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CRITICAL STUDY OF TVAK IN THE VIEW OF MODERN SCIENCE: A REVIEW ARTICLE

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ABSTRACT

In *Ayurveda*, the term *Tvak, Twacha* and *Charma* are frequently used to denote the skin. *Tvak* is described as the organ which covers the external surface of the entire body. *Tvak* and its related diseases have great importance because these are easily noticeable. It is the first part of the body that is in direct contact with any harmful substances or infective microorganisms. It protects the internal structures of the body from injury or infections and regulates the temperature of the body. Skin is also the beauty of a human being. Therefore, it should be protected from any abnormal conditions. Ayurveda *Acharyas* have described *Tvak* many years ago. They explained each layer of *Tvak* in meaningful sequences, its related diseases and measurement of each layer. They also explained that it maintains the normal colour of individuals and conveys the sensation of touch. Some topics of *Ayurveda* are easy to understand, and some topics become easy if we study along with modern science. So, for a proper understanding of the concept of *Tvak*, it is very essential to correlate it with modern science and elaborate according to the modern era.

Keywords: *Tvak, Sparshanendriya, Sharirsthan, Santanika, Vrihi*, Skin, Dermis, Epidermis

INTRODUCTION

Tvak is explained as an external covering of the body by *Acharyas*. It is considered as a seat of *Sparshanendriya* which comes under *Panchagyanendriya*. *Acharya Sushrut* has described seven layers of *Tvak* with measurement of each layer and diseases occurring on it. *AcharyaVagbha*t has the almost same opinion about *Tvak*, but *Acharya Charaka's* opinion is different. Acharya mentioned six layers of *Tvak* and its related diseases. Seven layers explained by *Sushrut* are *Avabhasini, Lohita, Shweta, Tamra, Vedini, Rohini* and *Mamsadhara* in sequence from outer to inner. According to modern science, the skin is considered the largest organ of the body. It covers the whole body externally and is part of the integumentary system. Skin is mainly of two types, epidermis (outer layer) and dermis (inner layer). The epidermis is subdivided into five layers whereas the dermis is divided into two layers. The thickness of the skin is variable from 0.5 to 5 mm depending upon different parts of the body.

REVIEW OF TVAK:

The word *'Tvak'* is derived from *the Sanskrit* root (*mooladhatu) 'Tvak samvarne'* which means the structure that protects and covers the entire body. *Tvak* is the *Upadhatu* of *Mamsadhatu, Moolasthan* of *Mamsavaha Storas* and is a site of *Bhrajaka pitta. Tvak* is mentioned as the *adhishthana* of *Sparshanendriya* which is one of the five *Gyanendriya* and its function is *Sparshagyana* (sensation of touch). It is *Panchabhautika* with a predominance of *Vayumahabhuta*[6] According to *Acharya Charak*, there are six layers of skin in the body. An Outermost layer is called *Udakadhara*, the second one is *Asrigadhara*, the third layer is the site of the origin of *Sidhma* and *Kilasa*, fourth one is the site of the origin of *Dadru* and *Kushtha*, fifth is the site of the origin of *Alaji* and *Vidradhi*. The sixth layer is that which cuts causes loss of consciousness and is the site of the origin of *Arunshi*, being manifested as blackish red and deep-rooted on joints and is hardly curable. Thus, the six layers of skin cover the *Shadanga* (Six regions) of the body. According to *Acharya Sushrut*, the combined form of *Shukra* (spermatozoon) and *Shonita* (ovum) has been processed by the heat of the body then the formation of seven *Tvak* (skin) occurs, just like the formation of *Santanika* (cream) when milk is boiled. Among these, the first *Tvak* is named by *Avabhasini* which expresses all the *Varna* (colour), illumines the five kinds of *Chhaya* (Shades of colours) and is the site of *Sidhma* and *Padmakantaka.* Second is *Lohita* which is the site of *Tilakalaka, Nyachchha* and *Vyanga.* The third is *Sweta* which is the site of *Charmadala, Ajagallika* and *Masaka.* Fourth, *Tamra* is the site of many kinds of *Kailasa* and *Kushtha.* Fifth, *Vedini* is the site of *Kushtha* and *Visarpa.* Sixth, *Rohini* is the site of *Granthi, Apachi, Arbuda, Shlipada* and *Galganda.* The Seventh *Tvak* is named by *Mamsadhara.* It is the site of *Bhagandara, Vidradhi* and *Arsha.*

Sushrut has also explained the thickness of each *Tvak* which are as follows-

S. No	*Tvak*	Thickness
1.	*Avabhasini*	18th part of Vrihi
2.	*Lohita*	16th part of Vrihi
3.	*Sweta*	12th part of Vrihi
4.	*Tamra*	8th part of Vrihi
5.	*Vedini*	5th part of Vrihi
6.	*Rohini*	Equal to Vrihi
7.	*Mamsadhara*	Equal to 2 Vrihi

Acharya Vagbhat has also accepted that there are seven layers of *Tvak* in the body which are formed by the heating process of *Asrij* (Blood), just like the formation of *Santanika* (cream) when milk is boiled.

Review Of Skin: Skin or integument consists of two layers, the superficial epidermis and deep dermis.

Epidermis-: It is nonvascular and is formed by stratified epithelium which is made up of five layers-

1. **Stratum corneum** -: It is the outermost layer of the skin and consists of dead cells called corneocytes. These cells lose their nucleus due to pressure and become dead cells. The cytoplasm is flattened with a fibrous protein called keratin. These cells also contain phospholipids and glycogen.
2. **Stratum lucidum** -: It is made up of flattened epithelial cells. This layer is present in a thick cell only. It is translucent and barely visible. Many cells have degenerated nucleus, and, in some cells, the nucleus is absent.
3. **Stratum granulosum**-: This is the third layer with 2 to 5 rows of flattened rhomboid cells. The cytoplasm contains kerato- hyaline granules. The protein keratohyalin is the precursor of keratin.
4. **Stratum spinosum**-: This layer consists of 4 to 6 rows of cells. This layer is also known as the prickle cell layer because the cells of this layer possess some spine like protoplasmic projections. By these projections, the cells are connected.
5. **Stratum germinativum**-: It is also called stratum basale because it is the deepest or basal layer of the epidermis. This is a thick layer made up of polygonal cells superficially and columnar or cuboidal epithelial cells in the deeper parts. Here, new cells are constantly formed by mitotic division. The stem cells which give rise to new cells are known as keratinocytes. The colour of the skin depends upon the cells of this layer which contain the pigment melanin.

Dermis: It is vascular and is characterized by dense irregular connective tissue. It is made up of 2 layers namely-

1. **Superficial papillary layer**-: This layer projects into the epidermis. This contains blood vessels, nerve fibres, lymphatics and has some pigment-containing cells known as chromatophores.
2. **Deeper reticular layer**-: This layer is made up of reticular and elastic fibres which are found around the hair bulbs, sebaceous glands and sweat glands. It is a loose connective tissue that connects the skin with the internal structures of the body. This serves as an insulator to protect the body from excessive heat and cold in the environment. A lot of smooth muscles called arrector pili are also found in the skin around the hair follicles.

The thickness of skin: The average thickness of the skin is about 1 to 2 mm, but it is not uniformly thick. In some places, it is thick, and, in some places, it is thin. In the sole, palm and interscapular region, it is considerably thick, measuring about 5 mm. In other areas of the body, the skin is thin. It is the thinnest over eyelids and penis measuring about 0.5 mm only.

The basic histology of the skin is similar in different regions of the body, except regarding the thickness of the epidermis. Palms and Soles are constantly exposed to increased wear, tear, and abrasion. As a result, the epidermis in these regions is thick and skin is called thick skin. It also contains sweat glands but lacks hair follicles, smooth muscle fibres, and sebaceous glands. The remainder of the body is covered by a thin skin. In these regions, the epidermis is thinner than thick skin. Thin skin contains hair follicles, sweat glands and sebaceous glands. Attached to the connective tissue sheath of hair follicles and connective tissue of the dermis are smooth muscle fibres called arrector pili.

Functions of the Skin:

1. A skin forms the covering of all the organs of the body and protects these organs from bacteria, toxic substances, mechanical blow, and ultraviolet rays.
2. The skin has many nerve endings which are cutaneous receptors, and these receptors are stimulated by pain, touch, pressure, or temperature sensations and convey these sensations to the brain via afferent nerves.
3. Vitamin D_3 is synthesized in the skin by the action of ultraviolet rays on cholesterol.
4. Skin plays an important role in the regulation of body temperature, water balance and electrolyte balance.

5. Skin absorbs fat-soluble substances and some ointments.
6. The skin excretes waste materials like urea, salts, and fatty substance.
7. Skin secretes sweat through sweat glands and sebum through sebaceous glands.

DISCUSSION

After studying the reviews of *Tvak* and skin, many points came out which show similarities between each other. According to *Ayurveda Tvak* covers the external surface of the entire body. Modern science has also explained that skin is the outermost covering of the body which provides a barrier between muscles, organs, tissues, bones of the body and the outside environment. This barrier protects the body from microorganisms, chemical exposure and changing temperatures. *Acharya Sushrut* and *Vagbhat* have mentioned seven layers of *Tvak* whereas *Acharya Charak* has mentioned six layers while modern science has also considered seven layers of skin under the epidermis and dermis layer. So, we can correlate the seven layers of *Tvak* as explained by *Sushrut*, with seven layers of skin as explained by modern science. According to *Ayurveda, Tvak* is mentioned as the *Adhishthana* (site) of *Sparshanendriya* which is one of five *Gyanendriya*. It is responsible for the sensation of touch. Modern science has also considered that the skin is one of five sensory organs which is also responsible for the sensation of touch and temperature. *Ayurveda* has explained different layers of *Tvak* as the sites of origins of many diseases like *Sidhma, Padmakantak, Kushtha, Visarpa* etc. These diseases are originated from a layer of *Tvak.* According to modern science, skin is also the main site of many diseases like eczema, psoriasis, leprosy, acne etc. Many diseases are related to the epidermis, and many are related to the dermis layer of skin.

According to *Ayurveda, Tvak* is the site of *Bhrajak pitta* which is one of five *Pittas. Bhrajak pitta* is responsible to reflect *Varna* (colour) and *Chhaya* (shades of colours) and regulates the temperature of the body. Modern science has explained melanin pigments which are like *Bhrajak pitta* because the functions of both are the same. Melanin pigments determine the colour of the skin of individuals. *Tvak* is *Panchbhautik* with a predominance of *Vayu Mahabhuta.* This *Vayu* conveys the *Sparsh* (touch) sensation of *Sparshanendriya* to the brain. According to modern science, many nerve endings are present in the skin which receives the sensation of touch, pain, and temperature as an impulse and then this impulse is conveyed to the brain through the nerve pathway. The brain reads this impulse, and we feel the sensations. *Acharya Sushrut* has explained the thickness of each layer of *Tvak.* Acharya measured the thickness by *Vrihi* (barley or rice). If we measure the total thickness of *Tvak*, it will be 3 to 4 *Vrihi.* Thickness increases continuously from outer *Avabhasini* (first layer) to inner *Mamsadhara* (last layer). This thickness is only on muscular regions and not on all regions of the body. According to modern science, the thickness of the skin is about 0.5 to 5 mm with an average of 1 to 2 mm. Modern science also accepts that the thickness of the skin is not equal on every part of the body. Because of this, the skin is divided into thick and thin skins. As mentioned in *Ayurveda*, same the inner layer of skin (dermis) is thicker than the outer layer (epidermis). So, the measurement of the thickness of *Tvak* as described by *Acharya Sushrut* is much close to modern science. Skin is having many important functions which are mainly protective. It synthesizes Vit. D_3 helps in receiving the sensation, regulates body temperature, maintains water and electrolyte balance, and excretes harmful waste materials. Skin is composed of hairs, nails, sweat glands, sebaceous glands, and numerous openings. Sweat glands excrete the waste materials of the body through sweat and sebaceous glands keep the skin's surface oily.

CONCLUSION

Tvak, according to *Ayurveda*, and skin, according to modern science have great similarities based on several layers, total thickness, variation of outer to inner thickness, functions, morphology, and diseases affection it. *Sushruta's* description regarding *Tvak* is more scientific, very systematic and one step ahead of

modern science because explanations about thickness, function and disease affection of each layer are very clear which is lacking in modern science. Thus, the present study will be very helpful to understand the concept of *Tvak* and the concept of skin also. It is also helpful to manage some skin diseases that occur in different layers of skin.

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