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Concept of *Rakta Dhatu* w.s.r. to *Rakta Pradoshaja Vikara*

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ABSTRACT

Dhatu (tissue) is an entity by which sustenance, growth and nourishment of the body takes place. *Dhatu* are the functional apparatus of the *Dosha* (body humours). *Rakta Dhatu* is the 2nd *Dhatu*. It is produced from the *Prasada Bhaga* of *Rasa Dhatu* with the help of *Bhutagni* and *Rasa Dhatwagni*. *Rakta* is word originated Sanskrit word from 'Raj Ranjane' meaning is to stain. If white cloth is stained with this *Dhatu* (tissue) it become red coloured hence it is called as *Rakta*. As it is one of the seven *Dhatu*, (tissue) it is present in entire part of the body. However it may present in large quantity in some places & may be functioning specifically in context to some organ. Such places are known as *Sthana* (location) of the *Raktadhatu* (Blood) *Raktavaha Strotas* (channel) is main site of *Raktadhatu* (Blood). Principle organs of this *Strotas* are liver & spleen.

Key words: *Rakta Dhatu*, *Raktavaha Strotas*, *Rakta Pradoshaja Vikara*.

INTRODUCTION

Dosha, *Dhatu* and *Mala* are considered as three basic elements of body.^[1] Among these, *Dhatu* does *Dharana Karma*.^[2] They are seven in number. *Rakta Dhatu* is the 2nd *Dhatu*. It is produced from the *Prasada Bhaga* of *Rasa Dhatu* with the help of *Bhutagni* and *Rasa Dhatwagni*.^[3] Its *Gunas* are similar to *Pitta Guna* like *Sneha*, *Ushna*, *Tikshna*, *Drava* etc. It is *Apa* and *Teja Mahabhuta* predominant, circulates all over the body from *Hridaya* through *Dhamanis* and does *Shareera Jeevana* and *Mamsa Pusti*.

By the characteristic features of *Rakta Dhatu*, one can

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understand it, as that fluid component which circulates all over the body through heart and vessels and does nourishment of every tissue and organ of the body. So it is interpreted as blood. The red color of blood is due to the hemoglobin content of RBC's. So grossly *Rakta Dhatu* can be considered as the complete blood. Similarly *Rasa Dhatu* can be considered as the component of blood except RBC's. So there is a need to differentiate and have a clear cut understanding of *Rakta Dhatu* from *Rasa Dhatu* which comes under the broad term blood.

Rakta is word originated Sanskrit word from 'Raj Ranjane' meaning is to stain.^[4] If white cloth is stained with this *Dhatu* (tissue) it become red coloured hence it is called as *Rakta*. As it is one of the seven *Dhatu*, (tissue) it is present in entire part of the body. However it may present in large quantity in some places and may be functioning specifically in context to some organ. Such places are known as *Sthana* (location) of the *Raktadhatu* (Blood) *Raktavaha Strotas* (channel) is main site of *Raktadhatu* (Blood). Principle organs of this *Strotas* are liver and spleen.^[5]

Susruta added the *Raktavahi Dhamini* (blood vessels). *Rakta* (blood) is very important entity in context to

maintain internal environment constant. It is extremely important for the sustenance of life. As *Dosha* (body humours) are responsible for the creation of living body, fourth entity named as *Rakta Dhatu* (blood) also takes part in origin, sustaining and is responsible for the death.^[6]

Susruta described as fourth *Dosha* (body humours) to the *Rakta Dhatu* (blood).

Nidana Sevana leads to *Dosha Dusti*, when these *Doshas* come to *Rakta Dhatu* they lead to *Rakta Pradoshaja Vikara*.^[7]

Hence present work is undertaken to analyze the concept of *Rakta Dhatu* w.s.r. to *Rakta Pradoshaja Vikara*.

Nirukti

Root '*Raja Ranjane*' means to stain, since this *Dhatu* is red coloured it is called as *Rakta*. If white coloured cloth is stained with *Rakta* it becomes red coloured.

Synonyms

The synonyms of *Rakta Dhatu* are *Rudhiram*, *Asriga*, *Shonitam*, *Asram*, *Lohitam*.^[8] The word *Apyayana* in this context means to increase or to strengthen.^[9] it is the synonym of *Preenana* and *Trupti*.^[10]

Dhatu is an entity by which sustenance, growth and nourishment of the body takes place. *Dhatu* are the functional apparatus of the *Dosha*. *Dhatu* are seven in number, unanimously accepted by all Ayurvedic Scholars. *Rakta Dhatu* is one of the seven *Dhatu*s. It is in liquid form and is heavier than the *Rasa Dhatu*. The ideal state of *Rakta Dhatu* is *Asamhatam* i.e. neither viscous nor liquid state.^[11]

Role of food in Rakta Utpatti

According to Ayurveda food must have all six *Rasas* and such food is capable of developing all *Dhatu*s. *Chakrapani* identifies the quantity of different food as one *Kudava* of *Anna*, two *Palas* of *Mamsa*, one *Pala* of *Supa* etc. Since *Rakta* has *Agneya Guna*, food which is *Agneya* in nature must increase *Rakta*. *Agneya Dravyas* possess *Ruksha* (dry), *Tikshna* (sharp), *Ushna* (hot), *Visada* (clear), *Sukshma* (subtle) and chiefly consist *Roopa Guna* (colour/vision). When consumed

it creates *Daha* (burning sensation), *Prabha* (lusture), *Varna* (colour), *Prakasa* (bright) and helps in *Pachana* (digestion).^[12] From the qualities attributed to *Agneya* by *Acharya*, we can assume that hot, coloured vegetables, redmeat, and animal blood can increase *Rakta*.

Dhatu Poshana

Dhatu Poshana is also known as *Suksma Pacana* when the *Ahara Rasa* absorbed from the *Adho-Amasaya* it was taken to *Hrdaya* with the help of *Samana Vayu* and then transported to the *Dhatu*s with the help of *Vyana Vayu*.

The nourishment of the *Dhatu* takes place in the order. Though *Charaka*^[13] and *Vagbhata*^[14] while giving the description about the distribution of *Rasa* all over the body used the word '*Yugapat*' (all at once) but according to Arundatta commentator on *Ashtang Hrdaya*.

That is '*Yugapat*' means rapid distribution of *Ahara Rasa*.

This can be better understood by *Utpal Shatapatra Vedhana Nyaya*.

There are several theory postulated by the *Tikakaras* these are as follows :

1. *Ksira Dadhi Nyaya*
2. *Kedara Kulya Nyaya*
3. *Khale Kapota Nyaya*

When the *Ahara Rasa* will be distributed in the body first *Rasa Dhatu* will be nourished then followed by *Rakta*, *Mamsa*, *Meda*, *Asthi Majja* and last the most essence of all *Dhatu*s i.e. *Sukra* will get nourishment.

Dalhana, commentator of *Susruta* has given^[15] the *Dhatu Poshana Krama* is much elaborated way. When the *Ahara Rasa* subjected to the digestion by the *Rasagni* it split up in to three *Amsas* (parts). The *Sthula Amsa* will nourish the *Rasa Dhatu*, *Suksma Amsa* will nourish the *Rakta Dhatu* and residue part will be *Mala Kapha*. As *Sukra Dhatu* is the essence part of all the *Dhatu*s so it will not produce any type of *Mala*.

Sites of formation of Rakta Dhatu

Ayurveda mentions that essence of food become *Rasa Dhatu* and when this *Rasa* passes through *Yakrit* and *Pleeha* it gets coloured and *Rakta* is formed. A variety of *Medas Sarakta Medas* is mentioned may be equalent to red bone marrow, but it is not mentioned as a site for production of *Rakta*.

Physiological functions of Rakta Dhatu

Shuddharakta lakshana

Purity of blood was determined by physical appearance such as

- Pure blood look like a bright Indragopa.
- Like pure gold
- Looks like *Padma* and *Alaktaka*.
- Brightly reddish like *Gunja Phala*^[16]

Rakta which is identical to the colour of *Indragopaka*, not too thick and free from discolouration should be taken as normal.^[17]

Shuddharakta Purusha Lakshana^[18]

A person is designated as having the purest quality of blood, depending upon some characters such as excellent complexion of skin, properly functioning sense organs, unimpaired digestive system, pleasant and well nourished tissues with good stamina.

Rakta Dhatu Sara Purusha Lakshana

When a *Dhatu* in our body is in excellent condition that person is known by that *Sarata*. If one possesses pure *Rakta* in excellence he has *Rakta Sarata*. Individuals having the excellence of *Rakta* are characterized by unctuousness, beautiful dazzling appearance of the ears, face, tongue, nose, lips, sole of the hands and feet, nails, forehead, and genital organ. And will be glistening and attractive. They are happy, having good intelligence, mental tranquillity and tenderness. They are more susceptible to stress and cannot tolerate heat. Their body remains hot. *Raktasara* individual bears unctuous, red nails, mouth, palate, tongue, lips, hands, feet.^[19]

Shuddharakta Karya

The *Rakta* endowed with the good qualities enhances the clarity in complexion, nourishes the muscle tissue, sustains the life and enhances the quality of the *Ojus*, Along with these it withholds the life by its action of *Pranadharana*.^[20]

The blood in its normal state and flowing through its specific *Siras* strengthens the other *Dhatu*s of the body, improves the complexion, aids the organ of touch in the proper performance of its functions and produces other functions characteristic of it in the body. Flowing through them in a vitiated condition, it begets diseases which are due to the de- rangement of the blood.^[21]

Living creatures are endowed with strength, complexion, happiness and longetivity due to pure blood. Blood plays a vital role in the sustenance of *Prana*. Blood is one of the ten *Pranayatanas*.^[22]

Blood generates clarity in complexion, nourishes muscles and sustains life.

According to Ayurveda the fluid that is circulating through vascular system i.e. *Dhamanies*, *Srotases* and *Siras* is both *Rasa Dhatu* and *Rakta Dhatu*. The circulating *Rakta* is the medium of transport of *Ojus* – the factor responsible for resistance to disease. It is also the medium of transport of *Prakupita Doshas* through out the body, having it self involved in the process.^[23] During circulation *Rasa Dhatu* exudes through the *Srotomukhas* and fill up the place between *Srotas* and *Sthayi Dhatu*s (interstitial space) nutrients passes into *Sthayi Dhatu*s and *Malas* and *Kittas* passes into *Rasa* (lymph). And so *Rasa* is considered as *kosta*.^[24] So circulating *Rakta* is a complex fluid consisting of *Sthayi Rasa* (plasma, serum) and *Sthayi Rakta* (erythrocyte), remaining *Astayi Dhatu*s, *Doshas*, *Malas*, *Ojus* etc. It perfoms the vital functions as *Jeevana* (giving oxygen), provide normal colour to skin, strength, health and happiness, nourishment of other *Dhatu*s, tranquillity and life.^[25]

Quantity of Rakta Dhatu

Physiological measures of the *Raktadhatu* is 8 *Anjali*.^[26]

In the *raktamokshana* procedure upto one *prastha* (13.1/2 pala) of blood can be drawn from the veins. If the bleeding is excess, there is every chance of complications, hence care must be taken to protect the life of the patient.

Raktakshaya Lakshana

In decrease of blood, roughness in skin, craving for sour and cold and looseness of blood vessels are seen.^[27]

In the case of diminution of *Rakta* symptoms seen are roughness, dryness and cracks in the skin and loss of its lusture.^[28]

Sensation of touch gets hampered if there is *Rakta Kshaya*. The *Kshaya* of *Rakta Dhatu* creates a desire of *Amla* and cold, loosening in the vessels and *Rukshata*. When *Rakta Dhatu* is depleted, the qualities of pitta *Dosha* and fire diminish. A person feels cold, the skin loses its luster becoming pale or dusty gray, and coldness causes the body to hold on to heat by becoming constipated and by reducing urination and sweat. In the mind, depletion of the *Rakta Dhatu* leads to dullness, and difficulty processing and understanding new information. This often leads to confusion and misunderstandings.

Raktavridhi Lakshana

Increase in *Rakta Dhatu* can lead to diseases like *Khushta*, *Vatasra*, *Pittasra*, *Visarpa*, *Pleeha*, *Vidradhi*, *Gulma*, *Upakusha*, *Kamala* and *Vyanga*. It also hampers the *agni* of the individual. Skin eyes and urine of such person appears red in colour.^[29]

Excessively increased blood causes flushed body particularly eyes and fullness of blood vessels.^[30]

Mahabhuta composition of Rakta

Artava and *Sonita* are formed from *Rasa* which is *Soumya*, but both are *Agneya* in nature.^[31]

Other scholars are of the opinion that *Rakta* is *Anushnashita*. So it can be considered that *Rakta* is composed of *Agni Mahabhuta* and *Jala Mahabhuta*.

Some scholars opine that the live-blood is formed of *Panchamahabhutas*.^[32]

Five *Mahabhutas* contribute to the five qualities of the *Rakta*.

Fishy odour, liquidity, redness, pulsation and lightness-these qualities of *Prithvi* etc. respectively are seen in blood.^[33]

View of Acharya Charaka

While classifying the tissues of the body based on the mahabhutas, *Rakta* is categorised under the *Jala Mahabhuta Pradhana Dravyas*.^[34]

While explaining the treatment for *Raktakshaya*, *Rakta* is considered to have *Agni* and *Soma Guna*.^[35]

Rakta Pradoshaja Vikara

During the healthy and harmonious working in the human body there is a friendly relationship between the *Dosas*, *Dhatu*s and *Malas*. This relationship is known as *Asrayasrayee-Bhava*.^[36] It could also be said that there is a good similarity in the properties of the guest and the host i.e. the *Dosas* and the *Dusyas*. But there is a limitation to this good relationship. So as long as the *Dosas* are in balanced condition, they do not harm the host but when they get vitiated by the above mentioned etiological factors they fail to continue the friendship, become aggressive in nature and try to harm the host by creating possible disturbances in their normal function initially and after attaining the further stage of *Samprapti*, they try to manifest at various sites a no. of symptoms leading to a clinical entity. This disturbed relationship is known as *Dosha-Dusya Sammurchana*.

It is a conglomeration manifesting a disease. Here at this stage the actual fight of vitiated *Dosas* and *Dushya* takes place and a variety of symptoms accordingly get manifested.

While dealing with *Rakta Pradoshaja Vikaras* when it is said that *Rakta* is vitiated a question arises, vitiation of *Rakta* by which *Dosha*? The answer is based on the symptoms manifested.

For example: If *Vata* has vitiated the *Rakta* then the following properties of *Rakta* could be seen. *Arunabham Bhavet Vatata Phenilam Vishadam Tanu* | (Ca. Su. 24/8)^[37]

If vitiated by *Pitta* the properties are, *Pittat Peetasitam Raktam Styayati Aushnyat Chirenacha* | (Ca. Su. 24/8)

If vitiated by *Kapha* the properties are, *Ishat Pandu Kaphat Dustam Picchilam Tantumad Ghanam* | (Ca. Su. 24/8)

If the vitiated *Rakta* is compared with normal *Rakta*, the change in the properties denotes the dominance of *Dosha*, which has vitiated it. Two types of changes are found in the properties of *Rakta* one change is called 'Prakrutisamasamavayajanya' which is in accordance with the action of the *Dosha* and the other is 'Vikrutivishamasamavayajanya' that which is not in accordance with the action of *Dosha*.

The *Dosha* vitiates *Rakta Dhatu* while in circulation reaches at various sites in the body creating a variety of symptoms when it attacks the skin, the skin shows discoloration, eruption, pain, burning sensation, swelling, tenderness. All these things depending upon the intensity of the vitiation of *Dosha* and the reaction of the *Dusya* to it, which is technically called as, "Vyadhikamatva".

If during circulation the manifestation takes place at the important *Marma* like *Guda* and if *Pitta* has started the role playing then the manifesting symptoms will be *Guda Daha, Guda Paka, Raktarsa, Adhoga Raktapitta* and so on just like that almost all diseases mentioned under the broad heading of *Rakta Pradosaja Vikaras* could be elaborately explained.

The etiological factors which are explained for *Raktaja Roga* in have a bifold nature i.e. it vitiates the *Dosha* i.e. *Pitta* as well as *Dhatu* i.e. *Rakta*.^[38]

These etiological factors can be categorized, under 5 headings.

Etiological Factors

Aharaja	Viharaja	Kalaja	Manasika	Vyasantah
Katu, Amla, Lavana, Rasa Sevana	Divasvapa	Sarata Rtu	Krodha	Madya

Ksara	Atyadana			Sura
Kulattha	Atapa Sevana			
Masa	Anila Sevana			
Tila Taila	Vega Avarodha (Chardi)			
Pindalu	Srama			
Mulaka	Abhighata			
Jalaja, Anupa, Mamsa	Adhyasana			
Dadhi	Ajeernasana			
Viruddha Ahara				

In *Charaka Samhita Raktapradosaja Vikaras* are explained at two places in the *Sutrasthana* itself i.e. in *Vidhisonitiya Adhyaya*^[39] and in *Vividhasitapitiya Adhyaya*.^[40] *Susruta* listed the *Raktapradosaja Vikaras* in *Vyadhisammudesiya*^[41] chapter.

Though *Vagbhata* (A.S. & A.Hr) has not mentioned the *Dhatu Pradosaja Vikaras* separately but still the diseases which are explained in *Siravyadha Vidhi Adhyaya*^[42] have close similarity with the diseases mentioned as *Rakta Pradosaja Vikaras* by *Charaka* and *Susruta*.

In *Rakta Pradosaja Vikaras* there are some diseases which are indirectly related with *Rakta Dhatu* eg. *Agnimandya, Anga Gaurava, Aruci, Tandra* etc.

There are certain other *Vyadhi* in which the *Rakta Dhatu* is trickling out of body eg. *Raktapitta, Asrgdara, Raktameha* etc. some diseases reflects them selves in the form of *Tvak Vikaras* eg. *Kotha, Pidaka, Carmadala* etc.

Though *Vata, Pitta, Kapha* has a capacity to vitiates *Rakta Dhatu* but *Pitta Dosha* has more affinity towards *Rakta* because of the *Asrayasrayee* relationship between *Pitta (Dosha)* and *Dhatu (Rakta)*.

So in case of *Rakta Pradosaja Vikaras* there is definite role of *Pitta*, in the vitiation of *Rakta Dhatu*. The *Nanatmaja Vikaras* which are explained by *Charaka* (Ca. Su. 20) have a close parallence with the *Vyadhis* explained as *Sonitaja Rogas*.

Corelation between *Nanatmaja Vikaras* of *Pitta Dosha* with *Rakta Pradosaja Vikaras*.

SN	<i>Pittaja Nanatmaja Vikara</i>	<i>Rakta Pradoshaja Vikara</i>	<i>Pittaguna Vikruta Karma</i>
1	<i>Osha</i>		
2	<i>Plosha (Kwachit Dahana)</i>		<i>Ushna Gunatah</i>
3	<i>Daha (Sarvanga Dahan)</i>		
4	<i>Davathu</i>	<i>Santapa</i>	
5	<i>Dhoomaka</i>		
6	<i>Amlaudgara</i>	<i>Tiktaamlaudgara</i>	<i>Amla Rasatah</i>
7	<i>Vidaha</i>	<i>Vidaha (Annapana)</i>	<i>Tikshnatah</i>
8	<i>Amsadaha</i>		<i>Ushnagunatah</i>
9	<i>Antardaha</i>	<i>Santapa</i>	
10	<i>Ushmadhikya</i>		
11	<i>Atisweda</i>	<i>Sweda</i>	<i>Ushnagunatah</i>
12	<i>Amsagandha</i>	<i>Sharira Daurgandhya</i>	<i>Visragunatah</i>
13	<i>Angavadarana</i>	<i>Raktakshayajanya Vyadhi</i>	<i>Ushnagunatah</i>
14	<i>Shonitakleda</i>		<i>Kledakrut Karmatah Dravatwach</i>
15	<i>Mamsakleda</i>		<i>Kledakrut Karmatah Dravatwach</i>

			<i>a</i>
16	<i>Twakdaha</i>	<i>Santapa</i>	<i>Ushnagunatah</i>
17	<i>Twakavadarana</i>	<i>Angaavadaranam</i>	<i>Ushnagunatah</i>
18	<i>Charmadala</i>	<i>Charmadala</i>	<i>Ushna Kothakaratawa</i>
19	<i>Raktakotha</i>	<i>Kotha</i>	<i>Ushnagunatah</i>
20	<i>Raktavisphota</i>	<i>Kotha</i>	<i>Ushnagunatah</i>
21	<i>Raktapitta</i>	<i>Raktapitta</i>	<i>Dravatwa Kledakaratawa</i>
22	<i>Raktamandala</i>	<i>Kustha</i>	<i>Ragakrut</i>
23	<i>Haritatwa</i>	<i>Vaivarnya</i>	<i>Ragakrut</i>
24	<i>Haridratwam</i>	<i>Vaivarnya</i>	<i>Ragakrut</i>
25	<i>Neelika</i>	<i>Kshudraroga</i>	<i>Ragakrut</i>
26	<i>Kamala</i>	<i>Kamala</i>	<i>Ushna, Raga</i>
27	<i>Tiktasyata</i>	<i>Tiktodgara</i>	<i>Rasatah</i>
28	<i>Lohita Gandhasyata</i>	<i>Lavana Rasata</i>	<i>Rasatah</i>
29	<i>Pootimukhata</i>	<i>Mukhadurgandhi</i>	<i>Visratah</i>
30	<i>Trushnadhikaya</i>	<i>Pipasa</i>	<i>Ushnagunatah</i>
31	<i>Atruptischa</i>	-	<i>Laghugunatah</i>
32	<i>Asyavipaka</i>	<i>Mukhapaka</i>	<i>Ushna Tikshna</i>
33	<i>Galapaka</i>	<i>Mukhapaka</i>	<i>Ushna Tikshna</i>
34	<i>Akshipaka</i>	<i>Akshiraga</i>	<i>Ragatah</i>
35	<i>Gudapaka</i>	-	<i>Ragatah</i>
36	<i>Medrapaka</i>	-	<i>Ragatah</i>

37	Jeevadanam	Raktapitta, Raktapradara	Dravatah
38	Tamahpravesha	Tamodarshana	Ushnagunatah
39	Haridranetramutratwam	Vaivarnya	Ragatah

Principle of management for Rakta Pradosaja Vikaras^[43]

Kuryat Shonita Rogeshu Raktapittahari Kriyam |

Virekam Upavasascha Sravanam Shonitasya Cha ||
(Ca. Su. 24/18)

Before applying a *Sutra*, the literary and critical study is always needed, for this *Sutra*.

1. The difference between Verses: The commentator *Gangadhara* has accepted the *Patha* of "Anuvāsana" in the place of "Upavāsa". But rest of the commentaries have accepted the *Patha* as *Upavāsa*.
2. The meaning of which can be drawn by this quotation have three shades
 - a) First line stands an "*Uddesa Tantra Yukti*" saying that '*Raktapittaharikriya*' has to be adopted and it's '*Nirdesa*' is given in next line i.e. the '*Virecana Upavāsa* and blood letting (*Raktamoksana*) are the other Principle of Management as *Raktapittahari Kriya*'.
 - b) *Raktapittahari Kriya* should be considered as separate treatment modality along with *Upavāsa*, *Virecana*, *Raktamoksana*. *Raktapittaharikriya* indicate the *Samana* therapy for alleviation of *Pitta Dosha* along with that the *Pacana* therapy i.e. *Upavāsa* and *Sodhana* therapy i.e. *Virecana* and *Raktamoksana*. These treatment modalities to be used according to the stage of the disease.
 - c) *Gangadhara* in his commentary given definite sequence of the treatment.

The sequence comprises first the *Raktamoksana*, *Virecana*, *Anuvāsana* followed by *Samsamāni Kriya* is advised. Here he clarified that *Raktapittahari Kriya* is

devoid of *Vamana Kriya* which is advised as a chief treatment modality for *Adhoga Rakta Pitta*.^[44]

DISCUSSION

Dosha (biological functional entity), *Dhatu* (tissue) and *Mala* (waste products) are said to be foundation of the body.^[45] *Rasa* (plasma) and *Rakta* (formed elements of blood) both are liquid, as their measurement is described in terms of *Anjali Pramāna* (measurement of liquid by joining both the hands) and both are in continuous circulation. *Rasa* is the first *Dhatu* formed after complete digestion of food and due to its continuous circulation is called as *Rasa*. The function of *Rasa Dhatu* is *Preenana* (nutrition). *Rakta Dhatu* has been considered to be most vital amongst the seven tissues, since it is mentioned as *Pranayatana* (seats of life) among the ten seats of *Prana* (life).^[46] *Rakta* plays an important role in sustenance of life,^[47] viz. acute blood loss of more than 10% leads to conditions like hypovolemic shock, which may be fatal. It is also responsible for increase or decrease in other *Dhatu*s,^[48] because blood supplies nutrition to all the tissues and if it is itself deficient, it will lead to improper nutrition to other tissues, ischemia and hypoxia which ultimately leads to tissue death. Hence nutritional status of all the tissues will depend on the status of *Rasa-Rakta Dhatu*.

Considering such a great physiological importance of *Rakta*, *Sushruta* designated it as fourth *Dosha*, apart from the three *Doshas Vata, Pitta, Kapha*.^[49] The scholars of ancient Greek medicine have also considered that the regulators of all physiological processes in body are the four humors-1) blood, 2) phlegm, 3) yellow bile and 4) black bile.^[50] *Unani* medicine has also accepted blood (*Dam*) as a humor.^[51] Thus, different disciplines of ancient medicine have recognized the importance of blood in maintenance of homeostasis of body. For assessing the functional adequacy of *Rasa- Rakta Dhatu* in an individual, certain physiological, psychological, somatic features related to these *Dhatu* have been described under the examination of *Dhatu Sarata* (excellence of tissues).

What is blood in Ayurveda?

Blood is a connective tissue which is in fluid form. *Rasa* and *Rakta Dhatu* altogether can be considered as blood, as both are liquid and circulating in intravascular compartment. While describing the circulation of *Rasa* by the action of *Vyana Vayu* (a subtype of *Vata Dosha*), *Chakrapani* has explained the term *Rasa* as “*Rasateeti Raso Dravadhatuuchayate Taenrudhiraadinaamapi Dravaanam Grahanam Bhavati*”, where the term *Rasa* stands for intravascular circulating fluid (*Drava*) i.e. plasma including the blood cells.^[52] *Bhela* has also used word *Rasa* while describing the circulation of *Rasa* in heart and blood vessels.^[53] Again, the term *Rasa-Rakta* has been used for the completely digested essential and minutest material (nutrients absorbed in blood).^[54] *Rasa* is clear and colourless, so it refers to plasma; *Rakta* can be taken as Red Blood Cells (RBCs), as it is said to be of red color like *Gunjjaphala* (fruits of *Abrus precatorius*) and *Padma* (*Nelumbo nucifera*),^[55] whereas the White blood cells (WBCs) can be considered as *Shonitarupi Oja*.

CONCLUSION

On the basis of above discussion, the *Rasa* and *Rakta Dhatu* can be considered as blood because they both are in liquid (*Drava*) state, which gets circulated in intravascular compartment (heart and blood vessels) and have functional similarities. It is distributed to all throughout the body due to action of *Vyana Vata* on heart and blood vessels (cardiovascular system), quite similar to blood and there are great similarities at functional level too. The *Rasa- Rakta Dhatu* carries all the nutrients along with *Oja* and nourishes and protects all the tissues. Characteristics of the best quality of *Rasa* and *Rakta Dhatu* and *Dhatu sarata* have been described in order to clinically assess the functional status of a particular *Dhatu*. Various factors like diet and regimen, *Deshasatmya*, *Kalasadatmya* and *Oakasadatmya* have been described, that affects the formation of *Shuddha Rakta Dhatu* and may produce various disorders related to blood. Various measures for blood loss and blood clotting have been also described. These descriptions show that a very

detailed physiology of blood and its applied aspect have been discussed by the ancient Ayurvedic scholars, and the scientific explanations in this article may be helpful in its understanding.

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