

Exploring the Effects of Yogic Meditation on Stress, Anxiety, and Cardiovascular Health: A Prospective Cross-Sectional Cohort Study at Desh Bhagat Hospital

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Abstract

Background: Stress and anxiety are significant risk factors for cardiovascular disorders, with growing evidence suggesting that yogic meditation can mitigate these effects. This prospective cross-sectional cohort study was conducted to evaluate the impact of yogic meditation on stress, anxiety, and cardiovascular parameters among patients attending Desh Bhagat Hospital. **Methods:** A cohort of 350 patients was recruited, comprising individuals presenting with elevated stress, anxiety, or cardiovascular conditions. Participants underwent a guided yogic meditation program, which included mindfulness, Pranayama (breathing techniques), and Dhyana (meditation) for 30 minutes daily over six weeks. Stress and anxiety were evaluated using the validated Perceived Stress Scale (PSS) and Beck Anxiety Inventory (BAI). Cardiovascular parameters, including systolic and diastolic blood pressure and heart rate, were measured both at baseline and after the intervention. **Results:** This study showed significant reductions in stress and anxiety scores post-intervention, with mean PSS scores decreasing by 27% and BAI scores by 31%. Cardiovascular health indicators also showed improvement, with systolic blood pressure reduced by an average of 11 mmHg, diastolic blood pressure by 9 mmHg, and heart rate variability showing positive trends. **Conclusion:** Yogic meditation significantly reduces stress and anxiety while enhancing cardiovascular health parameters in a clinical cohort. These findings support the integration of meditation practices into standard care protocols for managing psychological and cardiovascular health. Further longitudinal studies are warranted to explore long-term outcomes.

Keywords: Anxiety Management, Cardiovascular Health, Heart Rate Variability (HRV), Blood Pressure Regulation, Perceived Stress Scale (PSS), Beck Anxiety Inventory (BAI)

INTRODUCTION

Stress and anxiety have become pervasive issues in modern society, significantly impacting both physical and mental health. These conditions serve as significant psychological burdens and are also key contributors to the global rise in cardiovascular diseases (CVDs) [1]. The World Health Organization (WHO) reports that cardiovascular diseases continue to be the leading cause of death worldwide, with stress and anxiety identified as critical risk factors. Chronic stress disrupts the body's physiological balance, leading to elevated blood pressure, increased heart rate, and heightened inflammatory responses—all of which predispose individuals to cardiovascular disorders. Understanding and addressing these factors is vital to improving public health outcomes.

Stress affects the hypothalamic-pituitary-adrenal (HPA) axis and autonomic nervous system, leading to sustained activation of the sympathetic nervous

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system [2]. This activation prompts the release of stress hormones such as cortisol and adrenaline, which, if prolonged, can lead to negative cardiovascular effects, including hypertension, arrhythmias, and endothelial dysfunction. Similarly, anxiety—characterized by excessive worry and heightened autonomic arousal—can exacerbate cardiovascular risks by promoting unhealthy behaviors, such as poor diet, physical inactivity, and substance use. Given the multifaceted nature of stress and anxiety, interventions targeting both psychological and physiological aspects are crucial.

One such intervention gaining attention is yogic meditation. Rooted in ancient Indian traditions, yogic meditation integrates mindfulness practices, controlled breathing techniques (Pranayama), and focused attention (Dhyan) to promote relaxation and self-awareness. Unlike conventional therapies that often focus on isolated symptoms, yogic meditation addresses the mind-body connection, offering a holistic approach to stress and anxiety management. Recent research studies have shown that yogic practices can help reduce cortisol levels, improve heart rate variability, and promote overall cardiovascular health. The therapeutic benefits of yogic meditation are supported by emerging evidence from both clinical and community-based studies [3]. For example, mindfulness-based stress reduction (MBSR) programs and yoga interventions have been shown to reduce perceived stress, alleviate symptoms of anxiety, and lower blood pressure in diverse populations. However, despite the growing body of literature, the integration of yogic meditation into routine healthcare practices remains limited. This gap highlights the necessity for additional research to confirm its effectiveness and practicality in clinical settings.

This study aims to evaluate the impact of a structured yogic meditation program on stress, anxiety, and cardiovascular health among patients attending Desh Bhagat Hospital. By focusing on both psychological and physiological parameters, this research seeks to provide comprehensive insights into the potential of yogic meditation as an adjunctive therapy for stress and cardiovascular disorders. The findings will add to the expanding body of evidence that supports the incorporation of holistic practices into standard care protocols.

The Burden of Stress and Anxiety

Stress and anxiety are more than just temporary emotional states; they are pervasive health challenges with far-reaching consequences [4]. Chronic stress, marked by prolonged exposure to stressors, can result in various physiological and psychological dysfunctions. It is well-established that stress activates the HPA axis, triggering the release of cortisol. While acute cortisol release is essential for adaptive responses, chronic elevation of cortisol disrupts homeostasis, contributing to metabolic syndrome, immune dysfunction, and cardiovascular diseases.

Anxiety, which frequently occurs alongside stress, is linked to an overactive amygdala and an imbalance in the autonomic nervous system [5]. This results in increased sympathetic activity and reduced parasympathetic tone, further exacerbating cardiovascular risks. Epidemiological studies have consistently shown that individuals with high levels of stress and anxiety are at greater risk for developing hypertension, coronary artery disease, and other cardiovascular conditions [6]. Moreover, these individuals are more likely to engage in behaviors that negatively impact health, such as smoking, alcohol consumption, and poor dietary choices.

Given the complex interplay between stress, anxiety, and cardiovascular health, effective interventions must address both the psychological and physiological dimensions of these conditions [7]. While pharmacological treatments and cognitive-behavioural therapy (CBT) have demonstrated efficacy, they often come with limitations such as side effects, high costs, and accessibility issues. This has led to increased interest in non-pharmacological approaches like yogic meditation.

The Science Behind Yogic Meditation

Yogic meditation is a holistic practice that integrates mindfulness, controlled breathing, and meditation to induce relaxation and mental clarity. Its physiological benefits are mediated by downregulating the HPA axis and restoring autonomic balance [8]. Techniques like Pranayama, which focus on controlled breathing, enhance parasympathetic activity, leading to lower heart rate and blood

pressure. At the same time, mindfulness and meditation practices support emotional regulation and decrease the perception of stress.

Neuroimaging studies have shed light on the mechanisms behind the benefits of yogic meditation. Functional magnetic resonance imaging (fMRI) has revealed that meditation alters brain activity in areas related to stress and anxiety, such as the prefrontal cortex, amygdala, and insula [7]. These changes are linked to enhanced emotional resilience and reduced autonomic arousal. Additionally, consistent practice of yogic meditation has been associated with structural brain changes, including increased gray matter density in regions involved in self-regulation and attentional control.

In addition to its psychological benefits, yogic meditation has shown notable effects on cardiovascular health. Research indicates that regular practice can lower blood pressure, improve lipid profiles, and enhance endothelial function. These effects are partly mediated by reductions in systemic inflammation and oxidative stress. By addressing both psychological and physiological factors, yogic meditation offers a comprehensive approach to managing stress, anxiety, and cardiovascular health.[9]

Rationale for the Study

Despite the growing body of evidence supporting the benefits of yogic meditation, its integration into routine clinical care remains limited. Many existing studies have focused on healthy populations or individuals with mild to moderate stress and anxiety, leaving a gap in understanding its efficacy among patients with more severe conditions or comorbidities. Moreover, differences in study designs, intervention protocols, and outcome measures have made it difficult to reach definitive conclusions regarding its effectiveness.

This study aims to address these gaps by evaluating the impact of a structured yogic meditation program on stress, anxiety, and cardiovascular health in a clinical cohort. By using validated tools such as the Perceived Stress Scale (PSS) and Beck Anxiety Inventory (BAI), as well as objective measures of cardiovascular function, this research seeks to provide robust evidence for the therapeutic potential of yogic meditation. The findings will inform the development of integrated care protocols that incorporate holistic practices to improve patient outcomes.

Objectives of the Study

The primary aim of this study is to evaluate the effects of a six-week yogic meditation program on stress, anxiety, and cardiovascular parameters in patients attending Desh Bhagat Hospital. The specific objectives are as follows:

- To assess changes in perceived stress levels using the Perceived Stress Scale (PSS).
- To evaluate reductions in anxiety symptoms using the Beck Anxiety Inventory (BAI).
- To measure changes in cardiovascular parameters, including systolic and diastolic blood pressure, as well as heart rate variability.
- Exploring patient perceptions of the feasibility and acceptability of the yogic meditation program. [10].

Methods

A cohort of 350 patients was recruited, comprising individuals presenting with elevated stress, anxiety, or cardiovascular conditions. Participants underwent a guided yogic meditation program, which included mindfulness, Pranayama (breathing techniques), and Dhyana (meditation) for 30 minutes daily over six weeks. Stress and anxiety were measured using validated instruments, including the Perceived Stress Scale (PSS) and the Beck Anxiety Inventory (BAI). Cardiovascular parameters, such as systolic and diastolic blood pressure and heart rate, were recorded both at baseline and after the intervention.

Result & Discussion

This study showed significant reductions in stress and anxiety scores post-intervention, with mean PSS scores decreasing by 27% and BAI scores by 31%. Cardiovascular health indicators also showed

improvement, with systolic blood pressure reduced by an average of 11 mmHg, diastolic blood pressure by 9 mmHg, and heart rate variability showing positive trends. (Table 1)

Parameter	Baseline	Post-Intervention	Change	p-value
Perceived Stress Scale (PSS)	24.7 ± 5.3	18.1 ± 4.2	Decrease by 27%	< 0.001
Beck Anxiety Inventory (BAI)	18.6 ± 7.1	12.8 ± 6.2	Decrease by 31%	< 0.001
Systolic Blood Pressure (SBP)	136.1 ± 17.8 mmHg	125.1 ± 16.5 mmHg	Decrease by 11 mmHg	0.001
Diastolic Blood Pressure (DBP)	88.0 ± 10.1 mmHg	79.0 ± 8.5 mmHg	Decrease by 9 mmHg	0.001
Heart Rate (HR)	85.5 ± 7.8 bpm	80.0 ± 6.4 bpm	Decrease by 5.5 bpm	< 0.01
Heart Rate Variability (HRV)	N/A	Positive trend	Increased variability	0.07
Adverse Events	N/A	Mild discomfort (5% participants)	N/A	N/A

Table 1. Showing Comparison of Baseline & Post-Intervention.

The results of the study, involving 350 participants, demonstrated significant improvements in both psychological and cardiovascular parameters after the six-week yogic meditation intervention. The Perceived Stress Scale (PSS) scores decreased by 27%, from 24.7 ± 5.3 to 18.1 ± 4.2 ($p < 0.001$), while the Beck Anxiety Inventory (BAI) scores decreased by 31%, from 18.6 ± 7.1 to 12.8 ± 6.2 ($p < 0.001$). Cardiovascular parameters showed marked improvements, with systolic blood pressure (SBP) reducing by 11 mmHg (from 136.1 ± 17.8 mmHg to 125.1 ± 16.5 mmHg, $p = 0.001$), diastolic blood pressure (DBP) decreasing by 9 mmHg (from 88.0 ± 10.1 mmHg to 79.0 ± 8.5 mmHg, $p = 0.001$), and heart rate (HR) decreasing by 5.5 bpm (from 85.5 ± 7.8 bpm to 80.0 ± 6.4 bpm, $p < 0.01$). Additionally, heart rate variability (HRV) exhibited positive trends indicative of improved autonomic regulation, although the change was not statistically significant ($p = 0.07$). Subgroup analysis revealed that participants with higher baseline anxiety levels experienced the most substantial improvements across both psychological and cardiovascular outcomes. No major adverse events were reported, and only 5% of participants reported mild discomfort during meditation, which was resolved with guidance. These findings suggest that yogic meditation is an effective intervention for reducing stress and anxiety and improving cardiovascular health in larger clinical populations.

CONCLUSION

Yogic meditation significantly reduces stress and anxiety while enhancing cardiovascular health parameters in a clinical cohort. These findings support the integration of meditation practices into standard care protocols for managing psychological and cardiovascular health. Further longitudinal studies are warranted to explore long-term outcomes.

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