



## A REVIEW ON TWAK SHARIR AND TAMRA TWAK

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Article Received on 19/03/2022

Article Revised on 09/04/2022

Article Accepted on 29/04/2022

### ABSTRACT

As *gyan* of Ayurveda was given in '*sutra roopa*' by Acharyas, many topics and concepts in Ayurvedic classics are hidden or under cover. There are total '*Ekadash Indriyas*' mentioned in Ayurveda, out of which five are *Karmendiyas*, five are *Gyanendriyas* and one *Manas* which is known to be *Ubbhayatmaka*. Acharya Charak has told five types of *Gyanendriyas*- *Ghranendriya*, *Sparshanendriya*, *Chakshurendriya*, *Rasanendriya* and *Shravanendriya*. He also described their sites, functions, compositions and properties. *Twak/ Twacha* or Skin is the largest organ of the body which covers the whole body and is *Adhishtan* (seat) of *Sparshanendriya*. Structurally it has got many layers according to Ayurveda and Modern Science but when we talk about *Sparshanendriya*, it is a matter of concern that which layer or special structure is there in *twak* which can be considered as *Sparshanendriya*. Present paper is an effort made to compile and analyse the knowledge present in Ayurvedic classics about '*Twak Sharir*' with special reference to *Tamra Twak* correlate it with modern science for better understanding of the subject.

**KEYWORDS:** *Gyanendriya, Twak, Sparshanendriya, Tamra Twak.*

### INTRODUCTION

"As milk when heated by Agni, after some time it leads to the formation of multiple layers of cream". In the same manner *Twacha* is evolved in the form of multiple layers.<sup>[1]</sup> Acharya Charaka has depicted the opinion about *Twacha* in *Sharir sthana*.<sup>[2]</sup> *Indriyas* are those entities which are meant for perception of sensations or tools for obtaining knowledge. According to Acharya Charak, *Indriyas* are *panchbhautika* which means these are formed from *Panchmahabhutas*.<sup>[1]</sup> Acharya Sushruta follows the opinion of *Saankhya* and stated their origin from *Ahamkara*.<sup>[2]</sup> Acquaintance of knowledge is caused when *Indriya*, *Manas* and *Indriyaarth* communicate with each other.<sup>[3]</sup> So presence of all these three factors (*Indriya*, *Manas* and *Indriyaarth*) are important for knowledge acquaintance. Acharya Charaka described *Indriyas* are basic instrument in differentiating the living and non-living things. Besides being *Panchabhartika* i.e. composed of five elements, each *Indriya* has a specific dominant *Mahabhuata* present within.<sup>[4]</sup> This is the reason behind reception of specific sensation by its respective *Indriya*, e.g. *Vayu Mahabhuata* dominates *Sparshanendriya* and it receives knowledge of *Sparsha* or touch. That is why ear can't see, eyes can't hear, skin can't hear or see etc. This is the specificity of each *Indriya*. The reason for this specificity is mentioned by

Acharya Charak as *Swabhava* and *Vibhutwa*,<sup>[5]</sup> and *Yonisamanya* by Acharya Sushruta.<sup>[6]</sup> In Ayurvedic classics, various opinions regarding *Twak utpatti*, *Twakstara* or layers and associated disorders are mentioned. It is considered as *Updhatu* of *mamsa dhatu*<sup>[7]</sup> and seat (*adhishtan*) of *Sparshanendriya*. So light should be thrown on actually which layer or special structure can be said as *Sparshanendriya* and how sensation of touch is perceived. The fourth layer is known as *Tamra* which measures one-eighth of *Vreehi* and is a seat of various types of *kilasa* and *kushtha*.

### MATERIAL AND METHODS

It is a literary review to explore the understanding of *Twak Sharir* with special reference to *Tamra Twak*. With the help of data collected from classical and contemporary and Ayurvedic texts and published research articles. Then after comparative points were analyzed and interpreted.

#### Literary Review

##### *Utpatti of Twak*

Regarding *utpatti* of *Twak* Acharya Sushruta described that fertilization of sperm and ovum, development takes place and consequently seven layers of *Twak* comes into existence like those of cream over the surface of milk.<sup>[8]</sup>

Here analogy of cream and milk is given to explain the entire concept of formation of skin. Acharya Vaghbhatta described *Twak utpatti* due to the *paka of rakta dhatu* by its *dhatvagni* in the foetus. After *paka*, it dries up to form *Twacha*, just like the deposition of cream (Skim) over the surface of boiled milk.<sup>[9]</sup>

### **Structure of Twak**

Opinion of number of Layers of Twak from Different Ayurvedic classis.

*Twak* is composed of many layers and there is a bit controversy regarding number of layers in different Ayurvedic classics. Different opinions are as follows

- 1) Charak Samhita- 6 layers
- 2) Sushruta Samhita- 7 layers
- 3) Ashtang Hridaya- 7 layers
- 4) Ashtanga Samgraha- 6 layers
- 5) Sharangdhara- 7 layers
- 6) Bhavprakash- 7 layers
- 7) Kashyap- 6 layers
- 8) Modern Science- 7.

According to Acharya Sushruta, *Twak* is composed of seven different layers or *stara*. The first layer is known by the name *Avabhasini*. Its main function is to illuminate all sorts of complexion and also brightens five type of shade. Futher measurement is also given which is eighteenth part of *Vreehi* (barley grain).

The second layer named *Lohita* measures sixteenth part of *Vreehi* and is seat of diseases like *tilkalaka*, *nyaccha* and *vyanga*.

*Twak* can be briefly summarized as below

Bheda Name acc. To Sushruta	Measurement acc.to Sushruta	Diseases associated	Names acc. To Charak	Diseases associated
Avabhasini	1/18 <sup>th</sup> part of brVeehi	Sidhma, padmakantaka	Udakadhara	-----
Lohita	1/16 <sup>th</sup> part of Vreehi	Tilkalaka, nyaccha, vyanga	Asrigdhara	-----
Shweta	1/12 <sup>th</sup> part of Vreehi	Charmadala, ajgallika, mashaka	Tritiya	Sidhma, kilasa
Tamra	1/8 <sup>th</sup> part of Vreehi	Kilasa , kushtha	Chaturthi	Dadru, kushtha
Vedini	1/5 <sup>th</sup> part of Vreehi	Kushtha, visarpa	Panchami	Alaji, vidradhi
Rohini	Equal to 1 Vreehi	Granthi, apache, arbuda, galganda shleepada	Shashthi	Tama pravishti, arunshika
Mamsadhara	2 Vreehi	Arsh, bhagandara, vidradhi	-----	-----

Sharangdhara,<sup>[12]</sup> and Bhavprakash,<sup>[13]</sup> gave the same description as that of Acharya Sushruta but differently named the seventh layer as *Sthoola*. *Twak* is *panchbhautika* with predominance of *Vayu mahabhuta*.

Description according to.

### **Panchapanchaka siddhant**

Indriya: Sparshanendriya.

Dravya: Vayu.

Adhishtan: Twak

Indriyarth: Sparsha

Buddhi: Sparsha buddhi.<sup>[14]</sup>

The third layer is known by the name *Shweta* which measures twelfth part of *Vreehi* and is a seat of *charmadala, ajgallika and mashaka*.

**The fourth layer is known as Tamra which measures one-eighth of Vreehi and is a seat of various types of kilasa and kushta.**

The fifth layer is *Vedini*, measuring one-fifth of a *Vreehi*, and is a seat of *kushtha and visarpa*.

The sixth layer is *Rohini* which measures equal to one *Vreehi* and is seat of *granthi, apachi, arbuda, shlipada and galaganda*.

The seventh layer is *Mamsadhara* which is of two *Vreehi pramaṇa* and it is a seat of *bhagandara, vidradhi and arsh*.

The above said measurements should be considered from thick muscular areas of the body, and not from areas having thin musculature like forehead or fingers.<sup>[10]</sup>

Acharya Charaka mentioned six layers of the skin, but has not mentioned the name of each of the layer except first two. The outermost layer of skin is known as *Udakadhara*. The second one is *Raktadhara* which holds the blood. The third one is the seat of *sidhma* and *kilasa*. The fourth layer is the seat of *dadru* and *kushtha*. The fifth layer is the seat of *alaji* and *vidradhi*. The sixth layer is that which when cut causes loss of consciousness and is the seat of boils being manifested as blackish red and deep rooted on joints and are very difficult to cure.<sup>[11]</sup>

*Vishaya grahan* is the basic karma of *Indriya*, and for this purpose to be fulfilled *Indriya* makes connection with *Indriyartha* and *manas*.

*Twak* is also a seat of *Bhrajaka pitta*, which absorbs externally applied drugs in the form of *abhyanga, lepa, snana* etc. and also illuminates various shade of complexion.<sup>[15]</sup> *Twak* is also mentioned as *Mamsa vaha srotas mula*.<sup>[16]</sup>

The Pitta in the skin is known as *Bhrajaka Pitta*, which is responsible for absorption of drugs externally in the form

of Massage, Bath, Deepings, Paste etc. and also illumines various shades of complexion. Out of the five types of Pitta, Bhrajaka is the type concerned with the function of Bhrajana of Skin.

**Prana Vayu** is responsible for perceiving the sense of so many substances through Twacha, which is the seat of Prana Vayu. This sense phenomenon is possible due to infinite number of minute channels, which convey Vata through Twacha.

### Structure of Skin (Integument)

Skin is the general covering of the entire external surface of the body, including the external auditory meatus and the outer surface of tympanic membrane. Because of its large number of functions, the skin is regarded as an important structure of the body. In an adult the surface

area of the skin is 1.5-2 sq. metres. The thickness of the skin varies from about 0.5 to 3 mm.

Structurally, skin is composed of two distinct layers-Epidermis and Dermis.

### EPIDERMIS

It is the superficial, avascular layer of stratified squamous epithelium. It is ectodermal in origin and give rise to appendages of skin, namely hair, nails, sweat glands and sebaceous glands. It consists of five layers:

- 1) Stratum corneum (the outermost)
- 2) Stratum lucidum: (found in thick skin)
- 3) Stratum granulosum
- 4) Stratum spinosum
- 5) Stratum germinativum/ basale.

S.No.	EPIDERMIS	CELLS	SPECIAL FEATURES
1.	Stratum Corneum (Horny layer)	Corneocytes Stratified epithelial cells	Fibrous protein keratin is present
2.	Stratum lucidum	Flattened epithelial cells	Eleidin (precursor of keratin) is present
3.	Stratum granulosum	Rhomboidal shape cells, 3 cell layered	Keratohyalin is present in shape of granules
4.	Stratum spinosum	Several layers (3-5) thick Cells have spine like processes/projections	Some melanocytes
5.	Stratum germinatum/ basale	Polygonal cells-superficially Columnar or cuboidal Epithelial cells- deep	Keratinocytes Melanocytes. Merkel's cells.

### DERMIS

Dermis or corium is the deep, vascular layer of the skin, derived from Mesoderm. It is made up of connective tissue mixed with blood vessels, lymphatics and nerves and a variety of touch receptors. Its primary function is to sustain and support the epidermis by diffusing nutrients to it. It comprises of two layers:

1. **Superficial papillary layer:** forms conical, blunt projections (dermal papillae) which fits into reciprocal depressions on the undersurface of the epidermis.
2. **Deep reticular layer:** composed chiefly white fibrous tissue arranged mostly in parallel bundles.<sup>[17]</sup>

### Somatosensory System: The Ability To Sense Touch

Our sense of touch is controlled by a huge network of nerve endings and touch receptors in the skin known as somatosensory system. This system is responsible for all the sensations we feel- cold, hot, pressure, tickle, itch, pain etc. There are four main types of receptors: mechanoreceptors, thermoreceptors, pain receptors and proprioceptors.

**Mechanoreceptors:** these perceive sensations such as pressure, vibrations, and texture. There are 4 main types of mechanoreceptors in the skin: **Merkel's disc**, **Meissner's corpuscles**, **Ruffini's corpuscle**, and **Pacinian corpuscles**. The most sensitive mechanoreceptors, Merkel's disc and Meissner's

corpuscles, are found in very top layers of dermis (basale layer of epidermis) and are generally found in non-hairy skin like palms, lips etc. Located deeper in the dermis and along the joints, tendons, and muscles are Ruffini's and Pacinian corpuscles. These can feel the sensations such as vibrations travelling down bones and tendons, rotational movements of limbs and stretching of skin.

**Touch Pathway:** Of course, none of the sensations felt by the somatosensory system would make any difference if these sensations could not reach the brain. The nervous system of the body takes up this important task.

Signals are taken up by the receptors, goes to dorsal column of spinal cord through dorsal root ganglion. Then information travels through **1<sup>st</sup> order neuron** to **2<sup>nd</sup> order neuron** and from **2<sup>nd</sup>** to **3<sup>rd</sup> order neuron** (Medial Lemniscal Pathway). From here it gives information to **Ventroposterolateral Nucleus of Thalamus** and further to **Post central gyrus** of the **cortex of brain**. (this pathway is dorsal pathway for fine touch, crude touch comes from ventro-lateral pathway).

### DISCUSSION

The numbers of skin layers mentioned in Sushruta Samhita and Modern Science are same.

*Avabhasini* can be compared with Stratum Corneum, as it is a reflector layer which illuminates all shades of skin and is the outermost layer.

*Lohita* can be compared with Stratum Lucidum as it is transparent white or clear layer.

*Shweta* can be compared with Stratum Granulosum as it has reddish coloured cells and S. granulosum also has granular copper coloured cells.

*Tamra* can be compared with Malpighian layer. Kilasa occurs in *Tamra* layer, and as malpighian layer is involved in vitiligo, so both these layers can be treated as same.

*Vedini* can be compared with Stratum Basale as it is having touch sensitive papillae.

*Rohini* can be compared with Papillary layer as *rohini* is the layer having cells helpful for wound healing and is also having dense irregular connective tissue and blood vessels arranged in thick collagen network.

*Mamsadhabha* can be compared with Reticular layer of Dermis as it is a layer which gives support to the underlying structures.

Deep fascia and muscles and hypodermis are the layers below the dermis just above the muscles.

*Twak* is the seat of *Sparshanendriya*. The receptors and free nerve endings present in skin can be considered as the *Sparshanendriya* as by means of these receptors and nerve endings the sensations of touch/ spars are perceived. For perception, *manas* is also an important factor other than *indriya* and *indriyartha*, so complete somatosensory pathway and cerebral cortex can be compared with *manas* as the information when goes to the level of consciousness, only then sense of touch is experienced.

## CONCLUSION

Description of *Twak* in classical texts and modern texts have tremendous similarity regarding numbers, layers etc. There is much more wide area still to be covered. According to Acharya Sushruta there are seven layers of skin which is same as that of modern science (5 layers of epidermis + 2 layers of dermis). The layers of *Twak* described by Acharya Sushruta and their names match with the layers of skin anatomically and physiologically. *Indriya panchapanchak* and factors causing *pratyaksha gyan* can be used as a tool to understand physiology of *Gyan grahan prakriya* of any sense organ. *Tamra Twak* can be Considered as Stratum Spinosm or Malpighian layer as This Layer Has the The color of Tamra or copper due to the presence of Melanin pigment.

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