International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Evaluating the Role of Yoga Therapy in Cardiovascular Disease and Stress Disorder Management

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Abstract: ***Cardiovascular diseases (CVDs) and stress-related disorders are closely linked, with chronic psychological stress recognized as a major contributor to cardiac dysfunction. As medical science continues to explore integrative and non-invasive therapies, yoga has emerged as a promising adjunct to conventional treatment. This review examines the physiological and psychological pathways through which yoga, especially the AVAV (Aahaar, Vihaar, Achaar, Vichaar) framework, can positively influence cardiovascular health. By analysing recent studies, the paper highlights yoga's role in lowering blood pressure, regulating lipid profiles, reducing mental stress, and enhancing autonomic stability. The review further explores how lifestyle modification through yoga can offer a sustainable approach to managing CVD risk factors, particularly in underserved populations.***

Keywords: cardiovascular health, AVAV lifestyle, holistic health, stress disorders, yoga, yoga therapy

1. Introduction

This review aims to evaluate the effectiveness of yoga therapy, particularly the AVAV lifestyle model, in the prevention and management of cardiovascular diseases and stress-related disorders.

Cardiovascular disease (CVD) is the leading cause of death globally. It consists of a wide range of conditions affecting both the heart and blood vessels, including coronary artery disease, heart failure, stroke and peripheral artery disease. These disorders arise because of various risk factors, such as high blood pressure, high cholesterol, smoking, diabetes, and lifestyle choices, such as poor diet and physical inactivity. Eventually, these variables lead to atherosclerosis, where plaque formation in arteries narrows blood vessels, raising the risk of heart attacks and strokes. [1] [2]

Despite advances in medical research, CVD remains a growing global health crisis. According to the American Heart Association's 2021 report, CVD prevalence has nearly doubled from 1999 to 2019, with its death increasing by 53.72%. This paper also explores protective measures to reduce CVD and risk factors as well as the very distinct roles of technology and yoga in treating them. Cardiovascular disease (CVD) is a broad term that refers to a variety of conditions affecting the heart and blood vessels. These conditions include disorders that directly impact the heart muscle, such as coronary artery disease, heart failure, and cardiomyopathies. It also covers ailments that affect the blood vessels responsible for supplying oxygen and nutrients to vital organs such as the brain, kidneys, and limbs. For example, stroke and peripheral artery disease are linked to problems in the arteries that supply the brain and extremities oxygen, respectively. CVD can be caused by a combination of factors, including high blood pressure, high cholesterol, smoking, diabetes, and lifestyle choices such as poor diet and lack of physical activity. Over time, these risk factors can lead to the buildup of plaque in the arteries (atherosclerosis), which narrows and hardens the vessels, restricting blood flow and increasing the risk of complications [3][4].

The large scope of CVD reflects its significant impact on multiple organs and systems in the body, making it one of the leading causes of morbidity and mortality worldwide. The data they acquired verified the conclusions, despite the fact that people's lifestyles and genetic compositions may differ throughout the globe. Majorly, low-income and middle-income countries contribute to this number due to insufficient healthcare services, which will be elaborated further through our review. Therefore, a good and healthy lifestyle and diet are needed to prevent the same [5][6].

Understanding the therapeutic impact of yoga on CVD and stress-related conditions can offer cost-effective, culturally grounded alternatives or complements to conventional medical interventions, especially in resource-limited settings.

2. Methodology

This review synthesizes findings from peer-reviewed journals, government publications, and institutional reports published from 2011 to 2024. Articles were selected based on relevance to yoga, CVD, and stress disorders using databases such as PubMed and National Library of Medicine.

Risk factors

The main risk factors for cardiovascular disease include smoking, obesity, diabetes, and hypertension. Efforts are being made to address these risk factors in order to prevent the burden of CVD. Cardiovascular health is greatly influenced by social aspects of health, including socioeconomic position, education, and access to healthcare. Individuals with a lower income and less education are far more likely to suffer from cardiovascular disease (CVD). In summary, social determinants such as income, education, and healthcare access significantly shape an individual's risk for cardiovascular disease. These factors influence not only the ability to maintain a healthy lifestyle but also the likelihood of receiving timely medical care and the overall ability to manage risk factors. Addressing these social disparities through improved access to resources, better education, and stronger healthcare systems is crucial in reducing the burden

of cardiovascular disease, particularly among underserved populations [7] [8].

Nutrition

One of the main risk factors that can be improved for CVD is poor nutrition, which is defined as having a lot of processed food items and inadequate quantities of fruits, vegetables, and whole grains. Consistent physical activity has been demonstrated to lower the risk of heart disease, stroke, and other related disorders. Worldwide obesity rates are growing, and mainly because of how obesity is linked to diabetes, dyslipidaemia, and hypertension. It poses a serious threat to cardiac health. Another dangerous risk factor for CVD is diabetes, because it also increases the chance of having heart-related problems. Obesity raises the risk of CVDs in type 2 diabetes patients significantly due to its ability to contribute to endothelial dysfunction and plaque buildup. Moreover, it impairs vessel flexibility by reducing nitric oxide and facilitating LDL buildup in vessel walls. Another factor that increases the risk of CVD dangerously in insulin resistance is that it boosts free fatty acids which promote heart cell damage. [9] [10] [11].

Hypertension

The most prevalent risk factor for CVD is hypertension, which fluctuates significantly in frequency and control rates throughout regions. Studies have found that a well-established risk factor for CVD is elevated low-density lipoprotein (LDL) cholesterol, and statin therapy is the key for its prevention. Moreover, studies done by other research groups show that reducing tobacco and cigarette consumption is vital to decreasing the death rate due to CVD, as smoking is still one of the primary avoidable causes of hypertension and its types. Hypertension in both types 1 and 2 is linked to diabetic nephropathy, as high blood sugar stimulates kidney cells to release cytokines, which leads to structural changes in the kidney and thickens blood vessels, proving to be detrimental. The same group found that if diabetes worsens, it causes nephrotic syndrome, which is protein loss, blood clot risk and high blood lipids, further elevating the risk of cardiovascular diseases [12][13].

Mental Stress

Mental stress is defined as “the negative cognitive and emotional response to environmental demands that exceed an individual's ability to cope”. This makes it a modifiable risk factor, even though measuring and standardising it is difficult due to its subjective nature and interaction with external stressors. Studies have shown that patients with a higher risk of cardiovascular diseases, specifically due to the risk factor of psychological stress, usually have either one of the following: social isolation, marital or work stress, or childhood abuse or trauma. Whether the stress was experienced in their childhood or adulthood, it increases the risk of coronary heart disease by 40 to 60%. Essentially, these stressors enable the body’s defence reaction, preparing the body for flight or fight, which takes a toll on the body if enabled for a long time. This occurs because stress activates both the amygdala and the sympathetic nervous system. This response increases immune cell output and cytokine production, along with the release of leukocytes. These factors combined trigger the thinning of blood vessels and deposition of substances on the vascular endothelial walls, which leads to atherosclerosis, which then leads to myocardial ischaemia without its usual symptoms showing up [14][15].

Myocardial ischaemia doubles the risk of adverse cardiac issues in coronary artery disease patients. In almost 50% of stable CAD patients, ischaemic episodes are triggered by even minute emotional stressors. Moreover, these physiological changes lead to haemodynamic shifts, changes in coronary vasoreactivity, platelet activation and endothelial damage, leading to heart attacks and arrhythmia. As for how the brain processes stress, neuroimaging studies during stress showed that the central nervous system activates various parts of the brain, including the amygdala, hypothalamus, hippocampus, periaqueductal grey, thalamus, prefrontal cortex, anterior cingulate cortex and insular cortex. The amygdala mediates interaction between stress and CVDs by interpreting stimuli and linking fear-inducing stimuli to appropriate responses. This is done with the help of the hippocampus and the anterior cingulate cortex, where the amygdala uses long-term memory to evaluate and modulate emotional responses. Stress triggers the sympathetic nervous system to release catecholamines (adrenaline & noradrenaline) into the bloodstream, which leads to increased heart rate, vasoconstriction and elevated blood pressure. The response to stress is sometimes similar to the response of physical exercise. But mental stress usually leads to a lower increase in rate-pressure product compared to physical exercise, therefore giving out less cardiac output and myocardial oxygen demand. Moreover, mental stress leads to vasoconstriction compared to vasodilation in physical exercise. Acute cardiovascular events can also increase the risk of chronic psychological conditions such as PTSD, which furthermore increases the risk of recurrent CVD. Long-term mental stress can lead to obesity and diabetes, which are the two most common and well-known contributors to CVDs. Therefore, as a resolution, doctors are advised to look into the factor of psychological stress to determine the intensity of any disease related to the heart. Moreover, positive thoughts are known to drastically decrease the risk of CVD by lowering blood pressure, heart rate and the risk of developing CAD [16][17].

Other Factors

Abdominal obesity and insulin resistance are two of the many risk factors that make up metabolic syndrome, which greatly increases the chance of cardiovascular disease. Additionally, declining kidney function results in a greater death rate from cardiovascular causes, along with chronic kidney disease. Research groups have predicted that males are more vulnerable to congenital cardiovascular abnormalities and Kawasaki disease. Furthermore, arrhythmias, a very well-known CVD, emphasise the need for early identification and intervention. Examples are subclinical atherosclerosis, abrupt cardiac arrest, and atrial fibrillation (AF) [18][19].

Rural and urban regions differ in their trends in coronary heart disease. Both pulmonary hypertension and venous thromboembolism go on to be major health risks, especially for hospitalised patients. Non-dominant groups are more likely to have peripheral artery disease and aortic disorders compared to the majority, and genetic factors may contribute to the progression of these medical conditions. Diabetic adults

face up to five times the risk of CVD compared to non-diabetic adults, resulting in them having greater healthcare costs because of its complications. These diabetic complications not only include CVDs but also kidney issues. Another symptom caused by diabetes is structural changes to the heart, such as increasing the left ventricle's mass or even causing triglyceride accumulation in the heart. This causes lipotoxicity, raising the risk for heart failure significantly. Silent myocardial ischaemia is often undiagnosed in diabetic patients, leading to delayed treatments and worse outcomes. Due to diabetic patients being at risk for common CV risk factors such as poor glycaemic control, obesity, hypertension, dyslipidaemia and autonomic dysfunction, it is essential for their treatments to address these factors. Certain ethnic groups, such as non-South Asians and South Asians, have a greater prevalence of cardiovascular disease. Health disparities are influenced by genetic variations across ethnic groups, with non-South Asians and African Americans having greater rates of obesity, diabetes, and hypertension. Rather than genetic variations, these disparities might be ascribed to unique cultural and social behaviours. Hormonal, genetic and environmental factors contribute to sex differences in CVDs. Oestrogen in women helps against increasing nitric oxide poisoning and inflammation and improves lipid profiles. Its receptors provide protection against adverse cardiac remodelling such as hypertrophy and fibrosis along with hypertension. Androgens help with blood pressure regulation and lipid metabolism. However, it can also contribute to atherogenesis and arterial damage and even aortic aneurysms, depending on its levels. Due to the protection of oestrogen, premenopausal women have a lower risk of CVD compared to postmenopausal women and men in general. Although the heart's health and the kidney's health are independent, together, their dysfunctionality leads to cardiorenal syndrome. They are linked in such a way that the maintenance of the vasomotor tone and blood volume depends on their interactions. So therefore, if one had a kidney-related issue, the risk for also having CVD increases. Strokes have steadily increasing rates that decrease gradually, also proving the same reason as IHD proved. Its death and disabilities are also greater in men compared to women, due to better survival of women who suffered IS, intracerebral haemorrhage and subarachnoid haemorrhage. Hyper-extensive heart disease (HHD) is another cause of death under CVD that is similar to IHD and stroke in terms of increasing and decreasing rates. People with high blood pressure can be more susceptible to this. Another factor in this disease is primary and secondary prevention being overlooked, along with regional and sex differences [20][21].

Discussions on CVD management:

The few risk factors that can be modified to reduce the risk of CVDs are high systolic blood pressure, high fasting plasma glucose, high low-density lipoprotein cholesterol, high BMI, impaired kidney function, ambient and household air pollution, tobacco, dietary risks, low physical activity and, most importantly, stress. Given these circumstances, cardiovascular prevention calls for a holistic approach that includes not only pharmaceutical and medical interventions but also encourages people to embrace long-term, lifestyle-based solutions for stress management and cardiovascular resilience improvements. In this context, Yoga has been extensively studied and applied as a complementary approach in the prevention, management and rehabilitation of various diseases. Its multifaced benefits- physical, mental and emotional – make it a powerful tool in holistic healthcare. It has been found that yoga practices including asanas (postures) and pranayamas (breathing techniques) effectively lower blood pressure, improve lipid profiles, enhance insulin sensitivity, improve overall glycaemic control, and reduce body mass index (BMI), suggesting its ancillary role in the primary prevention of CVDs. Participants who practised yoga before aerobic exercises experienced greater reductions in systolic blood pressure and resting heart rate compared to those who only performed stretching exercises. [22] [23] [24][25]

Yoga and AVAV Therapy

Renowned institutions like The Yoga Institute (Mumbai) promote AVAV, which consists of Aahaar, Vihaar, Achaar, and Vichaar. It serves as a lifestyle restructuring paradigm that emphasises the behavioural and psychological elements that are known to have an impact on cardiovascular health. AVAV has a long-term effect on risk factors like high blood pressure, lipid imbalances, obesity, and chronic stress through cultivating a synergistic alignment of the mind, body, and feelings rather than just encouraging specific wellness habits [26].

Aahaar means mindful eating of sattvik (pure, balanced, vegetarian) food. It emphasizes the saying "You are what you eat". Food is not only a source of nutrition, but it also affects the state of mind and body. It suggests eating only when hungry, consuming food in moderation in a calm state of mind and chewed well. In the context of CVD, it advocates for a low-salt, high-fibre diet that includes mineral, red, or black salt; it also suggests avoiding tamasic (packaged, processed and stale) foods, alcohol, and smoking, as well as high-fat meals. To support optimal metabolism and cardiovascular rest, it recommends eating dinner three to four hours before bed. Vihaar signifies the importance of conscious relaxation and rejuvenation via fostering happy living through spending time with loved ones, less social media use, and cultivating a conscious habit of relaxing the mind and body when tired, stressed and anxious. In addition to getting 7 to 9 hours of restorative sleep each night, heart-healthy activities include hobbies (e.g. dancing, signing, etc.), nature walks, and relaxation techniques like pranayama. Achaar emphasizes on discipline and regularity in daily routines for self-development and growth; including adhering to a set meal, exercise, and rest schedule, avoiding overexertion, and being aware of physical symptoms like exhaustion and dyspnoea that could indicate underlying cardiac stress. Lastly, by promoting positivity and reducing the influence of negative thoughts, Vichaar encourages a balanced mindset to bring clarity in thoughts and actions as the mind is the real owner of the body vehicle. In order to manage CVD, one must be mindful for negative thought patterns (like those associated with Type A personality), cultivate emotional awareness, develop spiritual faith, learn to predict and control stressors, and practise daily gratitude (such as writing down ten positive thoughts in a journal). These four pillars work together to provide a thorough, therapeutic, and preventative approach that combines traditional yoga teachings with contemporary cardiovascular care. [27]

Table 1

Component	Role in CVD Prevention	AVAV for CVD Prevention & Management
Aahaar (food for wellness)	Lowers cholesterol, blood pressure, and sugar	• Emphasize sattvik, vegetarian, high-fiber, low-salt diet • Use mineral, red, or black salt • Seasonal fruits and vegetables, nuts, flax seeds, potassium and Vitamin D3 rich diet • Stay hydrated during the day with lemon juice, coconut water, and have half cup of warm water before sleeping • Have dinner 3–4 hours before bedtime • Avoid tamasic foods with High salt and high fat, heavy proteins at night, gassy and acidic foods, smoking and alcohol
Vihaar (relaxation and recreation for wellness),	Supports healthy heart rhythm and stress recovery	• Ensure "ME" time daily and engage in hobbies, develop calm and relaxed attitude • Take nature walks • Practice relaxation and yogic breathing techniques. • - 8 hours of quality sleep is essential.
Achaar (daily routines to improve your lifestyle)	Builds discipline and reduces harmful behaviours	• Maintain a timely schedule for meals, walks, exercise, rest, sleep. • Meditative postures and yogic asanas, with sitting and lying down positions. Avoid forward bending postures • Practice pose by putting legs up the wall, and gravity helps circulation by facilitating the return of venous blood and lymphatic fluids back to heart. This is then oxidized and circulated back in the body. • Avoid overexertion • Follow Doctor's advice and have regular check-ups. Be alert to bodily warning signs (e.g., fatigue, breathlessness)
Vichaar (positive thought patterns)	Lowers stress hormones and promotes calm	• Monitor negative thought patterns (e.g. Type A personalities) • Practice gratitude journaling (10 positive per day) • Maintain awareness and cheerfulness. Develop relaxed attitude, friendliness and compassion • Anticipate and manage stress triggers • Develop emotional awareness and spiritual faith

Along with concepts like AVAV, digital health technologies are transforming how we determine and prevent cardiovascular disease. With noncommunicable illnesses impacting a large proportion of India's adult population, early and accessible screening is more critical than ever. In response to this need, organisations such as Philips have created smartphone-based solutions that allow people to monitor health indicators including heart rate, respiratory rate, heart rate variability, and oxygen saturation in an instant. These physiological signals undergo analysis to provide a Heart Energy Potential (HEP) score, a simple 1 to 100 metric that measures overall cardiovascular health. This approach, which does not need wearable devices or laboratory facilities allows for non-invasive, low-cost monitoring from anywhere. Tools like these, particularly for underprivileged or remote groups of individuals, provide a hands-on, affordable way to detect early warning symptoms and aid lifestyle-based remedies, which is congruent with the preventative approach of yogic practices like as AVAV. [28] [29]

3. Summary

Constant improvement in heart surgeries (including heart transplants and operations for congenital heart conditions) has boosted the quality of care provided to patients. Prevention and management are key to reducing the global impact of these diseases, and advancements in medical research continue to improve treatment options for those affected. Yoga is not a curative treatment but it plays a significant therapeutic and preventive role in managing and reversing risk factors and improving quality of life in patients with CVDs [26]. Yoga supports cardiovascular health by regulating blood pressure, improving lipid profiles, reducing stress, and enhancing autonomic function through controlled breathing, movement, and meditation. These practices are especially valuable in managing chronic stress, one of the most significant and often overlooked contributors to heart disease. Integrating the yogic lifestyle framework known as Aahaar–Vihaar–Achaar–Vichaar (AVAV)—which emphasises balanced diet (aahaar), healthy routines and recreation (vihaar), disciplined conduct (achaar), and positive thinking (vichaar)—can significantly reduce modifiable risk factors associated with CVDs [25][27]. This holistic approach not only addresses physical health but also nurtures mental and emotional resilience. When combined with modern medical care, AVAV provides a sustainable and culturally grounded path toward a healthier, heart-smart future.

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