



IJCRR

Section: Healthcare  
 Sci. Journal Impact  
 Factor: 6.1 (2018)  
 ICRV: 90.90 (2018)

# A REVIEW OF THE CONCEPT OF ANGIOLOGY IN AYURVEDA

**B. M. N. Kumar**

Assistant Professor, Department of Rachana Sharir, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi (U.P.)

## ABSTRACT

The *Sushruta Samhita* (classical text) is one of the three great treatises (*Brihatrayi*) of *Ayurveda* representing mainly the school of surgery. *Sushruta Samhita* (classical text) is the best one in *Sharira* (Anatomy). The term *sira* (blood vessel) is as old as *Vedas*. In *Ayurveda*, the term *sira* (blood vessel) has been used for blood vessels. Angiology is the division of modern anatomy and it deals with different types of blood vessels of the body. The ancient texts of *Ayurveda* have mentioned *sira* (blood vessel), *dhamani* (artery) and *srotas* (capillary) are interchangeable words and these terms are equal to blood vessels in modern anatomy. According to *Ayurveda*, the term *sira* (blood vessel) reflects different modern anatomical terms like blood vessel, vein, and nerve. Therefore, it requires great research work to get a clear concept. The main aim of this work is to understand the concepts of *sira* (blood vessel) in *Ayurveda* and its correlation with modern angiology.

**Key Words:** *Sira*, *Dhamani*, Artery, Vein, *Sushruta*, Blood vessel

## INTRODUCTION

*Sushruta* was the first scholar scientist who described the method of the dissection of a human cadaver and emphasized the importance of dissection in the study of anatomy<sup>1</sup>. That's why he is regarded as the father of anatomy and the *Sushrut Samhita* as the best one in *sharira*<sup>2</sup>. In *Ayurveda* the structure *sira* (blood vessel) is of vital importance, we can see an elaborate description of the *siras* (blood vessel) in various classical texts<sup>3</sup>. *Sushruta* has explained the anatomy of *sira* (blood vessel) in *sharira sthana* (part of *Sushrut Samhita*) 7<sup>th</sup> chapter "*Sira varna vibhakta nama shariram*"<sup>4</sup>. According to *Ayurveda*, the term *sira* (blood vessel) reflects different modern anatomical terms like blood vessel, vein, and nerve<sup>5</sup>. So, the main aim of this work is to understand the concepts of *sira* (blood vessel) in *Ayurveda* and its correlation with modern angiology.

## MATERIALS AND METHODS

The literary material related to *sira* (blood vessel) has been collected from different *sthanas* (parts) of *Ayurvedic* text books and modern anatomy books like Chaurasia general

anatomy, Gray's anatomy etc. critically reviewed and correlated with modern terms.

### Review of literature

It is said that the word *sira* (blood vessel) derived from the *Vedic* term *hira*. The term *hira* is described as blood carrying channel towards the *hrudaya* (heart)<sup>6</sup>. *Ayurvedic acharyas* have used anatomical term *sira* (blood vessel), which is one of the controversial term (structure). It is used to represent tubular structure, to carry material such as *rasa* (plasma) & *rakta* (blood) and it is one of the synonyms of *srotas* (channels)<sup>7</sup>.

### A. Origination of sira

*Sushruta* has stated that *sira* (blood vessel) originates in the embryonic life from *nabhi* (umbilicus) and they spread upward, downward and in oblique fashion from *nabhi* (umbilicus). *Pranas* (life) of living beings stay in *nabhi* (umbilicus). *Nabhi* (umbilicus) is surrounded by *siras* (blood vessel) in the same way as the nave of the wheel is surrounded by spokes<sup>8</sup>.

### Corresponding Author:

**B. M. N. Kumar**, Assistant Professor, Department of Rachana Sharir, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi (U.P.); E-mail: [drbmnkbhu123@gmail.com](mailto:drbmnkbhu123@gmail.com)

ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 20.04.2020

Revised: 21.05.2020

Accepted: 08.06.2020

**Table 1: Showing origination of Sira by different Acharyas**

S. No.	Origination of Sira	Names of Acharyas
1.	Nabhi (umbilicus)	Sushruta, Bhava Prakash, Sharangadhara, Padma Purana
2.	Hrudaya (Heart)	Charaka, Vagbhata, Bhela, Kashyapa

**B. Development of sira**

Sushruta described that *vayu* by taking *sneha* (oiliness) of the *meda* (fat) converts them into *sira* (blood vessel) and *snayu* (ligament). When the *paka* is mild, it is *sira* (blood vessel)<sup>9</sup>. It is *Pitruja bhava* (paternal origin). The hard structures like hair, nail, teeth, bones, blood vessels, ligaments, etc. are derived from father<sup>10</sup>.

**C. Structure of Sira**

*Siras* are like the fine fibers in the leaf of a tree, thick at their roots and becoming finer towards the end, the branches of the *sira* (blood vessel) resemble the tendrils, the first branch gives out a branch and this again gives out another branch and so on. The blood streams in all the *sira* (blood vessel) which are “like water channels going out to the diverse ranges of a garden or agricultural field”<sup>11</sup>.

**Table 2: According to Vagbhata and Bhela structure of sira**

Vagbhata	Bhela
<i>Siras</i> are dividing themselves into the size of two <i>angula</i> , one <i>angula</i> , half <i>angula</i> , half <i>yava</i> and so on, just like venation of the life.	Ten blood vessels are attached to the heart. These after going 4 inches become 20, then 60, then 3, 00,000 networks of <i>siras</i> . These are spread all over the body like branches of tree. In each and every pit of the hair ( <i>romakupa</i> ), there is an exit aperture of the <i>sira</i> <sup>13</sup> .
<i>Siras</i> are big at the root ( <i>sthoala mula</i> ) and fine at periphery ( <i>sukhma agra</i> ). They are spread like the veins of a leaf <sup>12</sup> .	

**D. General functions of Sira**

*Sira* (blood vessel) has special properties to perform *akunchana* (contraction) and *prasarana* (dilatation) *karma*. The continuous uninterrupted nourishment of the body takes place due to the pumping of the heart and contraction and dilatation of the main blood vessels related to the heart. This nourishment takes place under the principle of “*kedari kulya nyayaa*”(theory of transmission). The *rakta dhatu* (blood) thus circulates the entire body and nourishes through the process of *upasneha karma* (diffusion). As a garden or a grain field is made wet by the water carrying big and small channels, similarly the *sira* (blood vessel) by their contractility and dilatatory property, supply nutrition to the body<sup>14</sup>.

*Dalhana* commented this *arama* (garden) or *kedari* (a small piece of land) is irrigated by *jalharani* of *kulya* (small channels), in the same fashion body is nourished by *sira* (blood vessel). Through this process, the entire body gets nourished constantly<sup>15</sup>.

**E. Number and types of sira**

The total numbers of the *siras* (blood vessel) are 700. The *Mula siras* (root vessels) are 40. These classified into 4 types based on carrying *vata*, *pitta*, *kapha* and *rakta*.

1. *Vatavaha siras* are 10, when they reach the organs of the body where *vata* predominant, divide into 175 branches.
2. *Pittavaha siras* are 10, when they reach the organs of the body where *pitta* predominant, divide into 175 branches.
3. *Kaphavaha siras* are 10, when they reach the organs of the body where *kapha* predominant, divide into 175 branches.
4. *Raktavaha siras* are 10, when they reach the *yakrut* (liver) and *pliha* (spleen), divide into 175 branches.

By this *Sushruta* meant that *vatavaha siras* are those which are found in *vata* predominating areas, similarly *pitta* and *kaphavaha siras* are found in *pitta* and *kapha* predominating areas respectively<sup>16</sup>.

**F. Colour, characters and functions of four types of siras**

1. *Vatavaha sira* – *Aruna varna* (crimson red) and filled with *vayu*. These *siras* (blood vessel) perform physical functions without hindering the specific of *buddhi* (intellect) and sense organs. *Acharya Dalhana* has explained the term *kriyanam* in this he includes both voluntary action and involuntary action. The word *buddhi karma* (intellect function) is related to the five sense organs and *manas* (mind). The intellect plays its role in deciding the normal state. When there is a hindrance in the normal functioning of sense organs; it is supposed that there is something wrong with the *buddhi* (intellect) or it has gone under *moha* (confusion)<sup>17</sup>.
2. *Pittavaha sira*– *Neela varna* (blue) and have a warm touch. These *siras* (blood vessel) create lusture in the body and develop a good appetite. Maintain normal health and normal functions of the body.
3. *Kaphavaha sira*– *Gaura varna* (white) and cold to touch and steady. These *siras* (blood vessel) give lubrication to the various body parts and produce firmness in the joints. It also improves strength and maintains normal functions of the body.
4. *Raktavaha sira* (blood vessel) – Red and they are neither too hot nor too cold. These *siras* (blood vessel) nourish the *dhatu*s (tissues), improves the complexion, cause a definite

perception of *sparsha* (touch) and maintain normal functions of the body.

**Table 3: showing colour, character and function of four types of siras by Sushruta**

Type of sira	Colour	Character	Function
Vatavaha siras	Aruna varna (crimson red)	Filled with <i>vayu</i>	Perform physical functions without hindering the specific functions of <i>buddhi</i> (intellect) and sense organs.
Pittavaha siras	Neela varna (blue)	Warm to touch	It creates luster in the body and develops a good appetite.
Kaphavaha siras	Gowra varna (white)	Cold to touch and steady	Gives lubrication to the various body parts and produces firmness in the joints. It also improves strength.
Raktavaha sira	Rohini varna (red)	Neither they are too hot nor too cold	Nourishes the <i>dhatus</i> (tissues) improves the complexion definite perception of <i>sparsha</i> (touch).

**Table 4: showing colour, character and function of four types of siras by Vagbhatta<sup>18</sup>**

Type of sira	Colour	Character and Function
Vatavaha siras	Svaya-Aruna varna (bluish red)	Pulsate, small, get full and empty every minute. It carries blood associated with <i>Vata</i> .
Pittavaha siras	Nila-Pitavarna (bluish yellow)	Warm to touch and bleed quickly. It carries blood associated with <i>Pitta</i> .
Kaphavaha siras	Sveta varna (white)	Smooth, hard, cold to touch and causes itching steady. It carries blood associated with <i>Kapha</i> .
Suddha Raktavaha sira	Mild red in colour	Those which are even, deep-seated, smooth. It carries purified blood.

### G. Sarvavaha sira (blood vessel)

According to *Sushruta* no *sira* (blood vessel) in the body carries either the *vayu* or the *pitta* or the *kapha* alone. Therefore *siras* (blood vessel) should be considered as *sarvavaha sira* (blood vessel). The particular *sira* (blood vessel) is to circulate a particular *dosha* (body humor) in its specific area. But all the three *doshas* (body humor) circulate in the whole of the body. Therefore *doshas* (body humor) are not apt for circulation only in their specific areas but they circulate in the whole of the body. This proves that the *siras* (blood vessel) are *sarvavaha*<sup>19</sup>.

## DISCUSSION

In *Ayurveda* the term *sira* (blood vessel) used in two purposes-in general *sira* has been used to denote the vessels otherwise in specific sense *sira* means veins. He described the angiology under the term of *sira* (blood vessel) and he includes artery, vein, capillary and lymphatics in four types of *siras* (blood vessel)<sup>20</sup>. The following points suggest that similarities in between the *Ayurvedic* term of *sira* and the blood vessels in modern science-

- ⇒ *Sira* (blood vessel) originates in the embryonic life from *nabhi* (umbilicus) and they spread upward, downward and in oblique fashion from *nabhi* (umbilicus)<sup>8</sup>. This statement of *Sushruta* is accepted only during embryonic life. In foetus it can be seen also, that number of blood vessels are attached to the umbilicus<sup>21</sup>. In fetal life, the *siras* (blood vessel) are concerned with the nutrition of the foetus through the umbilical cord, but after birth, these *siras* (blood vessel) no more exist. *Sushruta* has labelled them “*Nabhiprabhava*” because either they start or end in *nabhi* (umbilicus) in uterine life. Thus *Sushruta*'s description regarding the origin of *sira* (blood vessel) seems to be correct. Here the term *sira* (blood vessel) is used for umbilical vessels<sup>22</sup>.
- ⇒ *Sushruta*'s description regarding the structure, the *sira* is very similar to the structure of blood vessels in modern anatomy. After leaving the heart, large arteries are branch into smaller ones that reach out to different parts of the body. These smaller vessels despite everything further into minute vessels considered arterioles that enter the body tissues. Inside the tissues, the arterioles branch into a network of microscopic vessels called capillaries. Substances move all through the capillary walls as the blood exchange materials with the cells. Before leaving the tissues, capillaries join and form venules, which are little veins. The venules converge to shape larger veins that in the long run return blood to the heart. The walls of arteries, veins, and capillaries differ in structure. In all three, the vessel wall surrounds a hollow center through which the blood flows<sup>23</sup>.

- ⇒ As a garden or a grain field is made wet by the water carrying big and small channels, similarly the *sira* (blood vessel) by their contractility and dilatatory property, supply nutrition to the body<sup>24</sup>. The blood vessels of the body (supply arteries, capillaries, and veins) make up a closed framework of tubes that carry blood from the heart to tissues all over the body and after that back to the heart. Arteries carry blood away from the heart, whereas veins carry blood toward the heart. Here dilation and contraction are the functions of arteries. Because of pulsation, the blood circulates all over the body. In the nutrition process of the body, all the three blood vessels take part. Lymphatics also take part in nutrition and they circulate lymph<sup>25</sup>.
- ⇒ The four types of *siras* (blood vessel) are correlated with blood vessels by the following way<sup>26</sup>:
- The colour and character of *vataavaha siras* like *aruna varna* (crimson red) and filled with *vayu* (pulsation) are very similar to the characters of an artery.
  - The colour *neela varna* (blue) of *pittavaha siras* are very similar to veins. These are blue because these carry deoxygenated blood.
  - The *gowra varna* (white) of *kaphavaha siras* are very similar to lymphatics. These are white because these carrying clear fluid lymph.
  - The colour and function of *raktavaha siras* like *rohini* (red) and nourishes the *dhatu*s (tissues) are very similar to capillaries. These are red and exchange the nutrients in tissue level.

**Table 5: Showing similarities between four types of *siras* and blood vessels**

Type of <i>sira</i>	Modern correlation	Similarities between <i>sira</i> and blood vessels
<i>Vataavaha siras</i>	Arteries	<i>Aruna varna</i> (crimson red), filled with <i>vayu</i>
<i>Pittavaha siras</i>	Veins	<i>Neela varna</i> (blue)
<i>Kaphavaha siras</i>	Lymphatic	<i>Gowra varna</i> (white)
<i>Raktavaha siras</i>	Capillaries	<i>Rohini varna</i> (red), nourishes the <i>dhatu</i> s (tissues)

## CONCLUSION

According to *Ayurveda sira* (blood vessel) is a tubular structure, which carries the materials such as *rasa* (plasma) & *rakta* (blood). In common, this term *sira* (blood vessel) implies for blood vessels. In modern anatomy the *vataavaha siras* can be compared with the arteries, the *pittavaha siras* can be accepted as veins, *kaphavaha siras* can be considered as lymphatic channels and *raktavaha siras* are correlated with capillaries of the body. So it seems that *Sushruta* includes the vascular system (angiology) under the term of *sira*. So the word *Sira* is correlated with the blood vessels and lymphatics is not farfetched and fanciful.

## ACKNOWLEDGEMENT

Author acknowledges the immense help received from the scholars whose articles are cited and included in references of this manuscript. The author is also grateful to authors/editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

**Conflict of interest-nil**

**Financial support-nil**

## REFERENCES

- Srikantha Murti KR, English translation of Sushruta Sharira Sthana, Volume-I, Chaukhambha Orientalia Publishers, Varanasi, 3<sup>rd</sup> edition, 2007, p-102.
- Sharma PV, Sushruta Samhita Sharira Sthana English translation and Nibandha sangraha commentary of Dalhana, Volume-II, Chaukhambha Orientalia Publishers, Varanasi, 2007, p-315.
- Patawardhan Kishor, Human Physiology in Ayurveda, Chukhambha Orientale, Varanasi, 1<sup>st</sup> edition, 2005, p-112.
- Rama Sundara Rao M. , Sharira Rachana Vignanam , Vijayawada – 520002, 1<sup>st</sup> edition, 2005, p-236.
- Tarachand sharma, Ayurvediya Sharira Rachana Vijnana. Natha Pustaka Bhandara, Rohataka (Hariyana), 1983, p-143.
- Sen Gananath, Sanjna panchaka vimarsha, , Krishnadas Academy Publishers, Varanasi, reprint edition, 1993, p-53.
- Agnivesha, Charaka Samhita Sutra Sthana, Jadavaji Trikanji Acharya with the Ayurveda Dipika commentary of Chakrapanidatta, Chaukhambha Orientalia Publishers, Varanasi, reprint edition, 2009, p-285.
- Srikantha Murti KR, English translation of Sushruta Sharira Sthana, Volume-I, Chaukhambha Orientalia Publishers, Varanasi, 3<sup>rd</sup> edition, 2007, p-122.
- Vagbhatta, Ashtanga Hruday, sarvanga Sundri commentary by Lalendra Vaidya, Motlala Banarasidasa Publishers, 1990, p-122
- Ghanekar, Sushrut Samhita Sharira Sthana, Meharchand Lachmandas Publication, New Delhi, 2015, p-241.
- Srikantha Murti KR, English translation of Sushruta Samhita Sharira Sthana, Volume-I, Chaukhambha Orientalia Publishers, Varanasi, 3<sup>rd</sup> edition, 2007, p-122.
- Vagbhatta, Astanga Sangraha, Hindi Commentary by Atrideva Gupta, Krishnadasa Academy, Varanasi, 1993, p-113.
- Bhela, Bhela Samhita, Edited by Shastri V.S.V. and Sharma C.R.R., C.C.R.I.M.H. Pub., New Delhi, 1997, p-412.
- Thatte DG, English translation of Sushruta Sharira Sthana, Chaukhambha Orientalia Publishers, Varanasi, 2007, p-140
- Sharma PV, Sushruta Samhita Sharira Sthana English translation and Nibandha sangraha commentary of Dalhana, Volume-II, Chaukhambha Orientalia Publishers, Varanasi, 2007, p-200.
- Thatte DG, English translation of Sushruta Sharira Sthana, Chaukhambha Orientalia Publishers, Varanasi, 2007, p-140.
- Tiwari Rashmi, Vatvah Sira (blood vessel) – A Critical & Conceptual Correlation with Modern Science, Int J Ayu Pharm Chem, 2019, 10 (2):124-131.
- Vagbhatta, Ashtanga Hruday, sarvanga Sundri commentary by Lalendra Vaidya, Motlala Banarasidasa Publishers, 1990, p-124.
- Sharma Anantram, Sushrut Samhita Sharira Sthana, Chaukhambha Surbharti Prakaashan, Vaaranasi, reprint edition, 2008, p-102.

20. Ashok Kumar. B., Thomas A, Chaudhary S. A review on sira vyadhana: an important para-surgical procedure of ayurveda. Int J Health Sci Res. 2019; 9(11):62-68.
21. Shiba Datta .P., Thesis on A critical study on Avedhya Sira of head and neck in Ayurveda and modern literature, Govt. Ayurvedic college, Ujjain, April-2008.
22. Dr. Kulkarni BG, Nabhi Marma- An embryological and Anatomical focus, Journal of Indian system of Medicine, 2014, 2(4): 68-73.
23. Chaurasia BD, Handbook of General Anatomy, CBS publishers, New Delhi, III<sup>rd</sup> edition, 2000, p-81.
24. Blood vessels in Ayurveda, <https://www.planetayurveda.com/shira-blood-vessels/>, 21 march 2020, DOI: <https://doi.org/10.31838/pa/2020.21.03.022>
25. Tortora and Angasontakos, Principles of Anatomy and Physiology, Harper and Row publishers, Newyork, IV<sup>th</sup> edition, 1984. P-482
26. Khan Rohee, Khan Wadood, A Literature Review of Sira and Vein, International Ayurvedic Medical Journal, 2017, p-1557-1563.