Circulatory system of Sharangadhara Samhita

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ABSTRACT

In the back light of the inspirational article of Kishor Patwardhan ji ‘The history of the discovery of blood circulation: unrecognized contributions of Ayurveda masters’ raising at most relevant issue of neglected Ayurvedic scholars’ contribution to the field of Anatomy-physiology well ahead of the contemporary developing sciences. Crawling in the same lines this article is dedicated for one such legendary Sharangadhara and his work related to Circulatory system. Structural entities play a major role in any of the system; especially in Medicine and that too in Ayurveda as it recommends 'Rogam ado pareekshet' shows how important the examination of a diseased person is considered by our Acharyas. The Circulatory System is one such structural physical entity, not only circulate but has additional Functions like Nutrition, Metabolism, Excretion system of body depends, endocrine etc. As early as 200 BC, works to understand this human body was initiated. In this article an attempt is made to sketch out the understanding of circulatory system as evident in 14th century in India through the prismatic view of Sharangadhara Samhita and its commentator.

Key words: Circulatory system, Sharangadhara Samhita.

INTRODUCTION

Sharangadhara’s period is considered as the beginning of compilation and specialization era of Ayurveda; a drift seen from Astanga Ayurveda, as the same Idea is being reflected in his contemporary writers like Madhavakara and Bhavamishra. They are scholarly persons who took Ayurveda in the difficult period of Geo-political, Patronage and cultural drift happened in India; historians call it as post Shodala period. Commonalties found in their work can be listed as,

1. They are experimental and inclusion of disease likes Amavata, Shuka roga, firanga and upadamsha like disorders being included.
2. Specific area of authenticity is seen; Madhava Nidhana in particular never spoke even a word in treatmental aspects, while Sharanaghadara and Bhisajya Rathnavali oriented themselves around the treatment.

If one analyze this with myopic view to understand why such a drift is seen in Ayurveda when already classical like Brihat trayee were present. Perhaps a perfect answer may not be possible as one has to relive in such period and can speak truth. At most one can give possible reasons in such stand:

1. Patronage drift as an effect of medieval geopolitical change towards another home grown system of medicine called Unani a system belnded with Middle East and South East Asia.
2. Taking into consideration of the size of work of laghutrayee, it is possible to state a lighter version of Ayurveda was aimed and perhaps a small or bridge course might have in practise. But the higher learning was trusted in classical study of Brihatrayee as we see classical commentaries
came in this period like Chakrapaniduta, Dalhana, Arunaduta and Hemadri came out with their commentaries. A need might have been felt to address the issues related to lay man and as a sub system with mass reaching abilities was felt for to fill up gap and to coup up the upsurge of Unani. The works of laghu trayee might be a preliminary level study and for the higher study the classical works of Brihat trayee might have entrusted with their commentary preserving the intactness and transmission of the knowledge of the system to the next generation.

3. May be specialization as a process of ramification to ease the learning processes in a more simplified manner; i.e. as the system get organised the slaving responsibilities for effective and efficient manner the works of laghu trayee evolved. For example the Diagnosis and Treatment might have occurred as separate levels of learning. We find in the history evident Madhava approached Chakrapani for critical notes on diagnostic methods. Pharma procedures and the detailing of the preparation found in Sharangadhara. Though history has washed away but its imprints are still alive in their work. This is one such attempt being made to unwind, understand and learn the basis of circulatory system through Shareera Rachana terms called Siras and Dhamani terms and that too with the perspective of Sharangadhara Samhita.

History of the Circulatory System in contemporary system:

The most basic principles of the circulatory system took thousands of years to uncover. An Egyptian papyrus dating back to 1500BC correctly correlated the character and frequency of the pulse with the patient’s health status. Hippocrates (460-355BC) and his pupils also drew accurate conclusions regarding the nature of blood flow. One pupil described the perpetual movement of blood “with courses of rivers returning to their sources after a passage through numerous channels”. However, this concept of circularity would only be confirmed two millennia later by William Harvey. It was Aristotle, the anatomist, philosopher, and knowit-all of the time who began the disruption of scientific understanding of the heart and its system. While some of his physiological ideas bore some value, he also committed the academic disservice of attributing ‘the seat of body intelligence’ and the source of body heat to the heart. Such exaggeration of the heart’s function in the body was mirrored by Erasistratus (c. 310-240BC) who first described the heart’s valves, and explained that air entered the heart from the lungs where it was transformed into ‘pneuma’, the vital spirit, ‘a most subtle vapor’ to be carried to the body by arteries.

Galen claimed that the liver produced blood that was then distributed to the body in a centrifugal manner, whereas air or pneuma was absorbed from the lung into the pulmonary veins and carried by arteries to the various tissues of the body. Arteries also contained blood, which passed from the venous side via invisible pores in the interventricular septum and peripheral anastomoses.[1]

William Harvey (1578-1657) who finally deconstructed the false views of the cardiovascular system in his “De Motu Cordis”, a short book specified that blood moves, ‘as it were, in a circle’ and ‘this is the only reason for the motion and beat of the heart’. He emphasized that the heart is no other thing but a pump as if to crush the spiritualistic functions imposed on the heart until that time. Finally, Marcello Malpighi (1628-1694), Jacob van Swammerdam (1637-1680), and Anthony van Leeuwenhoek (1632-1723) used the microscope to explain the shape of the red blood cell and the capillary networks that form the connection between arterioles and venules.[2] A point to be noted is even by the end of 16th century AD there was enough dogma regarding the Circulatory system. Under this limelight one has to read the Sharangadhara’s perspectives.

REVIEW OF LITRATURE

Count of Sira and Dhamanis [3]

In fifth lesson of Sharangadhara Samhita Poorva Kanda we find the fragmental description of associate
structures related to Circulatory system. The Siras are seven hundred, and Rasavahini (the channels of Rasa) Dhamanis are twenty four.

Siras are 700 in number, Siras transport Doshas, and Dhatu. The use of word ‘Chakara’ has significance that by the other opinion they are numerous. “1027 are counted Siras again there are many; as many as Roma Kupa. The Siras may be Sthula, Sukshma, as a leaf like, are even Prathanthavat. Dhamani are Nadi Vishesha and are 24 as stated Rasavahi; Shira, Dhamani, Nadi are synonyms. But we find difference in Shira, Snayu and Dhamani based on functions. In males the Mamsa also called as Mamsa Granthi and are counted as 500. Dehaoshma present in Kala. Siras are 700 in number, Siras transport Doshas, Dhatu. Site of Ranjaka Pitta is Yakrith and it is the Raktha Vahini Shira and its Moola is Pleeha.

Siras, Dhamani functions

The Siras and Dhamanis which exist (get rooted) in Nabhi (navel) are spread all over the body and they nourish the Dhatus continuously.[4]

Deepika Commentary:

From Nabhi means taking word for Nabhi as Mula and the Siras those spreads to entire body. The Dhamanis resides in Sira. Sira are Dhamanis; as they also have Saranatva (flowing) and the Dhamani which has Dhamanatva (pulsate) in nature hence called as Dhamani and work throughout day and night. This function of Dhamanatva brings nourish to Deha. Hence the tender body is nourished. The older ones are maintained. As stated that ‘the old aged person has reached the maturity stage and in this stage the nourishing is not seen.’

How Poshana is being made? With the help of Vata Sayoga etc; the synchronous Vayu and Agni Sayoga as natural helpers. As stated ‘the Karya of Poshana is of a Prthigathaka in nature and occurs without knowledge of it being carried out under the normal sense activity. The Gunas of the Ahara is being carried away by the respective Siras along with Vata Dosha. Which of them being nourished? – all the parts of the body.

Goodartha Deepika Commentary:

The Sarva Dhatu here connotes the seven Dhatu starting with Rasadi. By doing so Siras ensures they bring about the natural activity. As stated – ‘they dose nourishment to the Deha just like that of Kedara Kulya. The channels of irrigation bringing the Snehana etc.; the similar thing is brought by the Akunchana and Prasarana Adi Karma by the Deha. Is it not so, that which originated from the Nabhi reaching out to the entire body certainly. As stated – ‘the spread to all parts of the Deha starting from the Nabhi similarly lotus being nourished from its Bisa (tuber present in the water.)

Inference:

The word tender Dhatus implies the process of anabolic activity and such a type of the circulatory system is seen in the fetus nourishment closely correlated today’s understanding as fetal circulation. Nabhi word also specifies umbilical cord circulation of growing fetus. But after delivery the function is over taken by the heart proper. The other type of Dhatu Poshana seen in Vrudhapa where in state of Dhatu Reehyamana stage the maintenance of decaying tissues are considered for nourishment. But the anabolic process of Dhatu Poshana is seen Balya Avastha because of Apraptha Dhatu Avastha.

The use of the word Akunchana and Kedara Kulya Prasarana Adi Karma not only define the physical transfer of the circulation but also maps the process.

Sira – Dhamani Rachana and Kriya

One of the stridently discussed topics is Sira as channels for connection. While counting the Shareera related entities in the 5th chapter of Poorva Khanda we find relevance of 700 Siras are centered at the navel and spread out all over the body and carry Doshas etc. from place to place; and at the joints, they facilitate movements like flexion and extension. Dhamanis are those which do Dhamana. In fact, according to Sushruta, there is no difference between Sira and Dhamani. They are so called due to particular activity of pulsatile nature.
In Deepika commentary classification of Siras are dealt and they are of two types Sthula and Sukshama; their Mulas or origination is from Nabhi and have tendency to run upper, downward and tridimensional way. As stated the sirsas are present in the body and all of them originate from the Nabhi rapping up and spreads throughout the Deha evenly. And stated that at Mula they are 40 in number; ten Siras are for Vata Doshas, ten Siras are for Pitta Doshas, ten Siras are for Kapha Doshas and ten Siras are for Raktha Dhatu. The Vata Vahi Siras having directed to Vatasthana and divides in to 705. Similarly the Pitta Vahi Siras having directed to Pitta Sthana and divides in to 705. The Kapha Vahi Siras having directed to Kapha Sthana and divides in to 705. the Rakta Vahi Siras having directed to Yakrith and Pleeha ramifying in to 705. And become instrumental in Sandhibandhana Karinya i.e. helps in Akunchana – Prasarana etc.

Table 1: Count of Siras

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Snayu</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mula (Nabhi)</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>Vata doshas,</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Pitta doshas</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Kapha doshas</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Raktha dhatu</td>
<td>10</td>
</tr>
</tbody>
</table>

The description of Dhamanai is stated by Dhamani Iti: “Dhamanyath Anila Puranath Dhamani” is specifies Nirukti of Dhamani i.e. that which is pulsating and by this means it is filling the Vata in to it. Dhamani carries the Rasa and is 24 in number. Their by the influence of Nabhistita Vato the upward 10 Dhamanis, those trending downward is of 10 and remaining 4 have a tendency of tridimensional and reaches out all parts of the body by continuous ramification, as that of the channels of river source and reaches out the openings of sweat glands which are present at hair follicles and performs the letting out of the sweat from the body; this set of reticulation is also used to circulate the Rasa internally and externally for nourishment; this is the set up even for the absorption of medicaments applied on the skin like Abhyanga, Parisheka, Avagaha, Alepa etc. By doing the Santarpana as a means of Rasa circulation and the absorption of medicaments applied on the skin like Abhyanga, Parisheka, Avagaha, Alepa etc. the Dhamanis are totally responsible for the Dharana of entire Deha.

Goodartha Deepika opined by stated ‘Shiranam Shata Saptake.’ Acharya starts the description of the Siras as 700 in number. These Siras help in the binding of Sandhi. And it also helps in the circulation of the Dosha and Dhatu. As we find in some of the references, where in the Siras are elaborately described; as that which is helpful in the binding of the Sandhi, helps in Doshadi Vahana and having originated from the Nabhi all the body parts are supported by these Siras as that of Prathanti (tapes like). As that of arrangement seen in the plugged field and the seeds, similarly helps in the Akunchana (contractions) etc. functions as a continuous process. The Siras which is divided in to 700 has additional functions. The Siras as that of in a tree the leaf seen originating from the branches posses the reticulation of veins, similarly in the body the Siras has reaching out to every part of the body. So for the Shareera; the life is existing because the role of Siras. It is stated that the life resides in Nabhi and the Nabhi itself is the life. As a wheel being protected by the nail similarly the body gets protected by Siras. As per Sushruttha Acharya the Prana is in Nabhi as that of a wheel is protected by nail (Ara). And Prana is Prana Vayu. Such Prana are of the ten types and they are Naga etc. Where? In the Nabhi Sthanam, Parna and Pranavaha are located in the Nabhisiras. What is resided in the Nabhi? As Nabhi Shabdha etc., tie as that of Nabhi from the center of body in the Shareera. Vagbhata extended saying Dhamanis related to Nabhi 30 circulates though out body.

Nabhi having the center for reticulation similar to that of the spokes of a wheel become center for the radiating Siras. Hence Sharangadhara considered it as
two types. Sira and Dhamani starting from the Nabhi spread throughout the body. Nourishment of the Deha is in association of Vayu and to all Dhatus. The Dhamanis however are different from the siras. Hence Sushrutha writes the Sira, Dhamani and Srothus are different entities. If it is not differentiated by individual identities then Sira Vikara are taking shelter Dhamani and the Dhamani as Sira Vikara. Hence the Dhannyat – that which has pustule is Dhamani. Here onwards the description of Sira Sankhya (counting of sira) – as per Sushrutha the Sira are 40 in basic classification ten Siras are for Vata Doshas, ten Siras are for Pitta Doshas, ten Siras are for Kapha Doshas and Raktha Vaha as they are carried by Vata reaches out the Vata Sthana and they are of 25 types of Siras are for Dhatu. The other 25, in Hasta the 25 are there, and the second 25, similarly the 100 are there in Shaka and in Koshta 24 and there description is that, they are present in Shroni, Guda, Medhra there are 8, 2 each in Parshva, 6 in Prutha, 6 in Urdhva, 14 in Greeva, 4 in Karnas, 9 in Jheeva, 6 in Nasa, 8 in Netra. Similarly the Vata Vaha is 705 likewise Pitta, Sleshma and Raktha has to be presumed. Similarly the Shiraajya 700 is the number. The Aruna is for Vata Dosha Vahana (conduct) and has been dealt as Vayu Siras. The one which conducts ushna are Asethavarna. The Goura Shira is for Kapha Doshas Vahana. The Raktha Vahanartha Rakthavaha Shira and they are neither Sheeta nor Ushna. So the Dhamani are of 24 in number as stated earlier there use are; the Dhamanis are Rasavahini and they are pulsating because of the Vata. Hence Sharangadhara’s untold should be learnt by considering the allied Samhitas. So the Dhamani which originates from the Nabhi are 24 in number and upward 10 and downward 10 the left over are of tridimensional in nature. As they are by nature hollow structure and through these structures the Rasa moves. They are born out of Pancha Mahabhuta and has divided as 5 based on Pancha Indriya. At the time of death these structures collapses. That (the commentator) take the meaning as these structures are formed by Pancha Mahabhuta, having divided as five and such 5 brings the Karma of Panchendriya; how? The 5 Srothra Adi Indriya Adhistana is itself is formed by these types of Dhamanis but at the time of death the collapsing of these halo structures occurs. How ? the Dhamani having accessed with Pancha Mahabhutas like Akashadi resides is stated by Panchabhibhuta, and is responsible for Shabda, Sparsa, Rupa, Rasa and Gandha respectively for Akasha, Vata, Dahan, Toya and Bhumi and spreads and brings the Panchatva meaning that covers the Indriyas and had perception by these Dhamanis, as they Panchendriya and Indriyapanchaka are of Shukshma Roopa (subtleness), So ends the Dhamani description.

Siras are responsible for Sandhibandhana of the Mula can only be explained taking the Poshana Krama from the Nabhi and this is the mark of both the commentators as they narrate - Siras are centered at the navel and spread out all over the body. Siras carry Doshas etc. from place to place; and at the joints, they facilitate movements like flexion and extension. Dhamanis are those which do Dhamana (blowing). The blowing is formed by Siras to make nourishment – i.e. set of reticulation is also used to circulate the Rasa internally and externally for nourishment; this is the set up even for the absorption of medicaments applied on the skin like Abhyanga, Parisheka, Avagaha, Alepa etc. By doing the Santarpana as a means of Rasa circulation and the absorption of medicaments applied on the skin like Abhyanga, Parisheka, Avagaha, Alepa etc. the Dhamanis are totally responsible for the Dharana of entire Deha. Deepika Kara not only shown the inter-relationship of Nabhi and Sandhibandhana but had brought the peripheral circulation including dermal drug dynamics is also established.

Goodartha Deepika Kara

Identification of the divisions of Sira can be said a need specific development who’s authenticity on the dissection can be questioned but to support the very identity of Dosha Siddanta it might have formulated to accommodate even Raktha Dhatu. This Raktha Dhatu has even at times being accepted as forth Dosha for the role it play in manifesting disease.
He not only stated but also illustrated classification of *Pancheindriya*, accessing the role of *Pancha Mahabootha* in these *Dhamanis*. Further the reason for their dilation and for any cascade of *Gunas* brought by them is established, this also lets us to imagine the pharma-co-dynamics of the therapy.

The *Prana* context a unique attempt is made to show the *Pramanas* for the existence of life (*Prana*) on the structural entity called the *Siras*. The *Panchatva* is nothing but the loosing of this dilation factor which yield death there by the functioning of *Siras* come to an halt.

The structures of *Siras* are utilized to establish the pharma-co-kinetics of trance dermal application. The insight of coating the example of leaf is very much identical to demonstrate the reticular structures of *Siras*. Though the reticulation structures being identified in the *Sandhi Prakarana* but still explanation appears to be out of context.

*Sira and Peshi* [5]

Structurally they are covered by *Peshi* as per the following *Deepika* commentary the formed muscle structures having divided by each other are called *Peshi* (Bursa?) as that of relation of *Bala* and *Ojus* extending the others opinion as *Sira*, *Snayu*, *Asthi*, *Parvani*, *Sandhi* in a body being covered by *Peshi* (more of a covering structure) and provides the *Bala* to these structures.

Other relevance of the use of term *Sira*;

1. *Tilam* is stated as the *Kloma* and this is considered as the *Pippasa Sthana*. Hence the same is considered as the *Jalavahi Shira Mula* is *Tilam*.

2. The one seated in the *Hrudaya* and *Uras*, *Siras of Sandana of Bhaus*, is of binding functions, and besides it also makes the *Sneha Karma of Hrudaya Sira*, *Snayu*, *Asthi*, *Parvani*, *Sandhi* in a body being covered by *Peshi* (more of a covering structure) and provides the *Bala* to these structures.

3. The *Mamsa Peshis* are muscular structures which from cover to the *Mamsa* etc. (*Shira*, *Snayu*, *Asthi*, *Parvani*, *Sandhi*) and give shape and strength.

**Discussion**

*Siras at Mula (Nabhi)* are 40 in number, the functional classification is *Vata Doshas* 10, *Pitta Doshas* 10, *Kapha Doshas* 10 and *Raktha Dhatu* 10 and further dividing into 705 each speaks about the ramification of major channels of circulation and to ease in interest of conceptualize the Ayurvedic principle.

On the other hand *Dhamanath anila puranath Dhamani* technically speaks about related structure of Arteries. But when added the word *Nadi* which are also Arteries we have to limit the meaning of palpable Arteries.

By saying *Dhamani* carries the *Rasa* and are 24 in number. There by the influence of *Nabhistita Vata* help in the upward oriented 10 *Dhamanis*, those trending downward is of 10 and remaining 4 have a tendency of tridimensional reticulation so as to reach out all parts of the body. Certainly spells out the roll of Dhamani in Circulation. Though we have *Hrudaya* and *Nabhi* as mula of *Rasavaha srothomula* but neither case in any way justify the Dasha Dhamani. Nabhistita vata involvement is involved in the process of circulation. This vata even performs the letting out of the sweat, circulate the rasa internally and externally for nourishment and absorption of medicaments applied on the skin like abhyanga clears the very idea of such setup has to offer in parallel to today's understanding of excretion through skin, circulatory system and pharma-dynamics associated with skin.

The relevance of *Vata* reaches out the *Vata sthana* and they are of 25 types of siras are for dhatu etc where in various types of siras are stated and varna bedhaja classification are hard to establish a congruency by any of the anatomical structures. Even if the numbers are speculative as a representation of symmetrical body paterns and the mentioning of varna bedhaja can only be understood for the ease in the therapeutic simplified approach of doshic siddanta.

The statements *Dhamanis* are *Rasavahini* and they are pulsating because of the *Vata* confines the function of circulatory system. And *Siras* are more
responsible to carry three types of doshas and Raktha. Even if taken rasa and raktha makes the blood and such assumption eases the half of our hypothesis that the circulatory systems are brought by Sira and Dhamani.

The other half truth is that the same circulatory mechanism is responsible for draining and aiding excretion etc. Then the contemporary science’s exo and endocrine system, homeostasis etc functions are to be brought by Siras or Dhamanis. The answer is yes the Siras in the form of functions of doshas that they carry were assigned with such functions. In Ayurveda the Kriya samarthya is assigned to the doshas and these doshas are being carried by the structural entities called Sira and Dha’mani.

Goodartha Deepika specifies the cause of collapse of the special types of Dhamanis based on Panchamahabootha sirdhanta. They are born out of Pancha mahabhuta and are divided into 5 based on pancha indriya i.e. the panchendriyas are brought and nourished by the Panchamahaboosta for their proper functions. At the time of death these structures collapses. Even today one of the last sign in conformation of death is pupil dilation which is nothing but the Panchamahabootha had its Panchatva leena.

CONCLUSION

In Ayurveda the structural entities are studied from the perspective of phato-physiological and for to ease in establishing therapeutics. Very assumption of Tri-doshas based on the guna siddhanta; which are attributed by the Panchamahaboosta the structural entities of universe is to facilitate simplification in the applications of treatment. The descriptions of nature of structures of siras and Dhamani speaks volumes of the Anatomical knowledge they posses, but the classification and numbering is to help the therapeutical application. Sharangadhara Samhita and its commentators had continued the tradition of knowledge but added that Nabhi-stita vata helps in the circulation of rasa along with excretion through skin, circulatory system and pharma-dynamics associated with skin. The Goodartha Deepika had worked out pancha maha boota concept for the nourishment of the indriyas and aids the aspects of siras in the determination of death. Use of the words like Sthula and Sukshama Siras Mulas or origination is from Nabhi and have tendency to run upper, downward and tridimensional way that have the knowledge of divisions of siras this explanation appeals totality when we consider the nourishment of a fetus.

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