subject received the same daily yoga instruction and clear instructions to maintain consistent eating habits. During yoga training, the subjects were also instructed not to alter their lifestyle or engage in any other physical activity.

Data analysis was done with Microsoft Excel. We created a P-value using a paired T-test to determine significance.

Results

The Paired 't' test was used to evaluate the data. P-values less than 0.05 and less than 0.001 were regarded as very significant and significant, respectively.

Table 1: Changes in PR, SBP and DBP before and after yoga

Variables	Before yoga (Mean±SD)	After yoga (Mean±SD)	t-value	p-value
Resting pulse rate	80.6±5.87	76.34±6.33	1.96	<0.001
Systolic blood pressure	126.72±4.45	123.04±5.06	2.86	<0.001
Diastolic blood pressure	82.8±3.52	79.96±3.88	3.18	<0.001

From the above table, changes in PR, SBP and DBP are highly significant in our study.

Discussion

Increasing stress, poor food, less physical activity, increasing use of alcohol, cigarettes, and caffeine, as well as changes in lifestyle all contributed to a rise in the prevalence of cardiovascular illnesses.

Heart disease and elevated blood pressure are largely caused by stress. By calming the mind and calming the nerve system, yoga naturally relaxes us and lessens the negative consequences of stress.

Systolic and diastolic blood pressure, as well as resting pulse rate, all significantly decreased in the current investigation. The same results were noted in patients with asthma, diabetes, and hypertension. [12,13,14,15]

In addition to other elements like temperature, hormones, etc., brain factors also control cardiovascular functioning. Neural aspects pertain mainly to the autonomic nervous system, which is involved in the maintenance and regulation of cardiac functions such as heart rate (HR) and systolic and diastolic blood pressure (SBP and DBP).

Cardiovascular diseases including hypertension, ischemia, infarction, etc. are caused by imbalances in these. [16]

Yoga lowers PR, SBP, and DBP by regulating autonomic activity by raising parasympathetic tone and decreasing sympathetic tone. According to the current study, a considerable decrease in PR, SBP, and DBP may be caused by a change in autonomic activity that favours the parasympathetic nervous system and has a comparatively lower sympathetic tone. Yoga generates multiple cerebral and autonomic mechanisms, as well as mechanical and hemodynamic adaptations, which cause both tonic and phasic alterations in cardiovascular functioning. This autonomic modulation is mediated by breathing pattern alteration. [17]

The intricate breathing techniques of pranayama soothe the body and mind. The primary objective of pranayama is to control breathing. It works by causing deep, leisurely breathing. The mechanism of action of slow breathing is a widespread reduction in the excitatory pathways that control the cardiovascular and respiratory systems.

Since the respiratory and cardiovascular systems share a brain regulatory mechanism, changes to one will affect how the other functions. [18] Breathing deeply and slowly causes the lungs to fill to capacity. By stretching the pulmonary stretch receptors, this inflation lowers sympathetic tone in the blood vessels of the skeletal muscle, which causes peripheral vasodilatation and peripheral resistance to drop, lowering diastolic blood pressure.

During the practice of pranayama, one concentrates on the act of breathing which diverts attention from worries and de-stresses him.

When one is in a stress-free mental state, parasympathetic nerve activity dominates sympathetic activity, resulting in relaxed responses. Meditation works by lessening the sympathetic over activity brought on by stress.

As a result, it lowers peripheral resistance and arterial tone, which lowers diastolic blood pressure and heart rate. Regular yoga practice lowers sympathetic tone and increases barore flex sensitivity, which helps individuals with essential hypertension return to normal blood pressure. [12,13]

Another way that yoga lowers PR, SBP, and DBP is by either directly stimulating the vagus nerve or by lessening the activation of the hypothalamicpituitary-adrenal axis.

This latter mechanism acts by changing the balance of the autonomic nervous system from sympathetic to parasympathetic, which improves cardiac vagal functions, mental wellbeing by lowering stress and energy levels, and related neuroendocrine, metabolic, and inflammatory responses.

Conclusion

Our study has shown that doing yoga on a daily basis enhances cardiovascular health. Heart disease risk can be decreased by leading an active lifestyle, eating well, getting enough sleep, exercising frequently, and practicing yoga. Yoga may be able to improve cardiovascular endurance by fostering parasympathetic dominance over the sympathetic nervous system.

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