



Review Article On Anatomy Of Skin Compared With Degree Of Burns.

Dr. Virendra Suryakant Mahajan¹, Dr. Minal Vijay Etankar²

¹Principal/Professor in Department of Anatomy, in Govindrao Wanjari Ayurvedic College and Research Centre, Nagpur, Maharashtra.

²Consultant in Department of Agadtantra, in Govindrao Wanjari Ayurvedic College and Research Centre, Nagpur, Maharashtra.

Abstract

Located on the outermost layer covering a living body, skin is an organ which protects the underlying body from the external environment such as shocks, temperature, ultraviolet radiation, chemicals and other threats. The skin is composed of three layers, listing from the outside, which are the epidermis, the dermis, and the subcutaneous fat tissues. The skin is the body's largest organ, made of water, protein, fats and minerals. Your skin protects your body from germs and regulates body temperature. Nerves in the skin help you feel sensations like hot and cold. For studying the degree of burns study of anatomical structure of skin is important. In *Ayurveda* burn is called as *dagdha*, and burn injuries is called as *dagdha vrana*. Total four degrees of burns are explained in which the different part of skin is involved. In this article comparison of skin anatomy and degrees of burns is discussed for detailed study.

Keywords: *Ayurveda*, skin, degree of burns.

Introduction:

The knowledge of *Rachana Sharir* and *Kriya Sharir* is of great importance as skin is the most important factor involved in the pathogenesis of any disease which is manifested in the skin. Skin is the largest organ of the integumentary system. In recent years skin diseases have gained more importance and attention by medical science as well as public. Skin is the largest organ of the integumentary system. It covers an area of 1.8 square meters and serves as a protective barrier that prevent internal tissues from exposure, to trauma, ultraviolet radiation, temperature extreme, toxin etc. *Ayurveda* is the time tested system of treatment prevalent in India since long time. It is a treasure house of knowledge gathered in thousands of years. The main treatises of *Ayurveda* are *Brihatrayee* viz. *Charak Samhita*, *Sushrut Samhita*, *Astanga Samgrah* or *Astanga Hriday* and *Laghutrayee* viz. *Madhav Nidan*, *Sharangadhar Samhita*, *Bhavaprakasha*, as well as in treatises like *Yog Ratnakar* and *Harit Samhita* descriptions of burn injury are found. *Sushrut Samhita* is the authenticated text

book of surgical knowledge of Indian civilization. It contains detailed descriptions of basic surgical knowledge like wound healing and management of various wounds along with surgical procedures. It contains vivid descriptions of burn injury and its management. In *Ayurveda*, the skin is called as *Twacha*, *Twak* or *Charma*. *Acharya Charaka* has said that *Twacha* is *Upadhatu* of *Mamsa dhatu* and seat of *Sparshendriya*. Since *Twacha* covers the whole body it protects the body from various physical and chemical stimuli present in the environment.

Following is the representation of *Paanchabhautikatwa* of *Twacha*:

Panchabhautikatva* of *Twacha

1) *Prithvi*

Twacha has been considered as the *Upadhatu* of *Mamsa Dhatu* that shows it is stable which an innate quality of *Prithvi* is.

2) *Jala*

Due to the presence of *Jala Mahabhuta*, *Twacha* is *Snigdha*.

3) *Agni*

Twacha has the specific *Varna* and *Prabha* (lustre)

4) *Vayu*

Twacha is the *Adhithana* of *Sparshanendriya*.

5) *Akasha*

Presence of some micro channels of *Sweda* forming organs.

Modern aspect of Skin

Layers of skin

Modern texts have classified the skin into two main parts:

1. The superficial, thinner portion, which is composed of epithelial tissue, is the Epidermis.
2. The deeper, thicker connective tissue portion is the Dermis. The Epidermis is avascular and the Dermis is vascular, that's why, by cutting the layer of epidermis there is no bleeding, but if we cut the dermis there is bleeding. Deep to dermis, but not part of skin, is the subcutaneous layer, known as the Hypodermis. This layer consists of areolar and adipose tissues.

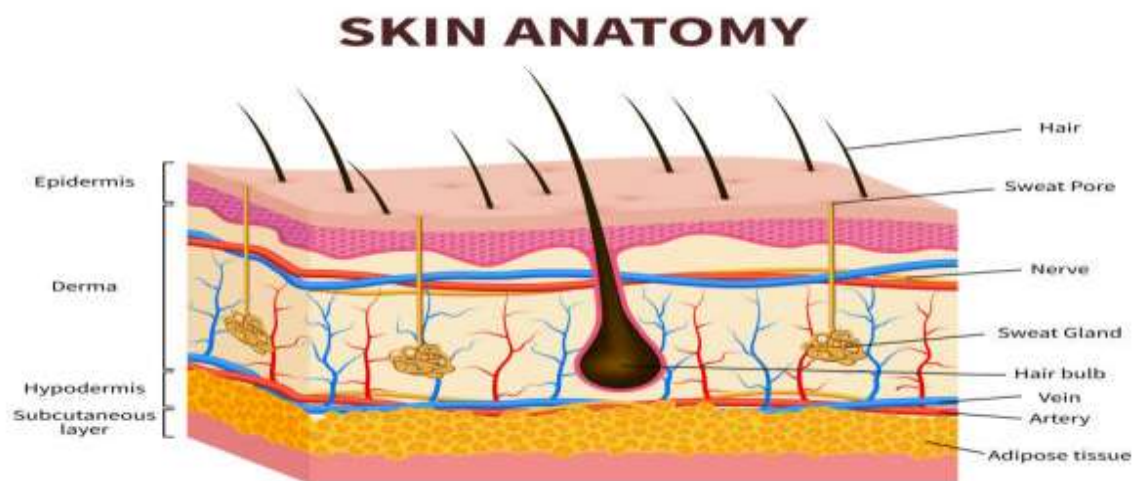
The Epidermis is further grouped into five layers:

1. Stratum Corneum or Horny Layer
2. Stratum Lucidum
3. Stratum Granulosum
4. Stratum Spinosum or Malpighian Layer
5. Stratum Basale or Germinative Layer

The Dermis is further divided into two regions:

- I. Papillary region
- II. Reticular region

Image showing the Skin Anatomy.



Probable correlation of layers of *Twacha* and layers of skin.

Layers of skin according to <i>Sushruta</i>	Thickness (Vrihi/rice)	Modern layers of skin	Thickness (in mm)	
1. <i>Avabhasini</i>	1/18	Stratum corneum	0.05-0.06	Epidermis
2. <i>Lohita</i>	1/16	Stratum lucidum	0.06-0.07	
3. <i>Shweta</i>	1/12	Stratum granulosum	0.08-0.09	
4. <i>Tamra</i>	1/8	Malpighian layer	0.12-0.15	
5. <i>Vedini</i>	1/5	Papillary layer	0.20-0.50	Dermis
6. <i>Rohini</i>	1	Reticular layer	1-1.1	
7. <i>Mamsadhara</i>	2	Sub cutaneous tissue	2-2.1	

Functions of skin

- 1. Thermoregulation:** The skin contributes to regulation in two ways: by liberating sweat at its surface and by adjusting the flow of blood in the dermis. In response to high temperature, sweat production from endocrine sweat glands increases; the evaporation of sweat from the surface of skin helps to lower the body temperature.
- 2. Blood Reservoir:** The dermis houses an extensive network of blood vessels that carry 8-10% of the total blood flow in a resting adult. For this reason, the skin acts as a blood reservoir.
- 3. Protection:** The skin protects the body in various ways. Keratin protects underlying tissues from microbes, abrasion, heat and chemicals. Lipids released from the lamellar granules inhibit evaporation of water from skin surface. The oily sebum from the sebaceous glands keeps hair and skin from drying out and contains bactericidal chemicals.
- 4. Cutaneous sensations:** These sensations arise in the skin such as touch, pain, pressure, vibration, tickling and thermal sensations like warmth and coolness.
- 5. Excretion and absorption:** Despite the waterproof nature stratum corneum, about 400mL of water evaporates through skin daily. Fat soluble vitamins (A,D,E,K), certain drugs and few gases do enter and exit the skin.
- 6. Synthesis of Vitamin D:** Synthesis of vitamin D requires activation of precursor molecules in the skin by U.V rays in sunlight. Enzymes in the liver and kidney modify the activated molecule, producing calcitriol, the most active form of Vitamin D.

Classification of burns

Burns are classified by degree depending on how deeply and severely they penetrate the skin's surface: first, second, third, or fourth. It may be impossible to classify a burn immediately when it occurs. It can progress over time so you may not know the full extent for a day or two.

- **First-degree (superficial) burns.** First-degree burns affect only the outer layer of skin, the epidermis. The burn site is red, painful, dry, and has no blisters. Mild sunburn is an example. Long-term tissue damage is rare and often consists of an increase or decrease in the skin color.
- **Second-degree (partial thickness) burns.** Second-degree burns involve the epidermis and part of the lower layer of skin, the dermis. The burn site looks red, blistered, and may be swollen and painful.
- **Third-degree (full thickness) burns.** Third-degree burns destroy the epidermis and dermis. They may go into the innermost layer of skin, the subcutaneous tissue. The burn site may look white or blackened and charred.
- **Fourth-degree burns.** Fourth-degree burns go through both layers of the skin and underlying tissue as well as deeper tissue, possibly involving muscle and bone. There is no feeling in the area since the nerve endings are destroyed.
- **Depth of burn wound**

Clinical features of all the types mentioned above are described in terms of appearance, Presence/absence of blisters, presence/absence and nature of pain, suppuration, extent of tissue Destruction, time and nature of healing, systemic involvement etc. which indicates the depth of damage due to thermal injury.

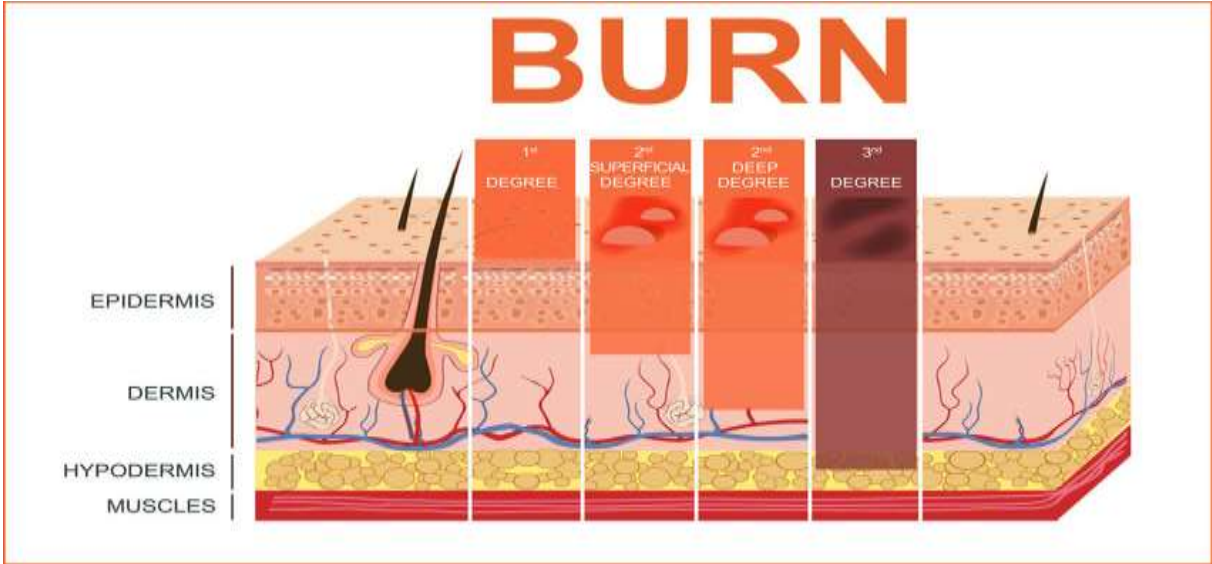
1. **Plusta:** Discoloration; Burning pain without any blisters.
2. **Durdagdha:** Blisters, severe pain, redness, suppuration, pain lasting for long duration.
3. **Samyagdagdha:** Without the features of *Atidagdha*, color of ripe palm tree fruit, neither elevated nor depressed, along with the features as mentioned above.
4. **Atidagdha:** Sloughing out, injuries of vessels, ligaments, joints and bones; fever; burning Sensation; thirst; fainting; the wound heals very slowly; discoloration after healing.

Modern classification of burn depth on clinical appearance

Typical clinical appearance of burn depth:

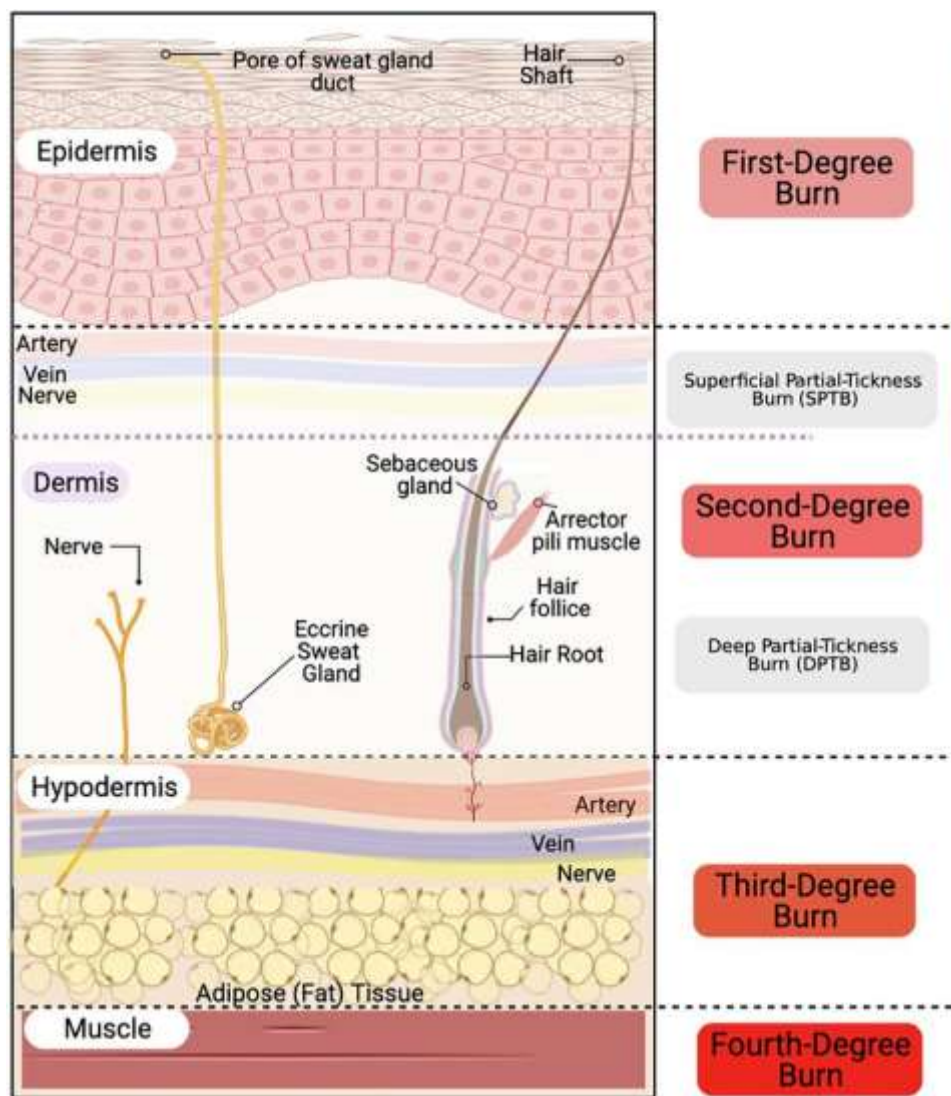
1. **First degree:** Involves only the epidermis with no blisters. It appears as a “sunburn” and is not included in the %TBSA calculation.
2. **Second degree superficial:** Pink, homogeneous, normal capillary refill, painful, moist, intact hair follicles.
3. **Second degree deep:** Mottled or white, delayed or absent capillary refill, dry, decreased Sensation or insensate, non-intact hair follicles
4. **Third degree:** Dry, white or charred, leathery, insensate.

Image showing the depth of burns in the skin.



Modern description	Ayurvedic description
First degree	Plusta
Second degree Superficial	Plusta
Second degree Deep	Samyagdagdha
Third degree	Atidagdha

Image showing the detailed anatomical structure of skin affected during burns.



Discussion

Skin (*Twacha*) is one of the important presentable organs of the body. It has a definite role in one's personality. Burns occur on skin (*twacha*) affect not only on somatic level but also on psychological level too. To get a proper idea of burn one must know the normal echo-texture. Hence the study of skin anatomy is necessary. Hence the *twacha* according to *Rachana Sharir* and layers of skin according to modern science *has* to be studied in depth. From which the study of degree of burn can be analyzed and studied.

Conclusion

From the above study it can be concluded that *Ayurvedic* concept of Skin or *Twacha* is unique, deep and vast like an ocean which needs to be explored, analyzed for better understanding as the references are in so much subtle details. From detailed study of skin and its layers helps to study the degree of burns.

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