



Original Research Article

Effect of yoga on pulse rate and blood pressure

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ABSTRACT

Introduction: Change in the lifestyle, increased in facilities, more consumption of junk food and increased stress has raised chances of cardiovascular diseases. Aerobic exercises, sports and others tend to bring about sympathetic stimulation. But regular practice of yoga increases vagal tone and tends to reduce sympathetic responses. So in this study, we tried to see the effects of yoga on cardiovascular parameters like pulse rate, systolic blood pressure, and diastolic blood pressure.

Materials and Methods: A study was carried out in 50 healthy individuals of age between 30 to 60, irrespective of sex. Their pulse and blood pressure were recorded before and after yoga.

Results: Data were statistically analyzed and we got p-value < 0.001 which indicates a highly significant reduction in pulse rate, systolic blood pressure and diastolic blood pressure in subjects after performing yoga.

Conclusion: Regular practice of yoga bring improvement in cardiovascular function which can be helpful to reduce the chances of cardiovascular diseases.

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1. Introduction

A combination of stress, sedentary lifestyle, obesity, unhealthy food, poverty, ignorance, lack of access to quality care, consuming alcohol and smoking are causes of driving heart disease-related deaths in India. Heart disease has been accounted as India's most prominent cause of death and has been growing in tandem with a rapid shift in lifestyles brought about through India's rapid industrialization, increased migration to cities and economic growth. Sedentary lifestyles and occupation coupled with high-calorie low nutrient food, consumption of alcohol and tobacco have elevated mortality rate due to cardiovascular diseases.¹

Despite of recent advances in pharmacological and device therapy, morbidity and mortality from heart failure remain high.² Heart failure is associated with altered autonomic function.³ There is markedly elevated sympathetic activity for a prolonged period in heart failure.

Though less well documented, parasympathetic withdrawal is also an important facet of heart failure.⁴ Elevated blood pressure is a powerful predictor for congestive heart failure and other cardiovascular diseases outcomes.⁵⁻⁷

Regular practice of yoga with modification in lifestyle and dietary habits can bring about a reduction in the incidence of cardiovascular diseases and can be helpful even to control hypertension, diabetes mellitus, and other diseases.⁸

Yoga is an art and science originated in India thousands of years ago. The word yoga is derived from the Sanskrit word 'Yuj' means 'yoke' or unite. Yoga is not only physical or mental exercise to be healthy but it is a practice that unites the soul with the universal consciousness or supreme self.

Yoga along with providing physical and mental health, in advanced state makes one experience union of body, mind and internal energy to the universal energy that provides better physical health, mental control, and self-realization.

Yogic exercises are different from aerobics, sports, gymnastics workouts which increase heart rate, achieve cardiovascular workout, leave a person sweat more,

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exhausted & more breath out. Yoga instead of giving tiredness makes a person feel physically and mentally relaxed. The main aim of yoga is to promote wellness, good health, and the well being of mind, body, and spirit.⁹

Specific yoga asanas bring effect on specific body systems. Regular practice of yoga helps to reduce incidence & control diabetes, hypertension, and various other disorders. Yoga helps to treat hypertension as it relaxes body and breathing exercise tends to act on control system of cardio-vascular functions.

In this study, I have chosen subjects who performed pranayama and meditation for a minimum of 1 month.

Pranayama and meditation are a type of Ashtanga yoga. Pranayama is performed by prolongation and controlling breath which helps to bring conscious awareness of breathing and it reshapes breathing habits and patterns.¹⁰ Meditation provides deep rest to the body systems by allowing the mind to calm down. So it is considered as a relaxation process used for treating stress and stress-related diseases.¹¹

2. Materials and Methods

Present study was carried out in 50 healthy subjects doing yoga from a minimum duration of 1 month. Their age was in between 30 to 60 years.

We excluded subjects with a history of respiratory, cardiovascular and renal diseases, and diabetes from the study. Subjects who do smoking and consume alcohol or any drugs were also excluded from the study. Detailed clinical history of each subject was taken. Informed consent was obtained from all the members. Pulse rate (PR) and blood pressure (BP) were recorded before and after the practice of pranayama and meditation.

The pulse rate was recorded in beats per minute and the systemic arterial blood pressure in millimeter of mercury (Hg) was recorded with a fully automatic Omron blood pressure monitor, in the right upper limb. All the parameters were recorded between 6 and 8 am in order to avoid circadian variations.

All the subjects were well instructed to keep uniform dietary habits and received the same yoga training for a daily. The subjects were also advised not to change their lifestyle or perform any other physical exercises during yoga training.

The yoga practice schedule consisted of

1. Pranayama - 45 mins.
2. Short break - 5 mins.
3. Meditation - 20 mins.

Pranayama which they performed were:

1. Bhastrika pranayama
2. Kapal Bhati pranayama
3. Anulom Vilom pranayama

4. Bhramari pranayama

Data were analyzed using Microsoft excel. For significance, we did a paired T-test and made P-value.

3. Results

The results were analyzed by Paired 't' test. P-value < 0.05 and < 0.001 was considered significant and highly significant respectively.

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

4. Discussion

Change in lifestyle such as increased stress, unhealthy diet, decreased physical activities, more consumption of tobacco or caffeine or alcohol or smoking all caused increased incidences of cardiovascular diseases.

Stress is a major factor responsible for high blood pressure and heart disease. Yoga acts as a natural relaxant that calms the mind and soothes the nervous system reducing our stress response and its harmful effects.

In the present study, we got a significant decrease in resting pulse rate, systolic and diastolic blood pressure. Same findings were recorded in hypertensive^{12,13} diabetic¹⁴ and asthmatic patients too.¹⁵

Cardiovascular functions are controlled by neural factors as well as others like temperature, hormones, etc. Of these, neural factors primarily concern the autonomic nervous system which plays a major role in maintaining and regulating cardiac functions, e.g. systolic and diastolic blood pressure (SBP and DBP) and heart rate (HR). Imbalances in these lead to cardiovascular disorders such as hypertension, ischemia, infarction, etc.¹⁶

Yoga by modulating autonomic activity with increased parasympathetic tone and reducing sympathetic tone decreases PR, SBP, and DBP. In the present study, a significant reduction in PR, SBP, and DBP can be due to alteration of autonomic activity with parasympathetic predominance and relatively reduced sympathetic tone. This autonomic modulation in yoga is mediated through alteration of breathing patterns which induces various central and autonomic mechanisms as well as mechanical and hemodynamic adjustments causing both tonic and phasic changes in cardiovascular functioning.¹⁷

Pranayama is composed of complex breathing that calms body and mind. The main aim of pranayama is to regulate breathing. It acts by making breathing slow and deep. Slow breathing acts by a generalized decrease in the excitatory pathways regulating respiratory and cardiovascular systems. A neural control mechanism is the same for the respiratory and cardiovascular system, so alteration in one system will modify the functioning of the other.¹⁸ Slow and deep breathing inflates lungs to its maximum capacity. This inflation stretches pulmonary

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

Character	Before yoga (Mean±SD)	After yoga (Mean±SD)	T	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

stretch receptors which result in decreased sympathetic tone in skeletal muscle blood vessels resulting in peripheral vasodilatation and decreased peripheral resistance and thus decreases diastolic blood pressure. During the practice of pranayama, one concentrates on the act of breathing which diverts attention from worries and de-stresses him. This stress-free state of mind evokes relaxed responses in which parasympathetic nerve activity overrides sympathetic activity.

Meditation acts by reducing stress-induced sympathetic overactivity. Thereby it decreases arterial tone and peripheral resistance resulting in lowering of diastolic blood pressure and heart rate. Regular practice of yoga improves baroreflex sensitivity and decreases sympathetic tone that restores blood pressure to normal levels in patients of essential hypertension.^{12,13}

Another mechanism by which yoga reduces PR, SBP and DBP is by reducing activation of hypothalamic-pituitary- adrenal axis or by direct stimulation of vagus nerve which acts by shifting the autonomic nervous system balance from sympathetic to parasympathetic resulting in positive changes in cardiac vagal functions, mental well-being by decreasing stress and energy state and in related neuroendocrine, metabolic and inflammatory responses.

5. Conclusion

It has been observed in our study that the regular practice of yoga helps to improve cardiovascular function. When a person follows an active lifestyle, takes healthy food, takes required sleep, does regular exercise and yoga, it will reduce the chances of cardiovascular diseases. Yoga may do it by parasympathetic dominance over the sympathetic system, which will bring improvement in cardiovascular endurance.

6. Source of Funding

Self

7. Conflicts of Interest

None

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