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REVIEW ARTICLE

Analytical Review of *Pranavaha Srotas* with Special Reference to Cardiopulmonary Unit

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ABSTRACT

Introduction: The human body, according to *Ayurvedic* principles, is composed of *Dosha*, *Dhatu*, and *Mala*, which circulate through channels known as *Srotas*. *Pranavaha Srotas*, specifically, are responsible for the transport and regulation of *Prana Vayu* (vital life force), essential for physiological processes such as respiration and circulation. This review aims to provide an analytical comparison between *Pranavaha Srotas* and the modern understanding of the cardiopulmonary system.

Materials and Methods: The study is grounded in classical *Ayurvedic* texts, including the *Sushruta Samhita* and *Charak Samhita*, supplemented by modern medical literature and recent scholarly research. The review focuses on the theoretical constructs of *Pranavaha Srotas* and their anatomical and functional correlation with the cardiopulmonary system.

Results: *Pranavaha Srotas*, as per *Ayurvedic* texts, encompass the heart (*Hridaya*) and respiratory passages, analogous to the modern cardiopulmonary system. The study identifies the heart as the central organ in both systems, responsible for the circulation of *Prana Vayu* and blood. The functions of *Prana Vayu* in respiration, oxygenation, and waste elimination align with modern principles of gas exchange and blood circulation.

Discussion: *Pranavaha Srotas* highlight the intricate connection between respiration and circulation, emphasizing the holistic nature of health as viewed in *Ayurveda*. Disruptions in these channels are linked to various respiratory and circulatory disorders, similar to conditions recognized in modern medicine, such as *Asthma*, bronchitis, and cardiovascular diseases.

Conclusion: The *Ayurvedic* concept of *Pranavaha Srotas* aligns closely with the contemporary understanding of the cardiopulmonary system. This integrative approach to health, blending *Ayurvedic* principles with modern medical practices, offers a comprehensive framework for preventing and managing cardiopulmonary disorders.

1. INTRODUCTION

The human body is made up of *Dosha*, *Dhatu*, and *Mala*, according to the context "*Dosha Dhatu Mala Mulam Hi Shariram."*[1] These constituents of *Sharir* are in constant circulation through both macro and microchannels throughout the body. These channels are known as *Srotas*.[2] The channels through which *Sravana* happens are called *Srotas*[3] The body's many channels known as *Srotas* are assigned to perform a variety of physiological tasks. *Srotas* are the systems that transport or circulate the constituents of the tissues (*Dhatu*) to the different organs.[4] In addition to delivering nutrition to the body's many tissues and cellular systems, *Srotas* microchannels are also engaged in the elimination of waste materials.

There are two parts to every *Dhatu*: Food for its own tissue layer and nourishment for the next *Dhatu* that is growing. These *Srotas Swaroopa* is characterized as being tubular, either large or tiny in size, and either straight or reticulated in shape.[5] Their color is said to be

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identical to the *Dhatu* they carry. These are the dominating structures of *Akasha Mahabhuta*. The state of *Srotas* must be unvitiated to be healthy. If it is vitiated, this *Srotas* are considered as primary centers of disease. Therefore, it is important that these channels both macro and microchannels remain intact for the body to function normally. Although there are many *Srotas, Acharya Charaka*[2] has classified 13 of them, and *Acharya Sushruta*[6] has characterized 11 pairs of *Srotas* based on their therapeutic value. These channels, or *Srotas*, are called *Rasavaha Srotas*, *Udakavaha Srotas, Pranavaha Srota*s, and so on, based on the substances that they contain.

2. MATERIALS AND METHODS

The foundational and theoretical materials for this research have been gathered from the classic *Ayurvedic text*s, such as *the Sushruta Samhita, Charak Samhita,* and other works with available commentary, as well as a number of reference books that need to be evaluated. These texts include the *Brihatrayee* and *Laghutrayee*. In addition, to gather information about recent studies on the particular subjects, a variety of websites and scholarly publications were referred.

3. DISCUSSION

Based on the aforementioned reasoning, *Acharaya Charak* has attempted to offer a scientific interpretation of the meaning of *Srotas*. *Charak* claims that these are the channels that carry the altered material following digestion and that every other bodily structure is merely a representation of *Srotas Sharir.*

3.1. *Pranavaha Srotas*

The *Pranavaha Srotas* include *Prana* since the *Srotas* are named after the material or element that they contain. In their commentary, *Acharya Chakrapani* defined *Pranavaha Srotas* as the channels that contain *Vata*, also known as *Prana*. To put it another way, the *Pranavaha Srotas* are the bodily organs that carry *Prana Vayu*, facilitate its assimilation and transfer to various parts of the body, and eliminate *Vayurupa Mala*.

3.2. *Prana Vayu*

Pranavaha Srotas are the one who transports *Prana Vayu*, which is found in the following places: *Murdha* (brain), *Ura* (chest), *Kantha* (throat), *Jihva* (tongue), *Asya* (mouth), and *Nasika* (nose).[7] It carries out bodily processes such as deglutition of food (*Ahara*), eructation (*Udgara*), spitting or salivation (*Shthivana*), sneezing (*Kshavathu*), and respiration (*Shawasa*).[7] Because of the duties that it carries out, *Prana Vayu* is also known as *Dehadhrika* or the one that holds the body. Apart from the functions mentioned by *Charak*, *Astanga-Hridaya*[8] added several more as *Prana Vayu's* functions: Control over the mind, the heart, all sensory and motor organs, and intellectual capacity.

3.3. *Mula Sthana* of *Pranavaha Srotas*

According to *Acharya Charak*, the *Pranavaha Srotas*, or channels that convey *Prana Vata*, originated in *Hridaya* and *Mahasrotas.*[9] *Hridaya* and *Rasavahini Dhamani* are referred to be *Mula* of *Pranavaha Srotas* by *Aacharya Sushruta.*[10] The organs of *Pranavaha Srotas*, according to *Gangadhar Tikka*, are *Hridaya* and *Vaksha (Phusphusa*, or the lungs).

3.4. Hridaya

The word *Hridaya* is formed by the three *Dhatu*, *Hri, Da,* and *Ya*. This indicates the three primary purposes of *Hridaya*, which are *Aharana* (receiving), *Dana* (giving), and *Ayana* (moving). The central authority for the *Pranavayu*-carrying canals is based in Hridaya.

It is referred to be *Ojas* seat.[11] According to *Acharya Sushruta, Chetana's* seat is the *Hridaya.*[12] *Triguna* is said to have his seat there. According to the *Kasyapa Samhita*, *Hridaya* is *Sonita's* seat. The *Mana* and *Indriya* are inspired by it.

The *Hridaya* is an extremely delicate instrument with a built-in rhythm. It continues to contract and relax by itself. In addition, the *Vata* system regulates its rhythmicity, which is cyclical and lasts a lifetime. During the day, the *Hridaya* is more active. *Hridaya* provides *Rasa*, *Rakta*, and *Oja* to all of the body's *Srotas*. Being a muscular organ, the *Hridaya* gets its nourishment from *Rasa*, its nutrition from *Rakta*, and its life force from *Oja*. The autonomic nerve system, or *Vyana Vayu*, regulates its movements. At *Hridaya*, their lives *Sadhaka Pitta*. Its purposes are *Krodhra* (rage), *Bhaya* (fear), Shourya (courage and bravery), *Harsha* (excitation and cheerfulness), and *Moha* (delusion and fainting). The *Atharva Veda* also mentions that the *Shira* (head) and *Hridaya* (heart) are interconnected through sutures. *Vayu*, which is situated in the upper part of *Mastishka* and has universal power, is responsible for everything. Once more, the terminology *Manas, Chitta, Buddhi*, and *Hridaya* do not refer to separate organs situated in distinct parts of the body; rather, they describe diverse functional characteristics of the mind. Hence, *Sadhaka Pitta* is impacted by any disruption or interaction with *Hridaya*. The way in which *Hridaya* receives nourishment from *Rasa*, the pericardial fluid and synovial fluid that offer lubrication to the thoracic joints (*Trik Pradesha*), and the replenishment of fluid to the body's fluid systems are all strikingly similar to *Avalambaka Kapha*. Any one of the eight fundamental components – muscular tissue, *Rakta*, *Rasa, Oja, Prana Vayu, Vyana-Vayu, Sadhaka Pitta,* and *Avalambaka Kapha* when affected – can disturb the function of the *Hridaya* and cause *Hridroga.*

According to contemporary science, the heart is a muscle pump that pushes blood under enough pressure into the vascular tree to preserve ideal circulation. The human heart is comprised of four chambers: The superior right and left atrium as well as the bigger inferior right and left ventricles. The thick muscular interventricular septum separates the ventricles from the atria, while the thin interatrial septum separates the ventricles.[13] Three types of heart valves control blood flow: Two atrioventricular, loose flap-like valves, the tricuspid on the right and the mitral (bicuspid) on the left, as well as two semilunar valves, the pulmonary and aortic valves, which protect the outflow tract and have three leaflets each. The myocardial, which makes up the majority of the heart wall, is lined internally by the endocardium and externally by the epicardium, also known as the visceral pericardium.

The circulation of blood within the heart chambers follows a meticulously planned route, which includes the following: Venous blood from the systemic circulation – left atrium – left ventricle – aorta – systemic arterial supply – pulmonary arteries – lungs – pulmonary veins.

3.5. *Mahasrotasa*

Along with *Hridaya, Mahasrotasa* has been counted as *Moolasthana* by *Aacharya Charaka*. It is mentioned that the *Mahasrotasa* is the alimentary canal and its associated organs, which form a lengthy channel extending from *Mukha* to *Guda*. GIT-absorbed nutrients are essential to sustaining an individual's existence. The diaphragm, a muscle that separates the thorax and abdomen and is a primary muscle of respiration, can be regarded as a component of *Pranavaha Srotas* out of the entire *Mahasrotasa* (which constitutes the majority

of *Annavaha Srotasa*). Here is where we can consider one more *Sharangdhara Samhita* reference. The *Shawashan Prakriya* has been thoroughly demonstrated by *Acharya Sharangdhara*. He says that the breathing process starts with Naabhi.

3.6. *Rasavahi Dhamani*

The arteries that assist in transporting pure, nutrient-rich blood from *Phusphusa* to *Hridaya* and eventually to all the tissues are known as *Rasavahi Dhamani*. *Hridaya* is also the origin of the *Rasavaha Srotas* and the seat of *Ojas* and *Prana*. Therefore, it is evident that these *Sira*, which further divide into multiple branches and acquire the name *Mahaphala*, carry the *Ojas* or *Prana* from the heart to the smallest unit of the body. Through *Rasavahi Dhamani, Prana* reaches every part of the body and carries out the classified activities. *Rasavahi Dhamani* is hence regarded as *Moolasthana* as a means of transportation.

4. ROLE OF *PRANAVAHA SROTAS* IN CIRCULATION AND RESPIRATION

*Pranavaha Srota*s are the channels that carry *Prana Vayu* (the vital breath or life force) throughout the body – its *Moolsthan*, the heart, which is considered the seat of *Prana* and the heart pumps blood, which carries oxygen (*Prana*) to all parts of the body.

4.1. Oxygenation

The primary function of *Pranavaha Srotas* in blood circulation is the oxygenation of blood in the lungs. Oxygen is taken in through the respiratory tract and diffused into the blood.

4.2. Transportation

Oxygenated blood is then transported by the heart through the arteries to tissues and organs, providing them with essential nutrients and energy.

4.3. Removal of Carbon Dioxide

The deoxygenated blood, carrying carbon dioxide and other waste products, is returned to the heart and then to the lungs for expulsion from the body.

Proper functioning of *Pranavaha Srotas* ensures effective respiration and circulation, maintaining overall health and vitality.

Imbalances or blockages in *Pranavaha Srotas* can lead to respiratory issues (such as asthma or bronchitis) and circulatory problems (such as high blood pressure or heart disease).

Understanding *Pranavaha Srotas* provides a holistic view of the interconnection between the respiratory and circulatory systems, emphasizing the importance of maintaining balance for overall health.

The *Shawashan Prakriya* has been explained in great detail by *Acharya Sharangdhar*.[14] There are two phases in *Shawasa Kriya*: *Prana* and *Apana*. *Aacharya Charaka* defines *Prana* as the inspiratory phase and *Apana* as the expiratory phase while describing the *Aatma* character (Guna). *Prana Vayu* moves from *Nabhi* to the heart's inside, *Kantha* to the outside, then back to the heart and finally the body. This can therefore be seen as the alternate gas flow between the body and the outside. In the same point, *Aacharya Sharangdhar* explains the exchange of gases between the ambient air (*Vishnupadamruta*) and the numerous tissues that subsequently receive it. This stanza describes the four fundamental elements of respiration, which are defined by modern science as ventilation – the exchange of breathing gases between the lungs and the atmosphere. Gases are exchanged by diffusion between the blood and lungs. Blood is circulated to every cell in the body through perfusion. The metabolism or cellular respiration is described by *Prinana* of *Jatharagni*.[15]

5. CONCLUSION

The *Pranavaha Srotas*, as described in *Ayurvedic* texts, are fundamentally analogous to the modern understanding of the cardiopulmonary system. It encompasses the heart, lungs, and associated channels, which work synergistically to ensure the efficient exchange of gases, distribution of oxygen, and removal of metabolic wastes. Integrating approach helps to understand and treat disorders related to the cardiopulmonary system. Emphasizing preventative care, lifestyle modifications, and natural therapies, as advocated in *Ayurveda*, alongside conventional medical interventions, can enhance patient outcomes and promote long-term health.

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10. CONFLICTS OF INTEREST

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11. DATA AVAILABILITY

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