



A review article on anatomy of skin in Ayurveda

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Abstract

Skin is the largest organ in the body, constituting 15-20% of total body mass. Ayurveda uses the terms Twacha and Charma for skin. Explanations of formation, structure, layers and different types of diseases affecting the skin are explained in ayurvedic literature. The word Twacha is derived from the root "twak – samavarane" "is twak is one which covers or covering of the body. It is one of the matrujabhava (maternal factor).

Twacha (skin) develops soon after fertilization at the outer surface of the developing embryo as a result of the metabolic activities within it. It is formed on the outer surface of the body just like how cream is formed on the outer surface of the boiling milk.

Acharya Sushruta explains seven layers of skin but Acharya Charaka explain six layers of skin. The nature of the skin as highly variable according to the dosa predominance and the prakriti of an individual. The chayya and prabha (lustre and the radiance) are expressed through Twacha. Examination skin is an important step in examination of the patient. Twacha is the sensory organ for touch. Twacha is also seat for many diseases.

In this work the concept of twacha and its layers according to Acharya sushruta is studied and compared with the modern anatomy of skin.

Keywords: anatomy, Ayurveda, skin, body

Introduction

According to Ayurveda skin is an important component of body. It does the avarana or covering of body surface. Skin reflects the healthy and unhealthy status of the body. It is one of the sense organ where sparshana (touch) is perceived. It is the seat of vata and pitha dosha. The swda (sweat) is eliminated through skin.

Formation of skin

According to acharya Susruta the skin with seven layers are formed during the foetal development. During the process of growth and development of the conceptus by the metabolic activities taking place within it the seven layers of skin will be formed just like how cream is formed on the surface of boiling milk.

According to acharya vagbhata skin is formed from the blood (asruk). The blood undergoes metabolic activities and form seven layers of skin.

The formation of skin is influenced by doshas, according to the predominant dosha the complexion of skin varies.

Formation of skin is influenced by various other factors as well. The pachamahabhoothas (The five constitutional elements) have great influence on formation of skin. The prithvi (earth) mahabootha provide compactness and apa (water element) provide unctuousness. The Agni (Fire element) imparts colour and complexion. The pores and channels in the skin are formed by Akasha. Twacha or skin is matrujabhava

Layers of skin

Acharya Susrutha and Charaka are given beautiful description for skin. Acharya Susrutha has identified seven layers of skin but according to Charaka skin has only six layers.

According to Acharya Susrutha skin consists of seven layers

The first of layer is Avabhasini. It reflects and shines all the colours and glows (five types). Its thickness is one eighteenth of vrihi and it is the seat for the diseases – sidhma, padma and kantaka. The second layer is Lohita. Its thickness is one sixteenth of vrihi and it is the seat for the diseases like – tilakalaka, nyaccha and vyanga. The third layer is Shweta. Its thickness is one twelfth of the vrihi and it is the seat for the diseases like – charmadala, ajagallika and mashaka. The fourth layer is Tamra. Its thickness is one eighth of the vrihi and it is the seat for the diseases like – various types of kilasa and kushtha. The fifth layer is Vedini. Its thickness is one fifth of the vrihi. It is the seat for kushta and visarpa. The sixth is Rohini. Its thickness is one vrihi. It is the seat for the diseases like – granthi, apachi, arbuda, shlipada and galaganda. The seventh layer is Mamsadhara. Its thickness is two vrihi. It is the seat for the diseases like – bhagandara, vidradhi and arshas.

The thicknesses of the layers of the skin as mentioned are usually related to the skin over the muscular parts of the body, but not the skin over the lalata (fore head) or over the small fingers. In the udara (abdomen), incision is indicated as thick of thumb width; this denotes the more thickness of skin of abdomen.

According to Charaka's classification, Twacha have six layers. The first layer is Udakadhara – This forms the outermost layer. Asrigdhara is immediately deeper to udakadhara. The Third layer is seat for the sidhma, kilasa diseases. The Fourth layer is the seat for dadru, kushtha diseases. The Fifth layer is the seat for vidradhi. Sixth layer – This layer, if cut, person feels darkness before eyes like blind. This layer is the seat for the disease aroomshi (boils) – which are blackish red, deep & widely rooted into the joints and difficult to treat. All these six layers of the skin cover the entire body of six parts (angas).

Skin

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. It is the largest organ constituting 15-20% of total body mass. It is continuous with the mucous membrane at the orifices of the body. Because of a large number of its functions, the skin is regarded as an important organ of the body.

The thickness of the skin varies from about 0.5 to 3 mm.

The skin consists of two layers. A superficial layer, the epidermis, is made up of stratified squamous epithelium. A deeper layer, the dermis, is made up of connective tissue. The dermis rests on subcutaneous tissue (subcutis). This is sometimes described as a third layer of skin.

Epidermis

The epidermis is derived from ectoderm and composed of stratified squamous keratinized epithelium.

Layers of Epidermis

It is made up of five layers from within outward:

1. Stratum basale
2. Stratum spinosum

3. Stratum granulosum

4. Stratum lucidum

5. Stratum corneum.

Stratum basale/stratum germinativum

It is the deepest or basal layer of epidermis. It is made up of a single layer of cuboidal to columnar cells with basophilic cytoplasm and large nucleus that rests on a basal lamina. It contains stem cells that undergo mitosis and are responsible for the renewal of epidermal cells, Human epidermis is renewed about every 15-30 days depending on the region and age. The basal layer is therefore called the germinal layer.

Stratum spinosum

Above the basal layer, there are several layers of polygonal keratinocytes that constitute the stratum spinosum (or malpighian layer). The cells of this layer are attached to one another by numerous desmosomes. During routine preparation of tissue for sectioning the cells retract from each other except at the desmosomes. As a result the cells appear to have a number of "spines." Hence, this layer is called the stratum spinosum, and the keratinocytes of this layer are also called prickle cells.

Some mitoses may be seen in the deeper cells of the stratum spinosum, hence is included with the basal cell layer as the germinative zone of the epidermis.

Stratum granulosum

Above the stratum spinosum, there are one to five layers of flattened cells that are characterized by the presence of deeply staining granules in their cytoplasm called as keratohyalin granules. The granules in them consist of a protein called keratohyalin (precursor of keratin). The nuclei of cells in this layer are condensed and dark staining (pyknotic).

Stratum lucidum

Superficial to the stratum granulosum, there is the stratum lucidum (lucid = clear). This layer is so called because it appears Homogeneous, the cell boundaries being extremely indistinct. Traces of flattened nuclei are seen in some cells.

Stratum corneum

It is the most superficial layer of the epidermis. It is acellular. It is made up of flattened scale-like elements (squames)/dead cells containing keratin filaments embedded in protein. The squames are held together by a glue-like material which contains lipids and carbohydrates. The presence of lipid makes this layer highly resistant to permeation by water.

The thickness of the stratum corneum is greatest where the skin is exposed to maximal friction, e.g. on the palm and sole.

Dermis

The dermis is made up of irregular collagenous dense connective tissue. It is derived from mesoderm and divided into two layers.

1. Papillary layer: The papillary layer forms the superficial layers of dermis and includes the dense connective tissue of the dermal papillae. These papillae are best developed in the thick skin of the palms and soles. Each papilla contains a capillary loop. Some papillae contain tactile corpuscles.
2. Reticular layer: The reticular layer of the dermis is the deep layer of dermis and consists mainly of thick bundles of type I collagen fibers. It also contains considerable

numbers of elastic fibers. Intervals between the fiber bundles are usually occupied by adipose tissue. The dermis rests on the superficial fascia through which it is attached to deeper structures. It contains epidermally derived structures, such as sweat glands, hair follicles, and sebaceous glands.

Discussion

In ayurvedic literature we have two concept for structure of skin in the view Acharya Susrutha skin has seven layers and he has named each one of these layers. The names of the layers possibly suggest morphological appearance eg. Its colour – swetha the white colour or thamra the copper colour etc. Achary also describes the thickness of each layer. This could be the possible layers of skin which we can observe by our naked eyes by doing dissection in finer way as explained by susrutha. And he while explaining dissection also he specified to observe and understand human body starting from skin or twak. Acharya charaka classified the layers of skin merely on the basis on skin conditions manifesting in it and he just numbered them.

Modern anatomy has given an elaborate description of the structure of the skin. The detail classification and division of skin in to different layers are given. We can briefly compare the layers as follows:

Table 1

Avabhasini	Stratum Corneum
Lohitha	Stratum Lucidum
Swetha	Stratum Granulosum
Tamra	Malpighian layer
Vedini	papillary layer
Rohini	Reticular layer
Mamsadhara	subcutaneous tissue

Conclusion

Dermatology has given great importance and a detailed narration of skin elements are given in ayurvedic treatises. Ayurveda explain skin diseases under the heading Kushta mainly, which is considered under mahagada or major diseases. There are scattered references of examination of skin in the diagnosis of disease as well. Acharaya susrutha in the fourth chapter of shareera stana explained the formation and layers of skin first and then the rest of the organogenesis is explained. Acharya also explained that the layers explained are specially confined to the fleshy areas in the body not otherwise. He has also mentioned the thickness of the skin as it is practically important while putting incisions. Susrutha being the first person to perform cadaver dissection and beautifully narrated the human anatomy, further cadaver studies are required to identify the layers explained by him. Present sophisticated technologies are to be utilised to identify the seven layers of skin and their role in mentioned disease manifestation.

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