Comparison of Layers of Twak and Layers of Skin

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Abstract

'Twak' as per Ayurvedic science means which encloses the whole body. Joseph Listre said, 'Skin is best dressing'. Twak is updhatu of Mamsa which forms the outer covering of the body and protects the body from external factors such as heat & cold. It is an important organ of integumentary system which envelops underlying tissues & organs. Ayurveda mentions twak as sparshanaindriya and different layers of twak are mentioned by Acharyas. Understanding each layer is still unclear with reference to layers of skin mentioned by contemporary science. There is a need to understand the different layers of twak & skin, their structural, functional and developmental interpretation and to correlate between them.

Keywords: *Twak, Sparshanaindriya, Updhatu*

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Introduction

In Ayurveda, the term Twak refers to the skin, named so because it envelops the body. Acharya Sushruta explained the formation of Twak during fetal development. He compared it to the layer of scum (Santanika) that forms on boiling milk, which gradually thickens; similarly, seven layers of skin develop on the surface of the fetus.[1] During fetal formation (Garbha), the skin layers differentiate and are influenced by all three doshas, especially Pitta. Charaka described Twak as a Matruja Bhava (maternal factor), one of the six essential elements for fetal growth. On the other hand, Vagbhata suggested that Twak originates from Rakta (blood) through the action of Rakta Dhatu Agni, drying and forming the skin much like cream deposits on boiling milk. Charaka mentioned six layers of Twak, with only the first two layers specifically named: Udakadhara and Asrugdhara.[2]

Acharya Sushruta detailed seven layers of Twak, describing their thickness and the conditions that affect each layer.[3] Vagbhata also mentioned seven layers similar to Sushruta but did not provide detailed descriptions; commentators Arunadatta and Hemadri followed Sushruta's classification.[4] Sharangadhara described seven layers as well, aligning the first six with Sushruta's layers and adding a seventh layer called Sthula, identified as the site of Vidradhi (abscess).[5] There are differing opinions regarding the exact number of skin layers in Ayurveda. The layers of twak explained by different Acharyas have been tabulated (Table 1).

Table 1: Layer of Twak as per different Acharyas

Layers	Charaka[6]	Sushruta [7]	Vagbhata [8]	Arunadatta [8]	Sharangadhara [9]	Bhavaprakash a [10]
Prathama	Udhakadhara	Avabhasini	1st	Bhasini	Avabhasini	Avabhasini
Dwitiya	Asrugdhara	Lohita	2nd	Lohita	Lohita	Lohita
Tritiya	Sidhma, Kilasasambhava adhistana	Shwetha	3rd	Shwetha	Shwetha	Shwetha
Chaturtha	Alaji, Vidradhisambhav aadhistana	Tamra	4th	Tamra	Tamra	Tamra
Panchami	Dadru, Kushtasambhava adhistana	Vedini	5th	Vedini	Vedini	Vedini
Shashthi	If this layer is injuired, leads to Andhatwa and Tama pravesha	Rohini	6th	Rohini	Rohini	Rohini
Sapthami		Mamsadhara	7th	Mamsadhara	Sthula	Sthula

The skin is the body's largest organ, covering an area of about 20 square feet and weighing between 4.5 to 5 kilograms, making up roughly 7% of total body weight. Known as the "First Line of Defence," the skin protects against microbes and other harmful external agents. It is part of the integumentary system, which helps maintain homeostasis by shielding the body and regulating body temperature. Additionally, the skin allows us to perceive various external sensations, including pleasure and pain. The skin and its structures originate entirely from the ectoderm and mesoderm layers of the embryo. It consists of three main layers: the outer Epidermis, the Dermis, and the Hypodermis,[6,7] as outlined in Table 2.

Discussion

Acharyas such as Sushruta, Vagbhata, Bhavprakasha, and Sharangadhara described seven layers of Twak. In contrast, Charaka, Bhela, and Astanga Sangraha referred to six layers. These differences in opinion stem from the distinct perspectives of surgeons and physicians.[8,9]

Prathama Avabhasini: Acharya Sushruta referred to the outermost layer of the skin (Twak) as Avabhasini, describing its thickness as 18/20th of a unit called Vreehi. This layer is associated with diseases like Sidhma and Padmakantaka. Dalhana noted that this layer influences skin color variations such as Gaura (paleness) and Shyamadhi (darkness), as well as five types of skin radiance (Prabha) and shading (Chaya), through the action of Bhrajaka Pitta. Meanwhile, Acharya Charaka and Vriddha Vagbhatta named this outermost layer Udakadhara, meaning it holds the skin's moisture (Udakadhatu) and prevents its loss, maintaining surface hydration. Vagbhatta also called this layer Bhasini, aligning with Charaka and the Astanga Sangraha. Since layers above Malpighi are opaque, the skin's visible complexion is mainly due to the Stratum corneum, which corresponds to Avabhasini. This layer consists of flattened, scale-like keratinized cells that provide resistance to water loss, hence Charaka's term Udakadhara.[10]

Table 2: Layers of Skin and thickness

Layer of Skin	Sub-layers	Thickness
Epidermis	Stratum corneum	10-30mm
Thin skin –4 layers, 0.1mm	Stratum lucidum	100 mm
Thick skin – 5 layers 1-2mm	Stratum granulosum	100mm
	Stratum spinosum & S. basale	100mm
Dermis	Papillary layer	100 mm
	Reticular layer	

Dwitiya Lohita: The second layer, according to Sushruta, is called Lohita, with a thickness of 16/20th of Vreehi, and is the site of marks such as Tilakalaka, Nyaccha, and Vyanga. Charaka and Vriddha Vagbhatta referred to it as Asrugdhara, meaning the layer that holds blood and prevents its leakage. Hemadiri named it Lohini. This corresponds to the Stratum lucidum, a translucent layer with evenly distributed cells that lack clear boundaries, giving it a clear appearance. Changes in blood components like hemoglobin and bilirubin affect the skin's pallor or jaundice visible through this layer, justifying its association with blood by the Acharyas.[10,11]

Tritiya Shweta: Sushruta called the third layer Shweta, about 12/20th of Vreehi in thickness, which serves as the base for skin conditions like Charmadala, Ajagalika, and Mashaka. Charaka and Vriddha Vagbhatta described it as the site of Sidhma and Kilasa, while Astanga Hrudaya identified it as the site of Sidhma and Shwitra. In modern terms, this matches the Stratum granulosum, which consists of 2-5 layers of flattened cells filled with keratohyaline granules that bind keratin filaments.[12]

Chaturthi Tamra: Sushruta identified the fourth layer as Tamra, lying below Shweta, with a thickness of 8/20th of Vreehi, and associated with diseases like Kusta and Kilasa. Charaka described it as the site of Dadrukushta, and Astanga Sangraha and Hrudaya labeled it the location for Sarvakushta. Sharangadhara and Bhavaprakasha linked Tamra to Kilasakushta. This layer likely includes both Stratum spinosum and Stratum basale, as melanocytes residing here release melanin, which determines skin color.[13,14]

Panchami Vedini: The fifth layer, Vedini, according to Sushruta, is about 5/20th of Vreehi thick and is involved in sensing touch, pain, heat, and cold. It is also linked with diseases such as Kusta and Visarpa. Charaka and Vagbhata identified it as the site of Alaji and Vidradhi, while Hemadiri called it Twagvedini and Rogakarini. Sharangadhara and Bhavaprakasha associated it with Sarvakushta and Visarpa. This layer corresponds to the papillary dermis, rich in sensory receptors such as Meissner's corpuscles and free nerve endings, and its involvement in skin disorders affects the papillary layer's structure.[10,15]

Shasthi Rohini: The sixth layer, Rohini, is described by Sushruta as one Vreehi thick and is linked with conditions like Granthi, Apachi, Galaganda, Arbuda, and Shleepada. Charaka termed it the site of Arumshi, and Chakrapani noted that injuries to this layer could cause temporary blindness or loss of consciousness sensations. Vagbhata called it Pranadhara, with injuries here being life-threatening. This layer plays a vital role in wound healing (Vrana Ropana) by aiding the formation of granulation and fibrous tissue. It corresponds to the reticular layer of the dermis.[16]

Saptami Mamsadhara: The seventh and thickest layer, Mamsadhara, measures about 2 Vreehi and is the site of diseases like Bhagandhara, Vidradhi, and Arsas. Sharangadhara and Bhavaprakasha refer to it as Sthula, highlighting its role as the location of Vidradhi. This layer can be correlated with the hypodermis, containing blood vessels, lymphatics, and fat tissue. It acts as the superficial fascia, enveloping muscles and supporting them, hence the name Mamsadhara.[14]

Formation of Twak: Twak is considered the Upadhatu (secondary tissue) of Mamsa (muscle). Sushruta explained that after fertilization of Shukra and Shonita (sperm and ovum), the skin develops similarly to the formation of scum (Santanika) on boiling milk, accumulating layer by layer to form the seven layers of skin. Vagbhata believed Twak originates from Rakta (blood), which, after being processed by the

body's metabolic fire (Dhatwagni), dries up to form the skin, analogous to scum forming on boiling milk.[12,15]

The skin consists of two main layers: the epidermis (superficial epithelial tissue from surface ectoderm) and the dermis (deeper connective tissue from mesenchyme). Skin structures vary by body area. At 4-5 weeks of embryonic development, the skin starts as a single layer of surface ectoderm over the mesoderm. During the first and second trimesters, the epidermis thickens as ectodermal cells proliferate, forming layers including the periderm and basal layer. The periderm cells keratinize and shed until about the 21st week, when the Stratum corneum appears. Epidermal ridges form from proliferating basal cells, extending into the dermis. The multi-layered epidermis results from this transformation, and skin is classified as thick or thin based on epidermal thickness.[15]

Melanoblasts (pigment-producing cells) originate from the neural crest and migrate to the Stratum basale. Langerhans cells come from bone marrow and migrate into the epidermis. Merkel cells, of uncertain origin, associate with nerve endings.[16]

The dermis mainly develops from mesenchyme derived from the somatopleuric lateral mesoderm and dermatomes of somites. By week 11, mesenchymal cells produce collagen and elastic fibers. As epidermal ridges form, the dermis projects upward to form dermal ridges, interlocking with epidermal ridges. Sensory nerve endings, tactile receptors, and blood vessels develop within these ridges.[17]

During fetal development, the skin forms gradually in distinct layers. Two types of skin develop on the fetus's body: thick skin, which covers the palms and soles, consists of five epidermal layers, lacks hair follicles, arrector pili muscles, and sebaceous glands, but contains sweat glands; and thin skin, which covers most other areas, lacks the Stratum lucidum layer in the epidermis, and includes hair follicles, arrector pili muscles, sebaceous glands, and sweat glands.

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

Layers	Twak layer	Subdivision 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	Hypo-dermis

Measurement of Twak Layers:

Dalhana described the total thickness of the skin (Twak) as equivalent to the combined thickness of six barley grains (Shad Yava Pramana), roughly the size of a thumb or a fist. This measurement applies mainly to fleshy areas and not to bony regions such as the forehead or fingertips. The reason for specifying the thickness of each skin layer is to aid in surgical procedures—for example, abdominal tapping should be performed within this thickness using instruments like the Vrihimukha Yantra in Jaludhara. While the classical measurements add up to six barley grains in thickness, aligning these with modern scientific measurements proves challenging. Similarly, correlating diseases that affect specific skin layers with modern anatomy remains complex and requires further research.[18]

Conclusion

Based on comparative analysis, the seven layers of Twak described in Ayurveda—Avabhasini, Lohita, Sweta, Tamra, Vedini,

Rohini, and Mamsadhara—can be correlated respectively with the Stratum corneum, Stratum lucidum, Stratum granulosum, Stratum malpighianum, papillary dermis, reticular dermis, and hypodermis. These correlations are drawn considering similarities in their structure, function, and clinical significance. Regarding skin formation, all layers do not develop simultaneously; rather, they form gradually during fetal development, akin to the way cream layers accumulate on boiling milk, as described by the ancient Acharyas.

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