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A CRITICAL REVIEW ON PRANAVAHA SROTAS AND ITS CORRELATION WITH CONTEMPORARY MODERN SCIENCE

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ABSTRACT

Pranavaha Strotas, one of the fundamental strotas described in Ayurveda, is traditionally understood as the channel system responsible for the regulation of prana—a life-sustaining force closely associated with respiration. In contemporary biomedical terms, the respiratory system integrates multiple levels of neural, vascular, and autonomic regulation to maintain homeostasis. This article attempts a conceptual synthesis, viewing Pranavaha Srotas through the lens of systems physiology, mapping it to the respiratory neurofunctional axis, including brainstem respiratory centers, cranial nerves, pulmonary structures, and autonomic pathways. The study demonstrates that the Ayurvedic notion of prana aligns with neuro respiratory regulation and highlights the relevance of traditional wisdom in modern integrative physiology.

KEYWORDS: Pranavaha srotas, respiration, neurofunctional axis, Ayurveda, systems physiology.

INTRODUCTION

Ayurveda conceptualizes the human body as governed by doshas, dhatus, and srotas. Among the srotas, the Pranavaha Srotas plays a critical role in maintaining vitality through respiration and consciousness.[1] While classically linked to respiration, the Pranavaha Srotas also encompasses broader physiological activities including circulation of prana, regulation of voice, mental clarity, and sensory-motor integration.[2]

In modern physiology, the respiratory system is not an isolated mechanical system but a dynamic neurofunctional axis involving the brainstem, peripheral nerves, lungs, and feedback systems.[3] This paper explores the equivalence and integration of these concepts, proposing that Pranavaha Srotas can be understood as the respiratory neurofunctional axis comprising neural, pulmonary, and systemic networks.

Pranavaha Srotas: Classical Ayurvedic Description

According to Charaka Samhita and Sushruta Samhita, Pranavaha Srotas originates from the Hridaya (heart) and Mahasrotas (lungs)And Rsavaha Dhamani(Blood vessels).[4] Its mulasthana (roots) include:

Hridaya (heart): Central to the circulation and consciousness.

Rasavaha Dhamani(Blood Vessels): For transportation of nutrients.

Mahasrotas (Lungs): Site of respiration.

The major vitiating factors include smoke inhalation, suppression of natural urges, overexertion, and consumption of incompatible food.[5] The vitiation of Pranavaha Srotas is said to lead to conditions like Swasa (dyspnea), Kasa (cough), and even sudden loss of life (prana-nasha).[6]

Pranavata, a subtype of Vata dosha, governs the function of Pranavaha Srotas. It resides in the mastishka (brain) and urdhva jatrugata sthana (upper thoracic region), and its primary function includes respiration, swallowing, speech, and perception.[7]

Neurofunctional Axis of Respiration: A Modern Overview

1. Central Respiratory Centers

The medulla oblongata houses the dorsal respiratory group (DRG) and ventral respiratory group (VRG), regulating rhythm and forced breathing.

The pons modulates these rhythms via the pneumotaxic and apneustic centers.[8]

2. Peripheral Chemoreceptors and Baroreceptors

Located in the carotid bodies and aortic arch, these receptors monitor CO_2, O_2, and pH levels and communicate with the central centers via cranial nerves IX and X.[9]

3. Cranial and Spinal Innervation

Phrenic nerve (C3–C5): Controls diaphragm.

Vagus nerve (CN X): Provides afferent and efferent fibers to lungs and airway.

Glossopharyngeal nerve (CN IX): Transmits chemosensory data.

Intercostal nerves (T1–T11): Assist in chest wall movement.[10]

4. Autonomic Integration

Sympathetic fibers (T1–T4): Bronchodilation and increased respiratory rate.

Parasympathetic fibers (Vagus): Bronchoconstriction and secretion.[11]

This complex network supports the concept of a respiratory neurofunctional axis—a system involving structural, neural, and sensory-motor feedback loops.

Pranavaha Srotas and the Neurofunctional Axis: Conceptual Mapping

Ayurvedic Component	Modern Correlate
Hridaya	Heart + Medullary Cardiovascular Center
Mahasrotas	(lungs) Pulmonary structures and airways

This framework aligns the Pranavaha Srotas with a neurovisceral integrative axis that is not limited to mechanical respiration but includes sensory processing, autonomic regulation, and consciousness maintenance.

Physiological Implications of the Integration

1. Respiration and Consciousness

In Ayurveda, prana is not merely air but the life-force sustaining consciousness. The reticular activating system and its connection to medullary centers resonate with the concept of prana shakti.[12]

2. Voice and Speech

Pranavata aids in speech, akin to vagus and recurrent laryngeal nerve involvement in phonation.[13]

3. Emotion and Breath

The limbic system's control over breathing, including changes due to fear or calmness, mirrors manovaha srotas influence on pranavaha srotas, highlighting the psychophysiological interface.[14]

Clinical Implications

1. Swasa Roga and COPD

Ayurveda describes five types of Swasa Roga, the severe form (mahaswasa) correlating with chronic obstructive pulmonary disease (COPD). Treatment includes vatanulomana and rasayana, which may support modern respiratory rehabilitation.[15]

2. Pranayama and Neural Plasticity

Pranayama is not just a breath regulation tool but a way to modulate the autonomic nervous system, improve vagal tone, and enhance respiratory neuroplasticity.[16]

3. Vata Vyadhi and Neurogenic Respiratory Disorders

Neurodegenerative conditions like brainstem strokes affecting respiratory centers mirror vata vyadhi manifestations involving pranavaha srotas derangement.[17]

Therapeutic Correlations

Ayurvedic Intervention and Modern Neurofunctional Impact

Nasya karma-Enhances olfactory-vagal feedback and CNS access

Pranayama- Vagal tone improvement, respiratory rhythm entrainment

Abhyanga around chest/neck-Somatic-autonomic interface stimulation

Hrid basti-Modulation of cardiac-respiratory autonomics

DISCUSSION

The conceptualization of Pranavaha Srotas as a respiratory neurofunctional axis bridges ancient holistic understanding with current systems physiology. It also challenges reductionist perspectives by proposing a dynamic field of neurocardiorespiratory interaction, emotional regulation, and consciousness.

Unlike isolated anatomical classifications, srotas theory incorporates flow, interaction, and transformation, making it akin to modern systems biology models. Recognizing such parallels promotes a richer dialog between Ayurveda and biomedical science.

CONCLUSION

The Pranavaha Srotas is more than a respiratory conduit; it represents an integrative neurofunctional axis involved in life-sustaining processes. Aligning it with the brainstem–lung–vagal–cardiovascular axis in modern physiology reveals the sophistication of Ayurvedic thought and opens doors for integrative therapeutic approaches in managing respiratory and neuroautonomic disorders.

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