International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Review on Role of Raktavaha Strotas in Tissue Nutrition

Dr. Utkarsh Sharma[1], Dr. Manu Sharma[2], Dr Satish Sharma[3], Dr. Neeru Sharma[4], Dr. Bhawna Sharma[5]

[1]PG Scholar Final Year, Department Of Kriya Sharir ,Jammu Institute Of Ayurveda And Research, Jammu, India.
[2]Vice – Principal & Professor, Department Of Kriya Sharir ,Jammu Institute Of Ayurveda And Research, Jammu, India.
[3,4]Ayurvedic Practitioner ,Utkarsh Ayurveda Super Speciality Day Care Hospital, Kotkapura District Faridkot, Punjab.
[5]PG Scholar, Department Of Dravyaguna, Dayanand Ayurvedic College, Jalandhar, Punjab.

Abstract

Ayurveda, often described as the science of life, explains the existence of specialized channels known as **Srotas** that permeate the entire body. These channels serve as pathways for the movement and exchange of various biological substances and are distinct from structures such as **Sira** (veins) and **Dhamani** (arteries). Each Srotas originates from a specific **Moolasthana** (root site), which is responsible for the production, transformation, and transportation of the substances associated with that channel. The temporary forms of bodily tissues, known as **Asthayi Dhatus**, are transported through these pathways before being converted into their mature forms.

According to Acharya Chakrapani, the concept of Moolasthana can be understood from three perspectives: **Prabhavasthana**, the site where a particular tissue originates; **Sancharasthana**, the route through which substances are distributed; and **Parinamam Aapadyamananam**, the location where metabolic transformation occurs. These concepts highlight the role of Srotas in maintaining physiological functions and ensuring proper nourishment of the body.

Ayurveda considers the human body to be **Srotomaya**, meaning that it is fundamentally composed of interconnected channels. Srotas are responsible for the transportation of **Doshas**, **Dhatus**, and other essential constituents throughout the body. Their close association with their respective Moolasthana makes these root sites clinically important for understanding disease development, diagnosis, treatment planning, and prognosis. Among the various tissue systems, **Rakta Dhatu** (blood tissue) occupies a significant position and is sometimes described as the fourth Dosha due to its vital physiological functions. The formation, circulation, and maintenance of Rakta are governed by the **Raktavaha Srotas**, whose principal root sites are the **Yakrut** (liver) and **Pliha** (spleen). These organs are considered essential for the proper functioning of the blood-carrying channels.

Disturbance or injury to the Raktavaha Srotas may lead to symptoms such as fever, anemia, hemorrhage, cyanosis, and redness of the eyes. Factors such as excessive consumption of spicy, hot, oily, and liquid foods, along with prolonged exposure to sunlight and strong winds, are believed to aggravate these

channels. When vitiated, the Raktavaha Srotas may contribute to the development of skin diseases, abscesses, jaundice, and other disorders related to blood tissue dysfunction.

Keywords: Srotas, Moolasthana, Dhatus, Rakta

Introduction

Ayurvedic literature describes the human body as **"Srotomaya Sharira,"** signifying that it is composed of an extensive network of channels responsible for various physiological functions. These channels, known as **Srotas**, form the body's internal transport system and include both microscopic and macroscopic pathways through which nutrients, waste products, and other biological substances are conveyed. The proper functioning and integrity of these channels are essential for maintaining physiological balance and overall health.

The concept of Srotas is elaborately discussed in the classical Ayurvedic texts. All Srotas are interrelated, and impairment in one channel can influence the functioning of others. Their primary role is to facilitate the movement and distribution of **Doshas**, **Dhatus**, and their constituents throughout the body. During this process, nourishment is supplied to the tissues, and the sequential transformation of Dhatus occurs, progressing from **Rasa Dhatu** to **Shukra Dhatu**. Each Dhatu serves a dual purpose: sustaining its own tissue structure while simultaneously contributing to the formation and nourishment of the subsequent Dhatu.

Among the various channel systems, **Raktavaha Srotas** holds particular significance because it is responsible for the circulation and distribution of **Rakta Dhatu** (blood tissue) to all parts of the body. Through this function, it supports the nourishment and maintenance of bodily tissues. Since Rakta and **Pitta Dosha** share a close physiological relationship, disturbances in Pitta often lead to vitiation of Rakta. Such pathological changes may give rise to numerous disorders associated with blood and Pitta, collectively referred to in Ayurveda as **Rakta Pradoshaja Vyadhi**. In Ayurveda, the concept of **Dhatu** represents the fundamental structural and functional components of the body that are responsible for growth, nourishment, and maintenance. The nutrients derived from digested food, known as **Ahara Rasa**, serve as the primary source for the formation and nourishment of all seven Dhatus. According to Ayurvedic principles, these tissues are nourished sequentially, beginning with **Rasa Dhatu** and progressing through successive stages until the formation of **Shukra Dhatu**. To explain this process of tissue formation and nourishment, Ayurvedic scholars proposed several conceptual models known as **Dhatu Poshana Nyayas**.

These principles provide insight into the transformation of Ahara Rasa into various body tissues. Proper tissue nourishment depends upon the coordinated action of **Pachakagni**, **Bhutagni**, and **Dhatvagni**, which facilitate digestion, assimilation, and metabolic transformation. Each Dhatu receives nourishment from its predecessor and, in turn, contributes to the formation and sustenance of the subsequent Dhatu. Thus, tissue development occurs through a continuous and interconnected process.

Among the seven Dhatus, **Rakta Dhatu** (blood tissue) occupies a vital position as it is essential for sustaining life and promoting longevity. Its formation is a continuous physiological process that supports the nourishment and functioning of all bodily tissues. Understanding the development of Rakta Dhatu requires a clear comprehension of the Ayurvedic mechanisms governing tissue nutrition and transformation.

Concept of Raktavaha Srotas[1,2]

In Ayurveda, **Raktavaha Srotas** refers to the channels responsible for the transportation and circulation of **Rakta (blood)** throughout the body. These channels ensure the proper distribution of blood to various tissues and organs, thereby supporting nourishment and physiological functions. The concept of Raktavaha Srotas has been described in detail in the classical Ayurvedic texts, including the Vimana Sthana of the Charaka Samhita.

The **Moolasthana** (root sites) of Raktavaha Srotas have been explained differently by various Acharyas. Both Acharya Charaka and Vagbhata identified the **Yakrut (liver)** and **Pleeha (spleen)** as the principal root sites of these channels. In contrast, **Sushruta** included **Raktavahi Dhamanis** along with the liver and spleen as the Moolasthana of Raktavaha Srotas.

Raktavahi Dhamanis can be interpreted as the vascular structures involved in blood circulation, including arteries, veins, arterioles, venules, capillaries, and sinusoidal channels. The inclusion of these structures by Sushruta reflects his surgical expertise and practical anatomical approach. Unlike other scholars who primarily emphasized the theoretical concept of Srotas and their root sites, Sushruta incorporated observable vascular structures, thereby providing a more clinically oriented perspective on the circulatory system.

Concept of Dhatu Poshana[3,4]

Dhatu Poshana Nyaya

Dhatu Poshana Nyaya is an Ayurvedic concept that explains the mechanism by which nutrients derived from digested food nourish and sustain the seven body tissues (Sapta Dhatus). Ancient Ayurvedic scholars proposed various theories to describe the movement, distribution, and transformation of nutrients within the body. These include **Ksheera-Dadhi Nyaya**, **Kedari-Kulya Nyaya**, and **Khale-Kapota Nyaya**, while **Ekakala Dhatu Poshana Nyaya** is also mentioned to explain the simultaneous nourishment of all tissues.

Ksheera-Dadhi Nyaya (Milk–Curd Theory)

Ksheera-Dadhi Nyaya illustrates the formation and nourishment of Dhatus through a sequential process, comparable to the gradual conversion of milk into curd, curd into butter, and butter into ghee. According to this theory, the nutritive essence produced after digestion (Ahara Rasa) first nourishes Rasa Dhatu. Under the influence of the respective Dhatvagni, part of each Dhatu is transformed into the next Dhatu in sequence, eventually resulting in the formation of Shukra Dhatu.

Physiological Correlation: This theory can be related to modern physiological concepts of metabolism, where simple substances are gradually converted into more complex compounds through enzyme-mediated reactions. Similar to how nutrients are metabolized and stored as glycogen or adipose tissue, Dhatus are formed through a sequential process of transformation and nourishment.

Clinical Significance: According to this theory, any disturbance in the formation or nourishment of a Dhatu can adversely affect the subsequent Dhatus. For example, inadequate formation of Rasa Dhatu due to impaired Agni may result in insufficient nourishment of Rakta, Mamsa, and other Dhatus, leading to conditions such as anemia, reduced muscle strength, and reproductive disorders.

Kedari-Kulya Nyaya (Field–Irrigation Theory)

Kedari-Kulya Nyaya compares the nourishment of Dhatus to the irrigation of fields through a network of

channels. Just as water flows through canals to reach different fields, Ahara Rasa is transported through Srotas to nourish each Dhatu in sequence.

Physiological Correlation: This concept resembles the circulatory and lymphatic systems, where nutrients are transported and selectively absorbed by different tissues according to their needs.

Clinical Significance: Blockage or impairment of Srotas (Srotorodha) can hinder nutrient supply to Dhatus, resulting in various disorders. Therefore, Ayurvedic management focuses on maintaining clear channels through purification (Shodhana) and tissue-strengthening (Brimhana) therapies.

Khale-Kapota Nyaya (Pigeon–Grain Theory)

Khale-Kapota Nyaya explains Dhatu nourishment by comparing it to pigeons selecting grains from a field. According to this theory, each Dhatu independently absorbs the nutrients it requires from the circulating Ahara Rasa.

Process: After digestion, Ahara Rasa circulates throughout the body via Srotas. Guided by their respective Dhatvagni, the Dhatus extract the specific nutrients necessary for their nourishment according to their individual requirements.

Physiological Correlation

Khale-Kapota Nyaya is comparable to the modern concept of cellular metabolism, where different tissues selectively absorb and utilize specific nutrients according to their functional requirements. For example, bone tissue primarily uses calcium, while fat tissue stores lipids.

Clinical Significance

This theory supports targeted nutritional interventions for specific Dhatu deficiencies. Supplying appropriate nutrients can help strengthen the corresponding Dhatu, such as calcium-rich foods for Asthi Dhatu and iron-rich foods for Rakta Dhatu.

Ekakala Dhatu Poshana Nyaya (Simultaneous Nourishment Theory)

Ekakala Dhatu Poshana Nyaya states that all Dhatus are nourished at the same time rather than in a sequential order. According to this concept, Ahara Rasa contains nutrients required by all tissues, and each Dhatu simultaneously absorbs what it needs for maintenance and growth.

Process: After digestion, Ahara Rasa circulates throughout the body, providing nourishment to all Dhatus concurrently according to their individual metabolic demands.

Physiological Correlation

Ekakala Dhatu Poshana Nyaya can be related to the modern concept of systemic circulation, where the bloodstream simultaneously transports nutrients to all body tissues. The uptake and utilization of these nutrients depend on the specific needs and metabolic activity of individual cells.

Clinical Significance

This theory highlights the importance of a balanced diet and Rasayana therapies in supporting the nourishment of all Dhatus at the same time, thereby enhancing overall health, strength, and longevity.[4]

Organ Systems Involved in Dhatu Poshana[5]

The process of **Dhatu Poshana** (tissue nourishment) is facilitated through various Srotas and their associated anatomical structures. Each Srotas plays a specific role in the digestion, absorption, transportation, and distribution of nutrients required for the formation and maintenance of bodily tissues.

- **Annavaha Srotas**: The primary root sites of Annavaha Srotas are the **Amasaya (stomach)** and the organs located on the left side of the upper abdomen, traditionally interpreted as the **liver and gallbladder**. These structures are responsible for the reception, digestion, and initial processing of food.
- **Rasavaha Srotas**: The **Hridaya (heart)** and **Dasha Dhamanis (ten principal vessels)** constitute the root sites of Rasavaha Srotas. They are involved in the circulation and distribution of nutrient-rich Rasa throughout the body.
- **Udakavaha Srotas**: The root sites of Udakavaha Srotas are described as the **Talu (palate/oral cavity)** and **Kloma**, which is commonly correlated with the **pancreas**. These structures are associated with the regulation and maintenance of fluid balance within the body.
- **Pranavaha Srotas**: The **Hridaya (heart)** and **Mahasrotas (gastrointestinal tract)** are considered the principal root sites of Pranavaha Srotas. These channels are responsible for sustaining vital life functions through the regulation of respiration, circulation, and metabolic activities.

Metabolism, Energy Transformation, and Tissue Nutrition[5]

According to Ayurveda, the seven bodily tissues (**Sapta Dhatus**) undergo continuous metabolic transformation under the influence of their respective **Dhatvagni**. During this process, each Dhatu is divided into two components: **Sara (essence)**, which contributes to nourishment and maintenance of the body, and **Kitta (waste products)**, which are eliminated from the system. This concept is described in the Charaka Samhita (Chikitsa Sthana 15/15), emphasizing that tissue metabolism is governed by the specific metabolic activity of each Dhatu.

Ayurvedic physiology explains metabolism through the coordinated action of three fundamental factors: **Rasa**, **Agni**, and **Srotas**. Rasa represents the nutritive component derived from digested food, Agni is responsible for digestion, assimilation, and metabolic transformation, and Srotas serve as the channels that facilitate microcirculation, tissue perfusion, and nutrient transport throughout the body. The harmonious interaction of these factors ensures the proper nourishment and functioning of all tissues.

Following digestion and assimilation, the nutrient essence of food and medicinal substances is transported to the respective Dhatus, where it supports tissue growth, maintenance, and physiological activity. Ayurveda describes a sequential pattern of tissue development beginning with **Rasa Dhatu**, followed by **Rakta**, **Mamsa**, **Meda**, **Asthi**, **Majja**, and finally **Shukra Dhatu**. Each Dhatu receives nourishment from its predecessor and contributes to the formation and sustenance of the next tissue in the sequence.

For instance, **Rakta Dhatu** provides nourishment for the development of **Mamsa Dhatu**, which subsequently supports the formation of **Meda Dhatu**. This continuous process of tissue transformation and nourishment maintains structural integrity and physiological balance within the body. When all seven Dhatus are properly formed and functioning optimally, they give rise to **Ojas**, regarded in Ayurveda as the finest essence of all tissues. Ojas is considered the foundation of vitality, immunity, strength, and longevity, representing the highest state of physiological refinement that sustains life.

Fundamentals of Metabolism[6,7]

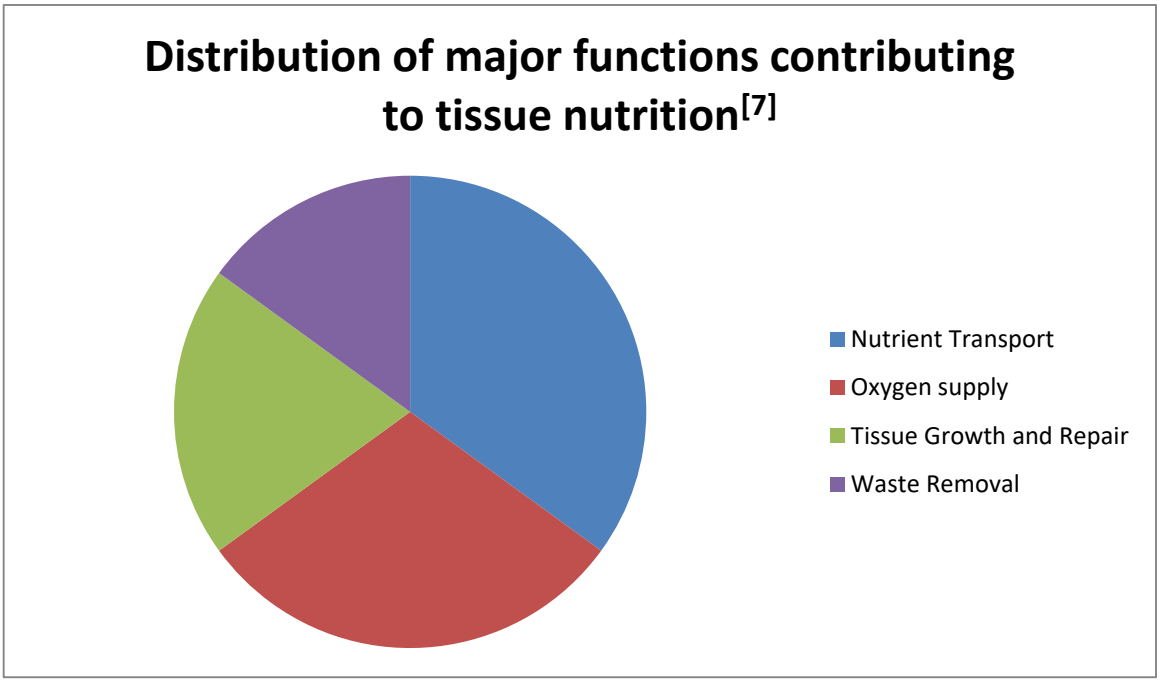
Metabolism refers to the collective set of biochemical reactions occurring within the cells of living organisms that are essential for maintaining life. These reactions generate the energy required for vital physiological activities and facilitate the synthesis of new cellular components. Most metabolic processes are catalyzed by enzymes, which regulate and accelerate chemical transformations within the body.

To meet its energy demands, the human body primarily utilizes **carbohydrates, fats, and proteins** as sources of fuel for the production of **adenosine triphosphate (ATP)**, the principal energy currency of cells. In addition to these macronutrients, the body requires essential elements such as **carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur**, along with several other inorganic minerals. These nutrients are obtained mainly through dietary intake and are necessary for growth, repair, and maintenance of physiological functions. Furthermore, adequate amounts of **vitamins, minerals, and water** are indispensable for normal metabolic activity and overall health.

Metabolism is broadly classified into two major processes:

- **Catabolism:** The degradative phase of metabolism in which complex molecules are broken down into simpler substances. This process releases stored chemical energy from food, which is then utilized for various cellular activities. The extraction of energy from nutrients occurs through a series of coordinated biochemical stages.
- **Anabolism:** The constructive phase of metabolism in which simpler molecules are utilized to synthesize complex biomolecules required for growth, tissue repair, and maintenance. This process depends on the energy generated through catabolic reactions.

The balance between catabolic and anabolic processes is essential for maintaining normal physiological function, energy homeostasis, and cellular integrity.



Discussion

The concept of **Raktavaha Srotas** occupies a central position in Ayurvedic physiology because it serves

as the principal channel system responsible for the transportation and nourishment of **Rakta Dhatu**, which is essential for sustaining life and supporting the functions of all bodily tissues. Ayurveda considers the body as a network of interconnected Srotas, emphasizing that proper tissue nutrition depends on the unobstructed functioning of these channels. Among them, Raktavaha Srotas plays a pivotal role in distributing nutrients and maintaining tissue vitality through the circulation of Rakta.

The process of tissue nourishment (**Dhatu Poshana**) is closely associated with the formation and circulation of Rakta Dhatu. According to Ayurvedic principles, nutrients derived from digested food undergo sequential transformation through the action of **Pachakagni, Bhutagni, and Dhatvagni**, resulting in the formation of successive Dhatus. Rakta Dhatu, formed from Rasa Dhatu, not only sustains its own physiological functions but also contributes to the nourishment of subsequent tissues. Thus, any disturbance in the formation, circulation, or quality of Rakta may adversely affect the nourishment of the entire Dhatu chain.

The classical descriptions of the Moolasthana of Raktavaha Srotas by Acharya Charaka, Vagbhata, and Sushruta highlight the significance of the **liver (Yakrut)**, **spleen (Pleeha)**, and vascular structures in blood formation and circulation. From a contemporary perspective, these organs are closely associated with hematopoietic, metabolic, immunological, and circulatory functions, suggesting a possible correlation between Ayurvedic concepts and modern physiological understanding. Sushruta's inclusion of Raktavahi Dhamanis further indicates an appreciation of the importance of vascular channels in maintaining tissue perfusion and nutrient delivery.

The concept of metabolism described in Ayurveda through the interaction of **Rasa, Agni, and Srotas** bears resemblance to modern concepts of digestion, metabolism, circulation, and cellular nutrition. The transformation of nutrients into various Dhatus through Dhatu Poshana Nyayas reflects a systematic process of nutrient assimilation and tissue development. Furthermore, the Ayurvedic description of the sequential formation of tissues parallels the modern understanding of biochemical pathways involved in growth, repair, and cellular differentiation.

Vitiation of Raktavaha Srotas has been associated with a variety of pathological conditions, including skin disorders, jaundice, hemorrhagic conditions, anemia, and inflammatory diseases. These manifestations indicate the importance of maintaining the integrity of blood-carrying channels for preserving physiological homeostasis. Factors such as inappropriate dietary habits, excessive consumption of hot and spicy foods, and environmental stressors are believed to impair the normal functioning of Raktavaha Srotas, leading to disturbances in Rakta Dhatu and subsequent disease development.

Thus, Raktavaha Srotas may be viewed as a vital functional network involved not only in blood circulation but also in tissue nutrition, metabolic transformation, and maintenance of systemic health. Understanding its role provides valuable insights into both preventive and therapeutic aspects of Ayurvedic medicine.

Conclusion

Raktavaha Srotas represents one of the most important channel systems described in Ayurveda, serving as the primary pathway for the circulation and nourishment of Rakta Dhatu. The proper functioning of this Srotas is essential for maintaining tissue vitality, supporting metabolic activities, and ensuring the sequential nourishment of all Dhatus. Classical Ayurvedic texts identify the liver and spleen as its principal root sites, highlighting their significance in blood formation and physiological regulation.

The process of Dhatu Poshana demonstrates that tissue nutrition is a continuous and dynamic phenomenon involving digestion, metabolism, transportation, and transformation of nutrients. Through the coordinated action of Agni, Dhatus, and Srotas, the body maintains structural integrity and functional balance. Since Rakta Dhatu plays a central role in nourishing subsequent tissues, disturbances in Raktavaha Srotas can have widespread systemic consequences.

The Ayurvedic concepts of Raktavaha Srotas, Dhatu Poshana, and tissue metabolism provide a comprehensive framework for understanding health and disease. A deeper exploration of these principles may help establish meaningful correlations with modern biomedical sciences and contribute to the development of integrative approaches for the prevention and management of disorders related to blood, metabolism, and tissue nutrition.

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