

COMPARATIVE STUDY OF FUNCTION OF SKIN

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**ABSTRACT**

In Ayurvedic compendia, the *Twacha* is explained as *Updhatu* of *Mamsa Dhatu*. We go through all aspect regarding *Twacha* in Ayurveda & try to correlate the concept of *Twacha* with modern concept of skin.

In Ayurvedic compendia a skin is called as "*Twacha*". Its reference comes as *Updhatu* of *Mamsadhatu*. The Ayurvedic point of view regarding *Twacha*, includes *Nirukti*, *Synonyms*, *Formation*, *Layers*, *Updhatu*, *Moolastathna* and *Functional Aspect*. *Nirukti* of *Twack* means the substance which act as cover. Synonyms for *Twak* are *Charma*, *Valka* etc. According to *Sushrut Samhita* *Twak* is formed during fetal life in growing embryo just like layers of cream forms on boiling milk. The skin is often classified as the largest organ of the body and it is one that all surgeons will operate on or through. It is therefore vital that the students understand the layers of the skin and the structures that are found within these layers. The skin can be injured in a number of situations including burns and various diseases. It is important to understand how these injuries can affect the physiological function of the skin. The present article deals with comparative study of functions of skin as per modern health science and Ayurvedic textual references.

Keywords: *Twacha*, *Updhatu*, *Mamsa Dhatu*, *Sparshanendriya*, *twak*.

INTRODUCTION

The exact meaning of word is called 'Nirukti'. In *Amarkosh* the *Nirukti* of *Twack* means the substance which act as cover or closing up or hiding the things or concealment of the things, as we see the skin covers whole body externally. Synonyms for *Twack* are *Charma, Valka, Valkal' Sparshni, Chedini*. These synonyms are given on the basis of various functions of *Twack* for e.g. *Sparshni* as it is site of *Sparshanendriya*. According to *Sushrut Samhita* there are layers of cream on boiling milk in that same way the skin is formed first during fetal life in growing embryo. There is difference of opinion regarding the no. of *Twak* layers. *Sushrut* has explained total 7 layers where as *Charak* has explained 6 layers of *Twak* & the layers are basically related with diseases of *Twak*. In both Compendia's they explained the various diseases in each layer of *Twak*. In addition to diseases *Sushrut* has explained the width of each layer in unit of '*Brihi*'. In these slides we see the various diseases of *Twak*. In modern science of medicine, the skin is explained as 'Integumentary system'. Integument means the external covering of body. It is a large organ if about 2 square meters & weight 4.5 – 5 kg, about 16% of total body weight. It includes all structures related to skin. It consists of two parts. The superficial thinner portion, which is composed of epithelial tissue, is the Epidermis. The deeper, thicker connective tissue portion is the Dermis. Deep to the dermis, but not part of skin is subcutaneous layer which is also called as 'Hypodermis', this attaches to the underlying fascia which is the connective tissue around muscle & bone. The hypodermis layer serves as a storage depot for fat & contain large on. Of blood vassals that supply the skin.

The epidermis contains 4 principal types of cells.

1. Keratinocytes – hornlike cells arranged in 4 or 5 layers & produce the keratin protein which protects the skin & underlying tissues from heat, microbes & chemicals.
2. Melanocytes – develop from the ectoderm of developing embryo & produce the pigment melanin which protects damage from UV rays
3. Langerhans – arise from red bone marrow & migrate to the epidermis. They participate in immune

response against5 microbe & and are easily damaged by UV rays.

4. Markel cells – they located deepest in the layer of epidermis, where they contact the flattened process of a sensory neuron called Markel disc & they detect touch sensation. Epidermis is composed of 4 to 5 layers of skin. In most of region it is 4 layers thick & in the areas like palms, sole where there is more friction it is 5 layers thick.
5. Stratum basale - it is the deepest layer. It contains keratinocytes & stem cells that will undergo cell division to produce new cells.
6. Stratum spinosum - it is superficial to basale. It is 8 to 10 layer thick & provides both strength & flexibility to skin. It also contains Langerhans & melanocytes cells.
7. Stratum granulosum - it is about middle of epidermis. Consist of 3 to 5 layers of flattened keratinocytes that undergo apoptosis. It contains lamellar granules, which release a lipid rich secretion. This secretion acts as water repellent sealant, retarding loss & entry of water & foreign materials.
8. Stratum Lucidum - it presents in thick areas of skin like palms, soles. It consists of dead keratinocytes & thickened plasma membrane.
9. Stratum Corneum - consist of 25 to 30 layers of dead keratinocytes, which shed & replaced continuously from deeper strata. Its multiple layers of dead cells also help to protect deeper layers from injury & microbial invasion.

Dermis – it is deeper part of skin. It contains collagen & elastic fibres, fibroblasts, some macrophages, blood vessels, nerves, glands & hair follicles. The dermis can be divided in to 2 layers. **Papillary Region**. It consists of areolar connective tissue with thin collagen & fine elastic fibbers, contains dermal ridges that house capillaries, Meissner corpuscles, & free nerve endings.

Reticular Region – consist of dense irregular connective tissue with bundles of thick collagen & some coarse elastic fibres. A Space between fibbers contains some adipose cells, hair follicles, nerves, sebaceous glands & sudoriferous glands. From above all information we can compare the layers of skin like. The

Udaka Dhara that holds water can be compare with epidermis as there is a functional similarity between both. The second layer i.e. *Asrigdhara* which holds blood can be compare dermis again there is a functional similarity between both. Now we see the functions of *Twacha* & comparative function of skin.

DISCUSSION

Twak- Sparshendriya & Cutaneous sensations- *Twacha* is one of *Jnyanendriya* called as '*Sparshanendriya*'. The sense organ that perceives touch. The two *Sparshavaha Dhamanis* and their branches are spread in the skin to conduct touch from skin to mind. *Sparshanendriya* occupies mind also & hence mind can experience favourable, unfavourable conditions (*Sukha, Dukha*). Due to conduction of *Sparshanendriya*, subtle (*Sukshama*) mind can occupy whole body. This similar function of skin is stated as cutaneous sensation including tactile, thermal & other sensations like pain etc. *Ushama Niyaman* & Thermoregulation of skin- As *Twak* is site for *Sweda* (sweat) excretion, which is one of three malas. *Kleda Viddriti* or holding some moisture in the skin is the function of *Sweda*. *Sweda* is also site for *Pitta* & hence one of function of *Sweda* is to controls hotness of *Pitta* by alternating sweat formation. Muscle activity contributes to 80% heat production in body that heat produced is regulated by *Twak*. Similar function of thermoregulation is appearing in the skin in two ways.

a) By liberating sweat at its surface- High temp. or heat produced increases sweat production, which helps to lower body temp. When temp. is low sweating is decreased, which help to conserve heat.

b) By adjusting the blood flow in the dermis. - In response to high temp. or heat production, the blood vessel in dermis dilate, which increases more heat loss from body. When temp. is low blood vessels in dermis constrict, which reduces heat loss from body. Blood Reservoir - *Dhamnis Moola Sthana* – In *Sushrut Samhita Dhamins* are also explained as *Moolasthanas* of *Mamsavaha Srotas*. According to Ayurvedic compendia the *Varnaprasad* (i.e. maintenance of skin color) is the function of *Raktadhatu* & it is examined on skin. As cheerful complexion is symptom of pure

Raktadhatu. Similarly, skin is act as blood reservoir as the dermis is a house of extensive network of blood vessel. It carries 8 to 10% of blood flow in resting adult. *Lepan* & Protection & *Twaksarata* – The skin provides protection to the body in various ways. It protects underlying tissues from microbes, abrasion, heat & chemicals. It stops invasion of microbes. It inhibits evaporation of water & guard against dehydration. It inhibits evaporation of water & it also retard entry of during showers or swims. The sebum keeps skin & hair soft, moist & avoids drying out. The pigment melanin helps shield against damage effects of UV light. As explained by *Charaka Twak* covers the body externally & protects the body. The function is carried out similar to skin. *Twaksarata* - In compendia's during elaboration of *Dhatu* *rasa*, *Rasasarata* is also called *Twaksarata*. The skin of *Rasasarata* is soft, smooth, *Loma*'s (hair on skin) are fine, sparse & deeply rooted. As we has seen previously the skin is site for *Sweda* excretions. It maintains soft texture of skin & hair. *Bhrajaka pitta* & Excretion & Absorption- The *Twacha* is site for *Bhrajaka Pitta* which is one of the sub types of *Pitta*. The *Pitta Dosh*a basically related to the metabolic processes of body. Hence as it is the sub type of *Pitta* it digests various application on *Twak*. Due to the biotransformation of this *Pitta* skin got lustre. *Sweda* excreted from skin carried out *Kleda* (*Kleda Vahan*). *Kleda* also means waste products formed during cellular metabolism. Excretion & Absorption – Sweat is the vehicle for excretion of small amount of salt, carbon dioxide, ammonia, urea. The absorption of fat-soluble vitamins like A, D, E, K, certain drug, gases like oxygen & carbon dioxide. Since topical ointments are easily move into skin. Synthesis of vitamin D – Precursor molecule of vitamin D is activated in skin by UV rays in sunlight. Then this activated molecule is modified by liver & kidney into final form of vitamin D.

CONCLUSION

From above all references that the function of skin is near about similar to the function of *Twacha* explained in Ayurvedic Compendia's.

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