

## ENUMERATION OF SHAKHAGAT SNAYU BASED ON CADAVERIC DISSECTION

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### ABSTRACT

*Sharir Rachana* is the subject which deals with a lot of anatomical terms and defining these terms are important for application of the science. *Snayu* is a term which is explained elaborately in classical texts but yet it is unable to point out exact structure related with it in human body. Structurally it has been described something similar to a fibrous in nature. *Snayu* hold the *Sharir* together by joining the bones at joints like the ropes hold the wooden planks of a boat together. Like a strong boat can carry heavy load the number of *Snayu* mentioned by *Susruta Samhita* is 900. These are further divided region wise. But it's still unclear about the anatomical structures which make up these

*Snayu* in our body. There are many structures like tendons, ligaments, nerves, aponeurosis, Fascia etc. It's really difficult in current scenario to identify and establish the number and classification of *Snayu* mentioned by *Acharya Susrutha*. This can be only made possible through a cadaveric study. This study is planned to explore the extremities of human body by region wise and observing the structures which we can consider as *Snayu*. This is done by studying them structurally and functionally. The structure should be having a binding property and should be fibrous structurally. Through dissection the structure are enumerated and tries to find a sense in the numbers given by *Acharya Susrutha*.

**KEYWORDS:** *Snayu, Pratanvati, uradhwa Shakha, Adho Shakha.*

## INTRODUCTION

*Ayurveda* is a science which requires a lot of research to establish its authenticity along with modern medical science. The first step in this is to define the terms mentioned in *Ayurvedic* classics, especially the basic terms. *Sharir Rachana* is the subject which deals with a lot of anatomical terms and defining these terms are important for application of the science. *Snayu* is a term which is explained elaborately in classical texts but yet it is unable to point out exact structure related with it in human body.

Literally the term *Snayu* means to bind. It is explained as a structure which helps in binding the joints and helps the body in weight bearing. Structurally it has been described something similar to a fibrous in nature.

According to *Sargandhara* *Snayu* is a structure which binds *Mamsa*, *Asthi* and *Medas* of the body.<sup>[1]</sup> one who has proper knowledge of *Snayu* can easily extracts hidden *Shalya* from the body.<sup>[2]</sup> *Snayu* hold the *Sharir* together by joining the bones at joints like the ropes hold the wooden planks of a boat together. Like a strong boat can carry heavy load.<sup>[3]</sup>

The number of *Snayu* mentioned by *Susruta Samhita* is 900. These are further divided region wise. But it's still unclear about the anatomical structures which make up these *Snayu* in our body. There are many structures like tendons, ligaments, nerves, Aponeurosis, Fascia etc. which can be related to *Snayu*. *Acharya Susruta* has further divided *Snayu* into four categories' based on the structure. These are *Pratanavati*, *Vrutta*, *Sushira* and *Prithula*. *Pratanavati Snayu* is found in *Sakha* and all *Sandhi*'s.<sup>[4]</sup>

According to location, form and structure, *Snayu* of kind four type *Pratanavati* (branched), *Vrutta* (circular), *Sushira* (porous), *Prithula* (flat). *Pratanavati* (spread out/ broad) are present in *Sakha* (extremities) and *Sarva Sandhi*. *Vrutta* (round/ cylindrical) are known as *Kandara*. *Sushira* (hollow/ ring like) are present at the end of *Amasaya*(stomach), *Pakvasaya* (large intestine), *Basti* (urinary bladder). *Prathula* (thick bag) are present in *parsva* (flanks), *uras* (chest), and *prustha* (back).<sup>[5]</sup>

*Snayu* are nine hundred, six hundred in *Sakha* and two hundred and thirty in trunk and seventy in head and neck. In each toe of foot six ligaments are attached thus thirty in total, the same in sole, tarsus and ankle, the same in leg, ten in knee, forty in thigh and ten in hip thus there are one hundred and fifty ligament, in one leg the same in other leg and two arms.

Sixty ligaments are in lumber region, eighty in back, sixty in sides and thirty in chest. In neck, there are thirty six ligaments and thirty four in head.<sup>[6]</sup>

As a boat consisting of planks becomes capable of carrying load of passengers in river after it is tied properly with bundle of ropes, all the joints in the human body are tied with many *Snayu* by which persons are capable of bearing load.

The present article aims at explaining and revealing the exact anatomical structure according to contemporary science and an attempt has been made to enumerate and classify the six hundred *Snayu* present in *Shakha* mentioned by *Acharya Susruta* in *Sharir Sthana*.

## MATERIAL AND METHOD

*Acharya Charaka* explains the four type of *Pramana Pariksha* like *Aptoupdesh*, *Pratakashya*, *Anumaan* and *Yukti*. *Pratakshya Pariksha*<sup>[7]</sup> is more important other than of four type of *Pramana Pariksha*, an *Acharya Sushruta* has also given preference of practical training in *Yogya-SutriyaAdhyay*.<sup>[8]</sup>

- Review of *Ayurvedic* literature regarding to *Snayu*, and its type from classics and relevant commentaries including its relevant modern literature.
- To observe and reveal the specific structure of *Snayu* and its type, on cadaver through dissection.

**Table no. 1.**

Serial No.	Type of Snayu	Meaning	Structure
1.	<i>Prtanavati</i>	a tendril, a shoot, a low spreading plant	Ligaments, nerves
2.	<i>Vrutta</i>	Round or circular	Tendon, large nerve cord
3.	<i>Pruthula</i>	Broad, large or great	Fascia, Aponeurosis
4.	<i>Sushira</i>	Porus, hollow, cavity	Sphincters

## Concept of *Snayu* in Ayurveda

### Cadaveric Study

A total of 184 *Snayu* were identified in upper limb. 20 in axilla, 04 in shoulder region, 17 in anterior compartment of arm and elbow joint, 21 in anterior compartment of forearm and wrist joint, 6 in posterior compartment of arm, 23 in extensor compartment of forearm, 40 in palmar region and 8 in dorsal region of hand, 45 in phalanges.

**IN UPPER LIMB**

**This part will be adjust in discussion**

- **Axilla region**

In axilla region, among various categories of *Snayu* a total number of 20 *Snayu* are found, like *Pratanvati* are 18 in out of 20, no *Vrutta Snayu* are found in axilla region, 2 *Pruthula Snayu*.

- **Shoulder region**

In shoulder region, among various categories of *Snayu* a total number of 4 *Snayu* is found, like they are *Pratanvati*.

- **Anterior compartment of arm and elbow joint**

in the both region is found a total number of *Snayu* are 17 in various category, like *Pratanvati* are 11 out of 17, 4 *Vrutta Snayu*, and 2 *Pruthula Snayu*.

- **Anterior compartment of fore arm and wrist joint**

In both regions, a total number of 21 *Snayu* is found in various categories, like *Pratanvati* 10 out of 21, 9 *Vrutta Snayu*, 2 *Pruthula Snayu*.

- **Posterior compartment of arm**

In the posterior compartment of arm, there are 6 number of total *Snayu* is found in various categories, like *Pratanvati* are 3 out of 6, 1 *Vrutta snayu*, 2 *Pruthula Snayu*.

- **Extensor compartment of fore arm**

In the extensor compartment of fore arm there are 23 numbers of *Snayu* is found in various categories, like *Pratanvati* are 11 out 23, 10 *Vrutta Snayu*, 2 *Prthula Snayu*.

- **Palmer region**

In the palmer region there are 40 numbers of total *Snayu* is found in various categories, like *Pratanvati* are 30 out of 40, 4 *Vrutta Snayu*, 6 *Pruthula Snayu*.

- **Dorsal region of hand**

In this region there are total numbers of 8 *Snayu* in various categories is found; like *Pratanvati* are 6 out of 12, 2 *Pruthula Snayu*.

- **Phalanges**

In this region there are total 45 numbers of *Snayu* are found, among these 38 *pratanvati Snayu*, 7 *vrutta Snayu*.

## **IN LOWER LIMB**

A total number of *Snayu* identified in lower limb is 194 in lower limb, out of these 24 found in front of thigh and medial side, 7 found in and hip joint, 11 found in knee joint, 22 found in front of leg and lateral compartment of leg, 14 found in posterior of leg, 11 found in back of thigh, 7 found in Ankle joint, 46 found in tarsal metatarsal, 52 found in phalanges.

- **Front of thigh and medial side**

In this region found a total number of *Snayu* found are 24, out of these 17 are *Pratanvati Snayu*, 5 *Vrutta Snayu*, and 2 *Pruthula Snayu*.

- **Hip joint**

In this region found total number of *pratanvati Snayu* found are 7.

- **Knee joint**

In this region 11 *Pratanvati Snayu* found.

- **Front of leg and lateral compartment**

In this region total number of *Snayu* found are 22, out of these 13 are *Pratanvati*, 7 *Vrutta Snayu*, 2 *Pruthula snayu*.

- **Posterior of leg**

In this region found total number of *Snayu* is 14, out of these 7 are *Pratanvati Snayu*, 5 are *Vrutta Snayu*, 2 *Pruthula Snayu*.

- **Back of thigh**

In this region found total number of *Snayu* 11; out of these 5 are *Pratanvati*, 4 *Vrutta Snayu*, and 2 *Pruthula Snayu*.

- **Ankle joint**

In this region found 7 *Pratanvati snayu* are found.

- **Sole, Tarsal, metatarsal joint:** in this region total number of 46 *Snayu* found are, out of these 44 *Pratanvati*, 2 *Pruthula Snayu*.
- **Phalanges:** in this region 52 number of *Snayu* found are, out of these 48 are *Pratanvati Snayu*, 4 are *Vrutta Snayu*.

## DISCUSSION

*Snayu* is considered as an important structure by all *Acharyas*, especially by *Acharya Susruta* in *Sharir Sthana*. It's mentioned in the *Sharirsankhya Vyakaran*, which is the fifth chapter of *Sharir Sthana*. *Chraka Samhita* explained about *Snayu* in *Sharir Sankhya Shariram*, seventh chapter of *Sharir Sthana*. *Ashtanga Hridaya* and *Ashtanga Sangraha* mention it in *Angavibhaga Shariram*.

- The number of *Snayu* in *Sharira* is said to be nine hundred by *Acharya Susrutha*. All other *Acharyas* have similar opinion about the number of *Snayu*.
- These are further divided region wise. Out of these nine hundred, six hundred are in extremities, two hundred and thirty in trunk and seventy in head and neck.
- *Acharya Dalhana* mentions *Snayu* as a *Shanakara* (fibrous structure) which is used in bow.

### Comparison of *Snayu* According to Modern and *Ayurveda* Literature in one limb *Adho - Shakha* (Lower Limb).

S. No	<i>Snayu</i> Region	<i>Susruta Samhita</i>	<i>Astanga Samgraha</i>	Dissection based
1	<i>Anguli</i>	30 (6 Each)	30 (6 Each)	52
2	<i>Padatata, Gulta, Kurcha</i>	30 (10 Each)	30 (10 Each)	53
3	<i>Jangha</i>	40	40	36
4	<i>Janu</i>	10	10	11
5	<i>Uru</i>	30	30	35
6	<i>Vamkshana</i>	10	10	7
	<b>Total</b>	<b>150</b>	<b>150</b>	<b>194</b>

### *Uradhawa - Shakha* (Upper - Limb)

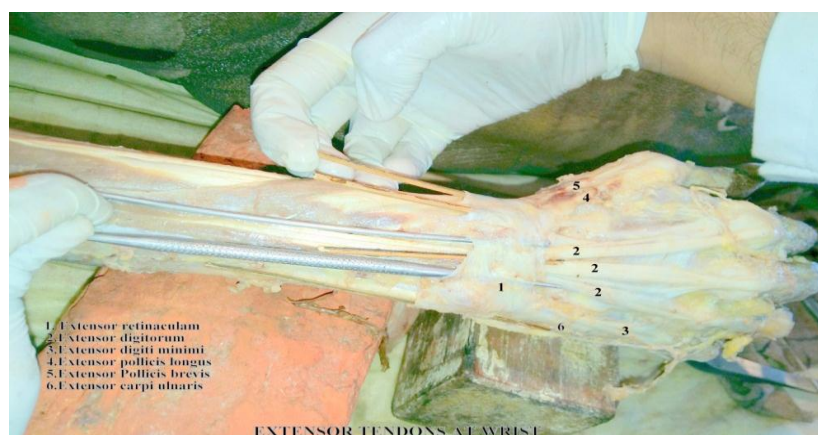
S. No	<i>Snayu</i> Region	<i>Susruta Samhita</i>	<i>Astanga Samgraha</i>	Dissection based
1	<i>Anguli</i>	30 (6 Each)	30 (6 Each)	45
2	<i>Hastatata, Kurcha, Manibandha</i>	30 (10 Each)	30 (10 Each)	53
3	<i>Prabahu</i>	40	40	39
4	<i>Kurpara Sandhi</i>	10	10	5
5	<i>Bahu</i>	30	30	22
6	<i>Kaksha</i>	10	10	20
	<b>Total</b>	<b>150</b>	<b>150</b>	<b>184</b>



Out of the 184 *Snayu* found in upper limb, 128 are *Pratanvati* (58 ligaments, 70 nerves), 38 are *Vrutta* (tendons) and 18 are *Pruthula Snayu* (fasciae). And in lower limb there are 194 *Snayu*, out of which 159 *Pratanvati* (85 ligaments, 74 nerves), 25 are *Vrutta* and 10 are *Pruthula Snayu*. Both upper limb and lower limb are devoid of *Sushira Snayu*.

### Reason behind the variation in number in Ancient science and cadaveric study

When counting the ligaments of interphalangeal and metacarpophalangeal joints, it was difficult to distinguish the palmar ligaments and collateral ligaments from joint capsule. If these are counted as one, we could get a difference of 28 *Snayu*. Similarly in the carpal regions also, the intercarpal ligaments were also difficult to differentiate. This could also have made a difference in numbers. There are many small nerves which are superficial and muscular branches. It is very hard to find them in regular dissection. They are approximately 58 in number (30 in upper extremities and 28 in lower extremities) in both extremities. If we deduct these nerves, the numbers comes close to that mentioned by *Acharyas*.





## CONCLUSION

The structures which can be considered as *Snayu* in human body are ligaments, nerves, tendons, fascia and sphincters. The total number of *Snayu* has been found on counting is 184 and 194 in upper and lower limb respectively compared to 150 mentioned by *Acharya Susruta*. In this study there are variations seen. In lower limb there are 52 in *Anguli*, 53 in *Tala*, *Kurcha* and *Gulpha*, 36 in *Jangha*, 11 in *Janu*, 35 in *Uru* and 7 in *Vamkshana*. In upper limb the numbers are 45 in *Anguli*, 53 in *Tala*, *Kurcha* and *Manibandha*, 39 in *Prabahu*, 5 in *Kurpara Sandhi*, 22 in *Bahu* and 20 in *Kaksha*. Out of the 184 *Snayu* found in upper limb, 128 are *Pratanvati*, 38 are *Vrutta* and 18 are *Pruthula Snayu*. And in lower limb there are 194 *Snayu*, out of which 159 *Pratanvati*, 25.

Are *Vrutta* and 10 are *Pruthula Snayu*. Both upper limb and lower limb are devoid of *Sushira Snayu*. This Study was conducted on the *Snayu* of extremities only the same technique can be adopted for the study of *Snayu* on other parts of body. Clinical study based on the findings of this work can be done, in conditions like *Snayugatavata*, *Gradhasi* etc.



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