

## A LITERATURE REVIEW OF *SIRA* AND VEIN

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### ABSTRACT

In *ayurvedic* literature three different concepts about “channels” in the human body are available. They are *sira*, *dhamani* and *strotas*. This study includes concept of *sira* in *ayurveda* and vein in modern science. In modern science five types of vessels are mentioned according to their structure and size. They are arteries, arterioles, capillaries, venules and veins. Major vessels of body are arteries, veins and capillaries. Modern science studied their histological structure and proved that they differ from each other. In *Ayurveda*, *sira*, *dhamni* and *strotas* differ from each other. *Sushruta* mentioned two different chapters for *sira* and *dhamani*. It is literature review for *sira* and vein. It concludes some comparative points between them.

**Keywords:** *sira*, *raktdharakalaa*, vein, reservoirs

### INTRODUCTION

Study of human body at fundamental level can be divided into two parts, such as, study of structure of any body part and study of function of that body part. While reviewing concept of “*sira*”- its embryological production, definition, function, its maintenance and nourishment after birth, *raktdharakalaa* etc points are taken into consideration. While studying concept of “vein”- structure of vein in body, blood volume that they hold, reservoirs of blood in the body, pressure changes in vessel etc points

are taken in to consideration. *Sira* and vein are used as synonyms. They differ from *dhamani* and *strotas*. Article includes very simple and short review of *sira* and vein.

**Aim:** To study concept of *sira* and vein.

**Objectives:**

1. To study concept of *sira* from available *ayurvedic* literature.
2. To study concept of vein from available modern medicine literature.

3. To conclude comparative points between *sira* and vein.

### Literature review for *sira*:

*Sira* is a structure seen by eyes. It means by using “*pratyaksha pramaan*” in dissection of dead body, its existence in human body can be proved<sup>1</sup>. *Sira* is visible and countable. Total 700 *sira* are present in body<sup>1</sup>. By definition *sira* means “a structure which pushes and conducts fluid in the body” (*saranaatsira*)<sup>2</sup>. *Sira* goes from organ to organ, from one body part to another<sup>2</sup>. *Sira* can constrict and relax<sup>3</sup>. Embryological development of *sira* is from *pitruja* element in fetus, as somewhat hard structure<sup>4</sup>. After birth its structure is nourished and maintained. Its nourishment is from *raktadhaatu*. *Sira* is formed as a byproduct of *raktadhaatu* and nourished from it<sup>5</sup>. *Dhamani* and *strotas* are not mentioned as byproduct of *raktadhaatu*.

*Dhamani* is pulsatile structure. It has pressure inside it. It works under direct influence of *vyaan vaayu*. Fluid is flowing through it with more pressure and speed than *sira*. In thin subjects some pulsations of *dhamani* can be seen by naked eyes. These pulsations can be felt by touch too, as in *naadipariksha*.

*Sira*, *dhamani* and *strotas*, all originate from *pitruja* element. They are enough hard to hold the fluid as per their structural capacity. But they differ in functions.

*Dhamani* contains fluid which will nourish body elements. It is mentioned as part of *strotas*<sup>6</sup>. *Strotas* is a channel which produces body elements. It secretes and conveys nourishing fluids. All of them are conveyors.

“*Saran*” is a main function of *sira*, in which secretion and exudation is not expected from its walls. This structure is made to hold the fluid in such a way that it will not exude or ooze out. Its fluid should not spread in other tissues. *Sira* is a site of “*vrana*”, where ulcerative lesions may occur<sup>7</sup>. Here *dhamani* is not mentioned.

*Raktamokshana*<sup>8</sup> is half of a treatment in *ayurvedic* surgery. Vitiated fluid from body is removed by short surgical procedures, which is called as *Raktamokshana*. One of its procedures is “*siravedh*”. By puncturing *vedhyasira*, vitiated fluid is removed. This procedure is not carried out at *dhamani*. Puncturing *dhamani* will cause unexpected heavy blood loss due to force present inside it (*dhman*). It does not happen with *sira* in *siravedh*. In *mansadharakalaa*<sup>9</sup>, *sira* gets branched and rebranched. It looks like roots of lotus spreaded in the mud (*lok-purush samya siddhant*). It grows deep by branching and rebranching inside mud. *Sira* is supported by *mansadharakalaa*. *Sira* looks like vessels in a leaf of tree. Look at following images-

Image a



Image b



Image c



Image d



Image e

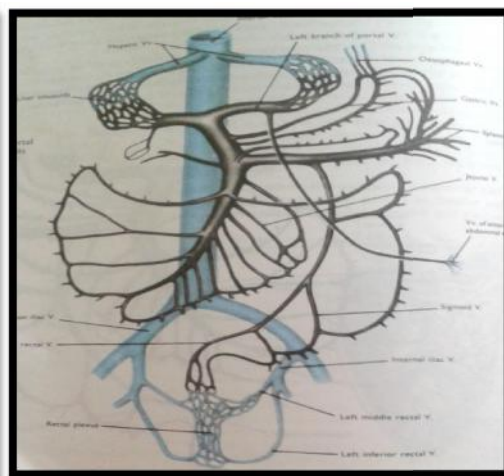
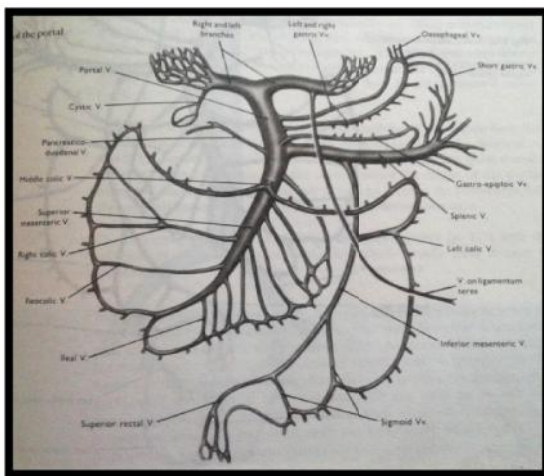


Image f



Above images include some leaves of original plants. A careful look towards them will give knowledge of different branching patterns of

vessels. Look at the example of *Sira* in human body; it will look like this-



**Image 1:** Portal venous system<sup>10</sup>

**Image 2:** portal venous system anastomosis<sup>11</sup>

Second *kalaa* is *raktadhara kalaa*<sup>12</sup>. It holds mainly blood. Major location of it are-*sira* of *yakrut* and *pleeha* (liver and spleen). Small injury to this *kalaa* causes profuse blood loss. *Shonita* or blood is mentioned as *praana* or life<sup>13</sup>. It holds much more quantity of blood .as if, when plant producing milk-like substance is injured, immediately after it, a white fluid oozes out. But liver and spleen are not mentioned in *siramarma* by *sushruta*. *Sira* of liver and spleen is major locations of *raktadhara kalaa*. Liver and spleen are major locations of *raktavahastrotas*. In these organs *rakta* is produced and hold.

*Sira* is grouped into four main categories. They are *vaatavahini*, *pittavahini*, *kaphavaahini* and *raktavaahini*<sup>14</sup>. Each of which are ten in number, so main *sira* are forty in number. When *vaatavahinisira* grows towards and into locations of *vaata*, they divide and re-divide in to total 175 branches. *Pittavahinisira* in to *pittasthaan* and *kaphavahinisira* in to *kaphsthaan* divide in to 175 branches from both separately. *Raktavaahinisira* in to *raktasthaan* i.e. liver and spleen, divide in to 175 branches. Though this grouping is so, but *sira* are *sarvavahaa*. It means that *sira* conducts all *doshas*. This nomenclature of *sira* is based on locations of *doshah* where *sira* gives tributaries.

## 2. Vein:

Vein<sup>15</sup> is a “vessel”. Vessel means a container or tube or duct, which carry fluid or liquid. There are three major vessels in human body- Artery, Vein and capillaries. They divide and redivide to give five types- artery, arterioles, capillaries, venules and veins. Artery is a

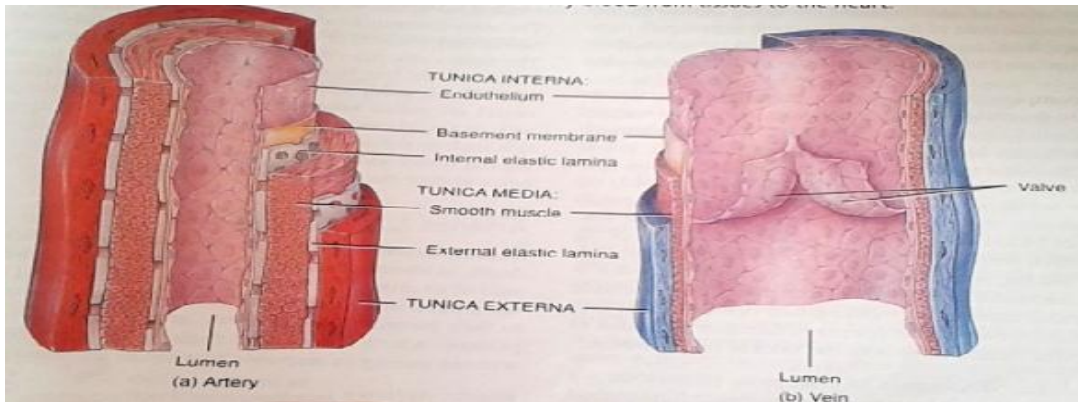
vessel which carries blood away from heart to other body organs. It is elastic structure. It divides in to medium sized muscular vessel named as arteriole. Arteriole branches into tiny branches as they enter into tissue. These tiny hairs like structures are capillaries. At this level exchange of nutritive and waste products occur. Process of oozing, between blood and tissues occur at capillary. Group of capillaries within the tissues reunite to form small venules. Venules merge to form vein. They are large in size and conveyors of blood from tissue to heart. These all are the vessels. Quality of fluid flowing through these vessels is different e.g. arterial blood is rich in nutrition and oxygen as compared to venous blood.

Blood pressure differs at these vessels. Arterial blood pressure is more than venous pressure and capillary pressure. Normal blood pressure keeps the blood flowing in vessels. It provides pressure for filtration at capillaries. It provides nutrition to tissues. E.g. Aortic pressure is about 90-140mm of Hg, at capillary 28-30 mm of Hg, at portal vein 8-10mm of Hg. These are some normal values at different levels. These vessels have major pressure differences. In routine clinical examination of cardiovascular system arteries are used for measurement of pulse and blood pressure and not the veins. Veins are not site for indication of vital signs of life.

Veins of upper and lower limbs have valves included in their structure. They push blood above, towards heart, against gravity or they pull blood towards heart from limbs.



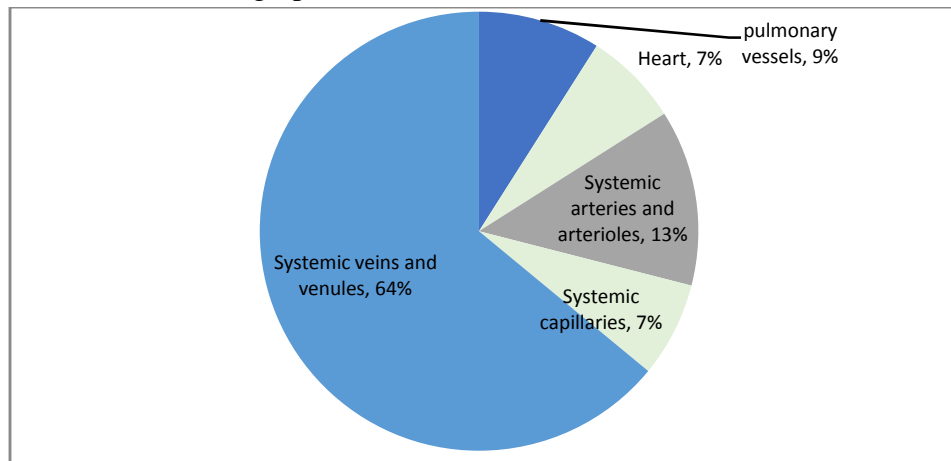
**Image:** Internal Structure of artery and vein respectively (see valve in vein)



Blood is a fluid and distributed in different parts of body. In resting state blood is distributed in –pulmonary vessels, heart,

systemic arteries and arterioles, systemic capillaries, venules and veins.

This graph shows blood volume distribution<sup>15</sup>:



Veins and venules hold 64% of blood volume. It is largest. These vessels are reservoirs of blood. Their blood can be used whenever needed in emergency. Veins of abdominal organs especially liver and spleen are largest reservoirs of blood. After them skin veins hold blood in large quantity. Superficial veins of skin are site for blood sample collection by

venepuncture method. It is routine method of blood “sample” collection or for donation of blood sample in large quantity. Artery is not a routine site for it. It is used in emergency case, under lot of precautions. Capillary blood is used for laboratory test but it is diluted with tissue fluid. Prick method is used for blood sample collection from capillary.

**Table 1:** Comparative points between *sira* and vein:

<i>Sira</i> in ayurveda	Vein in modern science
1. <i>Raktadhara kalaa</i> i.e. <i>sira</i> of <i>yakruta</i> and <i>pleeha</i> hold a lot of volume of blood. So, included in <i>raktadhara kalaa</i> .	Veins of abdominal organs, especially liver and spleen are 64% reservoirs of blood volume.
2. Injury to <i>raktdhara a kalaa</i> will lead to heavy blood loss, as it holds “ <i>shonita</i> ”. <i>Shonit</i> is a location for <i>Praan</i> .	Injury to liver and spleen will lead to heavy blood loss, as they are reservoirs of large blood volume.
3. <i>Saran</i> is a function of <i>sira</i> , which indicates its low pressure and less-pulsatile nature. They go from organ to organ and hold the blood.	Veins have low blood pressure. It pulls blood from organs and limbs towards heart.
4. Exudation and oozing are not expected from <i>sira</i> . <i>Stravan</i> and <i>dhmaan</i> are functions of <i>strotas</i> and <i>dhamani</i> respectively.	From veins, exudation of fluid is not expected. It will lead to ascitis in abdomen and edema in lower limbs.
5. <i>Sira</i> is not asite to examine “ <i>naadigati</i> ” in <i>naadi</i> examination routinely.	Vein is not used to examine pulse and blood pressure in routine clinical examinations of patient.
6. <i>Sira</i> is a site of <i>vrana</i> or ulcer	Limb veins have valves. They help to pull blood towards heart. If they fail to do their function, it will cause varicosities and may lead to venous ulcer.
7. “ <i>vedhan</i> ” procedure is done on <i>sira</i> and not on <i>dhamnies</i> . It is a part of treatment called as <i>raktamokshana</i> . <i>Dhamanivedhan</i> is not mentioned like <i>siravedhan</i> . In <i>siravedhsira</i> is punctured.	Venepuncture method is used at veins for blood sample collections, routinely. It is a part of investigation and not the treatment. It is used in hematological tests routinely, without any adverse effect or side effect. In blood donation process, blood is collected from superficial vein by venepuncture.
8. <i>Sira</i> conducts all <i>doshas</i> . Nomenclature of <i>sira</i> is based on locations of <i>doshah</i> where <i>sira</i> is branching. Main <i>sira</i> are forty in number- <i>vaatavahini</i> , <i>pittavahini</i> , <i>kaphavaahini</i> and <i>Raktavaahini</i> , each ten in number. They divide in to 175 branches from each type. This is functional aspect of <i>sira</i> . It is unique in <i>ayurveda</i> .	Vein conducts deoxygenated blood from tissue to heart. Nomenclature is based on name of associated artery and part of body.

## DISCUSSION

Histology showed that artery, vein and capillaries have different structures. Many of the above points show that *sira* is similar structure to vein. But physiology of *ayurveda* is completely different from modern medical science. One of the functional aspects of *sira* is “*sarvavahaa*”. *Sira* conveys all *doshas* and *rakta*. Their dividation is connected with locations of *vaata*, *pitta*, *kapha* and *rakta* too.

This part is not mentioned in modern medical science.

## CONCLUSION

1. *Raktadhara kalaa* is a reservoir of large blood volume. It is located in abdominal organs liver and spleen (*yakrut* and *pleeha*). Veins in these organs hold largest blood volume i.e.64%.
2. Exudation and oozing are not expected from *sira/vein*. If it happens it will lead to

ascities in abdomen and edema in lower limbs.

3. *Sira*/vein is a site for ulcer formation.
4. *Sira*/vein is a routine site of *vedhan* or puncturing, for removing *rakta*. That *rakta* can be removed for diagnostic tests or as part of treatment.
5. *sira* is *sarva-vahaa*. Functional aspect of *sira* cannot be compared with vein.

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