ISSN 2456-3110
Vol 6 · Issue 5
Sept-Oct 2021

JAiMS
INTERNATIONAL

Journal of Ayurveda and Integrated Medical Sciences

www.jaims.in

JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences

Maharshi Charaka
Ayurveda

Indexed

Journal of
Ayurveda and Integrated Medical Sciences
ISSN 2456-3110
REVIEW ARTICLE Sept-Oct 2021

A comprehensive study on *Twak Shareera*

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ABSTRACT

Background: *Twak* is the outermost protective layer as well as largest sensory organ of body. Acharya Susrutha and Acharya Charaka described its layers according to their functions and diseases, which are related to those layers. It is the location of sweat channels, hairs and hair pits. It is the largest organ constituting 15-20% of total body mass. **Objectives:** To do the literary study of *Twak Shareera* as explained in Samhitha and Comparative study of *Twak Shareera* with contemporary science. **Methodology:** Literary study was done by collecting references from different *Samhitas*, contemporary science, journals and web sites. **Conclusion:** *Twak* is one of the *Indriya Adhishtana.* The total thickness of the *Twak* is *Angushtodara Pramana*, which is approximately 5.95 *Yavas*. After this study, *Twak* layers can be compared with skin. *Avabhasini* and *Lohitha* as *Stratum Corneum*, *Sweta* as stratum lucidum, *Tamra* as stratum spinousm and stratum granulosum, *Vedini* as stratum basale and papillary dermis, *Rohini* as reticular Dermis and *Mamsadhara Twak* as Superficial fascia.

Key words: *Twak Shareera, Integumentary system.*

INTRODUCTION

Twak is described as the outermost protective layer as well as largest sensory organ of body. It develops at the time of conception just like cream formed while boiling the milk. Acharya Susrutha and Acharya Charaka very minutely described its layers according to their functions and diseases. *Twak* contains *Swedvahi Strotas*, *Loma,* and *Lomkupas*. Skin is the largest organ of the body, accounting for about 15% of the total adult body weight. It performs many vital functions, including protection against external physical, chemical, and biologic assailants, as well as prevention of excess water loss from the body and a role in thermoregulation. The skin is continuous, with the mucous membranes lining the body's surface. Structurally integumentary system is most complex structure and highly specialized, hence it is grouped in the sense organ. The most extensive organ system has the skin and accessory structures, including hair, nails, gland and specialized nerve receptors for stimuli such as touch, cold, heat, pain and pressure. Its functions are protection of internal structure, prevention of disease- causing microorganisms, temperature regulation, excretion through perspiration, primary protection against ultraviolet sunrays, and production of vitamin D. the body store about half its fat in the underlying hypodermis.

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Submission Date: 08/09/2021 Accepted Date: 13/10/2021

Access this article online

Quick Response Code

Website: www.jaims.in

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OBJECTIVES

1. To do the literary study of *Twak Shareera* as explained in *Samhitha*.
2. Comparative study of *Twak Shareera* with contemporary science.

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DISCUSSION

Twak is one, which covers the body. Various aspect of *Twak* is explained in the *Brihatthrayis* and *Laghuthrayis*.

Embryology of *Twak*

The *Twak* is formed from the essence of *Sukra* and *Sonitha* like the formation of cream from boiling milk. But modern embryology opines the development of skin in the third week of the fetal life. Different cells of the skin and appendages have different origin and from the different area, they migrate to the skin.

Pramana of *Twak*

Acharya Susrutha has explained the *Pramana* of each layer of skin as having thickness of 18^{th}, 16^{th}, 12^{th}, 8^{th}, 5^{th}, 1 and 2 *Vreehi* or *Yava.* Hence, totally it becomes 5.95 *Vreehi* or *Angushtodhara Pramana*. *Bhavaprakasha* and *Dalhana* clarifies the thickness of each layer as 18/20, 16/20, 12/20, 5/20, 1 and 2 *Vreehi,* and the total thickness of *Twak* is 5.95 *Yavas.* In the context of *Udara Patana,* it is explained, as the incision on skin should be of *Angushtodara Pramana*. *Angushtodara* is 6-$1/20^{th}$ *Yavas* = 5.95 *Yavas*. Some recent authors have considered the *Pramana* of *Twak* as $1/18^{th}$, $1/16^{th}$, $1/12^{th}$, $1/8^{th}$, $1/5^{th}$ 1 and 2 *Vreehi.* Then total thickness becomes 3.5 *Yavas.* As it is not equal to *Angushtodhara Pramana*, considering this opinion is not possible.

According to modern aspect, the thickness of the skin is 1-2 mm, in face it is 0.02 mm, while on the sole of the feet between 1 and 5 mm.

Acharya Susrutha has mention seven layers of *Twak*. Though the exact correlation is not possible with modern science. The subsequent comparison can be made with the modern science based on colour, appearance and structural involvement of the layers in various diseases.

Avabhasini and *Lohitha* as Stratum Corneum

Avabhasini is the first layer of *Twak.* This layer illuminates the *Varna* of the skin and the five *Chaya. Lohitha* is the second layer of *Twak*. Stratum Corneum can be compared with *Avabhasini* and *Lohitha* as this layer is pigmented and the disease occurring in this layer are pigmentation disorders

Sweta as Stratum Lucidum

Sweta is the third layer of *Twak. Sweta* word implies that clear layer. The stratum lucidum is also clear and highly refractive layer. This layer contains droplets of intermediate substance eledin that is eventually transformed to keratin. The disease, which occurs in this layer, is due to the localized over growth of melanocytes and melanin.

Tamra as Stratum spinousm and Stratum granulosum

Tamra is the fourth layer. *Kilasa* and *Kushta* are disease that are likely to occur in this layer. *Stratun spinousm* contains keratinocytes with bundles of tonofilaments. Melanocytes and Langerhans cell are present in this layer. At the site of allergic dermatitis Langerhans cells believed to take up antigen and present it lymphocytes in a form to which they can react by generation of antibodies. Stratum granulosum contains darky stained protein granules keratohyaline, which is converted tonofilaments to keratin. *Tamra Varna* of the *Twak* may be due to keratohyaline pigment.

Vedini as Stratum basale and Papillary dermis

Vedini is the fifth layer of the *Twak.* It is the *Adhishtana* of *Visarpa* and *Kushta. Stratum basale* and papillary dermis contains merkels disc, which serve as mechanoreceptors. The papillary dermis contains tactile receptors, messner corpuscles and free nerve ending it gives sensation of pain, warm, tickling etc. stratum basale also contains cells of Langerhans and keratinocytes. *Vedana* is seen in the diseases of this layer. Hence, it is named as *Vedini*.

Rohini as Reticular dermis

Sixth layer of the *Twak* is *Rohini*, the word meaning of *Rohini* which growing or ascending. In this layer abnormal growth, *Granthi, apache, Sleepada, Galaganda* are seen. Reticular dermis contains fibroblast, collagen, reticular fibres and few adipose cells. This region possesses rich lymphatic and

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vascular supply. Due to rich vascular & lymphatic supply various growths, *Granthi* etc are seen in this layer.

Mamsadhara as Superficial fascia

Mamsadhara is the 7th layer. *Bhagandra, Vidrathi, Arshas* are occurring in this layer. *Arshas, Bhagandra, Vidrathi* is developed here. The samprapti of all these disorder will not specify the role of *Twak*. But the *Vyaktha Sthana* of these is clearly observed through the *Twak.*

Twak as Sense organ

Twak is the *Gnanendria* concerned with sensation of touch according to our classics. Acharya Charaka has given prime importance to *Sparshanendriya* by quoting that tactual contacts and mental contacts are the two type of contacts, which bring happiness and miseries. In *Triyakgatha Dhamani*, also we get the reference of skin responsible for *Sukha or Dukha Sparsha*.

According to modern science, also the skin is considered as an organ of sensation. The cutaneous receptors carry information concerning various stimuli. The branched militated and non-myelinated terminals ends in the dermis and lower layer of epidermis. It is a sensory component; they may be mechanic, chemo and thermos in skin. Hirsute skin such fibre lies in close association with hair follicles. Here merkels disc and Meissen's corpuscles found in the dermal papillae are responsible for rapid adapting mechanoception. Dermis and hypodermis also contain Pacinian corpuscles, which are sensitive to pressure.

Varna of *Twak*

Varna Prasadana is because of *Raktha Dhatus*. The *Bhrajakapitta* also helps for *Twak Varna*. According to modern science, the skin colour depends on the pigments. That is melanin and blood capillary loops.

Bhavamishra explained the *Bhrajaka Pitta* in the layer of *Avabhasini,* which is responsible for *Twak Varna.*

The amount of melanin determines the skin colour. This variation is leads to yellow to red colour skin and red to brown colour. The number of melanocytes is almost same is all human being. The difference in colour is mainly depends on the amount of melanin they produce and transfer to keratinocytes. The amount of melanin is more in the dark skinned people and less in light-skinned people. Melanin pigments can be understood as *Bhrajaka Pitta.*

In the absence of large amount of melanin, the main determinant of skin colour is the oxygenated haemoglobin of the dermal vascular beds, particularly the superficial papillary plexus. These when viewed through the overlying epidermis, whose surface layer is somewhat opalescent, giving well-oxygenated skin a pink colour. These indicates the role of *Rakta Dhatu* in *Twak Varna*

Twak in Temperature Regulation

Regulation of the body heat and variations in the colour of the *Twak* are the functions of *Bhrajakapitta* as well as *Dhamanis*. The skin plays the major role in the regulation of the body temperature.

Sensory receptor in the skin provides information about the external environment, helping the skin regulate the body temperature. The large surface area of the skin makes it ideal for temperature regulation. The rate of heat loss can be regulated by the amount of the blood flowing through the blood vessels in the dermis close to surface of the skin.

Besides capillary, there are other vascular connections between the arterial and venous network in the skin. Plexus in the subcutaneous are connected with adjustable arteriovenous anastomosis (AVA) with feeding arteries. When they open large amount of blood can pass. The AVA plays major role in thermoregulation of the body. The activation of the sympathetic nerves leads to active vasoconstriction. The decrease of sympathetic activity leads to passive vasodilatation. In the warm environment the AVA are open and cold environment AVA are almost closed. These indicates the role of dhamanis in maintaining body temperature

CONCLUSION

Twak is one of the *Indriya Adhishtana*, which completely covers the body and is more prone to

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diseases and trauma. The *Pramana* of the *Twak* layers, from outside to inside can be taken as 18/20, 16/20, 12/20, 8/20, 5/20, 1 and 2 *Yavas* respectively. The total thickness of the *Twak* is *Angushtodara Pramana*, which is approximately 5.95 *Yavas*. After this study, *Twak* layers can be compared with skin. *Avabhasini* and Lohitha as Stratum Corneum, *Sweta* as stratum lucidum, *Tamra* as stratum spinousm and stratum *Granulosum*, *Vedini* as stratum *Basale* and papillary dermis, *Rohini* as reticular Dermis and *Mamsadhara Twak* as Superficial fascia.

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How to cite this article: Rakesh R, Nithin Kumar. A comprehensive study on Twak Shareera. J Ayurveda Integr Med Sci 2021;5:275-278.

Source of Support: Nil, **Conflict of Interest:** None declared.

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