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PRANA VATA AND THE VAGUS NERVE: AN INTEGRATIVE REVIEW OF POSSIBLE NEUROANATOMICAL AND FUNCTIONAL CORRELATES

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ABSTRACT

Background: In Ayurveda, *Prāṇa Vāta* is regarded as a major functional subdivision of *Vāta* and is associated with breathing, swallowing, phonation, sensory awareness, mental activity, and the maintenance of vital functions. In contemporary neuroanatomy, the vagus nerve (cranial nerve X) is the principal parasympathetic connection between the brainstem and the thoracic and abdominal viscera. Because the two concepts share several physiological domains, a careful comparative analysis may help clarify where the similarities are meaningful and where they should not be overstated.

Objective: To examine the classical description of *Prāṇa Vāta* alongside the anatomy and physiology of the vagus nerve and to identify plausible areas of functional convergence.

Methods: A narrative integrative review was undertaken using classical Ayurvedic texts, including the *Charaka Saṃhitā*, *Suśruta Saṃhitā*, *Aṣṭāṅga Hṛidaya*, *Aṣṭāṅga Saṅgraha*, and *Śārāṅgadharma Saṃhitā*. These descriptions were compared with information from standard anatomy and neuroanatomy texts and selected literature concerning vagal physiology, swallowing, memory, neurogastroenterology, and the gut–brain axis.

Results: The closest correspondences were observed in the regulation of swallowing, phonation, cardiac parasympathetic activity, gastrointestinal function, visceral sensation, and several respiratory reflexes. Broader functions attributed to *Prāṇa Vāta*—such as intellect, consciousness, memory, and global sensory control—cannot be explained by the vagus nerve alone and are more likely to involve distributed central and autonomic networks.

Conclusion: The vagus nerve may be considered an important, but partial, neuroanatomical correlate of *Prāṇa Vāta*. This interpretation is most useful when presented as a functional comparison rather than as a direct one-to-one anatomical equivalence. Further experimental and clinical research is required before stronger conclusions can be drawn.

Keywords: *Prāṇa Vāta; vagus nerve; Ayurveda; neuroanatomy; autonomic nervous system; cranial nerve X; gut–brain axis.*

INTRODUCTION

Ayurveda describes *Vāta* as the principle responsible for movement, communication, and regulation within the body. Classical texts divide *Vāta* into five functional subdivisions—*Prāṇa*, *Udāna*, *Samāna*, *Vyāna*, and *Apāna*—each of which is assigned a distinct field of activity [1]. Among them, *Prāṇa Vāta* is given particular importance because it is linked with functions that are immediately necessary for life, including respiration, swallowing, sensory reception, mental activity, and cardiac regulation.

The vagus nerve is the tenth cranial nerve and the most extensive parasympathetic nerve of the body. Arising from the medulla oblongata, it carries sensory, motor, and parasympathetic fibres to structures in the neck, thorax, and abdomen. Through these pathways, it participates in swallowing and phonation, modulates cardiac activity, influences gastrointestinal motility and secretion, and conveys a large volume of visceral sensory information to the brainstem.

The overlap between these physiological roles has encouraged attempts to interpret *Prāṇa Vāta* in relation to the vagus nerve. Such comparisons can be useful, but they require restraint. *Prāṇa Vāta* is a broad functional construct developed within the conceptual framework of Ayurveda, whereas the vagus nerve is a clearly defined anatomical structure. The present review therefore explores correspondence rather than equivalence, with emphasis on both the strengths and the limits of the proposed relationship.

CLASSICAL AYURVEDIC DESCRIPTION OF PRĀṆA VĀTA

Classification and location

Suśruta Saṃhitā describes the fivefold division of *Vāta* as follows:

“प्राण उदानौ समाने च व्यानोऽपानश्च वायवः।”
(*Suśruta Saṃhitā, Nidāna Sthāna 1/12*)

This classification identifies *Prāṇa*, *Udāna*, *Samāna*, *Vyāna*, and *Apāna* as the five principal functional expressions of *Vāta* [1]. *Acharya Charaka* locates *Prāṇa Vāta* primarily in the head and describes its movement through the chest and throat [2]. Related descriptions in *Aṣṭāṅga Hṛidaya* associate it with the head, thorax, and throat [3,4], while *Śārāṅgadhara Saṃhitā* also refers to the umbilical and cardiac regions in the context of *Prāṇa Vāta* [5].

“मूर्ध्नि स्थितः प्राणवायुः उरःकण्ठचरस्तथा।”
(*Charaka Saṃhitā, Chikitsā Sthāna 28/7*)

Functions attributed to *Prāṇa Vāta*

Classical descriptions connect *Prāṇa Vāta* with the support of intellect, the heart, the senses, and the mind. It is also associated with sneezing, belching, respiration, and the entry of food during swallowing [6].

“बुद्धिहृदयेन्द्रियचित्तधृक्। छीवनक्षवधूद्वारनिःश्वासान्नप्रवेशकृत्॥”
(*Aṣṭāṅga Hṛdaya, Sūtra Sthāna 12/4*)

In *Aṣṭāṅga Saṅgraha*, Acharya Vriddha Vagbhata further uses the expression dhamanī-dhāraṇa, suggesting a sustaining or regulatory influence over channels and vital pathways [7]. Acharya Charaka also relates *Prāṇa Vāta* to *buddhi* (intellect), *smṛiti* (memory), and *chetanā* (conscious awareness) [8]. These descriptions indicate that *Prāṇa Vāta* extends beyond a single organ system and represents an integrated regulatory concept.

MATERIALS AND METHODS

Study design

This work was designed as a narrative integrative review. Its purpose was not to establish anatomical identity, but to compare the functional domains described in Ayurveda with known vagal anatomy and physiology.

Sources of information

Classical material was drawn from the *Bṛhatrayī* and *Laghutrayī*, together with relevant commentaries. Modern anatomical information was obtained from standard anatomy, clinically oriented anatomy, neuroanatomy, and physiology texts. Selected publications and educational sources relating to vagal physiology, swallowing, memory, serotonin, and gut-brain communication were also considered.

Analytical approach

The review was carried out in three stages: first, the location and functions of *Prāṇa Vāta* were identified from classical sources; second, the origin, course, distribution, and major functions of the vagus nerve were summarised; and third, areas of strong, partial, or indirect correspondence were examined. Particular attention was paid to avoiding a simplistic one-structure-to-one-concept interpretation.

RESULTS: COMPARATIVE OBSERVATIONS

Neuroanatomical basis of the vagus nerve

The vagus nerve emerges from the medulla oblongata and leaves the cranial cavity through the jugular foramen. Its major brainstem nuclei include the nucleus ambiguus, the dorsal motor nucleus of the vagus, and the nucleus tractus solitarius. These nuclei contribute branchial motor, parasympathetic efferent, and visceral sensory components.

In the neck, vagal branches participate in pharyngeal and laryngeal function. In the thorax, the nerve contributes to cardiac and pulmonary plexuses. It continues into the abdomen, where vagal pathways influence the oesophagus, stomach, small intestine, and proximal part of the large intestine. A substantial proportion of vagal fibres are afferent, carrying information from the viscera towards the brainstem.

Functional comparison

Functional domain	Classical description of <i>Prāṇa Vāta</i>	Relevant vagal role	Degree of correspondence
Respiration	<i>Śvāsa; niḥśvāsa-ucchvāsa</i>	Visceral afferent input and modulation of	Partial

Functional domain	Classical description of <i>Prāṇa Vāta</i>	Relevant vagal role	Degree of correspondence
		pulmonary and airway reflexes	
Swallowing	<i>Anna-praveśa</i>	Sensory and motor participation in pharyngeal and oesophageal phases of swallowing	Strong
Speech and phonation	<i>Vāk-pravṛtti</i>	Motor supply to laryngeal muscles through superior and recurrent laryngeal branches	Strong
Cardiac regulation	<i>Hṛidaya-kriyā</i>	Parasympathetic modulation of heart rate and atrioventricular conduction	Strong
Gastrointestinal regulation	Support of ingestion and visceral function	Regulation of motility, secretion, satiety signalling, and visceral sensory transmission	Strong/partial
Mental and emotional regulation	<i>Buddhi, manas, smṛiti, chetanā</i>	Indirect influence through interoception, autonomic regulation, and gut–brain communication	Indirect
Sensory integration	<i>Indriya-dhāraṇa</i>	Visceral sensory transmission rather than global somatic or special sensation	Partial

Table 1: Functional comparison between *Prāṇa Vāta* and the vagus nerve

DISCUSSION

The comparison shows that the proposed relationship is most convincing in functions that are directly mediated by vagal pathways. Swallowing is a clear example. The vagus nerve, together with the glossopharyngeal nerve and medullary swallowing centres, coordinates sensory input and motor output during the pharyngeal and oesophageal phases of deglutition [10,11]. This provides a plausible modern correlate for *anna-praveśa*, the entry and passage of food described among the functions of *Prāṇa Vāta*.

A similarly strong relationship is evident in phonation. The superior and recurrent laryngeal branches of the vagus nerve supply the larynx and are essential for vocal fold movement and voice production. The classical association of *Prāṇa Vāta* with the throat and with vital upper-airway functions therefore has a reasonable anatomical basis, although the broader Ayurvedic concept of speech may also involve *Udāna Vāta* and higher cortical language networks.

Cardiac regulation represents another important point of convergence. Vagal parasympathetic activity slows the heart rate and contributes to short-term autonomic adjustment. This corresponds functionally with the traditional association of *Prāṇa Vāta* with the *hṛidaya*. However, cardiovascular homeostasis depends on the coordinated activity of sympathetic

pathways, intrinsic cardiac mechanisms, baroreceptor reflexes, endocrine factors, and central autonomic networks; it cannot be assigned to the vagus nerve alone.

The relationship with respiration requires a more qualified interpretation. Ayurveda identifies *niḥśvāsa* and *ucchvāsa*—expiration and inspiration—as central functions of *Prāṇa Vāta* [13]. The vagus nerve carries sensory signals from airway receptors and contributes to cough, bronchomotor, and pulmonary reflexes. Nevertheless, the basic respiratory rhythm is generated primarily by respiratory neuronal networks within the brainstem. The vagus nerve is therefore better viewed as a major modulator of respiratory function rather than as the sole neural basis of breathing.

The vagus nerve also provides an important route for bidirectional communication between the brain and viscera. Vagal afferents convey information related to distension, nutrient status, inflammation, and internal physiological conditions. In the gastrointestinal tract, serotonin and other signalling molecules participate in enteric and gut–brain communication [12]. These mechanisms offer a modern framework for understanding how visceral function may influence mood, behaviour, and autonomic state, but they do not establish that cognition or consciousness is located in the vagus nerve.

The mental functions attributed to *Prāṇa Vāta* require the greatest caution. Memory, attention, conscious awareness, and intellectual activity arise from distributed cortical and subcortical networks and depend on patterns of neuronal connectivity [9]. Vagal activity may influence arousal, stress responses, emotional regulation, and interoceptive awareness indirectly, but it cannot independently account for *buddhi*, *smṛiti*, *manas*, or *chetanā*. Polyvagal theory has proposed links between vagal pathways, social engagement, and adaptation to stress; these ideas may offer an interpretive bridge, but they should be discussed as a theoretical framework rather than as established proof of equivalence.

Taken together, the evidence supports a layered interpretation. Some functions of *Prāṇa Vāta* have strong anatomical parallels in vagal motor and parasympathetic pathways; others have partial parallels through visceral afferent signalling and autonomic integration; and still others extend well beyond the vagus nerve into broader neural systems. The vagus nerve may therefore be one component of the physiological network represented by *Prāṇa Vāta*, rather than its complete anatomical counterpart.

LIMITATIONS

- *Prāṇa Vāta* is a functional Ayurvedic construct and is not described as a discrete nerve or anatomical structure.
- The present work is a narrative comparison; it does not provide experimental evidence of a direct correspondence.
- Several functions attributed to *Prāṇa Vāta* involve central, peripheral, autonomic, respiratory, and enteric networks beyond the vagus nerve.
- Differences in terminology and epistemological frameworks make exact translation between classical Ayurveda and modern neuroanatomy inherently difficult.

- Some modern references available in the original source set are educational or secondary sources; stronger peer-reviewed evidence should be incorporated in a future systematic review.

CONCLUSION

Prāṇa Vāta and the vagus nerve share meaningful functional territory, particularly in swallowing, phonation, cardiac parasympathetic regulation, gastrointestinal activity, visceral sensation, and respiratory reflex modulation. These similarities make the vagus nerve a useful neuroanatomical correlate for selected aspects of *Prāṇa Vāta*. At the same time, *Prāṇa Vāta* includes broader dimensions of cognition, consciousness, sensory regulation, and vitality that cannot be reduced to a single cranial nerve. The most scientifically defensible conclusion is therefore that the vagus nerve represents a significant partial correlate within a wider neurophysiological network. Future work should use clearly defined outcomes, validated autonomic measurements, and clinical or experimental designs to examine this proposed relationship more rigorously.

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