AYUSHDHARA
ISSN: 2393-9583 (P)/ 2393-9591 (O)
An International Journal of Research in AYUSH and Allied Systems

Review Article

CONCEPT OF *SIRA* AND SIGNIFICANCE OF *VARNA* (COLOUR) IN UNDERSTANDING TYPE OF CONDUIT, CONTENT AND FUNCTION

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Article info

Article History:
Received: 02-01-2023
Revised: 22-01-2023
Accepted: 12-02-2023

KEYWORDS:
Shareera Sthana, Sira, Varna, Vein.

ABSTRACT

Sira Shareera is a chapter dealt under *Shareera Sthana* of *Sushruta Samhita*, that deals with description regarding vascular entity and its distribution and function in the body. In *Sushruta Samhita* specific colours are mentioned for different kinds of *Sira* based on conducting material. *Aruna Varna* for *Vatavaha Sira, Neela Varna* for *Pittavaha Sira, Gourya Varna* for *Kaphavaha Sira* and *Rohini Varna* for *Raktavaha Sira.* These colours of the *Sira* depend on the nature and colour of material conducting through these *Sira.* The word *Sira* is not confined only to one type of structural entity but is used for tubular vessels of the body such as nerve, vein, artery, lymph vessels etc. In such condition it is very difficult to understand the concept of *Sira* doubtlessly in terms of modern anatomy. Therefore, it requires critical literature review and analytical probe to understand the concept of *Sira.*

INTRODUCTION

The *Shareera Sthana* is an important section of Ayurveda that plays a significant role in understanding structural concept of human body. The concepts of *Shareera Rachana* possess great clinical significance. *Sira Shareera* is a chapter dealt under *Shareera Sthana*, which deals with description regarding vascular entity and its distribution and function in the body.

The term *Sira* stands for channels through which *Rasadi Dhatu* is conducted throughout the body and help in nourishing and maintaining healthy state.[1] In total there are 700 *Sira* present in the body.[2] They are classified on the basis of *Dosha, Adhishtana, Vedhya* and *Avedhya*.

Sushruta has categorized *Sira* based on their colour, characteristic features and conducting material.

Access this article online

Quick Response Code

https://doi.org/10.47070/ayushdhara.v10iSuppl1.1140

Website: https://ayushdhara.in

The word *Sira* is not confined only to one type of structural entity, but it is used for any tubular vessels of the body such as vein, artery, lymph vessels etc. In such condition it is very difficult to understand the concept of *Sira* doubtlessly in terms of modern anatomy. Therefore, an effort is made through reviewing all possible literature in understanding the concept of *Sira* in *Sushruta Samhita* based on the illustrated description as per modern parlance in relation to its colour and conducting material.

Conceptual Review

Sira present in the body are originated from the *Nabhi* and from there, they spread in all directions. The *Nabhi* is surrounded by *Sira* like the axle hole being surrounded by spokes. These *Sira* are spread in the body like water channels in a garden and takes part in nourishment and maintenance of the body.[2]

Classification and Enumeration of the *Sira*

As per *Sushruta Samhita* among 700 *Sira*, *Moola Sira* are 40 in number. These are classified as 10 *Vatavaha,* 10 *Pittavaha,* 10 *Kaphavaha* and 10 *Raktavaha Sira.* The 10 *Vata* carrying *Sira*, on reaching the seat of *Vata*, divides into 175, the *Pitta* carrying

Sira divides into 175 as it reaches seat of *Pitta,* the *Kapha* carrying *Sira* divides into 175 *Sira* after reaching the seat of *Kapha*. Similarly, the *Rakta* carrying *Sira* on reaching *Yakrut* and *Pleeha* divides into 175 *Sira*. Thus, together they form 700 *Sira*.[2]

Classification and Enumeration of *Sira* according to location

Shakhagata Sira are mentioned in table number 1, and are 400 all together.

Table 1: *Shakhagata Sira* (in each limb) [2]

S. No.	Type of *Sira*	Number	Total
1.	*Vatavaha Sira*	25 x 4	100
2.	*Pittavaha Sira*	25 x 4	100
3.	*Kaphavaha Sira*	25 x 4	100
4.	*Raktavaha Sira*	25 x 4	100
	Total		400

In the *Koshta*, there are 34 *Vatavahi Sira*. Out of these, 8 are in the pelvis residing in the anus and penis (4 each); 2 in each flank; 6 in the back; 6 in the abdomen and 10 in the chest. Identical distribution of *Sira* is considered for *Pittavahi, Kaphavahi* and *Raktavahi Sira.* Hence total number of *Sira* present in the *Koshta* region are 136 (34 x 4).[3]

Table 2: *Koshtagata Sira*

S. No.	Type of *Sira*	Number
1.	*Vatavaha Sira*	34
2.	*Pittavaha Sira*	34
3.	*Kaphavaha Sira*	34
4.	*Raktavaha Sira*	34
	Total	136

In *Urdhwajatru* there are 41 *Vatavahi Sira*. Out of these, 14 are in the neck, 4 in the ears (2 in each ear), 9 in the tongue, 6 in the nose and 8 in the eyes (4 in each eye).[4]

The arrangement of *Pittavahi, Kaphavahi* and *Raktavahi Sira* is also similar with an exception, in case of eyes and ears for *Pittavahi, Kaphavahi* and *Raktavahi Sira*, in eyes there are 10 *Sira* where as in ears there are two *Sira*. So, the total number of *Urdhwajatrugata Sira* is 164 (41 × 4).[4]

Table 3: *Urdhwajatrugata Sira*

S. No.	Type of *Sira*	Number
1.	*Vatavaha Sira*	41
2.	*Pittavaha Sira*	41
3.	*Kaphavaha Sira*	41
4.	*Raktavaha Sira*	41
	Total	164

So, total number of *Sira* is 400+136+164=700.

Classification of *Vatadi Sira* based on colour and characteristics features:

Acharya Sushruta classifies the *Vatadi Sira* based on their colour along with other properties.

Table 4: Classification of *Vatadi Sira* based on Colour and other properties[4]

S. No.	Type of *Sira*	*Varna*	Characteristics	Other features
1.	*Vatavaha Sira*	*Aruna*	-	Filled with *Vata*
2.	*Pittavaha Sira*	*Neela*	Warm	-
3.	*Kaphavaha Sira*	*Gourya*	Cold	Stable
4.	*Raktavaha Sira*	*Rohita*	Neither very hot nor very cold	-

Functions of *Sira* as per affluent they carry

Vata, moving in its own *Sira* perform physical functions without hindering the specific functions of *Buddhi* (intellect) and sense organs. When aggravated *Vata* accumulates in its own *Sira*, many *Vataja* diseases develop in the body.

Pitta, moving in its own *Sira* provides luster and complexion to the skin, taste perception, keenness of digestive fire etc. When aggravated *Pitta* accumulates in its own *Sira*, many *Pittaja* diseases develop in the body.

Kapha, moving in its own *Sira* bestows fluidic functions of the body, stability of the joints, provides strength to the body etc., when aggravated, *Kapha* accumulates in its own *Sira*, many diseases of *Kapha* origin, manifests in the body.

Rakta, moving in its own *Sira* performs functions such as nourishment to the tissues, enhances colour and tactile sensation to the skin etc. When aggravated, *Rakta* accumulates in its own *Sira* and many diseases due to *Rakta* vitiation manifests in the body.[4]

MATERIALS AND METHODS

Critical review of Ayurvedic classics, compilation of references and commentaries along with opinion of recent authors and peer reviewed publications in authentic journals is utilized and analyzed to elaborate as well as to understand the concept of *Sira* and significance of *Varna* in classifying it as per *Sushruta Samhita*.

DISCUSSION

In *Sushruta Samhita Sira* is classified as *Vatavaha Sira, Pittavaha Sira, Kaphavaha Sira* and *Raktavaha Sira* along with colour, characteristic features and conducting material.

Regarding the above description on classification of *Sira, Ghanekar* said that, at *Vatadi Sthana,* in the *Sira, Vatadi Dosha* will be increased. That means in *Vata Sthana, Sira* contain more *Vata* and same happens in other *Dosha* viz., *Pitta, Kapha* and *Rakta*. In *Rakta Sthana* like *Yakrut* and *Pleeha,* the *Sira* contain more *Rakta*. Because of this *Sira* are classified into *Vatavaha, Pittavaha, Kaphavaha* and *Raktavaha*.[5]

Vatavaha Sira: The term *Vatavaha Sira* stands for the *Sira* through which *Vata* is conducted. In the definition of *Vata "Vaa Gati Gandhanyoh",* the first word *Gati,* indicates to move or to cause movement or motor activities of the body.[6] The second word *Gandhan*, indicates *Suchana* or information through *Ghranendriya* (organ of smell).[7] So, the term *Gandhanyoh* represents all other sensory perception and conducting nerves. Thus, the definition of *Vata* indicates the two main functions of nervous system i.e., motor and sensory. If we observe the function of *Vatavaha Sira,* "*Buddhi Karma*" has related to five senses organs and *Manas*. We can infer that *Vatavaha Sira* are exclusively channels for carrying neural impulses in either way i.e., centre to periphery or periphery to centre. The normal functions of the *Vatavaha Sira* point out that the *Sira* are nerves. But they are not nerves, they are blood vessels that carry oxygen rich blood. In Ayurvedic classics, the anatomy of the brain or the nervous system has not been much elaborated, we get description regarding *Shiras* (head), which is considered as *Uttamanga*, and residence of *Prana Vayu* as *Murdha* (synonym for *Shiras*). The *Vayu* which circulates in blood vessels is responsible for performing the functions of nervous system and sense organs. An abrupt interruption of constant blood supply to brain causes loss of neurological function, termed as stroke. Interruption of blood flow may be due to blockage, leading to ischemic stroke or may be due to bleeding in brain leading to deadly haemorrhagic stroke. This affects *Buddhi Karma* and psychosomatic homeostasis of the body.

The colour of *Vatavaha Sira* is considered as *Aruna* (crimson red) and the quality of this *Sira* is *Vayu Puryante* (filled with *Vayu*). The crimson red colour of *Vatavaha Sira* and performing function without hindrance coincides with the two characters of artery. The arteries are conducting oxygenated blood which is also crimson red in colour due to presence of haem that binds with oxygen in bloodstream and responsible for providing crimson colour to oxygenated blood and there is continuous flow of blood without any hindrance.

Red blood cells contain hemoglobin, a protein with red pigment which carries oxygen. Each hemoglobin molecule is made up of four haem groups surrounding a globin group, forming a tetrahedral structure. Haem is composed of ring like organic compound known as a porphyrin to which iron atom is attached. [8] It is the iron atom that binds oxygen as the blood travels between the lungs and the tissues. If we observe the function of *Vatavaha Sira* as maintaining the intellect and senses, we can infer that it conducts *Prana Vayu*, and as per modern parlance the oxygen is carried to each cell by binding with haem. This confrontation of haem protein absorbs the wavelengths of light from violet end of the spectrum and reflect only red colour. Thus, this may be the reason responsible for arteries look crimson red in colour. So, those *Sira* through which oxygenated blood is circulating throughout the body is considered as *Vatavaha Sira.*

If blood oxygen levels are too low, body will not work properly. Blood carries oxygen to the cells throughout the body and keeps them healthy. Hypoxia may cause mild problems like headache and shortness

of breath. In severe hypoxia it interferes with brain and heart function.

Brain cells are very sensitive to a lack of oxygen, brain cell start dying within 5 minutes after disappearance of oxygen supply. Due to physiological effects of travelling high altitude, some may suffer from mountain sickness with symptoms like disorientation, lethargy nausea etc due to problem in acclimating.

***Pittavaha Sira*:** The term *Pitttavaha Sira* stands for the *Sira* through which *Pitta* is conducted. The word *Pitta* is derived from the root *"Tapa Santape"* which means the fire[6]. In modern concept *Tapa Santape* can be compared with cellular metabolism. Metabolism is the set of life-sustaining chemical reactions in organisms. The three main purposes of metabolism are the conversion of food to energy to run cellular processes; the conversion of food to building blocks for proteins, lipids, nucleic acids, and some carbohydrates; and the elimination of metabolic wastes. Metabolic reactions may be categorized as catabolic – the breaking down of compounds or anabolic – the building up of compounds such as proteins, carbohydrates, lipids, and nucleic acids. Usually, catabolism releases energy, and anabolism consumes energy. [9]

The colour of *Pittavaha Sira* is considered as *Neela* and the quality of this *Sira* as *Ushna.* The *Ushna* property of *Pitta* helps *Pachaka Pitta* in digestion and assimilation of food. It divides the food into *Sara* (essence) and *Kitta* (metabolic waste) with the help of *Samana Vayu.* The *Sara* is absorbed as *Anna Rasa* which is further transformed into *Rasa Dhatu.* At various stages of metabolism in formation of *Rakta* from *Rasa*, *Mamsa* from *Rakta, Meda* from *Mamsa*, likewise *Asthi*, *Majja* and *Shukra*, one after the other specific forms of related *Pitta* in the form of *Dhatvagni* help in transformation, formation and function of particular structural entity in the body.[10,11] The metabolic waste is carried out by blood for elimination from body. Metabolic wastes include nitrogenous compounds, carbon dioxide, sulphates, ammonia, urea, uric acid, creatinine etc. Due to presence of carbon dioxide the vessels and carrying the metabolic wastes, it appears dark red to purple in colour.

Pitta is considered as *Mala* of *Rakta.*[12] This may be referred for trafficking of the hormones, enzymes, the nitrogenous waste along with deoxygenated blood. When haemoglobin releases oxygen, its shape is modified and appears darker red.

The actual colour of venous blood is dark red. Though the veins are not blue in colour, they look blue because when the wavelengths of light hit the skin and veins some light is absorbed and some are reflected. The wavelengths of blue light cannot penetrate skin as well as red light, and more blue wavelengths are reflected than red wavelengths.[13] Thus, this may be the reason responsible for veins under the skin look blue in colour going in favour with *Neela Sira.*

Kaphavaha Sira: The term *Kaphavaha Sira* stands for the *Sira* through which *Kapha* is flowing. The word *Kapha/Shleshma* is derived from the root *"Shlish Alingane"* which means cohesion or joining.[6]

The colour of *Kaphavaha Sira* is considered as *Gourya* and the quality of this *Sira* is *Sheeta.* The *Gourya Varna* (white colour) of *Kaphavaha Sira* resembles with the lymph which is milky white in colour due to conduction of chyle, fat free fatty acids.

Lymph is the fluid that flows through lymphatic system, composed of lymph vessels and intervening lymph nodes. The function of lymphatic system is like the venous system, is to return fluid from the tissues to the central circulation. This lymphatic fluid is then transported via larger lymphatic vessels through lymph nodes, where substances are removed by tissue lymphocytes and circulating lymphocytes are added to the fluid, before emptying ultimately into the right or the left subclavian vein, where it mixes with central venous blood. Lymph contains a variety of substances, including proteins, salts, glucose, chyle, fats, water, and white blood cells, immunoglobins.[14]

The lymph formed in the human digestive system called chyle is rich in triglycerides, and looks milky white because of its lipid content. The special lymphatic vessels surrounding the intestine that collect chyle are called lacteals. Lacteals drain into the cisterna chyli at the lower end of the thoracic duct. The thoracic duct then conveys the chyle to the bloodstream, where the fats, it carries can be processed for energy or storage. Chyle plays a critical role in immune function, transporting immunoglobulins and T lymphocytes around the body.[15]

WBCs are the cells of the immune system that are involved in protecting the body against both infectious disease and foreign invaders. All white blood cells are produced and derived from multipotent cells in the bone marrow known as hematopoietic stem cells. Leukocytes are found throughout the body, including the blood and lymphatic system. [16]

Immunoglobulins, also known as antibodies, are glycoprotein molecules produced by white blood cells. They act as a critical part of the immune response by specifically recognizing and binding to antigens, such as bacteria or viruses, and aiding in their destruction.[17]

The *Kaphavaha Sira* bestow fluidic functions of the body, stability of the joints, provides strength to the body etc. All these functions are performed by

various components of the lymphatic fluid such as immunoglobins protecting the body from foreign particles, thus providing *Bala.* The *Sheeta Guna* of this *Sira* may be due to presence of fatty substances in lymphatic fluid as *Sneha* is *Sheeta* in nature. It has the property of soothening, cooling, replenishing, energising and anabolic effect on the body.

Raktavaha Sira: The term *Raktavaha Sira* stands for the *Sira* through which *Rakta* is flowing. The colour of *Raktavaha Sira* as per *Acharya Sushruta* is of *Rohini Varna* means straw coloured that helps in nourishing the *Dhatu.*

As per modern science, when the erythrocytes sediment, a light straw colour serum settles over the precipitated blood cells. This may be considered as blood plasma.

Blood plasma is a straw coloured liquid component of blood that holds the blood cells, proteins and other constituents of whole blood in suspension. It makes up about 55% of the body's total blood volume. Blood plasma is separated from the blood by spinning a tube of fresh blood containing an anticoagulant in a centrifuge until the blood cells fall to the bottom of the tube. The blood plasma is then poured or drawn off. It is mainly composed of clotting factors and other protein molecules. Plasma in blood mainly comprises 80 to 90 percent of water and the other 10 percent is composed of salts, lipids, nutrients, enzymes and hormones. Plasma in blood cells is rich in proteins, immunoglobulin, clotting factors and fibrinogen. This protein helps maintenance of serum osmotic pressure. Plasma serves as a transport medium for delivering nutrients to the cells of the various organs of the body and for transporting waste products derived from cellular metabolism to the kidneys, liver, and lungs for excretion. It is also a transport system for blood cells, and it plays a critical role in maintaining normal blood pressure. Plasma helps to distribute heat throughout the body and to maintain homeostasis, or biological stability, including acid-base balance in the blood and body.[18]

As the main function of *Raktavaha Sira* is providing nourishment to the *Dhatu* and thus helps in maintaining the homeostasis in the body. Same functions are performed by blood plasma also. The colour of this *Sira* is due to conduction of plasma.

CONCLUSION

The term *Sira* stands for channels through which *Rasadi Dhatu* flow. In general, this term stands for blood vessels. In *Sushruta Samhita* specific colours are mentioned for *Vatadi Sira. Aruna Varna* for *Vatavaha Sira, Neela Varna* for *Pittavaha Sira, Gourya Varna* for *Kaphavaha Sira* and *Rohini Varna* for *Raktavaha Sira.* These colours of the *Sira* depend on the nature and colour of material conducting through these *Sira.*

The oxygenated blood is conducted through the *Vatavaha Sira,* which possess red colour due to presence haem protein. That's why *Vatavaha Sira* appears *Aruna* (crimson red) in colour.

The metabolic wastes are carried out by venous blood for elimination from body is conducted by *Pittavaha Sira*. These metabolic waste products consist of carbon dioxide, nitrogenous waste, amino acids, hormones and enzymes. Due to presence of carbon dioxide the vessels carrying the metabolic wastes appears dark red in colour. The actual colour of venous blood is dark red. Though the veins are not blue in colour, they look blue because the blue wavelengths are reflected by light spectrum more as compared to red wavelength. Thus, *Pittavaha Sira* appears *Neela* (blue) in colour.

The lymph is conducted through the *Kaphavaha Sira.* The lymph is milky white in colour due to conduction of chyle, fats, free fatty acids, immunoglobins. Thus, the *Kaphavaha Sira* appears *Gourya* (white) in colour.

The *Raktavaha Sira* appears *Rohini* (straw) in colour due to conduction or presence of blood plasma which is also same in colour. Thus, we can conclude that the colour of *Sira* depends on the colour of its conducting material.

REFERENCES

1. Agnivesa. Charaka Samhita with the Ayurveda-Dipika commentary of Sri Chakrapanidatta. Jadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; Reprint: 2009: 185.
2. Sushruta. Sushruta Samhita with Nibandha Sangraha of Dalhanacharya. Yadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; 2008: 376.
3. Sushruta. Sushruta Samhita with Nibandha Sangraha of Dalhanacharya. Yadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; 2008: 376-77.
4. Sushruta. Sushruta Samhita with Nibandha Sangraha of Dalhanacharya. Yadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; 2008: 377.
5. Sushruta. Sushruta Samhita with Nibandha Sangraha of Dalhanacharya. Yadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; 2008: 209.
6. Sushruta. Sushruta Samhita with Nibandha Sangraha of Dalhanacharya. Yadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; 2008: 99.
7. P.V. Sharma. Sushruta Samhita text with English commentary, Volume-II. Varanasi: Chaukhambha Visvabharathi; 2005: 217.

8. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 558.
9. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 808.
10. Agnivesa. Charaka Samhita with the Ayurveda-Dipika commentary of Sri Chakrapanidatta. Jadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; Reprint: 2009: 512.
11. Agnivesa. Charaka Samhita with the Ayurveda-Dipika commentary of Sri Chakrapanidatta. Jadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; Reprint: 2009: 514.
12. Agnivesa. Charaka Samhita with the Ayurveda-Dipika commentary of Sri Chakrapanidatta. Jadavji Trikamji, ed. Varanasi: Chaukhambha Orientalia; Reprint: 2009: 515.
13. Alwin Kienle et al. Why do veins appear blue? A new look at an old question. Applied optics. 1996; 35(7): 1151-1160. doi: https://doi.org/10.1364/AO.35.001151.
14. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 671.
15. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 674.
16. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 563.
17. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 686.
18. Gerard j. Tortora, Sandra Reynolds Grabowski. Principles of Anatomy & Physiology. New York: Harper Collins College; 1996: 554.

Cite this article as:
Uma B Gopal, Sanchita, Simi C.P, Shoba G, Abegunasekara N.S. Concept of Sira and Significance of Varna (Colour) in Understanding Type of Conduit, Content and Function. AYUSHDHARA, 2023; 10(Suppl 1):60-65.
https://doi.org/10.47070/ayushdhara.v10iSuppl1.1140
Source of support: Nil, Conflict of interest: None Declared

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