



Research Article

Sadhaka Pitta and Neurocardiac Regulation: An Integrative Review of Ayurvedic Concepts and Modern Neurocardiology

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DOI: <https://doi.org/10.5281/zenodo.21159009>

Abstract

Sadhaka Pitta Is One of The Five Functional Subdivisions of Pitta Dosha Described in Ayurveda and Is Distinguished by Its Role in Regulating Higher Cognitive, Emotional, And Behavioral Functions. Classical Texts Locate Sadhaka Pitta in The Hridaya (Heart), Where It Governs Intellect, Memory, Motivation, Courage, Emotional Stability, Decision-Making, And the Accomplishment of Desired Goals. This Review Examines the Classical Ayurvedic Concept of Sadhaka Pitta and Explores Its Relevance in Light of Current Knowledge of Neurocardiology and Psychophysiology. A Comprehensive Review of Classical Ayurvedic Literature and Contemporary Biomedical Studies Was Undertaken to Evaluate the Functional Similarities Between Sadhaka Pitta and Modern Neurophysiological Mechanisms. The Findings Indicate That the Functions of Sadhaka Pitta Closely Parallel the Integrated Actions of Catecholamines, Including Dopamine, Norepinephrine, And Epinephrine, As Well As Neurotransmitters Such as Serotonin, Acetylcholine, Gamma-Aminobutyric Acid, And Glutamate, Which Collectively Regulate Cognition, Motivation, Emotional Processing, Stress Adaptation, And Cardiovascular Function. Contemporary Evidence on The Heart-Brain Axis and Neurocardiac Communication Further Supports the Ayurvedic Concept of Hridaya as An Integrative Centre for Psychological and Cardiovascular Regulation. Although Sadhaka Pitta Cannot Be Directly Equated with Any Individual Neurotransmitter or Hormone, It May Be Interpreted as A Higher-Order Functional Principle Coordinating Neural, Autonomic, Endocrine, And Cardiovascular Activities. This Integrative Perspective Provides A Scientific Framework for Understanding the Physiological Significance of Sadhaka Pitta and Highlights Its Potential Relevance for Future Interdisciplinary Research in Neuroscience, Cardiology, And Integrative Medicine.

Manuscript Information

- ISSN No: 2583-7397
- Received: 11-05-2026
- Accepted: 27-05-2026
- Published: 30-06-2026
- IJCRM:5(3); 2026: 1330-1334
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- Plagiarism Checked: Yes
- Peer Review Process: Yes

How to Cite this Article

Shrivastava K, Sharma M. Sadhaka Pitta and neurocardiac regulation: an integrative review of Ayurvedic concepts and modern neurocardiology. Int J Contemp Res Multidiscip. 2026;5(3):1330-1334.

Access this Article Online



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KEYWORDS: Ayurveda; Catecholamines; Hridaya; Neurocardiology; Neurotransmitters; Sadhaka Pitta.

1. INTRODUCTION

Ayurveda describes health as a state of equilibrium among *Dosha*, *Dhatu*, *Mala*, *Agni*, and *Manas*, with the *Tridosha* serving as the principal regulators of physiological functions. Among them, *Pitta Dosha* governs transformation and metabolism, regulating digestion, tissue metabolism, thermoregulation, vision, and higher intellectual activities. Classical texts classify *Pitta* into five functional subdivisions—*Pachaka*, *Ranjaka*, *Sadhaka*, *Alochaka*, and *Bhrajaka*—each possessing distinct anatomical locations and physiological functions.[1] Among these, *Sadhaka Pitta* is unique because it primarily regulates higher cognitive and emotional functions. Situated in the *Hridaya*, it governs *Buddhi* (intellect), *Medha* (higher intelligence), *Smriti* (memory), *Dhairya* (courage), *Utsaha* (enthusiasm), emotional balance, and the accomplishment of desired goals. *Sushruta* describes *Sadhaka Pitta* as:

यत् हृदये पित्तं तस्मिन् साधकोऽग्निरिति संज्ञा।
सोऽभिप्रार्थितमनोरथसाधनकृदुक्तः॥

(Sushruta Samhita, Sutrasthana 21/10) [2]

The term *Sadhaka* is derived from the Sanskrit root *सध्*, meaning "to accomplish" or "to achieve," indicating its role in transforming intention into purposeful action through coordinated cognitive and emotional processes. In Ayurveda, *Hridaya* is regarded as more than a circulatory organ; it is considered the seat of *Chetana* (consciousness), *Manas* (mind), *Buddhi* (intellect), and *Ojas*, reflecting its role in integrating mental and physiological functions.[3] This concept bears a striking resemblance to the modern heart–brain axis, where continuous interaction between the heart, brain, autonomic nervous system, and endocrine pathways regulates cognition, emotions, and cardiovascular homeostasis. Contemporary neurocardiology further demonstrates that the heart possesses an intrinsic neural network capable of bidirectional communication with the brain, influencing emotional processing and autonomic regulation.[4] Modern neuroscience has also established that cognition, motivation, emotional regulation, learning, and memory are mediated by the coordinated actions of catecholamines and neurotransmitters, including dopamine, norepinephrine, epinephrine, serotonin, acetylcholine, gamma-aminobutyric acid, and glutamate.[5] The physiological roles of these neurochemical mediators closely parallel the functions attributed to *Sadhaka Pitta*, suggesting a conceptual relationship between classical Ayurvedic principles and contemporary neurophysiology. Despite these similarities, a comprehensive review integrating the Ayurvedic concept of *Sadhaka Pitta* with current evidence from neurocardiology and psychophysiology remains limited. Therefore, the present review critically examines the classical description of *Sadhaka Pitta* and explores its functional correlation with modern concepts of neurocardiac regulation and neurophysiology to provide an integrative understanding of

its role in maintaining cognitive, emotional, and cardiovascular homeostasis.

2. MATERIALS AND METHODS

Study Design

The present study was conducted as a narrative review to evaluate the physiological significance of *Sadhaka Pitta* and its functional correlation with contemporary concepts of neurocardiac and psychophysiological regulation.

Literature Sources

Classical Ayurvedic literature was reviewed using authoritative texts, including the *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, and their standard commentaries. Contemporary biomedical evidence was retrieved from PubMed, Scopus, Google Scholar, Web of Science, and ScienceDirect. Relevant studies related to neurocardiology, the heart–brain axis, autonomic nervous system, catecholamines, neurotransmitters, cognition, emotional regulation, and cardiovascular physiology were critically reviewed to establish functional correlations with *Sadhaka Pitta*.

3. RESULT

Classical Concept of *Sadhaka Pitta*

Among the five subdivisions of *Pitta Dosha*, *Sadhaka Pitta* occupies a unique position because it governs higher cognitive and emotional functions rather than local metabolic activities. Classical Ayurvedic literature describes it as the functional principle responsible for cognition, memory, emotional regulation, determination, and the accomplishment of purposeful actions. Located in the *Hridaya*, *Sadhaka Pitta* establishes a functional relationship between the mind and the cardiovascular system, indicating an intimate association between psychological processes and physiological regulation. Unlike the other subtypes of *Pitta*, *Sadhaka Pitta* regulates *Buddhi* (intellect), *Medha* (higher intelligence), *Smriti* (memory), *Dhairya* (courage), *Utsaha* (enthusiasm), *Harsha* (joy), *Nirnaya Shakti* (decision-making), emotional balance, and goal-directed behaviour. These functions collectively enable learning, adaptation, behavioural responses, and successful achievement of desired objectives, highlighting *Sadhaka Pitta* as an integrative psychophysiological regulator rather than merely a metabolic entity.

Functional Correlation of *Sadhaka Pitta* with Catecholamines

The physiological functions attributed to *Sadhaka Pitta* closely parallel those regulated by catecholamines in modern neuroscience. However, this relationship should be regarded as a functional correlation rather than a direct biochemical equivalence. Similar to *Sadhaka Pitta*, catecholamines coordinate cognition, motivation, emotional adaptation, stress

responses, and cardiovascular regulation through the integrated actions of the nervous, endocrine, and autonomic systems.

Dopamine

Among the catecholamines, dopamine demonstrates the closest conceptual similarity with *Sadhaka Pitta*. Dopaminergic pathways regulate motivation, reward processing, reinforcement learning, executive function, and goal-directed behaviour, enabling an individual to initiate and accomplish purposeful activities. These actions closely resemble the Ayurvedic concept of *Abhiprarthita Manoratha Sadhana* (accomplishment of desired goals). Furthermore, dopamine deficiency is associated with reduced motivation, impaired concentration, apathy, and depressive symptoms, which conceptually resemble *Sadhaka Pitta Kshaya*, characterized by diminished enthusiasm, weakened determination, and impaired cognitive performance. [6-7]

Norepinephrine

Norepinephrine regulates vigilance, sustained attention, mental alertness, and adaptation to physical and psychological stress. By enhancing cognitive processing and behavioural readiness, it enables appropriate responses to challenging situations. These functions closely parallel the roles of *Sadhaka Pitta* in promoting *Dhairya* (courage), *Utsaha* (enthusiasm), mental clarity, and psychological resilience. Thus, balanced noradrenergic activity may represent one of the neurophysiological mechanisms underlying the adaptive functions attributed to *Sadhaka Pitta*. [8]

Epinephrine

Epinephrine primarily mediates the physiological response to acute stress by increasing heart rate, myocardial contractility, cardiac output, blood pressure, and cerebral perfusion, thereby preparing the body for immediate action. These cardiovascular adaptations are accompanied by heightened mental alertness and behavioural readiness. From an Ayurvedic perspective, these coordinated responses may be interpreted as the functional expression of *Sadhaka Pitta* acting in conjunction with *Vyana Vata*, integrating emotional stimuli with cardiovascular adaptation during stressful conditions. [9]

Functional Correlation of *Sadhaka Pitta* with Neurotransmitter

While catecholamines primarily regulate motivation and stress responses, higher cognitive and emotional functions are mediated by the coordinated actions of multiple neurotransmitters. Learning, memory, emotional regulation, attention, and behavioural adaptation result from the interaction of excitatory and inhibitory neural pathways. Similarly, Ayurveda attributes these integrated psychological functions to *Sadhaka Pitta*, indicating that it represents a higher-order psychophysiological regulator rather than a single biochemical entity.

Serotonin

Serotonin regulates mood, emotional stability, sleep, social behaviour, and psychological well-being. Adequate serotonergic activity promotes emotional resilience, whereas its deficiency is associated with anxiety, depression, irritability, and poor stress tolerance. These functions closely correspond to the role of balanced *Sadhaka Pitta* in maintaining *Harsha* (joy), emotional equilibrium, and mental composure. Disturbance of *Sadhaka Pitta* may similarly manifest as emotional instability, irritability, anxiety, and loss of enthusiasm. [10]

Acetylcholine

Acetylcholine plays a vital role in learning, attention, memory, and higher cognitive processing through cortical and hippocampal pathways. These functions parallel the Ayurvedic concepts of *Buddhi* (intellect), *Medha* (higher intelligence), and *Smriti* (memory), which are governed by *Sadhaka Pitta*. Cholinergic activity may therefore represent one of the neurophysiological mechanisms underlying these cognitive functions. [11]

Gamma-Aminobutyric Acid

Gamma-aminobutyric acid is the principal inhibitory neurotransmitter of the central nervous system and is essential for maintaining neuronal stability and emotional balance. By limiting excessive neuronal excitation, it reduces anxiety and promotes psychological calmness. These actions conceptually resemble the role of *Sadhaka Pitta* in maintaining emotional restraint, balanced judgement, and appropriate behavioural responses. [12]

Glutamate

Glutamate is the major excitatory neurotransmitter involved in synaptic plasticity, learning, memory, and information processing. Normal glutamatergic activity supports cognitive performance, whereas excessive activation may lead to neuronal hyperexcitability, emotional irritability, and impaired mental equilibrium. This closely parallels the Ayurvedic concept that balanced *Sadhaka Pitta* promotes intellectual clarity and effective decision-making, while its aggravation results in emotional and cognitive disturbances. [13]

Sadhaka Pitta, *Hridaya*, and Neurocardiac Integration

Ayurveda describes *Sadhaka Pitta* as residing in the *Hridaya*, where it regulates cognition, emotional balance, and purposeful behaviour, extending the role of *Hridaya* beyond circulation to an integrative centre of mental and physiological functions. [14] Modern neurocardiology likewise recognises the heart as an active neurocardiac organ possessing an intrinsic nervous system and continuous bidirectional communication with the brain through autonomic and neuroendocrine pathways. These interactions influence cognition, emotional processing, and cardiovascular homeostasis. The functional convergence of these concepts suggests that *Sadhaka Pitta* may be interpreted as an integrative principle coordinating neural, autonomic,

endocrine, and cardiovascular functions, thereby providing a conceptual bridge between classical Ayurvedic physiology and contemporary neurocardiac science.

Clinical Significance

The functional integrity of *Sadhaka Pitta* is essential for maintaining cognition, memory, emotional stability, motivation, and adaptive cardiovascular responses. Its imbalance may contribute to impaired concentration, reduced motivation, anxiety, emotional instability, altered autonomic regulation, and stress-related cardiovascular disorders. These observations support the relevance of *Sadhaka Pitta* as an Ayurvedic framework for understanding mind–heart interactions and provide a foundation for future interdisciplinary research in neurocardiology and integrative medicine.[15]

4. DISCUSSION

The present review demonstrates that the classical concept of *Sadhaka Pitta* closely corresponds to the integrated regulation of cognition, emotion, autonomic function, and cardiovascular homeostasis described in contemporary physiology. Rather than representing a single metabolic or biochemical entity, *Sadhaka Pitta* may be interpreted as a functional principle coordinating multiple neurophysiological processes involved in adaptive behaviour and psychological well-being. The localisation of *Sadhaka Pitta* in the *Hridaya* is particularly noteworthy. While Ayurveda describes *Hridaya* as the centre of mental and physiological activities, modern neurocardiology recognises the heart as an active neurocardiac organ that continuously communicates with the brain through neural and autonomic pathways. This functional similarity provides a scientific basis for understanding the integrative role of *Hridaya* in both psychological and cardiovascular regulation. The observed parallels between *Sadhaka Pitta* and catecholamines, neurotransmitters, and the heart–brain axis should be regarded as functional correlations rather than direct biochemical equivalences. These findings support an integrative interpretation of *Sadhaka Pitta* while highlighting the need for further experimental and clinical studies combining Ayurvedic principles with modern neurophysiological and cardiovascular biomarkers to validate these concepts.

4. CONCLUSION

Sadhaka Pitta occupies a unique position in Ayurvedic physiology by regulating cognition, memory, emotional stability, motivation, decision-making, and purposeful behaviour. Its functions extend beyond metabolism and reflect the close integration of mental, autonomic, and cardiovascular processes. Functional similarities with contemporary concepts of neurocardiology and neurophysiology suggest that *Sadhaka Pitta* may be understood as an integrative psychophysiological regulator coordinating neural, endocrine, autonomic, and

cardiovascular functions. Although these correlations are conceptual rather than direct biochemical equivalences, they provide a scientific framework for interpreting classical Ayurvedic knowledge in the context of modern medicine. Future interdisciplinary research integrating Ayurvedic principles with advances in neuroscience and cardiovascular science may further clarify the physiological significance and clinical relevance of *Sadhaka Pitta* in stress-related, psychosomatic, and cardiovascular disorders.

Acknowledgements

All the authors thank the library of Jammu Institute of Ayurveda and Research and Dhanwanti Library University of Jammu, for providing access to literature resources. The authors also acknowledge the classical Ayurvedic scholars and contemporary researchers whose contributions have advanced the understanding of neurophysiology and cardiovascular science.

Funding

The author received no specific funding for this work.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this review.

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