INTRODUCTION

The word yoga is derived from its Sanskrit origin “YUJ” which means “to bind”, “to join” or “to apply”. In the words of Maharshi Patanjali, “yoga is the restraint of the process of the mind”. Yoga has been extensively studied for the beneficial effects on human health. Yoga is practiced all over the world. It produces consistent physiological changes and have sound scientific basis. The cardiovascular changes due to the process of ageing are being pre-poned ever since the past few decades. Psychosocial stresses of our modern life precipitates various cardiovascular and other disorders by disturbing basic neuroendocrine mechanism. The psychosocial stresses activate limbic system and hypothalamus which controls the autonomnic nervous system. When this system is stimulated, increase in output of both adrenaline and nor-adrenaline occur, both from sympathetic nerve fibres as well as from adrenal medulla causing increase in heart rate, systolic and diastolic blood pressures. Chronic exposure to psychosocial stimuli will result in the development of increase in blood pressure, coronary thrombosis and heart failure. In addition to the activation of sympatho-adreno-medullary system, exposure to psychosocial stresses also activates the hypothalamus centre governing pituitary adrenal axis. An increased secretion of corticotrophin releasing hormone from hypothalamus. This hormone releases the release of adrenocorticotropic hormone from anterior pituitary which in turn stimulates adrenal cortex. The psychosocial stressful situation activates hypothalamo-pituitary-adrenal gland axis, glucocorticoid and aldosterone levels increase in the plasma causing salt and fluid retention which increases blood volume and blood pressure imposing severe strain on the heart. The harmful effects of these stresses on bodily systems can be reduced effectively eliminated by enhancing the adaptive mechanisms of our body that can restore the equilibrium. By giving rest to the mind and body, yoga can shake off many disorders of psychosocial origin.

Different types of pranayama produce different physiological cardiovascular responses in normal young individuals. During right nostril pranayama and alternate nostril pranayama, the heart rate increased, whereas during left nostril pranayama, there was a decrease or no change in heart rate. Four weeks of Nadisuddhi pranayama has shown significant decrease in pulse rate, diastolic blood pressure, systolic blood pressure along with significant increase in pulse pressure. During ‘OM’ meditation, there was a significant reduction in heart rate as compared to the control period in which non-targeted thinking was encouraged. All these studies reported the effects of individual pranayama or meditation practice for minimum of 4 weeks to 6 months. This study was carried out to know the physiological effects of 30days combined practice of pranayama and meditation in influencing cardiovascular status in healthy individuals of 30–50 years age group.

The pranayama practice schedule consisted of
1. Pranayama - 45 mins.

The different types of Pranayama practiced were –
- Adama (Kanista) Vibhagiya Pranayama (diaphragmatic/abdominal breathing)
- Vibhagiya Pranayama (sectional breathing)
The present study involved regular combined practice of pranayama and meditation for 30 days, whereas other studies reported the effects of individual pranayama or meditation practice for minimum of 4 weeks to 6 months.

Most of the studies conducted so far have generalized their results irrespective of age and gender of the subjects. Very few studies have been conducted on subjects above 40 years in which age group, cardiovascular diseases are more prevalent. In the present study, an attempt was made to fill up these lacunae.

Although the present study observed the clear short term (30 days) effects of pranayama and meditation practice, it remains to be assessed whether these changes persist after resuming normal respiration and whether long term practice will lead to stable modifications of cardiovascular control.

Thus in a nutshell, with this study, it is proved beyond doubt, that regular practice of pranayama and meditation for minimum of 30 days is beneficial in improving the cardiovascular functions even in healthy individuals irrespective of age, gender, and BMI.

Finally, these results and their explanations would justify the incorporation of pranayama as part of our lifestyle in promoting health and thereby preventing age related cardiovascular diseases.

**Discussion**

The significant decrease in resting heart rate, systolic and diastolic blood pressure after the pranayama practice in the present study is in accordance with the findings of other studies on physiological effects of pranayama practice in healthy individuals.

In the present study a highly significant reduction in HR, SBP, and DBP can be attributed to modulation of autonomic activity with parasympathetic predominance and relatively reduced sympathetic tone. This autonomic modulation in pranayama is mediated through modification of breathing patterns which triggers various central and autonomic mechanisms as well as mechanical and hemodynamic adjustments causing both tonic and phasic changes in cardiovascular functioning. As a technique, pranayama can assume rather complex forms of breathing. But the essence of the practice is slow and deep breathing. Slow breathing induces a generalized decrease in the excitatory pathways regulating cardiovascular systems. During slow and deep breathing lung inflates to the maximum. This stimulates pulmonary stretch receptors which bring about withdrawal of sympathetic tone in skeletal muscle blood vessels leading to widespread vasodilatation and decrease in peripheral resistance and thus decrease diastolic blood pressure. While practicing pranayama one concentrates on the act of breathing which removes 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 by modifying the state of anxiety reduces stress-induced sympathetic over activity thereby decreasing arterial tone and peripheral resistance resulting in lowering of diastolic blood pressure and heart rate. Regular practice of pranayama has showed improvement in baroreflex sensitivity and decrease in the sympathetic tone thereby restoring blood pressure to normal level in patients of essential hypertension.

In the present study, the responses to 30 days of regular combined practice of pranayama and meditation were also assessed with respect to age and gender. It revealed that both males and females responded similarly to the pranayama practice.

When compared age wise, it revealed similar response to 30 days of pranayama and meditation practice in both age group ≤40 years and age group >40 years.

Although a significant decline in resting heart rate, SBP, DBP, and mean arterial BP after the pranayama practice in the present study is in accordance with the findings of other studies on physiological effects of pranayama practice in healthy individuals, the present study has some differences. The present study involved regular combined practice of pranayama and meditation for 30 days, whereas other studies reported the effects of individual pranayama or meditation practice for minimum of 4 weeks to 6 months.

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**Conclusion**

Heart rate revealed significant decrease in study group compared to controls which is suggestive of psycho physiological relaxation. There is reduction in SBP and DBP and MAP indicates a trend of gradual shift of autonomic equilibrium towards relative parasympathetic dominance. We concluded that there is a decrease in sympathetic activity and increase in parasympathetic activity in study group as compared to controls.

**References**


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