INTEGRATIVE UNDERSTANDING OF *SADHAKA PITTA*: PHYSIOLOGICAL AND PSYCHOLOGICAL DIMENSIONS IN COGNITIVE REGULATION

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ABSTRACT

Background: *Sadhaka Pitta*, one of the five sub-types of *Pitta Dosha* described in Ayurveda, is located in the *Hridaya* (heart) and governs higher mental functions such as cognition, intellect (*Buddhi*) and emotional regulation (*Abhimana*). Classical Ayurvedic texts highlight its dual role in both physiological transformation and psychological processing, reflecting an early understanding of the mind-body interface. From a modern integrative perspective, *Sadhaka Pitta* can be correlated with neurochemical systems that regulate emotional stability, stress response and cognitive performance through neurotransmitters such as acetylcholine, serotonin and dopamine. *Sadhaka Pitta*, located in the *Hridaya*, can also be correlated with the heart-brain axis and cardiac hormones in relation to its functional roles. **Objectives:** To integrate Ayurveda concept of *Sadhaka Pitta* with modern neurophysiological insights, offering a holistic framework for understanding cognitive regulation. **Materials and Methods:** literary searches were conducted using classical text in *Ayurveda* and contemporary books, Articles and many other sources. **Conclusion:** Sadhaka Pitta offers a unified Ayurvedic framework that connects physiological processes, emotional balance and cognitive regulation, especially neurophysiological mechanism of heart brain axis and heart hormones.

Key words: *Sadhaka Pitta*, Cognition, Heart-Brain axis, Intrinsic Cardiac Nervous System

INTRODUCTION

In classical Ayurveda, the three *Doshas* - *Vata*, *Pitta* and *Kapha* govern physiological and psychological functions. Among the subtypes of *Pitta*, *Sadhaka Pitta* is situated in the heart (*Hridaya*) and is attributed to cognitive and emotional functions including intellect (*buddhi*)[1]. This article examines the role of *Sadhaka Pitta* in cognition, its location and functions in classical texts, mechanisms proposed in modern Ayurvedic physiology.

ETYMOLOGY OF *SADHAKA PITTA*

The term *Sadhaka* derived from the root word "*Saadha*" which means to accomplish, achieve or fulfill. Thus Sadhaka Pitta is that functional entity which enables the realisation of intentions and aspiration.

LOCATION AND FUNCTIONS

Table 1: location and functions of *Sadhaka Pitta* by different *Acharyas*

Classical Reference	***Sthana***	***Karma* (Function)**
Charaka Samhita (Chakrapani tika on C.Su.12/11)[2]	*Hridaya*	*Shaurya, Harsha, Moha, Bhaya, Krodha*
Susruta Samhita (Dalhaṇa tika on Su. Su. 21/10)[3]	*Hridaya*	It helps in fulfilling one's M*anoratha* and *Purushartha* by eliminating Kapha and Tamas from the *Hridaya*, enhancing *Sattva Guṇa*, and thereby enabling the *Manas* to perceive objects with clarity and precision
Susruta Samhita (Dalhaṇa tika on Su. Su. 15/4)[4]	*Hridaya*	*Ojakrita*, *Medha*
Ashtanga Hridaya (Sarvangasundara tika on A.H. Su. 12/13)[5]	*Hridaya*	*Buddhi*, *Medha*, *Abhimana.*
Ashtanga Samgraha[6]	*Hridaya*	The individual experiences enthusiasm in activities related to *Buddhi*, *Medha*, and *Abhimana* (self-esteem), which facilitates the fulfillment of desires
Madhava Nidana [7]	*Hridaya*	*Buddhi* (intelligence) and *Medha* (discriminative ability)
sarangadhara Samhita[8]	*Hridaya*	Responsible for *Buddhi* (intelligence), *Medha* (discriminative ability) (*Medha prajnanakara*)
Bhavaprakasha Nighantu[9]	*Hridaya*	Pacify the excess *kapha* and *tama*
Bhela Samhita[10]	*Hridaya*	To achieve *Chaturvarga*

Therefore *Sadhaka Pitta* can be viewed as the Ayurvedic principle that regulates cognitive functions such as intelligence, memory etc.

MODERN INTERPRETATIONS

Neurotransmitter Systems and Cognitive Regulation

Neurotransmitters are chemical messengers that enable communication among neurons and significantly influence cognition, mood, motivation and memory. Contemporary reviews suggest that Ayurvedic descriptions of *Sadhaka Pitta's* role correlate with the neurotransmitter systems governing higher brain functions:

- Acetylcholine - learning and memory
- Dopamine - motivation, reward and executive processing
- Serotonin - mood regulation and emotional equilibrium
- Norepinephrine - attention and arousal states

Such parallels support the interpretation that the transformative *and* directive nature of *Sadhaka Pitta* may reflect integrated neurotransmitter activity and neuronal network functioning that underlie cognition.[11]

Heart-Brain Axis and Psychophysiology

In modern era the brain is seen as the main organ for thinking and memory. However, in ancient times, memory was believed to be spread throughout the body. Aristotle and other early thinkers supported the cardiocentric view, which considered the heart to be the center of intelligence, movement and emotions. Aristotle believed that the heart controls learning and adaptation through the flow of blood, as it is connected to all organs and tissues by the circulatory system.[12] In the 19th century, Claude Bernard and Carl Ludwig showed that the autonomic nervous system (ANS) through its sympathetic and parasympathetic branches controls heart rate and cardiac strength. Later, Walter Cannon demonstrated that emotions strongly affect heart function and proposed that excessive sympathetic activation and adrenaline release can cause heart failure. These findings led to the development of Neurocardiology, which studies heart-brain interactions.[13]

Neurobiological and Neurobehavioral studies have firmly established that the biochemical mechanisms of memory are primarily localized in the brain. However, emerging evidence suggests that peripheral organs may also participate in memory consolidation and retention due to the presence of extra-cephalic nervous systems. Consequently, the role of peripheral organs in regulating neuroplasticity has become an expanding area of research.

The enteric nervous system (ENS), often termed the "second brain" consists of an extensive network of neurons and glial cells capable of independent function, while maintaining bidirectional communication with the brain through the gut-brain axis. Similarly advances in Neurocardiology and systems Neuroscience have identified complex neuronal networks within the heart, known as the intrinsic cardiac nervous system (ICNS). Owing to its

semi-autonomous information processing and its influence on brain activity, emotional states and psychophysiological balance, the heart has been metaphorically described as a "third brain."

The medulla oblongata regulates heart rate, contractility and vascular tone via sympathetic and parasympathetic pathways, integrating feedback from chemoreceptors and baroreceptors to maintain homeostasis. Beyond basic autonomic control, this neurocardiac axis interacts with higher brain regions, including the insular cortex and anterior cingulate gyrus, linking emotional and cognitive processing with cardiac regulation. Through these pathways, cardiac function influences attention, emotional states and adaptive decision-making, highlighting the heart's role in supporting cognition. Additionally, the hypothalamic-pituitary-adrenal axis and neurohormonal signaling, including stress hormones like cortisol and adrenaline, modulate both cardiac output and cognitive performance under varying physiological and psychological conditions.[14]

Heart Hormones and their Role in Cognition

Traditionally, natriuretic peptides are recognized for their role in cardiovascular and fluid electrolyte regulation. However, evidence indicates that these peptides also function within the central nervous system as neuromodulators. Atrial natriuretic peptide (ANP), Brain natriuretic peptide (BNP) and C-type natriuretic peptide (CNP) are expressed in various brain regions involved in cognition suggesting their contributory role in learning, memory, emotional regulation and neuroprotection.

ANP is widely distributed in the hypothalamus, hippocampus and cerebral cortex. Within the CNS, ANP modulates learning and memory processes and plays a significant role in stress regulation. It inhibits the hypothalamic-pituitary-adrenal (HPA) axis and antagonizes vasopressin activity, thereby influencing emotional behavior, attention and anxiety. Additionally, ANP enhances cerebral blood flow through vasodilation, indirectly supporting cognitive performance. Its neuroprotective role has been demonstrated in conditions of cerebral ischemia and stress-related cognitive dysfunction.

BNP is expressed in the hypothalamus and brainstem, where it primarily regulates neuroendocrine and autonomic functions. Unlike ANP and CNP, BNP has a limited direct role in higher cognitive processes. However, it indirectly influences cognition by reducing neurohumoral stress and improving cerebral perfusion. Clinically, elevated BNP levels observed in heart failure are often associated with cognitive impairment, which is largely secondary to compromised cerebral blood flow rather than a direct neuronal effect.

CNP is the most prominent natriuretic peptide involved in cognition. It is abundantly expressed in the hippocampus, cerebral cortex, and olfactory regions. CNP plays a crucial role in synaptic plasticity and long-term potentiation, both of which are fundamental to learning and memory. Through activation of natriuretic peptide receptor-B (NPR-B) and the cGMP signaling pathway, CNP regulates neuronal growth, differentiation, and neurotransmitter release. Disruption of CNP signaling has been linked to neurodevelopmental abnormalities and cognitive dysfunction, highlighting its importance in maintaining normal cognitive processes.[15]

CONCLUSION

Sadhaka Pitta, described in classical Ayurvedic texts as residing in the *Hridaya*, emerges as a central regulator of cognition, emotion, motivation and purposeful action. Classical references consistently attribute to *Sadhaka Pitta* functions related to *Buddhi*, *Medha*, *Abhimana* and emotional balance, highlighting its pivotal role in mental clarity and psychological well-being. When viewed through a modern physiological lens, these functions closely parallel integrated activity of neurotransmitter systems, cortical-limbic brain networks and autonomic regulation mediated through the heart-brain axis. Advances in Neurocardiology, systems neuroscience and neuroendocrinology demonstrate that the heart is not merely a mechanical pump but an active neurohumoral organ influencing cognition, mood and stress responses via intrinsic cardiac neurons, vagal signaling and cardiac hormones such as natriuretic peptides. Thus, correlating Sadhaka Pitta with heart-centered neurophysiological and neurohormonal mechanisms provides a coherent integrative framework that bridges Ayurvedic wisdom with contemporary neuroscience, reinforcing the relevance of classical concepts in understanding cognition and mental health

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