



ISSN 2456-3110

Vol 5 · Issue 2

Mar-Apr 2020

Journal of  
**Ayurveda and Integrated  
Medical Sciences**

*www.jaims.in*

# JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences



**Charaka**  
Publications

Indexed

## Critical analysis of *Raktavaha Srotas*

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### ABSTRACT

*Srotas* (body channels) is considered as an important entity of the body and is responsible for the *Vahana* (transferring) of *Dosha*, *Dhatu* etc. Full body is considered as *Srotomaya* (made of *Srotas*). These *Srotas* are very closely associated with their respective *moolasthanas*. These *Moolasthanas* are very important for treatment and prognostic aspect as its involvement in the formation, examination and control over the *Bhavapadartha* flowing through the *Srotas*. The *Rakta dhatu* (blood) which is also referred as fourth *Dosha* by Ayurveda, is one of the important functional element of body of which formation, transformation and conduction is carried out by *Raktavaha Srotas*. The root of *Raktavaha Srotas* is considered as *Yakrut* (Liver) and *Pleeha* (Spleen). Injury to *Raktavaha Srotas* leads to Cyanoses, Fever, Anemia, hemorrhage, reddish discoloration of eyes. *Raktavaha Srotas* gets vitiated by consumption of spicy food and drinks, Unctous & hot food stuffs and beverages, excessive consumption of liquids, excessive exposure to sunlight & wind. The characteristic manifestation of the vitiation of *Raktavaha Srotas* leads to different types of Skin disorders, abscess formation, Jaundice.

**Key words:** *Srotas*, *Moolasthanas*, *Yakrit*, *Pleeha*.

### INTRODUCTION

Ayurvedic classics proclaim “*Srotomayam hi shariram*” means that living body is a channel system and/or is comprised of innumerable channels which are designed as inner transport system for divergent function, gross and subtle, biological and energetic. Body-mind-spirit organization has as many as *Srotamsi* the number of life factors operating in the life process- *Yawantah Purushe Murtimanto Bhavavisheshah Tavantevasmin Srotasam Prakara Visheshah*.<sup>[1]</sup> Ordinarily the word *Srotas* is used as a generic term indicating all the macro and micro channels and pathways operating in the living

organism. The word *Srotas* is derived from Sanskrit root- “*Sru- gatau*” (*Sru* + *tasi* = *Srotas*) which means moving, filtering, flowing, leaking, secreting etc. *Charak* has defined it as “*Sravanata Srotamsi*” means the structure through which *Sravanam* takes place. *Chakrapani* has explained that *Sravanat* means *Sravanam* of *Rasadi Poshya Dhatu*. The term *Srotas* means channels or systems in which some tissue is formed; some material is metabolized, secreted or transported. *Charak* has described that *Srotamsi* are channels which transport the *Dhatus* (*Asthayi* or *Poshya Dhatu*) which are subjected to transformation. *Acharya Sushruta* and *Vagbhat* both have compared *Srotas* to the extremely fine passages and pores present in the lotus stem, through which *Rasadi Poshya Dhatu* circulate all over the body and provide nutrition to body.<sup>[2],[3]</sup> According to *Vagbhat* in *Ashtanghridaya Sharirsthana* mention two types of *Srotas* that is *Abhyantar Srotas* and *Bahya Srotas*. *Acharya Charaka* has described *Srotas* in *Vimanasthana* Chapter 5 (*Srotovimaniya Adhyaya*) in detail but he gave incisive definition of *Srotas* in *Sutrasthana* chapter 30 (*Arthedasamahamulia*) as *Sravanat Srotamsi*, means the organ which differentiate it from *Sira*, *Dhamani*. The number of

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Submission Date: 14/03/2020 Accepted Date: 21/04/2020

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#### Quick Response Code



Website: [www.jaims.in](http://www.jaims.in)

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*Srotas* is that much as the number of Specific structures present in the body of *Purusha*. The term *Moola* is used in different meaning in ancient Indian Literature. *Acharya Charaka* has used this term in meaning of *Karan* or *Adhara* means reason or base. In *Sushrut Samhita & Ashtanng Hridaya*, *Moola* word has been used as tracer, director or prob. In broad term *Moolasthan* means *Utpattisthana* (seat of origin of *Dhatu* and *Mala*), *Sangrahashthana* (Seat of storage) *Naidaniksthama* (diagnostic importance), *Chikitsatmaksthana* means important in treatment. Among the list is given of *Srotas* prime importance is given to *Raktavahavaha Srotas*. The word meaning of *Raktavaha Srotas* signifies that, the channel through which *Rakta* flows can be considered as the *Raktavaha Srotas*. The root of *Raktavaha Srotas* is considered as *Yakrut* (Liver) and *Pleeha* (Spleen). Injury to *Raktavaha Srotas* leads to Cynosis, Fever, Anemia, hemorrhage, reddish discoloration of eyes.<sup>[4]</sup> *Raktavaha Srotas* gets vitiated by consumption of spicy food and drinks, Unctuous & hot food stuffs and beverages, excessive consumption of liquids, excessive exposure to sunlight & wind. The characteristic manifestation of the vitiation of *Raktavaha Srotas* leads to different types of Skin disorders, abscess formation, Jaundice.<sup>[5]</sup> Anatomical understanding of blood is required for the better understanding of *Mula Sthana* of *Raktavaha Srotas*. Formation of blood in fetus in early stages is under Yolk sac, from 3<sup>rd</sup> – 5<sup>th</sup> month formation of blood is under the control of liver and spleen hence it's called as hepatic phase and later bone marrow takes the function of formation of blood. Erythropoiesis, the production of RBCs, starts in the red bone marrow with a precursor cell called a proerythroblast. The proerythroblast divides several times, producing cells that begin to synthesize hemoglobin. Ultimately, a cell near the end of the development sequence ejects its nucleus and becomes a reticulocyte. Loss of the nucleus causes the center of the cell to indent, producing the red blood cell's distinctive biconcave shape. Reticulocytes retain some mitochondria, ribosomes, and endoplasmic reticulum. They pass from red bone marrow into the bloodstream by squeezing between the endothelial cells of blood

capillaries. Reticulocytes develop into mature red blood cells within 1 to 2 days after their release from red bone marrow. Normally, erythropoiesis and red blood cell destruction proceed at roughly the same pace. If the oxygen-carrying capacity of the blood falls because erythropoiesis is not keeping up with RBC destruction, a negative feedback system steps up RBC production. The controlled condition is the amount of oxygen delivered to body tissues. Cellular oxygen deficiency, called hypoxia, may occur if too little oxygen enters the blood. For example, the lower oxygen content of air at high altitudes reduces the amount of oxygen in the blood. Oxygen delivery may also fall due to anemia, which has many causes: Lack of iron, lack of certain amino acids, and lack of vitamin B12 are but a few. Circulatory problems that reduce blood flow to tissues may also reduce oxygen delivery. Whatever the cause, hypoxia stimulates the kidneys to step up the release of erythropoietin, which speeds the development of proerythroblasts into reticulocytes in the red bone marrow. As the number of circulating RBCs increases, more oxygen can be delivered to body tissues. Premature newborns often exhibit anemia, due in part to inadequate production of erythropoietin. During the first weeks after birth, the liver, not the kidneys, produces most EPO. Because the liver is less sensitive than the kidneys to hypoxia, newborns have a smaller EPO response to anemia than do adults. Because fetal hemoglobin (hemoglobin present at birth) carries up to 30% more oxygen, the loss of fetal hemoglobin, due to insufficient erythropoietin production makes the anemia worse.<sup>[6]</sup> Red blood cells live only about 120 days because of the wear and tear their plasma membranes undergo as they squeeze through blood capillaries. Without a nucleus and other organelles, RBCs cannot synthesize new components to replace damaged ones. The plasma membrane becomes more fragile with age, and the cells are more likely to burst, especially as they squeeze through narrow channels in the spleen. Ruptured red blood cells are removed from circulation and destroyed by fixed phagocytic macrophages in the spleen and liver, and the breakdown products are recycled, as follows: Macrophages in the spleen, liver, or red bone marrow

phagocytize ruptured and worn-out red blood cells. The globin and heme portions of hemoglobin are split apart. Globin is broken down into amino acids, which can be reused to synthesize other proteins. Iron is removed from the heme portion in the form of Fe<sup>3+</sup>, which associates with the plasma protein transferrin, a transporter for Fe<sup>3+</sup> in the bloodstream. In muscle fibers, liver cells, and macrophages of the spleen and liver, Fe<sup>3+</sup> detaches from transferrin and attaches to an iron-storage protein called ferritin. Upon release from a storage site or absorption from the gastrointestinal tract, Fe<sup>3+</sup> reattaches to transferrin. The Fe<sup>3+</sup>-transferrin complex is then carried to red bone marrow, where RBC precursor cells take it up through receptor-mediated endocytosis for use in hemoglobin synthesis. Iron is needed for the heme needed for the globin portion. Vitamin B12 is also needed for the synthesis of hemoglobin. Erythropoiesis in red bone marrow results in the production of red blood cells, which enter the circulation. When iron is removed from heme, the non-iron portion of heme is converted to biliverdin, a green pigment, and then into bilirubin, a yellow orange pigment. Bilirubin enters the blood and is transported to the liver. Within the liver, bilirubin is released by liver cells into bile, which passes into the small intestine and then into the large intestine. In the large intestine, bacteria convert bilirubin into urobilinogen. Some urobilinogen is absorbed back into the blood, converted to a yellow pigment called urobilin and excreted in urine. Most urobilinogen is eliminated in feces in the form of a brown pigment called stercobilin, which gives feces its characteristic color.<sup>[7]</sup>

### AIMS AND OBJECTIVE

To study the anatomical aspect of *Raktavaha Srotas Moolasthanas* as per Ayurveda and modern science which is helpful for diagnosis & treatment of various diseases.

### MATERIALS AND METHODS

For the purpose of literary review of *Sharir Rachanatmak* aspect of *Raktavaha Srotas*

*Moolasthanas* from Ayurvedic & Modern science texts studied in detail

### DISCUSSION

The channel our *Srotas* which carry *Rakta* (blood) to system and its spread the entire body said in *Charak Vimansathan* chapter 5. To know the *Rachana Sharir* (Anatomy) of *Raktavaha Srotas* their *Moolasthanas* is considered. Both Charaka & Vagbhata considered *Yakrit* (Liver and Pleea (Spleen)) but *Sushrut* has described *Yakrit*, *Pleea* and *Raktavahhi Dhamani* as *Moolasthanas*. *Raktavahi Dhamanis* are none other than blood vessels means arteries, veins & capillaries. Injury to *Raktavaha Srotas* leads to Cyanosis, Fever, Anemia, Hemorrhage, reddish discoloration of eyes. *Raktavaha Srotas* gets vitiated by consumption of spicy food and drinks, Unctous & hot food stuffs and beverages, excessive consumption of liquids, excessive exposure to sunlight & wind. The characteristic manifestation of the vitiation of *Raktavaha Srotas* leads to different types of Skin disorders, abscess formation, Jaundice. Formation of blood in fetus in early stages is under *Yolk sac*, from 3<sup>rd</sup> - 5<sup>th</sup> month formation of blood is under the control of liver and spleen hence it's called as hepatic phase and later bone marrow takes the function of formation of blood. Red blood cells live only about 120 days because of the wear and tear their plasma membranes undergo as they squeeze through blood capillaries. Without a nucleus and other organelles, RBCs cannot synthesize new components to replace damaged ones. The plasma membrane becomes more fragile with age, and the cells are more likely to burst, especially as they squeeze through narrow channels in the spleen. Ruptured red blood cells are removed from circulation and destroyed by fixed phagocytic macrophages in the spleen and liver, and the breakdown products are recycled. Liver and spleen plays a major role life cycle of RBC, its destruction and recycling of components. Macrophages in the spleen, liver, or red bone marrow phagocytize ruptured and worn-out red blood cells. The globin and heme portions of hemoglobin are split apart. Globin is broken down into amino acids, which can be reused to synthesize other proteins. Iron is removed from the



heme portion in the form of Fe<sub>3</sub>, which associates with the plasma protein transferrin, a transporter for Fe<sub>3</sub> in the bloodstream. In muscle fibers, liver cells, and macrophages of the spleen and liver, Fe<sub>3</sub> detaches from transferrin and attaches to an iron-storage protein called ferritin. Upon release from a storage site or absorption from the gastrointestinal tract, Fe<sub>3</sub> reattaches to transferrin. The Fe<sub>3</sub>-transferrin complex is then carried to red bone marrow, where RBC precursor cells take it up through receptor-mediated endocytosis for use in hemoglobin synthesis. Iron is needed for the heme needed for the globin portion. Vitamin B12 is also needed for the synthesis of hemoglobin. Erythropoiesis in red bone marrow results in the production of red blood cells, which enter the circulation. Considering above aspect *Yakrut* (Liver) and *Pleeha* (Spleen) are considered as roots of *Raktavaha Srotas*.

## CONCLUSION

Structurally the *Srotas* are the hollow channels originating from the root space, spread within the whole body to acts as a transport system for the fulfillment of nutritional needs of organism. *Raktavaha Srotas* from its *Utpattisthana* we can compare with Haemopoietic system. From the *Sangrahasthane* come to know liver and spleen act as reservoir of blood and from the *Vahansthan* we can also compare with the circulatory system of the body and also the ruptured red blood cells are removed from circulation and destroyed by fixed phagocytic macrophages in the spleen and liver, and the breakdown products are recycled. Liver and spleen plays a major role life cycle of RBC, its destruction and

recycling of components. Considering above aspect *Yakrut* (Liver) and *Pleeha* (Spleen) are considered as roots of *Raktavaha Srotas*.

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**How to cite this article:** Dr. Rahul Kumar Gupta, Dr. Abhishek Magotra. Critical analysis of Raktavaha Srotas. J Ayurveda Integr Med Sci 2020;2:273-276.

**Source of Support:** Nil, **Conflict of Interest:** None declared.

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