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EVALUATION OF YOGA THERAPY FOR THE RISK FACTORS OF CARDIOVASCULAR DISORDERS-A REVIEW

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ABSTRACT

Yoga and Meditation techniques are growing popular worldwide in preventing or reducing cardiovascular diseases. We reviewed the latest studies and recent literature concerning the use of yoga in the treatment of cardiovascular disorders. The studies of yoga therapy on acute and chronic hypertensive patients showed significant reduction in stress, stress related blood pressure, blood cholesterol level and body weight. The studies showed significant improvement in cardiovascular endurance and reduction in left ventricular mass. The purpose of this review is to evaluate the effect of yoga therapy on hypertension, obesity and coronary heart disease.

INTRODUCTION

Yoga is an ancient cultural heritage of India, designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. Yoga is often depicted as a tree comprised of eight limbs, such as yama (universal ethics), niyama (individual ethics), asana (physical postures), pranayama (breath control), pratyahara (control of the senses), dharana (concentration), dyana (meditation), and samadhi (bliss)¹. Yoga is described as comprising a rich treasure of physical and mental techniques that can be effectively used to create physical and mental well-being through down-regulation of the

hypothalamic–pituitary–adrenal (HPA) axis and the sympathetic nervous system (SNS).

As shown in fig 1, The HPA axis and SNS are triggered as response to stress, leading to a cascade of physiologic, behavioral, and psychologic effects, as a result of the release of cortisol and catecholamines. The repeated firing of the HPA axis and SNS due to stress can lead to dysregulation of the system and ultimately produce diseases such as diabetes, autoimmune disorders, depression, substance abuse, and cardiovascular disorders. Numerous studies have shown yoga to have an immediate downregulating effect on both the SNS and HPA axis response to stress².

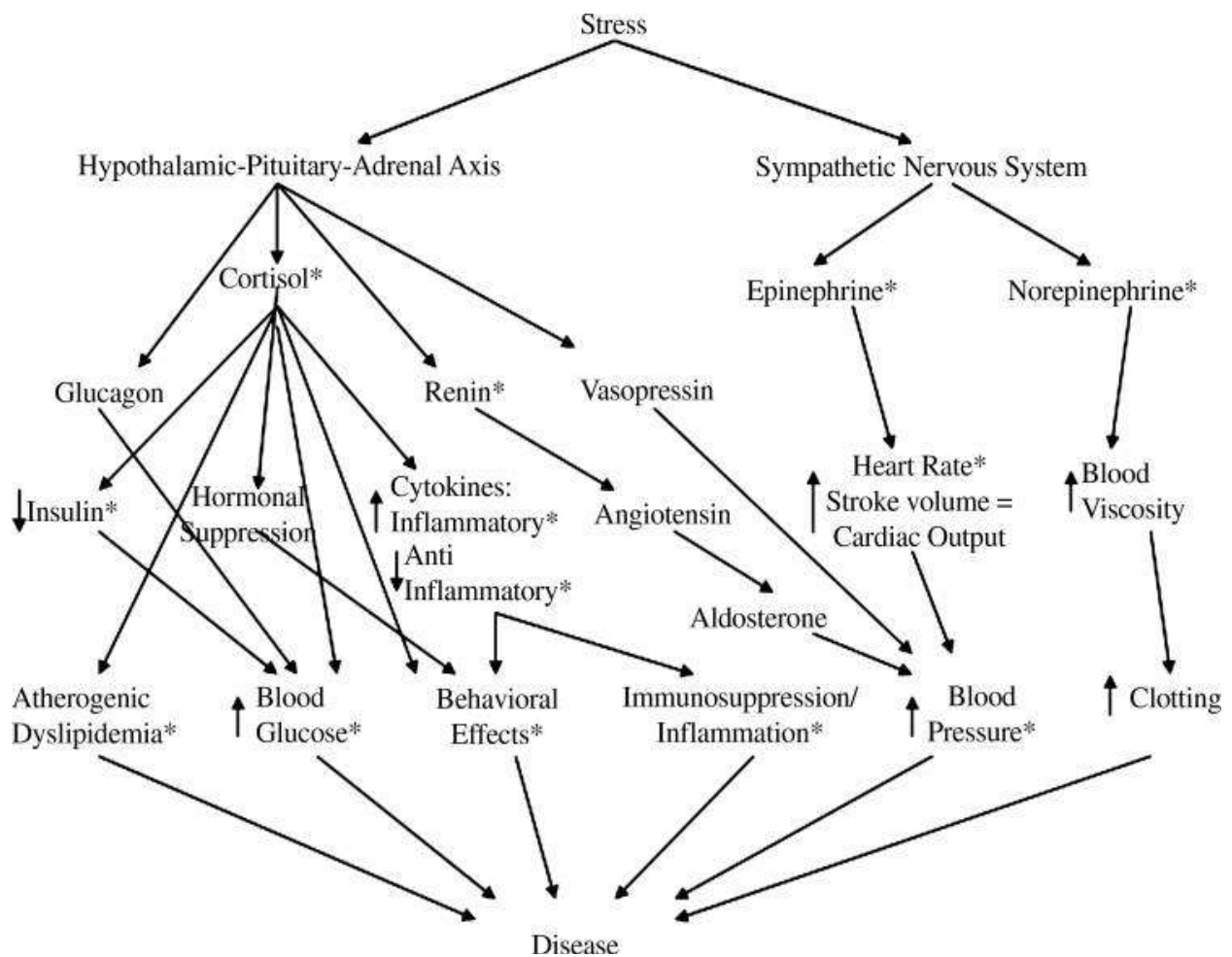


FIG. 1. The impact of stress on the hypothalamic–pituitary–adrenal axis and the sympathetic nervous system².

Yoga has been extensively studied for its various effects in reducing salivary cortisol, blood glucose, as well as plasma renin levels and 24-hour urine norepinephrine and epinephrine levels³. yoga reverses the negative impact of stress on the immune system by increasing levels of immunoglobulin A as well as natural killer cells .Yoga has been found to be useful on reducing BMR^{4,5}, improvement in respiratory capacity ⁶and shift of autonomic balance toward parasympathetic nervous system dominance, possibly via direct vagal stimulation⁷. It is also found to be useful in treatment of diabetes⁸, asthma⁹, epileptic seizures¹⁰ and in anxiety disorders ¹¹ .Yoga employs simple postures (asana), controlled

breathing exercise(Pranayama)and meditation admixed in varying proportions.

History of yoga

The origin of yoga is estimated to date back to the period between 200 BC and 300 AD, was written by a historically renowned yoga teacher and Hindu philosopher named Patanjali. The ancient Indian classic on the practice of yoga, Gherananda–Samhita, mentioned out of 840,000 asanas, only 84 are in contemporary common practice. Of these, only 32 are recommended by this ancient text as being useful for regular practice²⁸. Pranayama involves a slow deep inspiration and the breath is held momentarily in full

inspiration, followed by slow and spontaneous exhalation.

Hypertension and its management

Hypertension is the most common cardiovascular disease affecting more than one billion people throughout the world. It is a major contributor of stroke, ischemic heart disease, heart failure, renal dysfunction and blindness⁴³. The seventh Joint National Committee on Detection, Evaluation, and treatment of high blood pressure (JNC VII 2003) defined hypertension as a systolic blood pressure (SBP) of 140mmHg or greater and diastolic blood pressure (DBP) of 90mmHg or higher. Hypertension is further classified into two groups based on etiology as essential or primary hypertension and secondary hypertension. Essential hypertension is diagnosed when there is strong family history and no identifiable cause can be found⁴². Hypertension is almost always easy to treat but difficult to keep under control as blood pressure is a continuous variable¹². The goal of treatment is to lower the blood pressure as early as possible and maintain it, thereby preventing major complications of systemic hypertension. Drugs are prescribed as first line choice of treatment due to their significant, cost-effective, immediate action on reducing blood pressure. The utility of these agents is limited by the narrow range between

therapeutic and toxic doses. These often produce dose dependent side effects, adverse reactions and rebound or overshoot hypertension when drug therapy is discontinued suddenly.¹³ The side-effects, life long medical regimen, and cost of drugs have stimulated the search for a non-drug therapy as a primary treatment or as adjunctive therapy. Many non-pharmacological measures, such as 100mmol/day reduction in sodium intake, have been associated with a decline in blood pressure of about 5–7mmHg (systolic)/2.7mmHg (diastolic) in hypertensive subjects. Regular physical exercise such as walking is added along with drugs for its effect in managing hypertension. Many mind-body interventional methods like relaxation, biofeedback, stress management along with lifestyle modification have been shown as potential treatment for BP. Relaxation therapies alone doesn't show significant result in reducing BP. Hence progressive muscle relaxation techniques are not considered as an effective treatment method for high blood pressure. In contrast, Stress management therapies have some merits but are not widely available nor practiced. Studies on various non-drug modalities have shown more benefits from Yoga and Meditation in long term control of hypertension than any other modality.^{14,15}

Author Name	Year	Type of intervention	Used technique and Findings
Patel C and North	1975	Yoga and biofeedback compared to general relaxation	Yoga showed reduction of B.P. maintained even after 12 months ⁴⁰
Stone and Deleo	1976	Meditation	The average drop in mean arterial pressure was 12mm of Hg after 6 months and showed decrease in dopamine beta hydroxylase enzyme and plasma Renin activity ⁴¹
Agarwal et al	1977	Shavasana on hyperreactors using Cold Pressor Test	Reduction of the rise in B.P due to cold application ³⁴
Andrews et al	1982	Various non drug treatments	Found yoga and meditation to be effective in long term control of B.P ¹⁴

Table-1 Studies of yoga and meditation on high blood pressure, Lipid profile, heart rate and body weight			
Author Name	Year	Type of intervention	Used technique and Findings
Khanam et al	1996	yoga	Decrease in heart rate and decrease in diastolic blood pressure after Isometric Hand Grip test ³⁹
Schmidt et al.	1997	Yoga for 3 months on healthy adults	Significant reduction in Urinary stress hormone levels, body mass index, lipid profile ²⁷
Mahajan et al	1999	Yoga in Ischemic heart disease patients for 14 weeks	Reduction in lipid profile, body weight ²⁵
Jennifer et al	2000	Simplified pranayama	Decrease in mean arterial pressure and heart rate ³⁸
Murugesan et al	2002	Selected yoga practices for 11 weeks	Yoga and drug group showed greater B.P. reduction compared to only yoga group and drug group ¹⁶
Damodharan et al	2002	yoga	Reduction in VMA catecholamines and blood glucose level ³⁶
Bharshankar et al	2003	yoga	Reduction in pulse rate and increase in valsalva ratio in yoga people ⁴⁴
Vijayalakshmi et al	2004	yoga	Decrease in diastolic pressure, heart rate and rate pressure product after hand grip ¹⁷ test
Malhotra et al	2004	Yoga and OM meditation in normotensives	Improvement in cardiovascular performance and increase in melatonin levels ⁴⁵ .
Bijlani et al	2005	8 day yoga programme	Reduction in lipid profile except HDL ³⁵
Geetanjali et al	2007	Effect of shavasana after cold pressor test	The rise in parameters induced by stress test was less in shavasana practitioners ³⁷
Indla Devasena et al	2011	Yoga	Reduction in BP and heart rate ³¹

Yoga therapy on hypertension

It has been demonstrated in a randomised controlled Studies ,that even a short period of yoga intervention (3 months) is as effective as drug therapy in reducing high blood pressure¹⁶ and heart rate³¹. The mechanism of yoga-induced blood pressure reduction may be attributed to its beneficial effects on the autonomic neurological function. Impaired baroreflex sensitivity has been increasingly postulated to be one of the major causative factors of essential hypertension. Regular practice of yoga increase the baroreflex sensitivity and decrease the sympathetic tone, thereby restoring blood pressure to normal level in hypertensive subjects¹⁷. Similarly, the decrease in sympathetic activity seen with slow breathing might be beneficial in hypertension, where sympathetic activation

has been linked to disturbed breathing patterns and increased chemoreflex activity²⁹.

Meditation by modifying the state of anxiety reduces stress induced sympathetic over activity , decreases the arterial tone and peripheral resistance, that lead to reduction in diastolic blood pressure and heart rate. This ensures better peripheral circulation and blood flow to the tissues^{18,19}. Meditation is associated with reduced sympathetic adrenergic receptor sensitivity, which might affect cardiovascular response during stress. During meditation appearance of frontal midline theta rhythm in electroencephalogram reflects mental concentration as well as meditative state of relief from anxiety and is correlated negatively with sympathetic activation. This suggests a close relationship between autonomic functions and activity of medial frontal neural circuitry and possibility

of controlling CNS functions through yoga and meditation²⁰. Transcendental meditation (TM) practice improves mood state, adrenocortical activity and kidney functions and believed to reduce stress and shows significant reduction in ambulatory diastolic BP²¹.

Yoga on chronic hypertension

Yoga has proven its effect in modifying secondary complications produced by chronic hypertension. Left ventricular hypertrophy is a common consequence seen due to systemic hypertension. This may lead to many chronic cardiac complications, such as myocardial ischaemia, congestive cardiac failure and impairment of diastolic function. Left ventricular hypertrophy due to systemic hypertension is indicated by the height of 'R' wave in lead I, aVL, V5 and V6 in electrocardiogram. In one study The height of 'R' wave was taken prior to yoga practice and three months after continuation of yoga practice. The height of 'R' wave has come down appreciably in some patients indicating the reduction of left ventricular mass²².

Effect of yoga on body weight

Weight also has the strongest independent correlation with the risk of hypertension. Yoga has been found to be particularly helpful in the management of obesity²³. A randomized controlled study revealed that practising yoga for a year helped significant improvements in the ideal body weight and body density³. A retrospective observational study showed that a regular practice of yoga for 4 years was significantly associated with weight loss by overweight participants²⁴. After 4-day residential yoga practice followed by 14 weeks of 1 h daily home practice, one study found a significant loss in mean body weight from 72.26 to 70.48 kg among subjects with risk factors for coronary artery disease²⁵. Other studies confirmed that yoga was associated with significant weight loss by subjects with Coronary artery disease. After one year yoga practice coronary artery diseased patients showed a 7% loss of body

weight²⁶ and in a study by Schmidt and colleagues, healthy adults lost an average of 5.7 kg after 3 months of yoga practice²⁷.

Effect of yoga on coronary artery disease

Systemic hypertension is one of the risk factor for developing coronary artery disease. Participants with risk factors of coronary artery disease showed reduction in all parameters such as Blood pressure, LDL, total cholesterol, triglycerides except high density lipoprotein. In a randomized controlled study, patients with angiographically proven coronary artery disease who practiced yoga exercise for a period of one year showed a decrease in the number of anginal episodes per week, improved exercise capacity and decrease in body weight²⁸. Thus yoga exercise increases regression and retards progression of atherosclerosis in patients with severe coronary artery disease²⁶. Subjects who practiced pranayama or controlled yogic breathing could achieve higher work rates with reduced oxygen consumption per unit work and without an increase in blood lactate levels. one study reported the effects of yoga training on cardiovascular response to exercise and found yoga training improved the exercise tolerance to cardiovascular effects. Yoga on the management of coronary artery disease showed reduction in sympathetic tone, decreased peripheral vascular resistance, improved cardiac output, reduction in heart rate, blood pressure, and improvement in cardiovascular endurance³.

Effect of Yogic Practices in Prevention of Diabetes

Yogic practices reduce body fat and increase lean body mass, thereby help in improving insulin sensitivity³². The reduction in free fatty acid levels have a significant effect on beta cell function. hence yogasanas by preventing beta cell exhaustion may prevent diabetes. studies have confirmed the benefit of yoga in the control of diabetes mellitus. All the studies showed a significant fall in the fasting and post-prandial blood glucose values within 3 months and continued to have a

smooth and good control of diabetes during the period of the study as evidenced by a normal glycosylated hemoglobin and blood glucose levels³³. The drug requirements were significantly reduced.

CONCLUSION

The beneficial effects of yoga to the heart ailments is outstanding. However, the role of yoga in the management of the hypertension should be complementary to the conventional modes of treatment. Regular yoga practice involving simple postures, relaxation exercise and respiratory exercise combined with drug therapy showed superior results compared to those who did not practice yoga. The reviews showed that yoga had beneficial effects on reducing BP, blood cholesterol level and body weight. It also improves left ventricular function and cardiovascular endurance. Considering the scientific evidence discussed so far, we can postulate that the practice of yoga triggers neurohormonal mechanisms that bring about health benefits by suppressing sympathetic activity. Hence we conclude that yoga can be beneficial in preventing cardiovascular disease and can play a complementary role to drug therapy for hypertension. Any persistent benefits require a long-term adherence to yoga therapy and subjects who have continued their programs even at home showed better results³⁰. Additional studies are needed to distinguish between the different types of yoga and their various techniques. The optimal duration, the type of yoga program, and intensity of the yoga program need to be described clearly in many studies as they can affect the final outcome. Additional studies are needed to find the effect of yoga on long term as only a few follow up studies are available. All of these studies need to use rigorous study methodologies, including the use of larger sample sizes, randomized samples, and blinding of researchers.

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