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Analytical Study of the Skin in Ayurveda

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Abstract: ***Human skin is the outer covering of the body and the largest internal organ. Skin diseases are not life-threatening, but scars weaken a person's self-confidence. That is why the incidence has increased general practitioner dermatology cases. But to treat the disease, it is extremely important to get the right information about the affected organ.***
This review article covers the concept of skin or Twacha in Ayurveda including its Nirukti (Etymology), Sharir Rachana (Anatomy), Sharir Kriya (Physiology), Vikriti (Pathology) described by various Acharyas along with contemporary insights on important topics.
Apart from this unique concept of Ayurvedic Varno, Chhaya and Prabha and Twaksara are also mentioned. Thus, one of the important karmas of Twak is to act as a strong physical barrier against microbial invasion and protect the body against mechanical, thermal, chemical, osmotic and light damage.
Keywords: Twacha, Twaksara, Skin, Sapta Twacha, Integuments, Twak Utpatti, etc.

I. INTRODUCTION

Skin is the largest internal organ system In recent years, skin diseases have increased the importance and attention of medicine and the public. The general impression is that 10-20% of patients who visit a doctor have some kind of skin disease. Skin diseases cause a lot of pain, suffering, disability and financial loss.
Therefore, to prevent this disease, it is first necessary to understand the basic structure of the skin, the normal physiology. The skin is the largest internal organ system.
It has an area of 1.8 square meters and acts as a protective barrier against internal tissue exposure, trauma, ultraviolet radiation, extreme temperatures, toxins, etc. In *Ayurveda,* the skin is called *Twacha, Twak* or *Charm*. Ayurveda offers a unique concept of *Twacha* which is discussed below.

A. Twacha Nir'ukti (Etymology)

In *Ayurveda the* word is "*Tvacha*" or "*Charma"*. used on the skin. *Twacha* is a derivative of "*Twach-Samvarne*" which means body *dhatu* covering *Twacha (skin*) formation or embryo formation .

B. According to Charka

Shukra, Shonita and after conjugation *Garbha* enters the existence of *Jeeva Garbhasaya* . In the third month all the *indriyas* are formed and the skin is *Indriya* is formed in the third month itself.

C. According to Sushruta

This is followed by the development of *Shukra* and *Shonita Twacha* impregnation. Development of *Twacha* causes *Tridosha,* especially *Pitta*. The formation and development of *Twacha* is similar to the formation of *Santanika* (choir).
the milk is boiled. Just like *Santanika* builds layers and gradually adds thickness; this is how all the layers are formed during the development phase of the embryo and connect with each other to form the skin on the outer surface of the fully developed baby.

D. According to Vagbhata

Twacha is formed due to *Rakta dhatu Paaka* in the stomach of *Dhatwagni*, after *Paka* it dries up from *Twacha*, also due to crust (*Santanika*) on the surface of boiled milk. *Sharira Rachana Twacha Acharya of Charaka* said that *Twacha* is *Upadhatu.*
Mamsa dhatu and *Sparshendriya Twacha* covers the whole body and protects the body from various physical and chemical stimuli around. *Acharya Charaka* says that all organs are variations of *Panchmahabhoota.* Thus *Rachana* and *Kriya* of the organs are arranged according to the constitution of *Paanchbhautika*.

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E. Analysis of the Mahabhuta

Mahabhuta	Analysis
1). Prithvi	Tvacha has been considered as the Upadhatu of Mamsa Dhatu that shows it is stable which is an innate quality of Prithvi
2). Jala	Due to the presence of Jala Mahabhuta, Tvacha is Snigdha
3). Agni	Tvacha has the specific Varna and Prabha (lustre)
4). Vayu	Tvacha is the Adhisthana of Sparshanendirya
5) .Akasha	Presence of some micro channels of Sweda forming organs

F. Layers of Twacha according to different Acharyas

1) *Charak* described six layers of *Twacha*. But he named only two, the other four are described diseases But he also mentioned two main layers of *Twacha*.
2) *Sushruta* described seven layers of skin and specialty. He also mentioned the thickness of each layer and the disease associated with it.
3) *Sarangadhar* also mentioned seven layers of skin. *Acharya Gangadhara* explained the difference between *Charaka* and *Sushruta* by saying that the third layer *Charaka* consists of two layers - superficial and deep, which should be the 3rd and 4th layers. *Vagbhatta* also classified *Twaka* as seven in *Ashtanga Hridaya*.

G. Relationships with Tridosha

Touch (Sparsh) and circulation are associated with *Vyan Vayu*. *Bhrajak Pitta* is associated with giving brightness and color. Excess *Vayu* is represented by darkness, excess *Pitta* by yellowness, while excess *Kapha* represents the white association of the skin with trim. Sweat (Sweda) is secreted by the skin between the trimals, which helps maintain body temperature.
correlation of layers of *Twacha* and layer of skin:

Layers of skin according to *Sushruta*	Thickness (*Vrihi)*	Modern layers of skin		Pathology (disease)
1. Avabhasini	1/18	Stratum corneum	Epidermis	*Sidhma, Padmakantaka*
2. Lohita	1/16	Stratum lucidum		*Tilkalak, Nyaccha, Vyanga*
3. Shweta	1/12	Stratum granulosum		*Charmadala, Ajagallika, Mashaka*
4. Tamra	1/8	Malpighian layer	Dermis	*Kilasa, Kushtha*
5. Vedini	1/5	Papillary layer		*Kushtha, Visarpa*
6. Rohini	1	Reticular layer		*Granthi, Apachi, Arbuda, Slipad, Galaganda*
7.Mamsadhara	2	Sub cutaneous tissue		*Bhagandara, Vidradhi, Arsha*

H. 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.

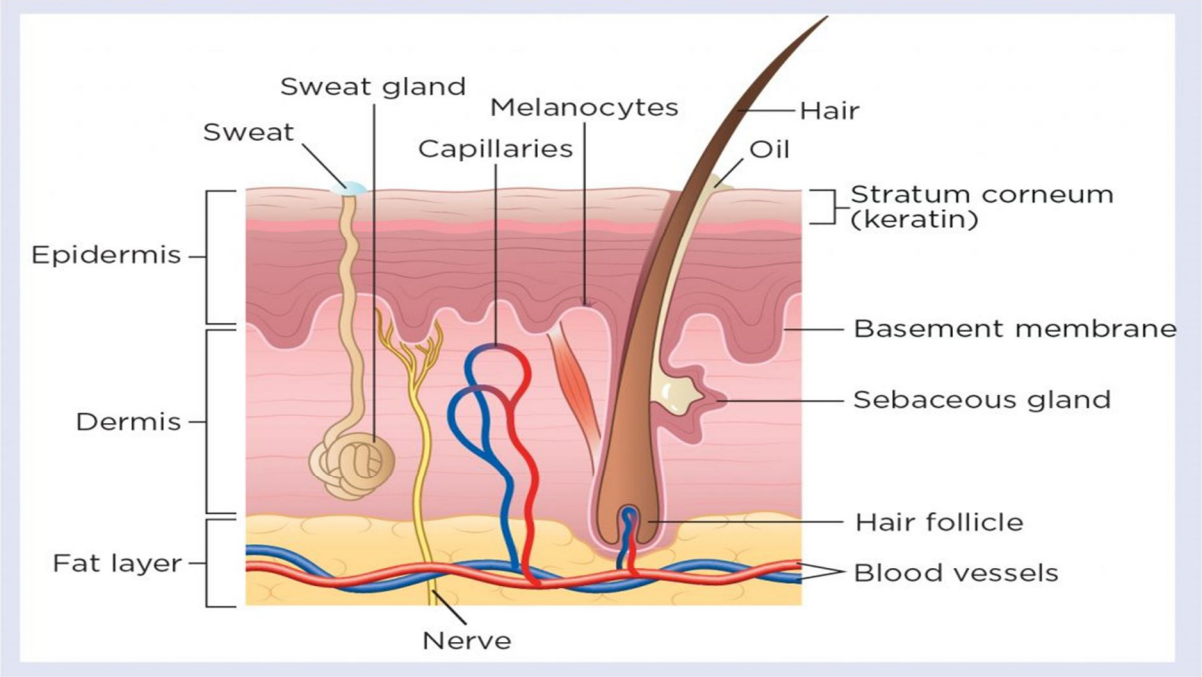
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II. EPIDERMIS

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.



III. 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.

A. 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 sometosensory 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.

B. 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.

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C. Touch Pathway

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 st order neuron to 2 nd order neuron and from 2nd to 3 rd order neuron (Medial Lemniscal Pathway). From here it gives information to Ventro posterolateral 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).

IV. 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 coppe 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.

Mamsadhara 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/ *sparsh* are perceived. For perception, manas is also an important factor other than *indriya* and *indriyarth*, 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.

V. CONCLUSION

Descriptions of *Twak* in classical and modern texts are remarkably similar in terms of numbers, layers, etc. There is still a much wider area to cover. According to *Acharya Sushruta*, the skin has seven layers, which are the same as in modern science (5 layers of epidermis and 2 layers of dermis). The layers of *Twak* described by *Acharya Sushruta* and their names correspond to the layers of the skin anatomically and physiologically. The causal factors of *indriya panchapanchak* and *pratyaksha gyan* can be used as a tool to understand the physiology of *Gyan graha prakriya* of any sense organ. Based on the conceptual study, *Twak Sthara* has seven floors namely; *Avabhasini, Lohita, Sweta, Tamra, Vedina, Rohini and Mamsadhara* can be correlated with St. Cornium, St. Lucidum, St. Granulosum, St. Spinosum and St. Basal, with the papillary layer of the dermis, with the reticular layer of the dermis and, respectively. A functional and applied perspective on the hypodermis (superficial fascia) based on mucus in its structure. Regarding the formation of *Twak*, all the layers of *Twak* do not appear at once, but appear layer by layer during the intrauterine life of the fetus, similar to the appearance of cream/foam in boiling milk, as mentioned by the *Acharyas*.

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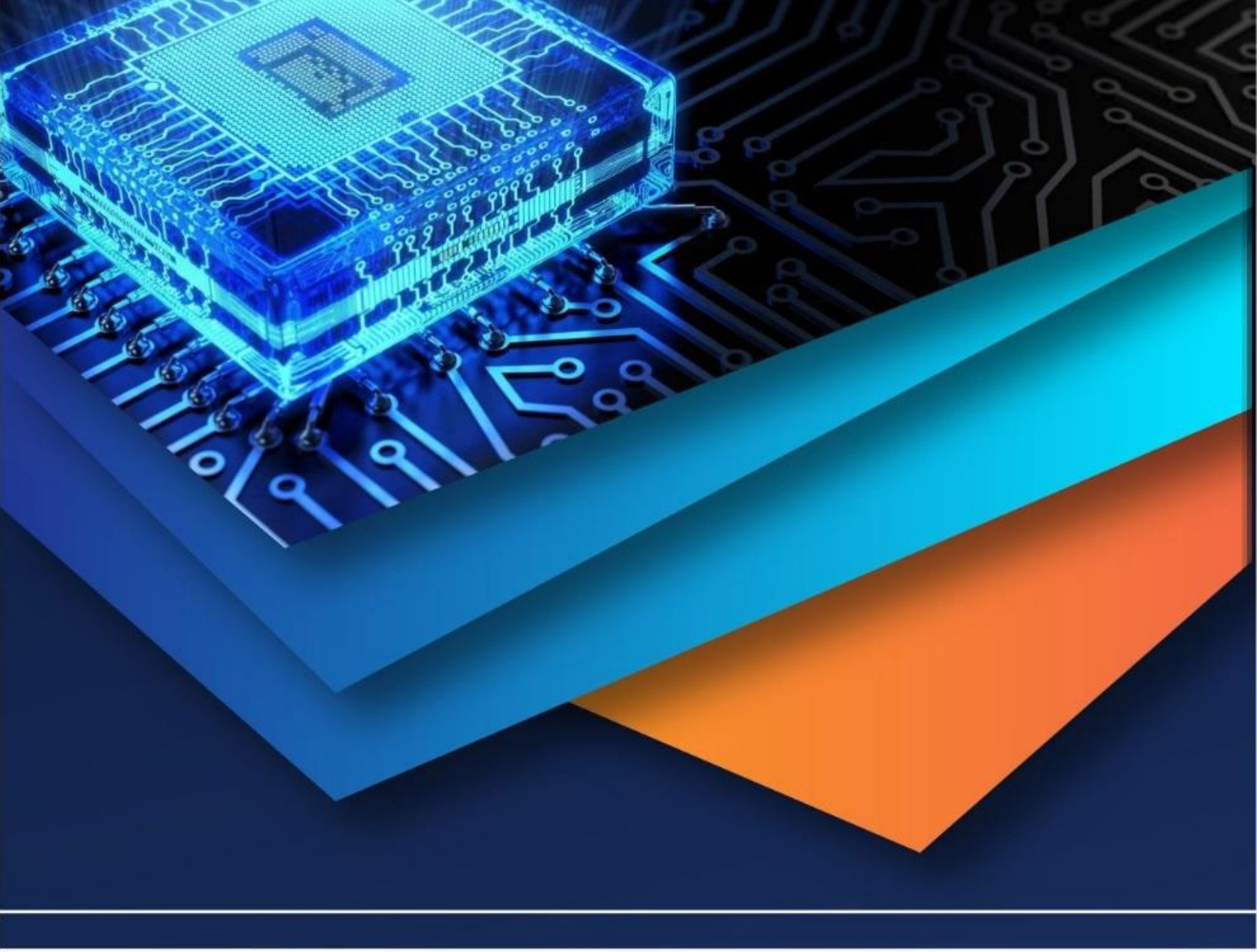
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