



Review Article

UNDERSTANDING VYANA VAYU: BRIDGING AYURVEDA AND MODERN PHYSIOLOGY

Abhirami Babu^{1*}, Anjali Sivaram²

¹MD Scholar, ²Associate Professor, Department of Kriyasareera, Govt. Ayurveda College, Tripunithura, Kerala, India.

Article info

Article History:

Received: 29-01-2024

Accepted: 22-02-2024

Published: 05-03-2024

KEYWORDS:

Vyana vayu, Vata, Dosh, Nervous system physiology.

ABSTRACT

Ayurveda is a traditional system of medicine that is based on the concept of the three *Doshas- Vata, Pitha, and Kapha*, which govern an individual's physical and mental characteristics. *Vata dosha* serves as the principle driving force within the body. *Pitha* plays a crucial role in functions such as digestion, metabolism, generating heat, and producing various forms of energy. *Kapha* is involved in both anabolic processes and maintaining structural integrity of the body. *Vata dosha* is again divided into five - *Prana, Udana, Samana, Vyana* and *Apana vayu*. Among these, *Vyana vayu* is *Mahajava*, most powerful and present throughout the entire body. **Aim:** This review explores the various aspects of *Vyanu vayu* in context of modern physiology. **Materials and Methods:** A comprehensive search for relevant information on *Vyana vayu* was done by reviewing classical texts and research articles. **Conclusion:** *Vyana vayu* assumes a vital role in the coordination and regulation of a range of physiological processes. It holds significant responsibility in overseeing the proper circulation of nutrients, and information throughout the body, primarily within the circulatory and nervous systems. The comprehension of *Vyana vayu* in contemporary physiology offers valuable insights into the interrelated nature of bodily functions. Acknowledging its influence may have meaningful implications for health and well-being, potentially enhancing the holistic approach to healthcare.

INTRODUCTION

Tridosha theory is the fundamental concept for the development of Ayurveda, a traditional system of medicine. The objective of Ayurveda encompasses two main goals: preserving health in the healthy individual and alleviating disease in the patient.^[1] A person is deemed healthy when their somatic and psychic humours are balanced, digestion functions optimally, fundamental bodily tissues operate normally, waste products are eliminated effectively, and their cognitive faculties and mental state are clear and vibrant.^[2] The emphasis placed on the equilibrium of *Doshas - Vata, Pitha* and *Kapha -* underscores their critical role in maintaining health. Any disruption in this equilibrium can lead to the onset of disease. *Vata* among them appears to be primary motive force in the body.^[3]

It is considered as the most important one as it is not only mobile, but also capable of moving *Pitha, Kapha Dhatus* and *Malas* which are incapable of independent movement of their own.^[4] The *Vata dosha* is classified into five distinct subtypes, namely *Prana, Udana, Samana, Vyana,* and *Apana*. Among these subtypes, *Vyana vayu* plays a pivotal role in orchestrating various bodily movements and *Rasa samvahana* till death.

The main functions of *Vyana vata* can be summarised as -

1. *Gati*- It involves the movements of the skeletal musculature including *Prasarana* (extension), *Akunchana* (contraction), *Vinamana* (bending), *Unnamana* (upward movement) and *Tiryaggamana* (lateral movement).
2. Circulation of *Rasa* and other *Dravadhatus* like *Raktha*.
3. Effecting the outflow of the blood from the body.
4. Effecting the outflow of sweat.
5. Separation of the essence of food from waste matter.
6. Deposition of semen inside the vaginal cavity^[5]

Access this article online

Quick Response Code



<https://doi.org/10.47070/ijapr.v12i2.3126>

Published by Mahadev Publications (Regd.)
publication licensed under a Creative Commons
Attribution-NonCommercial-ShareAlike 4.0
International (CC BY-NC-SA 4.0)

OBJECTIVES

To understand the functions of *Vyana vayu* in accordance with modern aspects of nervous system

MATERIALS AND METHODS

The literature review drew upon various Ayurvedic texts, including Samhitas such as the Caraka

OBSERVATIONS

Samhita, Susruta Samhita, Astanga Hridaya, and Astanga Sangraha. Additionally, articles were sourced from online databases such as PubMed and Google Scholar, employing keywords *Vata*, *Vyana vayu*, *Doshas*, and nervous system physiology.

Site of Vyana vayu by different Acharya

	Charaka Samhitha ^[6]	Susrutha Samhitha ^[7]	Ashtanga Hridaya ^[8]	Ashtanga Sangaraha ^[9]
Sthana (location)	<i>Vyana</i> has swift movement and spreads all over the body	<i>Vyana vayu</i> occupies entire living body. It helps in circulation of <i>Rasa</i> throughout the body.	<i>Vyana vayu</i> located in <i>Hridaya</i> and it travels along the whole body with very high velocity.	Located in heart moves all over the body with great speed.

Functions of Vyana vayu by different Acharya

	Charaka samhitha ^[6]	Susrutha Samhitha ^[7]	Ashtanga Hridaya ^[8]	Ashtanga sangaraha ^[9]
Karma (function)	Responsible for gait, flexion, extension, twinkling etc.	Responsible for sweating, blood circulation, and five type of movement like expansion, contraction upward, downward and oblique movements along with blinking and opening of eyelids.	All motor functions of the body such as <i>Mahajava</i> (rapid movement), <i>Gati</i> (movement), <i>Avakshepa</i> (flexion), <i>Utkshepa</i> (extension), <i>Nimesha</i> (closure of eyelid/ being not responsive to movement), <i>Unmesha</i> (opening eyelids/ staying responsive).	Responsible for movement, expansion, contraction, upward movement, downward movement, opening and closing of eyelids, yawning, feeling the tastes of food, clearing of the channels, causing the flow of sweat and blood, bringing the male reproductive tissue into the uterus, separating the nutrient portion and waste portion of the food (after its digestion) and supplying nourishment to all the <i>Dhatu</i> s

- *Vyana Vata* consistently propels the *Rasa dhatu* from the heart in a simultaneous, continuous, and vigorous manner throughout the entirety of the body.^[10]
- The *Rasa dhatu* is expelled from the heart and travels throughout the body via twenty-four *Dhamanies*, as described by Sushruta. This indicates that the circulation of *Rasa dhatu* occurs through all of these channels throughout the body.^[11]
- The re-entry of *Rasa dhatu* into the heart is governed by *Samana Vayu*.^[12]
- The nutrient component of digested food is referred to as *Rasa*, while waste material is termed *Purisha* and *Mutra*. After expulsion by *Vyana Vata*, this *Rasa* nourishes the tissues.^[13] *Vyana Vata* propels the *Rasa dhatu* within the body in three directions: upward, downward, and sideways through all *Dhamanies*.^[14]
- During the process of *Rasa sambhava*, Commentator Chakrapani advised physicians not to solely focus on *Rasa* but to consider blood and other fluids instead when studying the circulation of *Rasa*. The

entity responsible for the pumping function in the appropriate manner is termed *Vikshepochitta karma*, which is attributed to *Vyana vayu*. This circulation occurs continuously throughout the entire body, simultaneously and ceaselessly.^[15]

Sthana of Vyana vayu

Vyana Vata, according to Ayurveda, is centered at the *Hridaya*, representing the core or essence. In modern anatomical terms, the spinal cord serves as the pathway for transmitting sensory input to the brain and motor output from the brain. The spinalcord's gray matter includes anterior horns housing somatic motor nuclei responsible for skeletal muscle contraction and lateral horns housing autonomic motor nuclei regulating cardiac muscle, smooth muscle, and gland activity. The coordinated functions of these spinal cord regions collectively govern *Vyana Vata's* activities. Thus, regarding the spinal cord as the *Hridaya* aligns with the central or core role attributed to *Vyana Vata* in Ayurveda.^[16]

The term *Nimesa* can be interpreted as representing sleep, while *Unmesa* signifies arousal, particularly associated with the activity of the

Reticular Activating System (RAS). Additionally, these terms may also correspond to adduction and abduction, which are functions of the locomotor system. In this context, *Hridaya* should be understood as the primary motor area of the cerebral cortex, specifically the pre-central gyrus. Described as *Mahajava* or of great speed, it is involved in voluntary movements such as flexion and extension. The term *Mahajava* could refer to nerve impulses of high velocity rather than the rhythmic pulsations of the heart. Moreover, there is a belief that the functions of the vagus nerve are intricately related to *Vyana vayu* in various aspects. From this interpretation, *Vyana* denotes the motor system and the activities of both the Reticular Activating and Inhibitory Systems.

In the context of the circulation of *Rasa dhatu* (the intravascular fluid including plasma and lymph), the term *Vyana* pertains to the activities of the heart, including its intricate electrical conduction system originating from the SA (sinoatrial) node, often referred to as the heart's intrinsic pacemaker. This system involves specialized cells, including P cells, within the SA and AV (atrioventricular) nodes. The heart's pacemaker function is modulated by both parasympathetic and sympathetic components of the autonomic nervous system, notably through the activity of the Vagus nerve and the Bainbridge reflex.

Central to the regulation of autonomic reflexes related to heart function and circulation are medullary areas in the brainstem, where the vasomotor area is situated. Additionally, the limbic system also plays a role in cardiac activity. Practices such as yoga, through techniques like respiratory control (*Pranayama*), are believed to help maintain cardiac rhythm by influencing the medulla.

Furthermore, hormonal regulation, including the actions of adrenaline, noradrenaline, and Atrial Natriuretic Peptide (ANP), also impacts cardiovascular function. ANP, besides its role in counteracting the effects of Angiotensin II, is involved in neural regulation of the cardiovascular system, with a neural pathway extending from the anteromedial part of the hypothalamus to the lower brainstem.^[17]

Functions of *Vyanavayu* in modern aspects

Rasa samvahana and *Asruk sravana*

Rasasamvahana, a crucial function of *Vyana vayu*, involves the continuous circulation of *rasa* throughout the body in a perpetual (*Santatya*) and cyclical manner (*Chakravat*), resembling a constant rotation. Following *Rasavikshepana*, the circulation occurs uniformly across the entire body without any momentary pause. Chakrapani explains that it is essential to note that this process encompasses not only *Rasa* but also takes into account blood and other fluids. The effective pushing and pumping action carried out in a suitable manner is termed as

Vikshepochitha karma. The effective circulation is due to the contraction of heart muscles– ventricles. Sympathetic stimulation elicits a positive inotropic and chronotropic impact on the heart, resulting in an elevation of cardiac output. Conversely, parasympathetic stimulation leads to a reduction in cardiac output and blood pressure. The sympathetic fibres of heart belong to the thoracolumbar division of the autonomic nervous system and arise from the cells situated in the lateral horns of the upper thoracic segment of the spinal cord. These cells constitute the spinal cardio-accelerator centre. The vasomotor center, located in the medulla oblongata, plays a key role in regulating the heart through sympathetic function. It is influenced by the hypothalamus and cortex.^[18]

Gati, Prasarana, Akshepa

Gati is the movement of the skeletal musculature. All movements occur through contraction and relaxation of muscles. *Vyana vayu* controls all voluntary movements of the body. The cerebrum, brain stem, and spinal cord mainly do the coordination of movement. The motor cortex, divided into primary, premotor, and supplementary areas, initiates and regulates different levels of movement complexity. Two motor circuits, the Putamen Circuit and Caudate Circuit, respectively, execute learned patterns subconsciously and plan conscious motor goals. The cerebellum sequences and adjusts motor activities based on continuous updates from the motor cortex and sensory feedback. Additionally, the basal ganglia play a key role in planning and controlling intricate muscle movements, while the spinal cord serves as a pathway for sensory input and motor output, with alpha motor neurons facilitating rapid skeletal muscle contraction.^[19] *Vyana Vata* is thought to be responsible for functions similar to those of the somatic nervous system, including the regulation of movements like flexion, extension, and the opening and closing of eyelids.

Nimesha

The closing and opening of eyelids involve the coordination of various nerves. The muscles controlling eyelid movement receive innervation from three cranial nerves (3rd, 5th, 7th) and sympathetic nerve fibers. The facial nerve, responsible for facial muscle control, including those involved in closing the eyelid and mouth, plays a crucial role. The oculomotor nerve, originating from the oculomotor nucleus, supplies extrinsic eye muscles, excluding the lateral rectus and superior oblique. It also has general visceral efferent fibers from the Edinger-Westphal nucleus, terminating in the ciliary ganglion. Postganglionic fibers from the ganglion supply the sphincter pupillae and ciliary muscle. The trigeminal nerve, dividing into three branches, has the ophthalmic branch responsible

for supplying eye muscles, contributing to eyelid closure. Sympathetic fibers play a role in upper eyelid retraction through the innervation of the superior tarsal muscle, while lower lid retraction involves additional contributions.^[20]

Sweda sravana

Vyana vayu affects the outflow of sweat. Activation of the anterior hypothalamus pre-optic area, either through electrical stimulation or exposure to excessive heat, results in the induction of sweating. Nerve impulses originating from this region follow autonomic pathways, transmitting signals to the spinal cord and subsequently through sympathetic outflow to the skin throughout the body. Cholinergic nerve fibers innervate sweat glands, and these glands are also influenced to some extent by circulating epinephrine and norepinephrine in the bloodstream.^[21]

Annaswadana

Taste buds serve as the sensory receptors for taste perception. The majority of these taste receptors are located on the dorsum of the tongue. Within each taste bud, there are delicate nerve fibers that transmit the taste sensations. These nerve fibers belong to either the chorda tympani, situated in the anterior two-thirds of the tongue, or the glossopharyngeal nerve, located in the posterior one-third.

The chorda tympani nerve carries taste sensations from the anterior two-thirds of the tongue, traveling within the sensory division of the 7th cranial nerve. It ultimately terminates in the nuclei of the tractus solitarius. On the other hand, taste sensations from the posterior one-third of the tongue are conveyed by the sensory fibers of the glossopharyngeal nerve, which also terminate in the nuclei of the tractus solitarius.^[22]

Role of Vyana vayu in functions of other Vayu

While *Vata* is categorized into five subtypes, their functions are interdependent on each other.

1. Vyana vayu and Prana vata

Situated in the head region, *Prana Vayu* is responsible for the intake of food. The perception of taste, vital for food ingestion, is facilitated by *Vyana vayu*. *Prana Vayu* exercises control over all the senses (*Indriyas*), while the movement of these senses is made possible through the assistance of *Vyana vayu*.

2. Vyana vayu and Udana vayu

Srotopreenana, a function directed by *Udana Vayu*, signifies the widespread circulation reaching every cell. This extensive distribution is achievable only through *Vyana vayu*, which transports the essence of food throughout the entire body. *Udana Vayu* is also responsible for the process of respiration, and the facilitation of this respiratory movement is made possible with the assistance of *Vyana vayu*.

3. Vyana vayu and Samana vayu

Located near *Agni*, *Samana Vayu* plays a role in digesting food and separating it into its essential and waste components. The transportation of the food essence throughout the body, crucial for nourishment, is facilitated by *Vyana vayu*. Additionally, *Samana Vayu* preserves the integrity of *Swedavaha Srotas*, while *Vyana vayu* aids in the expulsion of sweat.

4. Vyana vayu and Apana vayu

Apana Vata governs all excretions, particularly the expulsion of semen. With the assistance of *Vyana Vata*, the ejaculated semen can be directed towards the yoni. While *Apana Vata* regulates the actual outflow of semen, the voluntary act of intercourse may be influenced by *Vyana Vata*.^[23]

DISCUSSION

The Ayurvedic understanding of *Vyana vayu* involves numerous physiological functions, several of which correlate with contemporary medical knowledge. *Vyana vayu* plays a crucial role in the circulation of *Rasa dhatu*, which is essential for nourishing tissues and maintaining overall health. This aligns with modern knowledge of the heart's electrical conduction system, the regulation of heart function by the sympathetic and parasympathetic nervous systems, and hormonal influences on cardiovascular activity. Moreover, involvement of *Vyana vayu* in bodily movements, such as skeletal muscle contraction and eyelid movement, corresponds to the functions of the somatic nervous system, cranial nerves, and motor areas of the brain like the primary motor cortex and supplementary motor area. The regulation of sweating by *Vyana vayu* demonstrates its role in thermoregulation, which is mediated through pathways involving the hypothalamus, sympathetic nervous system, and cholinergic innervation of sweat glands. Additionally, impact of *Vyana vayu* on taste perception, particularly through the chorda tympani and glossopharyngeal nerves, emphasizes its role in sensory processing and perception. Furthermore, the interconnectedness of *Vyana vayu* with other *Vata* subtypes, such as *Prana*, *Udana*, *Samana*, and *Apana Vata*, underscores the integrated nature of bodily functions and the importance of a balanced *Vata dosha* for overall health and well-being.

CONCLUSION

Vyana Vata is regarded as the most potent subtype among all *Vata* classifications. It undertakes vital functions such as *Gati* (movement), *Rasa-rakta paribhramana* (circulation of lymph and blood), *Anna aswadana* (taste perception), and *sweda sravana* (sweating). The operations of *Vyana Vata* are intricately connected with other *Vata* subtypes. The functions of *Vyana vayu* in the body may be partially correlated with the functions of nervous system.

REFERENCES

1. Acharya YT. editor. Charaka Samhita. Varanasi: Chowkhamba Surbharati; 2000. (Charak, Sutras 30/26)
2. 8th ed. Varanasi: Chaukhamba Orientalia; 2005. Sushruta. Sushruta Samhita. Sutra Sthana. Doshadhatu-Mala Kshaya Vriddhi Vijnaniya Adhyaya. 15/41. edited by Vaidya Jadavji Trikamji Acharya; p. 75.
3. Subrahmanya Sastri VV. Tridosha theory: Department of publications, Arya Vaidya Sala, Kottakkal; 1977. Ch 3. p. 40
4. Sharangadhara. Sharangadhar Samhita. Bramhanand Tripathi, editor. 1st ed. Varanasi: Chaukhambha Surbharati Prakashan; Purvakhand, 2011; 5/43-44: 60.
5. Subrahmanya Sastri VV. Tridosha theory: Department of publications, Arya Vaidya Sala, Kottakkal; 1977. Ch 3. p. 71
6. Pandey K. Chaturvedi G. eds. Vatavyadhi Chikitsa Adhyaya, Charaka Samhita. Varanasi, India: Chaukhambha Bharati Academy; 2015: 775 Reprint.
7. Shastri A.D. eds, Vatavyadhi Nidana Adhyaya, Ayurveda Tatwa Sandipika Hindi Commentary, Susruta Samhita, Varanasi (India): Chaukhamba Sanskrit Sansthan; Edition-2014. page no-296.
8. Tripathy B.N. Eds, Doshabhedhiya Adhyaya, Astanga Hridaya, Varanasi, India: Chaukhambha Sanskrit Pratisthan; 2012: 171 Reprint.
9. Gupta A.D. Eds, Doshabhedhiya Adhyaya, Astanga Sangraha, Varanasi, India: Chaukhambha Krishnadas Academy; 2012: 160 Reprint.
10. Pandey K, Chaturvedi G, eds. Grahani Chikitsa Adhyaya, Charaka Samhita. Varanasi, India: Chaukhambha Bharati Academy; 2015: 775 Reprint.
11. Shastri A.D. eds, Shareera sankhya vyakarana adhyaya, Ayurveda Tatwa Sandipika Hindi Commentary, Susruta Samhita, Varanasi (India): Chaukhamba Sanskrit Sansthan; Edition 2014. p. 55
12. Shastri D.D, Ahaaradi gati adhyaya, Sharngadhara Samhita, Varanasi (India), Chaukhamba surabharati prakashana; 2002: 86
13. Shastri A.D. eds, Annapana vidhi adhyaya, Ayurveda Tatwa Sandipika Hindi Commentary, Susruta Samhita, Varanasi (India): Chaukhamba Sanskrit Sansthan; Edition-2014. page no-289.
14. Gupta A.D. Eds, Vatashonitachikitsadhyaya, Astanga Hridaya, Varanasi, India: Chaukhambha Sanskrit Pratisthan; 2003: 427 Reprint
15. Gaur Banwarilal, Grahani Chikitsa Adhyaya, hindi commentary on Ayurveda Dipika, Charak Samhita, Vol-2, Delhi (India): Rashtriya Ayurveda Vidyapeetha; Edition-2014. p. p-817
16. Subrahmanya Sastri VV. Tridosha theory: Department of publications, Arya Vaidya Sala, Kottakkal; 1977. Ch 3. p. 74
17. T. Sreekumar. A Textbook of Ayurvedic Physiology. Thrissur: Harisree Publications; 2022. Ch 4. p. 81
18. Patwardhan K., Eds, Cardiovascular system, Human Physiology in Ayurveda, Varanasi (India), Chaukhamba orientalia; 2005: 37 Reprint
19. Hall. E, Guyton. C. (2016) Central nervous system, Textbook of medical physiology, New Delhi (India), Elsevier; 2016
20. Singh I. (2013), Cranial Nerves, Textbook of Human Neuroanatomy, Jaypee Brothers Medical Publishers; 2013:123
21. Hall. E, Guyton. C. (2016) Body temperature regulation and cutaneous circulation, Textbook of medical physiology, New Delhi (India), Elsevier; 2016:881
22. Jain. A.k. (2008), Nervous System, Textbook of Physiology, Himachal Pradesh (India), Avichal Publishing Company; 2008: 590
23. Saini M, Sharma RK, Sharma DC. Physiological study of Vyana vayu w.s.r blood circulation [Internet]. Wjpmr.com. [cited 2024 Feb 23]. Available from: <https://www.wjpmr.com/download/article/80042021/1619693712.pdf>

Cite this article as:

Abhirami Babu, Anjali Sivaram. Understanding Vyana Vayu: Bridging Ayurveda and Modern Physiology. International Journal of Ayurveda and Pharma Research. 2024;12(2):122-126.

<https://doi.org/10.47070/ijapr.v12i2.3126>

Source of support: Nil, Conflict of interest: None Declared

*Address for correspondence

Dr. Abhirami Babu

MD Scholar,

Govt. Ayurveda College,

Tripunithura, Kerala, India.

Email: drabhiramiib@gmail.com

Disclaimer: IJAPR is solely owned by Mahadev Publications - dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJAPR cannot accept any responsibility or liability for the articles content which are published. The views expressed in articles by our contributing authors are not necessarily those of IJAPR editor or editorial board members.