

UNDERSTANDING OF TWAK – A CONCEPTUAL REVIEW ARTICLE

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ABSTRACT

Background of study: Ayurveda has mentioned body as *DoshaDhatuMalaMoolaHeeShareeram*. *Twak* is *Upadhatu* of *Mamas Dhatu* which forms the outer covering of the body and protects body from external factors such as heat, cold etc. It is an important organ of the integumentary system envelops underlying tissues and organs. Ayurveda mention the *Twak* as *Sparshanaindrya*. The layers of the *Twak* has been mentioned as 6 or 7 respectively by different *Acharyas*, but the understanding of the each layer is not so much clear with respect to the layer mentioned in the contemporary science. Acharya explained the thickness of the *Twak* layers in compared with the *Vreehi* grain and each layer has different thickness. Regarding the formation of *Twak*, it was correlated with simile of formation of casein over milk. There is a need to understand the different layer of *Twak* and skin, their structural, functional & developmental interpretation to correlate in between them. **Aims & Objectives:** To analysis the *Twak Sthara* with layers of skin. To analysis the classical concept regarding formation of *Twak*. **Materials and methods:** Literature review regarding the *Twak* (structural, development and applied aspect related) was done through various authorized text books, journals and published articles, and then the critical analysis was done to correlate the possible layer of skin and its formation with the layer of the *Twak* and its formation process on the basis of classical information. **Results:** The layer of the *Twak* corresponds with the layer of skin in the functional and structural aspect. The skin layers are formed gradually throughout the antenatal period; as explained by our *Acharya* in the form of *Sapta Twacha* formation in similar order as scum formed over the boiling milk.

KEYWORDS: *Twak*, Skin, *Sapta Twacha*, Integuments, *Twak Utpatti*, etc.**INTRODUCTION**

In *Ayurveda* the word *Twak* or *Charma* is used for skin. *Twak* is called because it is that which covers the body. This also indicates the movements of skin in the form of pulsatility and responsiveness.^[1] *Twak* is the *Updhatu* of *Mamsa*.^[2]

Sushruta described the process of formation of *Twak* in the developing foetus. After fertilization of *Shukra* & *Shonita*, *Twacha* develops just as the layer of *Santanika*(scum) appears in the boiling milk which gradually increase in thickness, in the similar manner the seven layers of the skin are formed over the surface of foetus body.^[3]

During the formation of *Garbha*, differentiation of the layers of the skin takes place and is produced by all the three *Dosha*, particularly by the *Pitta Dosha*. *Charaka*

described *Twacha* as the *Matruja Bhava* (maternal factor) which is one of the six *Bhava* essential in the development of foetus.^[4] Whereas *Vagbhata* opinion that the *Twak* is derived from the *Rakta* by action of *Rakta Dhatwagni*, it gets dried up to form the skin, like the deposition of cream on the surface of boiling milk.^[5]

Acharya Charaka mentioned six layers of skin. Only first two layers are named such as *Udakadhara* & *Asrugdhara*. Other four layers of skin are mentioned with respect to conditions affecting them.^[6]

Acharya Sushruta has described seven layers of *Twak* along with specific names. He mentioned the thickness of each layer along with the conditions affecting those layers.^[7]

Acharya Vagbhata has mentioned seven layers of *Twak* similar to *Sushruta*. He has not given any description regarding it; commentator *Arunadatta* and *Hemadri* have named them according to *Sushruta*.^[8]

Sharangadhara has mentioned seven layers of *twak* along with the conditions affecting them. The names of

first six layers are same as that of *Sushruta* but a seventh layer is named as *Sthula* which is the site of *Vidradhi*.^[9]

There is different opinion regarding the number of the layers of the skin (*Twak*). The layers of *Twak* explained by different *Acharya* have been tabulated below;

Table 1: Layer of *Twak* as per different *Acharyas*.

Layers	Charaka ^[10]	Sushruta ^[11]	Vagbhata ^[12]	Arunadatta ^[12]	Sharangadhara ^[13]	Bhavprakash ^[14]
Prathama	Udakadhara-Bahaya Twak	Avabhasini	1 st	Bhasini	Avabhasini	Avabhasini
Dwitiya	Asrugdhara	Lohita	2 nd	Lohita	Lohita	Lohita
Tritiya	Sidhma, Kilasa Sambhavadhishthana	Shweta	3 rd	Shweta	Shweta	Shweta
Chaturtha	Alaji, Vidradhi Sambhavadhishthana	Tamra	4 th	Tamra	Tamra	Tamra
Panchami	Dadru, Kushta Sambhavadhishthana	Vedini	5 th	Vedini	Vedini	Vedini
Shashthi	If this layer is injured, leads to <i>Andhatwa</i> & <i>Tama pravesha</i> leads to <i>Andhatwa</i> & <i>Tama pravesha</i>	Rohini	6 th	Rohini	Rohini	Rohini
Saptami		Mamsadhara	7 th	Mamsadhara	Sthula	Sthula

Skin is the largest organs and organ of integumentary system of the body. It covers the entire surface of the body. It is one among the sense organ. The skin is also a reactive dynamic organ that manages to express the feeling and emotions. It is a protective boundary between the person and its environment, hence work as the first line defence of the body.^[15] Skin accounts for about 15

percent of body weight, most of it is between 2-3mm thick.^[16] Skin and its components are entirely derived from ectoderm and mesoderm.^[17] Skin is composed of three layers namely Epidermis, Dermis & Hypoderm (Subcutaneous tissue).^[18] The layer and thickness of each layer is tabulated below.^[19]

Table 2: Layer of Skin and thickness of its different layers.

Layer of skin	Sub layers	Thickness
Epidermis Thin skin -4 layers, 0.1mm thick Thick skin -5 layers, 1-2mm thick	Stratum Corneum	10-30µm
	Stratum Lucidum	100 µm
	Stratum Granulosum	100 µm
	Stratum Spinosum & Basale	100 µm
Dermis	Papillary layer of dermis	100 - 200 µm

DISCUSSION

Discussion on the layer of *Twak*

Acharya *Sushruta*, *Vagbhata*, *Bhavprakash* & *Sharangdhara* had mention seven layers of *Twak*.^[20,21,22,23] Whereas in *Charaka*, *Bhela* & *Astanga Sangraha* mentioned six layers of *Twak*.^[24,25,26] There is different in opinion regarding *Twak Sthara* due to prospective vision of surgeon and physician

Prathama Avashani

Acharya *Sushruta* called outermost *Twacha Stara* as *Avabhasini* with thickness about 1/18th of *Vreehi* and it is *adhishthana* for *Sidhma* and *Padmakantaka*. *Dalhana* mentioned that first layer is responsible for the exhibition of *Gaura*, *Shyamadi Varna* (complexion) and five types of *Prabha* (glory) and *Chaya* (shades) of the body with help of *Bhrajaka Pitta* present in this layer.^[27] Acharya *Charaka* & *Vridha Vagbhata* named first and outermost layer of *Twacha* as *Udakadhara* as name itself suggest it

holds the *Udakadhatu*. *Indu* depicts that this layer carries *Udaka dhatu* and prevents outflow and maintain *Ardrata bhava* i.e. moisture content of the *Twak* on its outer surface.^[28,29] *Vagbhata* stated 1st layer as *Bhasini* which is similar feature as explained by *Astanga Sangraha* & *Charaka*.^[30] *Ghanekar BG* mentions first *Twak Stara* is responsible for exhibition of complexion, glory and different shades of *Twak*.^[31]

As the layers superficial to *Malpighi* are opaque, exhibition of complexion is done by *Stratum Corneum*; hence *Avabhasini* may be correlated with *Stratum Corneum*. The corneum layer made up of scale like flattened epithelium which consist of keratin filaments this make it highly resistant to permeation by water.^[32] so as the result it prevent the water loss from body, and due to this reason *Acharya* opinion it is *Udaka Dhara Sthara* of *Twak*.

Dwitiya Lohita

Sushruta named second layer of *Twak* as *Lohita* having thickness of 1/16 th of *Vreehi*. And it is *adhishthana* of *Tilakalaka*, *Nyaccha* & *Vyanga*. *Charaka* & *Vridhha Vagbhata* called second *Twacha Stara* as *Asrugdhara*.^[27,28] *Indu* explains this layer as *Rudhantva Asram* i.e. it holds the blood and prevents outflow of *Rakta dhatu* from the body.^[29] *Hemadri* describes this layer as *Lohini*.^[30] *Ghanekar BG* stated that as *Lohita* lies beneath the *Avabhasini*.^[31]

Stratum lucidum layer consist of homogenous distributed cell layers with indistinct cell boundary which give it clear/lucid appearance. The change in amount of Hb%, bilirubin is reflected through this layer as the pallor or icteric look of skin. So the Acharya has opinin as *Lohita* &/or *Asrigdhara* for this *Twak Sthara*.

Tritiya Shweta

Sushruta called third *Twak Stara* as *Shweta*, it is having thickness of 1/12th of *Vreehi* and it is *adhishthana* for *Charmadala*, *Ajagalika* & *Mashaka*.^[27] *Charaka* & *Vridhha Vagbhata* mentioned third *Twak Stara* as prime location of *Sidhma* & *Kilasa*.^[28,29] *Astanga Hrudaya* describes third *Twak* layer as site of *Sidhma*, *Shwitra Adhishthana*.^[30] *Ghanekar BG* explained that *Shweta Stara* lies exactly below the *Lohita*.^[33]

Underneath the S. lucidum is stratum granulosum; it is made up of two to five layers of flattened cells containing the granules in their cytoplasm. The keratohyaline granules are numerous in this layer which binds the keratin filaments in thick layer.

Chaturthi Tamra

Sushruta mention the fourth layer of *Twak* as “*Tamra*”. It lies beneath the *Shweta* and having thickness of 1/8th of *Vreehi*. It is *adhishthana* for *Kushta* and *Kilasa*.^[27] *Charaka* mentioned fourth *Twak Stara* as *Dadru kushta adhishthana*. *Astanga Sangraha* and *Hrudaya* stated the fourth layer as *adhishthana* of *Sarva kushta*.^[28,29] *Sharangadhara* and *Bhavprakasha* stated *Tamra* as site for *Kilasa Shwitra*.^[34,35] *Ghanekar BG* stated that *Tamra* is located below the *Lohita* & it is Stratum Malpighi.^[33]

The *Chaturthi Sthara* we can take both stratum spinosum and stratum basale because below the *Shweta*(S. granulosum) is S. spinosum if we observe the *Kustha Roga Ashrita*(as etiopathogenesis *Kilasa* (leucoderma) is mentioned in *Tamra Stara*) in this layer then the S. basal is *Tamra*. Melanin pigment released by melanocytes which lies in S. basal layer determines the complexion of an individual. So the Acharya opines 5th layer as *Tamra* with is S. Malpighi & S. basal in contemporary science.

Panchami Vedina

Sushruta mention fifth *Twak Stara* as *Vedini*. As name suggests, it is concerned with the perception of touch, pain, heat, and cold. It is about 1/5th of *Vreehi* in thickness. It is *adhishthana* for *Kushta* and *Visarpa*.^[27]

Charaka & *Vagbhata* describes fifth *Twak* layer as *Adhishthana* for *Alaji* & *Vidradhi*.^[28,29] *Hemadri* state this *Twak Stara* as *Twagvedini* as well as *Rogkarini*.^[30] *Sharangdhara* and *Bhavprakasha* describe these *Twacha Stara* as site for *Sarvakushta* & *Visarpa*.^[34,35] *Ghanekar BG* state *Vedina* with Papillary layer of dermis as it lies beneath the *Tamra*.^[33]

This Layer is responsible for perception exteroceptive information, since it is incorporated with many extero-receptors such as meissner’s corpuscles, Pacinian corpuscle, Ruffinis corpuscles, free nerve ending etc. *Kushta* and *Visarpa* affecting this layer also produce in organization of papillary layer of dermis. So, the Acharya opinions this *Sthara* as *Vedina* which correspondence to Papillary layer of dermis.

Shasthi Rohini

Sushruta state sixth layer of *Twak* as *Rohini* which is equal to one *Vreehi* in thickness. It is *Adhishthana* for *Granthi*, *Apachi*, *Galaganda*, *Arbuda*, & *Shleepada*.^[27] *Charaka* mentioned these *Twak Stara* as *Arunshi adhishthana*. *Chakrapani* described that sudden injury to this layer leads to *Tamayati andha evaie* feeling of darkness in front of eye due to sudden loss of consciousness.^[28] *Acharya Vagbhata* state sixth *Twak Stara* as *Pranadhara*.^[30] *Indu* stated that any injury to this layer leads to life threatening condition *Tama Pravasha* i.e. feeling of blindness for short period, it is prime location of *Arunshi* i.e. small boils, blackish red in appearance commonly found in small joints and very difficult to treat.^[29] *Ghanekar BG* state *Rohini* with Reticular layer of dermis as it lies beneath the *Vedini*.^[33]

Rohini name suggest that is responsible for wound healing process i.e. *Vrana Ropana Karma*, this layer plays major role in formation of granulation tissue, fibrous tissue during the wound healing. Due to this Acharya opinions this *Twak Sthara* as *Rohini* corresponds to Reticular layer of dermis in contemporary science.

Saptami Mamsadhara

Acharya Sushruta mention seventh *Twak* layer as *Mamsadhara*. It is the thickest layer measuring about two *Vreehi*. It is the *adhishthana* for *Bhagandara*, *Vidradhi* & *Arsha*.^[27] *Sharangdhara* and *Bhavprakasha* describes seventh layer as *Sthula*, having thickness of two *Vreehi*, it is the site of *Vidradhi*. *Admala* mentioned *Sthula*, it is site for *Vidradhi*, *Bhagandara* & *Arsha*.^[34,14]

Ghanekar BG denies the inclusion of *Mamsadhara stara* under *Twak*. He agreed with six layers theory of *Charaka*.

Mamsadhara Twak explained by *Sushruta* can be correlated with subcutaneous i.e. hypodermis as it comprises of blood vessels, lymphatic and adipose tissue. It is the superficial fascia which envelopes the underlying muscle and does the *dharana* of the muscle so called *Mamsadhara*.

Table 3: Layers of Skin as per Ayurveda and possible modern correlation.

Layers	Twak Sthara	Sub division of layer of skin	Skin Layer
Prathama	Avabhasini	Stratum Corneum	Epidermis
Dwitiya	Lohita	Stratum Lucidum	
Tritiya	Shweta	Stratum Granulosum	
Chaturthi	Tamra	Malpighian layer	
Panchami	Vedini	Papillary layer	Dermis
Shasthi	Rohini	Reticular layer	
Saptami	Mamsadhara	Subcutaneous tissue and muscular layer	Hypodermis

Discussion on the Formation of Twak

Twak is the Updhatu of Mamsa.^[35] Sushruta described that after fertilization of Shukra, Shonita, Twacha developes just as Santanika forms in layers wise and gradually increases in thickness, in the similar way seven layers of the Twak are formed and deposited rapidly in the same manner as the layers of scum are formed and accumulates on the surface of the boiling milk.^[36] Vagbhata opinion that the Twak is formed from the Rakta. After the Paaka of Rakta by its Dhatwagni, it gets dried up to form the skin, like the deposition of scum on the surface of boiling milk.^[37]

Out of two layer of skin, the epidermis is a superficial epithelial tissue that is derived from surface ectoderm & dermis is a deeper layer composed of dense irregularly arranged connective tissue that is derived from mesenchyme. Skin structures vary from one part of the body to another. The embryonic skin at 4 to 5 weeks consists of a single layer of surface ectoderm overlying the mesoderm. During the first and second trimesters of pregnancy there is increment in epidermal thickness. The cells of surface ectoderm proliferate and form a layer of squamous epithelium, the periderm, & basal (germinate) layer. The cells of the periderm continually undergo keratinization and desquamation and are replaced by cells arising from the basal layer. Replacement of peridermal cells continues till 21st week; thereafter, the periderm disappears and the stratum corneum forms. Proliferation of cells in the stratum germinativum also forms epidermal ridges, which extend into the developing dermis. The transformation of the surface ectoderm into a multi-layered epidermis results in formation of different layer of epidermis. Skin is classified as thick or thin based on the thickness of the epidermis.^[38]

Melanoblasts are derived from neural crest & migrate in the stratum basale; Langerhans cells are derived from the bone marrow (mesoderm) and migrate into the epidermis. Merkel cells are of uncertain origin and is associated with free nerve ending.^[39]

The dermis mostly develops from mesenchyme which arises from the somatopleuric layer of lateral mesoderm plate; however some of it is derived from the dermatomes of the somites. By 11th weeks, the mesenchymal cells produce collagenous and elastic fibres. As the epidermal ridges form, the dermis projects into the epidermis, forming dermal ridges that

interdigitate with the epidermal ridges. Sensory nerve ending, tactile receptors and vascular element develops in the ridges.^[40,41]

The layer of skin derived gradually in layer wise during the intrauterine life of foetus. There develop two types of skins in foetus body; thick skin covers the palms and soles; it consist of 5 layers in epidermis, it lacks hair follicles, arrector muscles of hairs, and sebaceous glands, but it has sweat glands. Thin skin covers most of the rest of the body; it lacks the stratum lucidum layer in epidermis; it contains hair follicles, arrector muscles of hairs, sebaceous glands, and sweat glands.

Discussion on the measurement of layer of Twak

Dalhana describes the total thickness of Twak Stara as Angusta Udara Pramana which is equal to Shad Yava Pramana that is the thickness of six barley grains together.

The parameter for thickness is applicable for fleshy area not for bony area like Sukshma Anguli (little finger) and lalaata (forehead).The motive behind describing thickness of each Twak Stara is for performing various surgical interventions such as abdominal tapping should be done in Angusta Udara Pramana by Vrihimukha Yantra in Jaludhara.

Gananath Sen described two layers of Twak Stara; outer layer is named as Tanvi which gives rise to Plosha and Pidaka, when it gets burned. Inner layer is called as Sthula, it is thick and provides protection to the body. It is responsible for Snehaadi Karshanam which means responsible for metabolization of locally applied medicated taila, sneha etc.

The classical description regarding the Pramana of each Twak Sthara has lacuna of evidence so, it can be the subject for further study and should be matched with the contemporary descriptions.

CONCLUSION

On the basis of conceptual study, the seven layer of Twak Sthara namely; Avabhasini, Lohita, Sweta, Tamra, Vedina, Rohini, & Mamsadhara respectively can be correlated with the St. Cornium, St. Lucidum, St. Granulosum, St. Spinosum & St. Basale, Papillary layer of dermis, Reticular layer of Dermis and Hypodermis(superficial fascia) on the basis of slimily of their structure functional and applied aspect. Regarding

the formation of the *Twak* the all layer of the *Twak* does not appear at once rather they appear layer by layer during the intrauterine life of the fetus which is similar to the appearance of cream/scum in the boiling milk as mentioned by the *Acharyas*.

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