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A Bird's Eye View on the Fundamental Study of *Rakta* with Special Reference to *Sharir*

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Abstract

In *Ayurveda, Rakta* is considered one of the seven *Dhatus* (tissues) that make up the body. It is closely related to the liver, spleen, and bone marrow, which are responsible for its production and maintenance. *Rakta,* also known as blood, is an important component of the human body. It plays a crucial role in transporting oxygen and nutrients to various organs and tissues, while also removing waste products from the body. According to *Ayurveda, Rakta* is also closely linked to the *Pitta Dosha*, which governs metabolism and transformation in the body. Imbalances in *Pitta* can lead to various blood disorders such as anaemia, jaundice, and bleeding disorders. In terms of *Sharir* (body), *Rakta* is circulated throughout the body via a network of blood vessels, including arteries, veins, and capillaries. The heart acts as a pump to circulate blood throughout the body, while the lungs help to oxygenate it. *Rakta* is described in many ways in *Ayurvedic Samhitas* like *Dosh, Dhatu, Srotas, Sara, Dash Pranayatana, Marma, Pramana, Kala* and *Chikitsa* of many *Vyadhis* etc. Overall, *Rakta* is an essential component of the human body, and its proper functioning is critical for good health and well-being.

Keywords: *Pitta Dosha, Rakta Dhatu, Raktavaha Srotas, Sara, Sharir*

1. Introduction

Dosha, *Dhatu* and *Mala* are the three basic elements of the body. In *Ayurveda*, the *Sharir* (body), *Manas* (mind) and *Prana* (lifeforce) are supported by tissue called *Dhatu*. *Dhatu* is the essence through which nourishment, growth and sustenance of the body take place. The main function of *Dhatu* is to hold together the elements of the body. According to *Ayurveda,* there are seven *Dhatus*[1], which are *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja* and *Shukra*, they are constantly nourished, destroyed and renewed in the same order. *Rakta Dhatu* is one of the important *Dhatu* out of seven *Dhatus*.

It has the potential for the *Pranadharana* of all the *Pranimatras*. It plays an important role in the development of various organs, in their functioning and in the *Nidana* and *Chikitsa* of many *Vyadhis* (diseases). In *Shalya Tantra, Atyadhik Raktastrava* (haemorrhage) is of vital importance also[2].

Acharya Sushruta regarded this physical being as the fourth *Dosha*[3]. This provides the great physiological importance of *Rakta Dhatu*. The increase or decrease of other *Dhatus* depends on *Rakta Dhatu*[4]. *Rakta Dhatu* is of prime importance among the seven *Dhatu*, as it is listed as *Pranayatana* among the ten *Pranayatana*[5].

Arunadatta the commentator of *Ashtanga Hridaya* discussed that even though *Rakta* has *Sthana* (place of origin), *Guna* (qualities), *Karma* (action), *Vridhi* (hyper) and *Kshyaya* (hypo) like *Tri Dosha* still is not considered as *Dosha*. Later *Acharya Vagbhatta* established the *Ashrayaashrayee* (shelter and sheltered) relation between *Pitta* and *Rakta*.

Utpatti of *Raktadhatu* has been explained by almost all *Acharya* as per *Kedari Kulya Nyaya "Rasad Raktamtato Mamsam"*[6].

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2. Material and Method

References and data about *Rakta* are collected from various *Ayurvedic* textbooks and modern texts. From *Brihatrayi*, other journals and relevant articles, scientific review papers and previous work done related to *Rakta* along with details of contemporary science on the topic were reviewed and relevant information was collected.

3. Discussion

3.1 Literary Review

3.1.1 Nirukti of Rakta

The term *Rakta* is derived from the root *Ranja Rage* (to colour) with the suffix *Ktah. Rakta* is that, by which anything is made coloured i.e., *Ranjate Raktavaranam Kriyate Anen Iti Raktam.* Synonyms of *Rakta* (by *Amarkosha*) are *Rudhira, Asrika, Lohita, Shonita, Asra, Rakta, Kshataja* etc. The meaning of *Rakta* in different books is- Sir Monier-Williams Gave the meaning of *Rakta* as, dyed, coloured, painted or reddened, red and crimson, parts of the body which ought to be red. In *Shabdsaagar*- coloured, stained, red colour, blood, saffron, copper and by apte- coloured, dyed tinged, painted, liked.

Acharya Sushruta narrates the *Utpatti* of *Rakta* as *Rasa* gets converted to *Rakta* by getting *Araktata* at *Yakrita* and *Pleeha*. According to *Acharya Sushruta* commentator *Dalhana,* it is formed after *Rasadhatu* in five days.

Acharya Charaka explained *Jala Mahabhuta* and *Agni Mahabhuta* predominance *Sharir Bhava* and *Rakta* have been included in both due to their *Drava Guna* and *Usna Guna* respectively[7,6]. *Acharya Sushruta* considered *Rakta* as an *Agneya Guna* predominant and he further explained the individual *Mahabhuta* quality of *Rakta*[8,6].

3.1.2 Sthana (Seats) of Rakta[9]

Yakrita, Pleeha and *Raktavahi Dhamani* are seats of blood described by *Acharya Sushruta*. Marrow is found inside large bone, whereas a substance similar in appearance and found inside other bony structures (cartilages) should be considered as *Meda*, mixed with blood.

3.1.3 Shuddha Rakta Karya

The *Rakta* conferred with good qualities like enhancing the clarity in complexion, nourishing the muscle tissue, sustaining the life and ameliorating the quality of the *Oja,* along with these its interception the life by its action of *Pranadharana*[10].

3.1.4 Panchabhoutika Composition of Rakta[11]

Rakta Dhatu is *Panchabhoutika* in nature, so all five properties of *Panchmahabhuta* are expressed in *Rakta Dhatu*, these are-

Table 1. Showing *Panchabhoutika* composition of *Rakta*

S. N	***Panchmahabhuta***	**Properties of *Panchmahabhuta* for *Rakta Dhatu***
1	*Prithvi*	*Visrata*- The typical smell of *Rakta Dhatu*
2	*Jala*	*Dravata*- Fluidity of *Rakta Dhatu*
3	*Agni*	*Raga*- Typical red colour of *Rakta Dhatu*
4	*Vayu*	*Spandana*- Pulsation and motion of *Rakta Dhatu*
5	*Akasha*	*Laghuta*- Lightness

Despite the existence of *Panchmahabhuta Rakta Dhatu* dominates *Agni* and *Jala Mahabhuta*.

3.1.5 Pramana of Rakta

8 *Anjali*[12]

3.1.6 Updhatu of Rakta

Updhatu of *Rakta* are: -

- *Kandara* (tendons)
- *Sira*[13] (blood vessels)

3.1.7 Mala of Rakta

Pitta is the *Mala* of *Rakta*.

3.2 Features of *Shuddha Rakta*

According to *Acharya Charka, Rakta Dhatu* in pure status looks like *Tapniyabha* (heated gold which turns red after putting in fire), *Indragopabham* (a bright red coloured insect), *Padma* (red lotus), *Alaktaka* (a red colour dye that is applied on hands and feet), *Gunga* (*Abrus precatorius*) or *Ratti*[14].

According to *Acharya Sushruta* pure *Rakta Dhatu* looks like *Indragopa* (a bright red colour insect), having proper density (neither too fluid nor too thick) and does not bear any other colour[15].

According to *Acharya Vagabhatta, Rakta Dhatu* in pure status is slightly sweet *(Madhura)* and salty *(Lavana)* in taste, neither cold nor warm, having proper density (neither too fluid nor too thick) and colour matches the colour of *Padma* (red lotus), *Indragopa* (a bright red insect), *Hema* (gold) and blood of *Avi* (sheep) and *Shashaka* (rabbit)[16]. Persons who have pure blood in their body endowed with clarity in complexion, normal functioning of sense organs, normal urge for the objects sense organs, unobstructed *Agni*, unobstructed *Vega* of *Mutra* and *Purisha*, happiness, nourishment and strength[17].

Acharya Charaka has described *Rakta Sara* individual with the following *Lakshanas*-

- Physical characteristics- People possessing the *Rakta Dhatu* perfection are characterized by unctuousness, the red colour of the ears, eyes, face, tongue, nose, lips, palm, soles, nails, forehead and genital organs, and a beautiful dazzling appearance.
- Physio-psychological characteristics- They are endowed with happiness, the best intelligence, magnanimity/kindness, delicate, weak, unable to bear any stress or problems, and unable to tolerate heat.

3.3 Circulation of *Rakta*[18]

The word *Rasa* is also used as an indication for *Rakta*. It explains that from the heart (arteries), *Rakta* spreads all over the body and using *Sira* (veins) it returns to the heart. *Rasa Dhatu* circulates throughout the body in subtle ways like the continuity of; Sound, Flame and Water. *Acharya, Dalhana* explains this similarly like the continuity of sound as sideward movements, like flame as upward movement and like water as downward movement.

3.4 *Rakta Dhatu*

In *Ayurveda, Dhatus* are seven in number. These are, *Rasa*, *Rakta, Mamsa, Meda, Asthi, Majja* and *Shukra. Rakta Dhatu* is the 2nd, *Dhatu*. It is produced from the *Prasada Bhaga* of *Rasa Dhatu* with the help of *Bhutagni* and *Rasa Dhatvagni*[19,10]. *Ayurveda* mentions that the essence of food becomes *Rasa Dhatu* and when this *Rasa* passes through *Yakrita* and *Pleeha* it gets coloured and *Rakta* is formed. *Rakta Dhatu* is present in the whole body. It is available in large quantities in some places and may functionary specifically about the same organ. These places are known as sites of the *Rakta Dhatu.*

According to modern science the liver, one of the most important metabolic organs in the human body has a wide range of functions. In the first few weeks of embryonic life, nucleated primitive red blood cells are produced in the yolk sac. During the middle trimester of gestation, the liver is the primary organ for red blood cell production, but adequate amounts are also produced in the spleen and lymph nodes. *Acharya Sushruta* specifically mentioned the *Yakrita* is the only site where the production of *Rakta Dhatu* takes place after it has been transformed by *Raktagni* and *Ranjak Pitta*[20].

3.4.1 *Functions of Rakta Dhatu*

Rakta Dhatu is the root of a living body. It maintains the life of an individual by supporting the living body[21]. *Rakta Dhatu* is responsible for the *Kshaya* (wasting) and *Vridhi* (growth) of other *Dhatus*[22]. Other functions of *Rakta Dhatu* are-

- *Varna Prasadam- Rakta* brings lustre to the colour of skin.
- *Mamsa Pushti*- It nourishes the next *Mamsa Dhatu.*
- *Jivayti- Rakta* keeps the individual alive[23].
- *Dhatunam Purnam*- Circulating *Rakta* nourishes another *Dhatu*.
- *Varnam*- It brings colour to the skin.
- *Sparsha Gyanam*- Responsible for the sensation of touch[24].

Pure *Rakta Dhatu* is responsible for the promotion of *Bala* (strength), *Varna* (complexion/ colour), *Sukh* (happiness) and *Ayu* (longevity). It also plays a vital role in the sustenance of *Prana* in living beings[25].

Rakta is responsible for *Jivana*, as it does *Prana Dharan*. An energy without which the body will not function is called *Prana*. Living beings cannot survive without *Prana* and *Rakta Dhatu* is the medium for the conduction of *Prana*, so life depends upon *Rakta Dhatu*[26].

3.5 *Dhatvagni*

The normal state of all *Dhatu* in the body is maintained by the action of *Dhatvagni. Dhatvagni* comes from *Jathragni* found in every *Dhatus*[27]. The *Aahar Rasa* is transported to various *Dhatus* through appropriate channels[28]. When *Aahara Rasa* reaches a certain *Dhatu*, the *Dhatvagni* present their new transformations of that *Aahar Rasa* leading to the formation of *Sara* and *Kitta* portion[29]. The seven *Dhatus* are divided into *Prasadaja*, the clear and

important part, and *Kittaja*, the secondary part. Three things are formed when the metabolism of each *Dhatus* takes place- *Sthoola Bhag* (tissue proper), *Shukshma Bhag* (another part that nourishes the *Dhatu*) and *Kitta Bhag* (waste from tissue). The following is the order in which the *Dhatu* formed[30]. From *Rasa*, *Rakta* is formed, then successively *Mamsa*, *Meda*, *Asthi*, *Majja* and *Shukra*.

3.6 *Raktavaha Srotas* and *Raktadhara Kala*

Raktavaha Srotas is the centre site of *Rakta Dhatu. Yakrita* (liver) and *Pleeha* (spleen) are the base of *Raktavaha Srotas*[31]. *Acharya Sushruta* added the *Raktavahi Dhamani* (blood vessels) as a base of *Raktavaha Srotas*[32]. Blood vessels circulate the *Rakta* to each fine structure of the body. *Raktavahi Dhamanis* are none other than blood vessels mean arteries, veins and capillaries.

Injury to *Raktavaha Srotas* leads to cyanosis, fever, anaemia, haemorrhage, and reddish discolouration of the eyes. *Raktavaha Srotas* gets vitiated by the consumption of spicy food and drinks, unctuous and hot foodstuffs and beverages, excessive fluid intake, and excessive exposure to sunlight and wind. The characteristic manifestation of the vitiation of *Raktavaha Srotas* leads to various kinds of skin diseases, abscess formation, and jaundice.

Haematopoiesis in a foetus takes place in the early stages under the yolk sac, from the 3rd to the 5th month, haematopoiesis is controlled by the liver and spleen hence it's called as hepatic phase and later bone marrow takes the function of formation of blood[33].

Raktadhara Kala is situated inside the liver, spleen and blood vessels. *Rakta and Twacha*, both are *Matrija*. According to *Acharya Charaka,* the second *Twacha* layer is *Asrigdhara*[34,2].

3.7 *Rakta* and *Marma Sambandh*

In *Marmaviddhalakshanas*, *Atyadhik Raktastrav* (excessive bleeding) is one of the main causes of death. Since *Rakta* is the *Jeevan* of the *Pranimatras* if the bleeding gets stopped, the individual's chances of survival are higher[35], *Ashtanga Hridaya* says, if not stopped, death can result from the bleeding[36,2].

3.8 Pathological Conditions Associated with *Rakta Dhatu*

Due to overindulgence in oily, pungent food, to hot climate increases the *Rakta Dhatu* and hampers the *Agni* of the individual. Skin eyes and urine of such person appear red in colour[37]. Excessively raised blood causes produces red colouration of skin and eyes, and engorgement of blood vessels[38,10].

Malnutrition and improper diet cause deficiency of *Rakta Dhatu*. *Shonita Kshaya* causes skin roughness, craving or urge for cold and sour things, and emptiness of veins. Signs and symptoms of diminution of *Rakta* are; roughness, dryness and cracks in the skin and loss of its lustre. *Acharya Vagbhatta* also says that craving for sour, cold food and collapsing of veins are the symptoms of decreased *Rakta Dhatu*[39].

Table 2. Showing features of *Rakta* according to *Doshas*[40]

S.N	*Dosh*	Features of Blood
1	*Vata*	Frothy, slightly reddish or black, not slimy, thin, flowing quickly and not clotting of blood.
2	*Pitta*	Bluish, yellow, green or black, unpleasant smell, not liked by ants and flies and not clotting of blood.
3	*Kapha*	Colour similar to the solution of *Gairika*, unctuous, cold, thick, slimy, flowing slowly and resembling a muscle.
4	*Sannipataja*	All the above features, resemble *Kanjika* and have a very bad smell.

3.8.1 *Diseases Produced due to Vitiated Rakta*

Acharya Charaka and *Acharya Sushruta* also described that the following disease is caused by the vitiation of *Rakta*; *Kustha, Visarpa, Pidka, Raktapitta, Asrigder* (menorrhagia), *Pleehavikara* (splenic disorders), *Gulma, Nilika* (blue moles), *Kamla* (jaundice), *Vyanga, Piplu, Tilkalaka* (black mole), *Dadru* (ringworm), *Charmadala* (dermatitis), *Shwitra* (leukoderma), *Pama* (papules), *Kotha* (urticaria) etc[41].

3.9 *Chikitsa* of *Raktaja Roga*[42]

Virechan (purgation), *Upavasa* (fasting) and *Raktamokshana* (bloodletting) indicated for the treatment of *Raktapitta* are also useful for curing diseases due to vitiation of blood.

4. *Rakta* (Blood) and its Significance in *Sharir (Rachana* and *Kriya)*

Rakta is composed of various components, including red blood cells, white blood cells, platelets, and plasma. It is a specialized fluid that circulates throughout the body and provides oxygen and nutrients to various organs and tissues. In *Ayurveda*, the integrative approach to *Rakta* (blood tissue) within the realm of anatomy (*Rachana Sharir*) and physiology (*Kriya Sharir*) encompasses various factors that contribute to the maintenance of balanced and healthy blood tissue. Some key components of an integrative approach to *Rakta* in anatomy and physiology-

- Understanding the role of *Rakta*: *Rakta* is considered one of the seven *Dhatus* (tissues). It carries vital nutrients, oxygen, and *Prana* (life force) to the tissues and removes waste products. Understanding the functions of *Rakta* in nourishing and supporting the body is fundamental in its integrative approach.
- Diet and nutrition: A balanced and nutritious diet is crucial for maintaining healthy blood tissue. Consuming foods rich in iron, vitamin C, and other nutrients essential for blood health is emphasized. This includes incorporating green leafy vegetables, beets, legumes, and fruits into the diet while avoiding processed and unhealthy foods.
- Exercise and movement: Physical activity stimulates circulation and supports the healthy flow of blood throughout the body. Engaging in regular exercise promotes proper oxygenation and nutrient delivery to the tissues, thus contributing to the overall health of blood tissue.
- Holistic lifestyle practices: In addition to diet and exercise, lifestyle practices such as maintaining a regular daily routine (*Dinacharya*), managing stress through *Yoga* and meditation, and ensuring proper hydration are integral to supporting the health of *Rakta.*
- Herbal support: Utilizing *Ayurvedic* herbs and formulations known for their blood- purifying and supportive properties, such as *Manjistha, Turmeric*, and *Triphala* can aid in maintaining healthy *Rakta*.
- Balance of *Doshas* and *Agni:* Maintaining a balance of the three *Doshas (Vata, Pitta* and *Kapha)* and ensuring strong *Agni* is crucial for the proper metabolism and assimilation of nutrients which directly impacts the health of the blood tissue.
- Detoxification and cleansing: *Ayurvedic* detoxification practices, including *Panchakarma* therapies, can help eliminate toxins and impurities from the body, thereby supporting the health and purity of the blood tissue.

5. Conclusion

Ayurveda also recognizes the importance of maintaining the quality and quantity of *Rakta* in the body. This is achieved through various dietary and lifestyle practices, avoiding excess consumption of spicy, sour, and salty foods, and practising stress-reducing techniques such as *Yoga* and meditation to balance the mind and body. Maintaining a regular sleep schedule to support the body's natural healing and rejuvenation processes. Avoid alcohol and tobacco, which can damage the liver and spleen and lead to blood disorders.

Overall, *Ayurveda* recognizes the importance of *Rakta* in maintaining overall health and well- being and provides various dietary, lifestyle, and herbal recommendations to support its quality and quantity in the body.

In conclusion, *Rakta* is a vital component of the human body that plays a crucial role in maintaining overall health and well-being. It is responsible for transporting oxygen and nutrients, removing waste products, regulating body temperature, and providing an immune response. Understanding the significance of *Rakta* in *Sharir* is essential for maintaining good health.

6. References

1. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika, Sutra Sthan 15/7, Varanasi Chaukhambha Sanskrit Samsthan; Edited 62019. p. 75.
2. Milind Prajkta Kulkarni. Review of importance of Rakta in relevance with Sharir Rachana. IJAAR (International Journal of Applied Ayurved Research). 2015. ISSN: 2347-6362.
3. Shastri Kaviraja Ambikadutta, Vol-1, Shushruta Samhita, Ayurveda Tatva Sandipika, Sutra Sthan 21/3; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 112.
4. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika, Sutra Sthan 14/21; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 69.

5. Shastri PK, Samhita C, Vol-1, Vidhyotini Hindi commentary, Sutra Sthan 29/3; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 576.
6. Kar, Dr.A. et al. (2021) 'Critical Understanding of Rakta Dhatu and Its Clinical Interpretation- A Meta-Analysis', IJRAR (International Journal of Research and Analytical Review); 2021. ISSN: 2349-5138.
7. Agnivesha, Samhita Charaka, JT Acharya editor, Ayurveda Deepika Commentary of Chakrapani, Sharira Sthana 7/16, Reprinted edited 2015, Varanasi Chaukhambha Orientalia; p. 339.
8. Samhita Maharshi Sushruta, JT Acharya editor, Nibandha Samgraha Commentary of Dalhana, Sutra Sthana, 14/9, Reprinted edited 2014, Varanasi Chaukhambha Orientalia; p. 64.
9. Samhita Sushruta, Vol-1, Ayurveda Tatva Sandipika Hindi commentary, Sutra Sthana 21/16, Varanasi; reprint 2007, Chaukhambha Bharti academy.
10. Tadasad, Dr.S. et al. (2018) 'Concept of Rakta Dhatu w.s.r. to Rakta Pradoshaja Vikara' Journal of Ayurveda Integrated Medical Sciences. 2018; 5:187-197.
11. Shastri Kaviraja Ambikadutta, Vol-1, Shushruta Samhita with elaborated Ayurveda Tatva Sandipika, Sutra Sthan 14/9; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 65.
12. Samhita Charaka, Chakrapani commentary Vol-1; Sharir Sthana 7/15, Varanasi Chaukhambha Bharti academy; Reprint: 2005.
13. Shastri Kashinath P, Vol-2, Samhita Charaka, Vidhyotini Hindi commentary Chikitsa Sthan 15/17; Varanasi Chaukhambha Bharti academy; Edited 2013. p. 456.
14. Shastri Kashinath P, Vol-1, Samhita Charaka, Vidhyotini Hindi commentary Sutra Sthan 24/22; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 447.
15. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika commentary Sutra Sthan 14/22; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 69.
16. Tripathi Dr Brahmananda, Hridaya Ashtanga, Nirmala Hindi commentary Sutra Sthan 27/1-2; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2009. p. 294.
17. Shastri Kashinath P, Vol-1, Samhita Charaka, Vidhyotini Hindi commentary Sutra Sthan 24/24; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 449.
18. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika Hindi commentary Sutra Sthan 14/16; Varanasi Chaukhambha Sanskrit Samsthan, reprinted 2007.
19. Kushwaha Vd. Chikitsa Sthana 15/16, Varanasi Chaukhambha Orientalia; First Edition 2009. p. 383.
20. Pande, Prasad Prabhakarrao et. al, 'Conceptual study of Raktavaha Srotasa w.s.r to Yakrita.'
21. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika Sutra Sthan 14/44; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 73.
22. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika Sutra Sthan 14/21; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 69.
23. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika Sutra Sthan 15/7; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 75.
24. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika Sharir Sthan 7/15; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 81.
25. Shastri Kashinath P, Vol-1, Samhita Charaka, Vidhyotini Hindi commentary Sutra Sthan 24/4; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 443.
26. Tripathi Dr Brahmananda, Hridaya Ashtanga, Nirmala Hindi commentary Sutra Sthan 11/4; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2009. p. 160.
27. Hridaya Ashtanga, Commentaries Sarvangasundra of Arunadatta and Ayurved Rasayan of Himadri, edited by Pandit Hari Sadashiva ShastrinParadakara, Annotated by Dr. Anna Moreshvara Kunte & Krishna Ramacandra Shastri Navare; Sutra Sthana 11/36, Varanasi Chaukhambha Orientalia; Reprint Edition 2017. p. 188.
28. Agnivesh, Samhita Charaka, Ayurved Dipika commentary by Shri Chakrapanidatta, edited by Vaidhya Yadhav ji Trikam ji Acharya, Sutra Sthana 28/33, Varanasi Chaukhambha Surbharati Prakashan; Reprint Edition 2015. p. 138.
29. Agnivesh, Samhita Charaka, Ayurved Dipika commentary by Shri Chakrapanidatta, edited by Vaidhya Yadhav ji Trikam ji Acharya, Chikitsa Sthana 15/15, Varanasi Chaukhambha Surbharati Prakashan; Reprint Edition 2015. p. 513.
30. Samhita Sushruta, Nibandha Sangraha commentary by Dalhan, edited by Vaidhya Yadhav ji Trikam ji Acharya, Sutra Sthana 14/10, Varanasi Chaukhambha Surbharati Prakashan; Reprint Edition 2014. p. 60.
31. Shastri Kashinath P, Vol-1, Samhita Charaka, Vidhyotini Hindi commentary Viman Sthan 5/8; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 711.
32. Shastri Kaviraja Ambikadutta, Vol-1, Samhita Shushruta, Ayurveda Tatva Sandipika Sharir Sthan 9/12; Varanasi Chaukhambha Sanskrit Samsthan; Edited 2019. p. 96.
33. Gupta Dr R K, et al. Critical analysis of Raktavaha Srotas, Journal of Ayurveda Integrated Medical Sciences; 2020; 2:273-276.
34. Samhita Shushruta, Yadavji TK, Kavyatirth NA, Dalhan commentary 6, Varanasi, Chaukhambha Prakashan; Edited 1997.

35. Garde Dr G K, Saarth Vagbhatta, Reprint, Pune, Anmol Prakashan; 1994.
36. Gupt Kaviraj Atridev, Sangrah Ashtanga, Varanasi Krishnadas academy.
37. Hridaya Ashtanga, with commentaries of Arunadutta and Hemadri, edited by Pt. Hari Sadasiva Sastri Paradakara, Uthara Sthana 35/7, Chaukhambha Surbharati Prakashan; Ed Reprint 2010. p. 902, p. 184.
38. Samhita Sushruta, Nibandha Samgraha Commentary of Dalhana and Nyayachandrika of Gayadasa on Nidanasthana, Edited by Acharya Yadhavji Trikamaji, Varanasi Chaukhambha Krishnadas Academy; Ed Reprint; 2004. p. 824, p. 70.
39. Agnivesh, Samhita Charaka, Ayurved Dipika commentary by shri Chakrapanidatta, edited by Vaidhya Yadhav ji Trikam ji Acharya, Sutra Sthana 17/65, Varanasi Chaukhambha Surbharati Prakashan; Reprint Edition 2015. p. 103.
40. Samhita Sushruta, Nibandha Sangraha commentary by Dalhan, edited by Vaidhya Yadhav ji Trikam ji Acharya, Sutra Sthana 14/21, Varanasi Chaukhambha Surbharati Prakashan; Reprint Edition 2014. p. 64.
41. Shastri Kashinath P, Vol-1, Samhita Charaka, Vidhyotini Hindi commentary Sutra Sthan 28/11-12; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 571.
42. Shastri Kashinath P, Vol-1, Samhita Charaka, Vidhyotini Hindi commentary Sutra Sthan 24/18; Varanasi Chaukhambha Bharti academy; Edited 2009. p. 445.