AN ANATOMICAL STUDY OF RASAVAHA SROTAS IN RELATION TO ATHEROSCLEROSIS

Dr. Ameeta Titoria*1, Dr. Naresh Kumar2, Dr. R.B. Shukla3 and Dr. Sanjay Singh4

1PG Scholar, Department of Rachana Sharir, Rishikul campus, UAU, Haridwar Uttarakhand.
2Professor and HOD Rachana Sharir, Rishikul Campus, UAU, Haridwar, Uttarakhand.
3Professor Department of Rachana Sharir, Rishikul campus, UAU, Haridwar Uttarakhnad.
4Professor Department of Roga Nidan Evam Vikriti Vigyan, Rishikul Campus, UAU, Haridwar Uttarakhand.

ABSTRACT

The life Science of Ayurveda has been teaching the art of healthy life (Physical, mental and spiritual from ages). Many siddhantas are explained in Ayurveda, srotas kalpana is one of them. Srotas are the channels of the body through which the materials needed for tissue building, nutrition and other nutrients flow from one corner of the body to the other, we can tell that the materials are transported through the channels from the place of production to the place of need.\(^1\) Rasavaha srotas are considered as main srotas since they supply nutrients to all body parts. The word Srotamsi in the context of srotas indicates all level of exchanging and transportation of Posahya Rasa from Ahara Rasa at micro to macro level of cells and tissue. The sapta dhatu are the product of ahara rasa. The poshya Ras Dhatu is the first tissue. This comes in the heart and is circulated all over the body providing nourishment. If the heart is not developed or if there is abnormalities then the ahara Ras which is flowing will hamper the body, creating defect in it. This is not only for the organ but all the body organs must be healthy to secure a healthy and faithful life. The article is a try to opt on Rasavaha Srotas in detail view and resemblance with Atherosclerosis.

KEYWORDS: Srotas, Rasavaha srotas, Ahara rasa, Atherosclerosis.
INTRODUCTION

*Srotas* are channels which originate from hollow space are widely spread in all over body where the circulation of the fluid occurs irresistibly and continuously. According to Chakrapani, the channels who transport the *poshaka dhatus* (the part of the *rasa* etc) tissues which flow to provide nutrition to the successive tissues are called as *srotas.* The *srotas* have their own *moolasthana* or root. Chakrapani mentioned *moolasthana* of *srotas* as *prabhavasthana* means the anatomical seat of respective *srotas* is the main seat of pathological changes its be the focus of treatment.

*Acharya Sushruta* explains two type of *srotas* i.e *Bahirmukha* and *Antarmukha.* *Rasavaha srotas* are considered as main *srotas* since they supply nutrients to all body parts. *Rasa vaha srotas*, the channel of the lymph and plasma, which is responsible for delivering refined nutrition and nourishment to every cell and tissue throughout the body. *Rasa* means ‘movement’, as per this definition any liquid element in body which flows may be treated as *Rasa* including *Rakta* and lymph etc.

*Rasavaha Srotas* are considered as main *Srotas* since they also give *Poshana* to *Rasa Poshan* through this *Srotas* since food first goes to *Yakrit* then through the circulatory system of *Hrudaya* it will circulate to all body parts. Therefore the concept of *Rasavaha Srotas* in Ayurveda may be correlated with modern functions of heart, lungs and liver.

Atherosclerosis is a disease in which plaque builds up inside arteries, resulting in atherosclerosis. Plaque is formed by fat, cholesterol, calcium, and other substances found in the blood. Plaque hardens and narrows the arteries over time. The passage of oxygen-rich blood to the heart and other regions of the body are hampered as a result.

This condition is known as *Dhamanipratichay* in Ayurveda. This disease relates to *kapha dosha*, one of the three *dosha* which conduct normal and abnormal functions in the human body. The *Ayurvedic* perspective of atherosclerosis has been elaborated in this review article.

AIMS AND OBJECTIVES

1. To give appropriate and elaborate/description of *Rasvaha Srotas* and its *moola*.
2. To assess the relation of *Rasavaha Srotas* with Atherosclerosis.
MATERIAL AND METHODS

1. Conceptual Study
All the information regarding “Rasavaha Srotasa” will be collect from Brihattrayi, Laghutrayi, and other classics of Ayurveda. Definition of Rasavaha srotasa its etymology genesis and synonyms will be compiled from different texts. The modern view will be also discussed in detail.

2. Cadaveric Study
Study of Heart will be performed on the specimen available in the P.G department of Sharir Rachana, Rishikul campus, Haridwar, Uttarakhand.

CONCEPTUAL STUDY

REVIEW OF LITERATURE

ETYMOLOGY:-The word Srotas is derived from sanskrita root- ‘’Sru-gatau’’ (Sru+tasi=Srotas) which means moving, filtering, flowing, leaking, secreting etc.

SROTAS
The structure through which Sravanam takes place is known as Srotas. That which originates from vacant spaces (hollow organs) spread through out the body and purveys material are to be understood as Srotas (channels) and apart from Sira (Vein) and Dhamni(Artery).

RASVADA SROTAS
Ahara Rasa is the extract juice of Vijatiya anna (foreign diet). Rasa Dhatu is the first Dhatu which gets formed from Ahara Rasa i.e nutrient portion of food after proper digestion of food by the Koshthagni (digestive fire in kostha). It circulate throughout the body carrying Poskamsas (Nourishment part) to the remaining dhatus. The organs and channels through which this Rasa Samvahana (circulation) takes place are collectively termed as Rasavaha Srotas and include the following:

Hridya (Heart), Sira-jala (network of veins), Dhamani-jala (network of arteries), Rasayni-jala including the Lasika granthis (network of lymphatis). According to Acharya Charak the Moola of Rasvaha Srotas are Hridya and 10 Dhamni. According to Acharya Sushruta the Moola of Rasvaha Srotas are Hridya and Rasvahi Dhamni.
VRIDDHI KSHAYA LAKSHAN OF RASADHATU\[^{6,7}\]

The effect of *Rasa Vridhi*, *Rasa Kshaya* are clearly discernible in all the organs of this system and so have to be carefully noted. Some important *lakshanas* are tabulated:-

<table>
<thead>
<tr>
<th>RASAVRUDDIH</th>
<th>RASAKSHYA</th>
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<tr>
<td>HRUDAYA</td>
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<tr>
<td>Hrd Ayama/ dilatation</td>
<td>Hrd Sankocha/atrophy</td>
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<td>Hrd Gaurava</td>
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<td>Hrd Drava</td>
<td>Hrd Tama, Hrd Kampa, Hrd Drava, HrtShula.</td>
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<td>TWAK &amp; DHATUS</td>
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<td>Gurugatrata</td>
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<td>SIRAS AND DHAMANIS</td>
<td>Riktata, Saithilya</td>
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<td>Kathinya, Ayama, Granthi, Vidirna</td>
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<td>MANASIKA LAKSHANA</td>
<td>Tama, Nidranasha, Sabda Asahisnuta</td>
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<td>Alasya,Atinidra</td>
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<td>ANYA LAKSHANA</td>
<td>Truhsna</td>
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HRIDYA

The *hridya* is an important seat (primary location) of *vata*, *pitta*, *kapha*, and *ojas* (the subtle essence of vitality and immunity), and it plays a crucial role in a number of internal bodily channels (*srotamsi*). The *Ayurvedic texts* reveal that the heart is intimately connected to every cell and tissue throughout the body. No other organ in the body shares that level of integration with the entire body. The organs and channels through which this *Rasa Samvahana* (circulation) takes place are collectively termed as *Rasavaha Srotas* and include the following – *Hrudaya* (heart), *Sira –Jala* (network of veins), *Dhamani Jala* (networks of arteries), *Rasayani Jala* including the *Lasika Granthis* (network of lymphatics).\[^{8,9}\]

HEART

Heart is located in between the two lungs inside the chest just beneath the sternum slightly to the left of the middle line, its apex about 1” below the left nipple. The entire organ is covered with two layers of pericardium. In between the two layers, there is a small amount of thin fluid to help its free movement.

The heart measures six” in length, four in breadth, three in thickness and weighs about 200-3000gms, in adults. Heart is a hollow organ having four compartments viz, the two atrium (right and left) and two ventricles (right and left). Atrium being the upper cavities and ventricles the lower one each on other side. The two halves right and left of heart are...
separated by a thick band of muscles between atrium and ventricles. There are two valves with two cusps on the left side and with the three on right. These valves allows anything above downwards only but not in the reverse direction.

**DHAMNIPRATICHAY**

In Ayurvedic understandings Dhamnipratchiyay can be correlated with Atherosclerosis. Heart is the main site of rasavaha srotas and ten dhamani are associated with it.\[^{10}\] Dhamani can be defined as the vessels which carry rasa dhatu and rakta dhatu, [essential nutrients and blood]. Pratichay can be defined as ‘atipuran’ or coating within the vessels.\[^{11}\] It is correlated as ‘sanga’, as a sroto dushti laxan. Meda dhatu accumulates in the arteries, which is vimarga gamana of meda dhatu which is excess in body.

Dhamanipratchay is elaborated as diseases of kapha (one of twenty nanatmaja vikara of kapha) by Acharya vagbhat in doshbhediya adhaya in sutrasathan of Ashtang Sangraha text. Kapha is one of the three dosha forming the body.

Charak samhita has also mentioned dhamanipratchay as one of the kaphaj disorder out of twenty kaphaj nanatmaj vyadhi.\[^{12}\] Acharya Sushrut and Acharya Charak both have regarded hruday [the heart] as mulasthana of pranvaha and rasavaha srotasa. Chakrapani defined it as Prabhav sthan. It means that this organ is prominent organ of that system.

**ATHEROSCLEROSIS**

- Atherosclerosis is a thickening and hardening of large and medium sized muscular arteries primarily due to involvement of tunica intima and is characterized by fibrofatty plaque or atheromas.
- The term Atherosclerosis is derived from athero referring to soft lipid rich material in the center of atheroma and sclerosis referring to connective tissue in the plaque.
- This causes the walls to thicken which means less blood can flow through them at a time. Atherosclerotic plaques are visible as buldges along the affected arteries and can rupture and form blood clots from within the arteries.
- Atherosclerosis is the commonest and the most important of the arterial diseases. Though any large and medium size artery may be involved in Atherosclerosis.
- Plaque is made up of fat, cholesterol, calcium and other substances found in the blood.
CADEVERIC STUDY

The dissection of heart specimen has been done as per the Cunningham’s Manual of practical anatomy. Dissection procedure carried, observed and studied thoroughly.

Detailed study on the classical references and the applied aspects of hridaya performing the dual role as the moolasthana of rasavaha srotas has been estimated and well correlated according to the applied anatomy of heart.
DISCUSSION

Rasavaha srotas considered as main srotas since they also give nourishment to Rasa dhatu, through this srotas food first goes to yakrit then through the circulatory system of hridya it will circulate to all part of body.\textsuperscript{[13]} Therefore the concept of Rasa vaha srotas in Ayurveda can be correlated with modern function of heart.

Impaired functions of srotas leads to stagnation of Doshas, Dhatus and Malas resulting in obstruction and nourishment of further dhatu [asthi, majja, shukra] is hampered, leading to their kshaya and reduction in their functions. Hence improper Aahar vihar leads to Rasa vaha srotodushti resulting in the formation of hridya roga such as Atherosclerosis.

Chakrapani mentioned moola sthan of srotas as prabhav sthana means the anatomical seat of respective srotas is the main seat of pathological changes.
The general signs of any disturbed srotas [body systems] include one or more from the following phenomenon\cite{14}

1) **Atipravrutti**: This indicates excessive secretion of fluids, like excess bleeding etc.

2) **Sanga**: This indicates consolidation or accumulation. In dhamanipratichay, there is accumulation of fatty plaque (Vikrat medadhatu) inside arterial walls, narrowing their lumen.

3) **Sira granthi**: This indicates entangling or consolidation/thickening of vessels. Such phenomenon is seen in varicose veins.

4) **Vimargagamana**: This indicates improper movement of normal entities (like blood etc) due to obstruction in pathway.

**ELABORATION OF AMA CONCEPT**

*Ama* [undigested part of food] accumulates in the body. Each *dhatu* in the human body has its own *agni*. It is responsible for metabolism of that particular *dhatu*. When the *medadhatvagni* is slowed down, *vikrat Medadhatu* formed resulting in obstruction and nourishment of further *dhatu* [*asti, majja, shukra*] is hampered, leading to their *kshaya* and reduction in their functions. It is reported that if excessive fats accumulate in the body, *jatharagni* gets enclosed by the body fat and hence the *agni* intensifies and excess hunger is exhibited by the person. Excess cholesterol and accumulated fats can be correlated as *ama*. The prime treatment of *ama* is *langhan*, i.e. fasting. It leads to digestion of accumulated fat or lipids. When we fast, the digestive ‘Agni’ gets aggravated and it leads to digestion of accumulated *ama*. Control on eating habits and complete or partial fasting for cure of *kaphaj* diseases is regarded as an important lifestyle change by Ayurveda and allopathy both.

**CONCLUSION**

*Rasavaha Srotas* is considered as systemic capillary circulation by Acharya Ghanekar (commentator on *Sushruta samhita*)\cite{15} *Rasa dhatu* is the foremost *Dhatu* formed in the body which is responsible for the existence of the body. The *Sthana* of the *Rasa dhatu* is *Hridaya* from here it circulates all over the body. If the heart is not developed or if there is abnormalities then the *ahar Ras* which is flowing will hamper the body creating defect in it. This is not only for the organ but all the body organs must be healthy to secure a healthy and faithful life.

Hence it is necessary to have profound knowledge about this *Rasa dhatu* and the manifestation of diseases due to *rasa dushti*. Many *Hrudaya Roga* are due to *Rasavaha*
Srotas Dushti in which Rasa and Rakta are mainly affected. Symptoms described for Rasavaha Srotas Dushti in Ayurveda were clearly correlated with cardiac diseases, delay in their management may lead to grave consequences.

Heart is the moolasthan of rasavaha srotas since it has the role in regulation and distribution of the formed rasa throughout the body uninterruptedly.

Continuous nourishment is necessary for the tissues by the supply of rasa for the sustenance of the living body.

In Ayurvedic understandings Atherosclerosis can be correlated with Dhamnipratichyay.

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Dhamnipratichay arises mainly due to improper diet and improper lifestyle. This leads to thickening of arteries (dhamnipratichay) resulting in angio-obstruction and angina. Patients of Kapha dominant prakruti and obese persons are more prone to this condition. Causative factors related to diet, lifestyle and mind are found in the patients.

REFERENCES


