

## Concept of Ayurvedic *Twak Sharir* W.S.R. to Skin

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### ABSTRACT

In Ayurveda Skin is called "*Twak*" which encloses the whole body. Joseph Lister said, "skin is the best dressing"; so, a detailed study of *Twak* is important, as it is the seat for all *Twak Roga*. Skin disorders have some kind of internal pathology for this purpose. The conceptual aspect of skin needs to be understood. The largest organ of the human body is the skin, it plays a noteworthy role in keeping normal human physiological conditions. Ayurveda has described skin features ages back. This article focuses on the anatomical and physiological aspects and known and the lesser-known functions of the skin and its correlation with Ayurvedic science. The thermoregulatory function of the skin is in-depth analysed. Clinically proven indigenous drugs of Ayurveda are also deliberated briefly. In Ayurvedic diagnostic methodology, Specific skin Significances are used as a tool to assess the health status of the patient; a detailed description of this tool is also discussed in this article. This article is a humble and sincere attempt to explain the skin with a view of *Kriya Sharir* and *Chikitsa*.

**KEYWORDS:** *Twacha*, *Sharir Kriya*, *Ayurvedic Chikitsa*

### INTRODUCTION

#### Structure of skin

Skin plays an important role in the sensory and thermoregulatory functions of the body. It is the outermost covering of our body that protects our body from the outer environment. Skin is taken as the largest organ of the body. Ayurveda describes skin as the *Updhatu* of *Mamsadhatu* <sup>[1]</sup> (i.e. muscle). Seven *dhatu* are described in Ayurveda, *Rakta* is one of them, and Skin is supposed to be formed by the metabolism of *Rakhta dhatu* (i.e. blood); a phenomenon similar to the formation of cream over milk, after cooling it post-heating. <sup>[2]</sup> *Twak*, *Chavi*, *Chadani*, *Asrugdhara* are the synonyms of skin.

The *Vyutpatti* of the word *Twak* dictates *Aachaadana* which means to cover. According to *Charak Samhita*, *Kashyapa Samhita*, and *Ashtang Sangraha*, *Twak*

i.e. the skin has 6 layers<sup>[3]</sup>. Acharya *Sushrut* and *Sharangdhar* described 7 layers of *twak*<sup>[4]</sup>.

They comprise *Sthula/Mamsadhara* which may be compared to hypodermis (the layer just below the skin).

#### 1. Epidermis (Outer Skin):<sup>[5][6]</sup>

- A. *Avabhasini* (*Stratum corneum*)
- B. *Lohita* (*Stratum lucidum*)
- C. *Shweta* (*Stratum granulosum*)
- D. *Tamra* (*Stratum Malpighi*)

#### 2. Dermis (Inner layer of Skin)

- A. *Vedini* (papillary layer)
- B. *Rohini* (reticular layer)
- C. *Mamsadhara* (hypodermis), are two anatomical divisions of skin.

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**Description of skin layer according to Charak:**<sup>[7]</sup>

S. No.	Skin Layer	Functions	Diseases
1	<i>Udakadhara</i>	Holding the water	Dehydration, Wrinkles
2	<i>Asrukdhara</i>	Holding the blood	Non elevated mole ( <i>Tilkantaka naevi</i> ( <i>Nyacha</i> ) and Capillary angioma ( <i>Vyanga</i> )
3	Seat of <i>Sidhma</i> (dermatitis) and <i>Kilas kushtha</i> (Leukoderma or Vitiligo)	Possible function is pigmentation and community protection	Pityriasis versicolor or tinea versicolor ( <i>Sidhma</i> ) and Vitiligo ( <i>Kilas kushtha</i> )
4	Seat of <i>Dadru</i> (ring worm or <i>tinea corpora</i> ) and <i>Kushtha</i> (Hansen's disease or Leprosy)	Possible immune function against chronic infections	Tinea corporis or ring worm ( <i>Dadru</i> ) and Hansen's disease or leprosy ( <i>Kushtha</i> )

**Description of skin layer according to Sushruta:**<sup>[8]</sup>

S. No.	Name	Characters	Thickness	Diseases
1.	<i>Avabhasini</i>	1 <sup>st</sup> Layer	1/18 of Vrihi	It reflects <i>varna</i> and 5 types of <i>Chaya</i> , <i>Sidhama</i> , <i>Padma</i> , <i>Kantaka</i>
2.	<i>Lohita</i>	2 <sup>nd</sup> Layer	1/16 of Vrihi	<i>Tilkalka</i> , <i>Nyacha</i> , <i>vyanga</i>
3.	<i>Shweta</i>	3 <sup>rd</sup> Layer	1/12 of Vrihi	<i>Charmadal</i> , <i>Ajgallika</i> , <i>mashaka</i>
4.	<i>Tamra</i>	4 <sup>th</sup> Layer	1/8 of Vrihi	<i>Mahakushtha</i> , <i>Kilas</i>
5.	<i>Vedini</i>	5 <sup>th</sup> Layer	1/5 of Vrihi	<i>Mahakushtha</i> , <i>Visarpa</i>
6.	<i>Rohini</i>	6 <sup>th</sup> Layer	1 Vrihi	<i>Granthi</i> , <i>Apachi</i> , <i>Arbuda</i> , <i>Shlipada</i> , <i>Galganda</i>
7.	<i>Mamsdhara</i>	7 <sup>th</sup> Layer	2 Vrihi	<i>Bhagandara</i> , <i>Arsha</i> , <i>vidhradhi</i>

**Colour of Skin**

The Colour of Skin is owned by the presence of pigmentation along with the blood flow which takes place at the level of capillaries<sup>[9]</sup>. Pink, Blue, and pale are associated colors of skin that are due to blood flow in sub papillary venous plexus. the color of the skin is mainly influenced by the following factors:<sup>[10]</sup>

- Melanin:** It is a pigment secreted by the melanosomes present in the basal layer of the epidermis. black, white, yellow are skin colors that vary due to the presence of the amount of melanin. By providing skin colors melanin also protects from harmful UV radiation.<sup>[11]</sup>
- Melanoid:** It's responsible for absorption of light and a bio transformative derivative of melanin.
- Carotene:** It is a precursor of vitamin A Yellow colored pigment found in the fat storage of our body.
- Oxyhaemoglobin:** It provides the reddish warm appearance of the skin.
- Reduced Haemoglobin:** due to lack of hemoglobin skin appears bluish, which feels cold and clammy.

Aging is most prominently noticed on the skin. Due to loss of skin elasticity and Depletion of hypodermic fat depots with age wrinkles appear.

**Lustre of Skin**

In deciding the diagnosis and the prognosis of any disorder Ayurveda gives prime importance to the

luster of the skin. *Sansthana* and *Akruti* are synonyms of *Chaaya* (Which are also the synonyms of Lakshana or signs of diseases)<sup>[12]</sup>. *Chaaya* is found integrated into the *Varna* (color) and *Prabha* of the skin. the reflection of the skin is called *chaaya*. The same *Chaaya* when reflected via mirror or light is known as *Pratichaaya*.

**Pancha Mahabhautika description of Chaaya:**

- *Nabhiya Mahabhuta*--Blue colored mild and *Sneha + Prabha*.
- *Vayu*--Black/*Aruna* mixed color, dry, destroyed color.
- *Agneya*-- Reddish and pure as well as presentable *Prabha*.
- *Jaliya*--*Shuddha* like Cats eye gemstone, *Snigdha*, etc.
- *Parthiva*--*Sthira*, *Snigdha*, *Ghana*, *Shlakshana*, *Krushna/ Shvetavarna*.

Out of the above, all *chaayas* are good except the *Vayaviya Chaaya*. *Prabha* illustrates *Varna* in *Twacha*. *Harita* (green), *Peeta* (yellow), *Shveta* (white), *Krushna* (black), *Pandura* (whitish), and *Shyaava* (greyish black),<sup>[13]</sup> these are seven types of *prabha*.

**Bhrajaka Pitta**<sup>[14]</sup> is present in *Twacha*, which functions as follows.

- *Abhyanga*, *Parisheka*, *Avgahana*, and *Lepana* are the types of medicine applied to the skin and they got digested by *bhrajak pitta*.<sup>[15]</sup>

- It exemplifies the *Chaaya*.
- it is responsible for natural color to the skin.
- Provides luster to the skin.
- maintains an appropriate temperature of the body.

### Functions of the Skin <sup>[16][17][18]</sup>

1. **Protective**-Protects from the harsh external environment, dust, germs, and other pathogens.
2. A. Control of temperature via Conduction, Convection, and Radiation.  
B. Skin acts as an insulator causing stability in heat dissipation.  
C. heat sensory receptors are present in the skin which causes the production of excessive sweat through the sweat pores via the vasomotor mechanism. In the case of cold climate, it performs the opposite in which the hair present on the skin also helps for heat preservation.
3. **General Sensation**-Skin is a major organ that has multiple nerve endings per square inch. These nerve endings deliver perceptible sensory responses and transport the message to our brain.
4. **Absorption**-Many topical medications like steroids, NSAIDS, etc. are absorbed from our skin. Skin is water-resistant through continuous exposure to water causes swelling of hypodermal layers due to osmosis.
5. **Excretion**-Skin excretes excess electrolytes, water, and Certain medication and poisonous metabolites.
6. **Synthesis**- Ergosterol present in the skin is converted into the Vit. D precursor by its hydroxylation under the influence of sunlight.
7. **Secretion**- Sebaceous gland secretes mucinous material which keeps the skin moist and elastic.
8. **Water balance**- Evaporation of water based on the concentration of water in the body is done by the skin.
9. **Acid-base equilibrium**- In the case of acidosis excretion of excess H<sup>+</sup> ions is done by skin via sweat, for maintaining the pH of the blood.
10. **Storage**-The sub papillary plexus has storage of around 1000ml blood in case of emergency. Subcutaneous fat also stores essential fat-soluble vitamins (A, D, E, K), etc.
11. **Gaseous exchange**- A very small amount of CO<sub>2</sub> is excreted by sweat.
12. **Bhrajak Pitta** is present in the skin which absorbs medicine from *Lepa* etc.

13. 5 types of *Chaaya*, 7 types of *Prabha* are present in skin and skin has *Varna Prakashaka* quality.

### Body temperature:

The animal kingdom is divided into two types based on body temperature viz,

1. Warm-blooded animals or Homoeothermic organisms - animals that can maintain their constant body temperature irrespective of the changes in weather or climate. eg-man etc.
2. Cold-blooded or poikilothermic- animals that are unable to keep their body temperature constant and hence their body temperature fluctuates w.r.t climate i.e., during hot climate-body becomes hot and vice versa. Eg-Lizards etc.

### Average Body temperature.<sup>[19]</sup>

The average body temperature or oral temperature is 98.4°F (97- 99°F) i.e.36.89°C (36.11-37.2°C). Axillary temperature is 1°F to 0.55°F less than that of oral temperature whereas the rectal temperature is 0.55 to 1°F more than oral.

### Variation in Temperature:<sup>[20][21]</sup>

1. Diurnal variation- Early morning (around 5 am) measured temperature and evening temperature of around 5-7 pm have to difference around 1-1.5°F.
2. According to Age- Children (especially neonates) have an alteration in the body temperature regarding the environment, on the other hand, old age persons have reduced body temperature.
3. According to Build- Heat convection is directly proportional to the surface area hence more the body size, the faster is the tendency to lose heat and vice versa.
4. According to Diet- body temperature increases after consumption of food (especially protein-rich food) because of Specific Dynamic Action (SDA).
5. Sex-Normally females have lower body temperature. Their body temperature reaches a maximum of 24 to 48hrs post ovulation due to the calorific action of the corpus luteum (by releasing progesterone)
6. Exercise-It increases the body temperature.
7. Atmosphere-Extreme temperature hampers the thermoregulatory homeostasis rendering rapid body cooling or heating.
8. Sleep-Due to reduced muscle action reduction in Temperature occurs.
9. Mental agitation- It can give a rise of even 2°C rises in Temperature.



10. Drug interaction- Certain drugs like morphine, Chlorpromazine, etc. Act on CNS and reduce the body temperature. Curare causes a reduction in temperature by causing peripheral muscular palsy on the other hand Strychnine increases the core temperature of the body. Antipyretic medicine reduces PGE2 synthesis hence reducing the prostaglandin threshold in the hypothalamus.

### Regulation Of body Temperature:<sup>[22]</sup>

In spite of a human body being subjected to extreme temperatures, it maintains its core body temperature owing to a complex mechanism of heat regulation. To understand body temperature mechanisms better, we have to understand thermogenesis, thermolysis, and its balance in detail.

**1. Thermogenesis** Chemical interaction which takes place during the process of digestion of complex food material like protein, fats, and carbohydrates releases energy in the form of heat due to certain exothermic reactions. Due to the activity of the skeletal majority of the heat production in the body takes place. The chief method of heat production is via friction. This is the principle behind shivering when subjected to a cold environment. The majority of the heat in our body is produced in the liver followed by the heart, glandular secretions like insulin, thyroxine, and epinephrine have an important role in heat regulation. Various digestive enzymes, as well as gut mobility, gives off heat. 1g of carbohydrate and protein on breakdown gives 4kcal energy whereas fats give 9 kcal

**2. Thermolysis:** Heat loss from our body takes place via 3 routes i.e skin, lungs, waste products. Skin wards off heat through conduction, convection, and radiation.<sup>[23]</sup> According to the law of thermodynamics, the loss of heat is directly proportional to the surface area of the body and also the difference between the temperature of our body and the cooler environment. heat absorption is also affected by the color of clothes e.g. white reflects radiation while black absorbs maximum heat radiation. 55% of heat loss takes place through the medium of the skin.

### Heat production and heat loss:

25% of the body heat is lost via sweat. Evaporation of body fluid is done mostly by the skin and lungs. There is a large capillary network beneath the skin that continuously supplies fluid in the form of blood. This fluid is evaporated to control the body temperature. 2% of the total body heat loss from the body is through the lungs. Similarly, another 2% of the total body heat is lost from the excretion of macro waste products (stool and urine).

Thermogenesis	Thermolysis
Heat is produced due to digestion, metabolism at both tissue and cellular level	Radiation 50% Evaporation 30% Conduction and convection- 15% Excretion 2% Lungs 2%

### Regulation of thermotaxis

#### 1. Hypothalamus<sup>[24]</sup>

In the anterior part of the hypothalamus Thermoregulatory center is situated. When a nerve ending in the skin is stimulated by heat and cold sensory response and the signal is conveyed to the Hypothalamus which releases it to the subcutaneous papillary plexus, in response to which they dilate increasing the blood flow and resulting in elevated sweat formation causing heat loss. The posterior part of the hypothalamus is responsible for increasing the body temperature when there is increased heat lost from the body. It achieves this phenomenon by inducing the act of shivering and increasing the secretion of hormones like thyroxine and epinephrine.

#### 2. Spinal cord

The involvement of the spinal cord is similar to that of the bridge which conveys the signal between the Thermo receptor of the skin, skeletal muscle, certain hormones producing gland, and higher center of the brain (hypothalamus)

#### 3. Endocrine glands effects<sup>[25]</sup>

When a human body is exposed to cold the anterior pituitary gland releases an excess amount of TSH which in turn stimulates the thyroid gland to produce the additional amount of thyroxine. Thyroxine increases the BMR result of which heat is produced. Adrenal gland releases adrenaline which also increases metabolism, resulting in heat production. The process of conversion of glycogen to glucose which takes place in the liver causes heat production. Peripheral vasoconstriction and release of corticosteroids from the adrenal gland are also responsible for increasing the heat. The heat regulatory center in neonates is underdeveloped.

### List of Herbal drugs useful in skin diseases:

1. *Anjeer* (*Ficus carica*)<sup>[26]</sup>
2. *Atibala* (*Abutilon indicum*)<sup>[27]</sup>
3. *Amaltas* (*Cassia fistula*)<sup>[28]</sup>
4. *Erindakarkati* (*Carica papaya*)<sup>[29]</sup>
5. *Eranda* (*Ricinus communis*)<sup>[30]</sup>
6. *Atasi* (*Linum usitatissimum*)<sup>[31]</sup>
7. *Tuvaraka* (*Hydnocarpus shitaliana*)<sup>[32]</sup>
8. *Khadir* (*Acacia catechu*)<sup>[33]</sup>

9. *Kaner* (*Nerium indicum*)<sup>[34]</sup> [8] Anantaram Sharma. Sushruta Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2013. p. 47
10. *Kampilak* (*Mallotus Philippinensis*)<sup>[35]</sup> [9] Anil Baran Singha Mahapatra. Essentials of Medical physiology. Second edition. Kolkata, Mumbai. Current Books International, 2006. p.299
11. *Kapoor* (*Cinnamomum camphora*)<sup>[36]</sup> [10] Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.391
12. *Kalonji* (*Nigella sativa*)<sup>[37]</sup> [11] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.391
13. *Gunja* (*Abrus precatorius*)<sup>[38]</sup> [12] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.880
14. *Chitrak* (*Plumbago zeylanica*)<sup>[39]</sup> [13] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 2, Varanasi: Chaukhamba Subharti Prakashan, 2011. p.553
15. *Palasha* (*Butea monosperma*)<sup>[40]</sup> [14] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 2, Varanasi: Chaukhamba Subharti Prakashan, 2011. p.1020
16. *Tulsi* (*Ocimum sanctum*)<sup>[41]</sup> [15] Dr. Brahmanand Tripathi, AstangaHridayam of Srimadvagbhata, Delhi- Chaukhamba Sanskrit Pratishtan. 2009. p. 173
17. *Nagkesar* (*Mesua ferrea*)<sup>[42]</sup> [16] Anantaram Sharma. Sushruta Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2013. p. 180
18. *Neem* (*Azadirachta indica*)<sup>[43]</sup> [17] Anil Baran Singha Mahapatra. Essentials of Medical physiology. Second edition. Kolkata, Mumbai. Current Books International, 2006. p.300
19. *Bael* (*Aegle marmelos*)<sup>[44]</sup> [18] Chandi Charan Chatterjee, Human Physiology, Vol. 2. Calcutta, Medical Allied Physiology, 2004. p.1- 72

### Conclusion

1. The entire article concludes that skin not only protects the internal structure of the body but its complex structure and function create a unique environment that protects the inner functioning of the body and provides an incredible interface with which to interact with the outside world.
2. Skin also acts as a medium for the absorption of various medicines in the form of Abhyanga, Parisheka, etc.
3. The thermoregulatory is the other and most important function of the skin.

### References:

- [1] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 2, Varanasi: Chaukhamba Subharti Prakashan, 2011. p.553
- [2] Anantaram Sharma. Sushruta Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2013. p. 46 3.
- [3] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2006. p.919
- [4] Anantaram Sharma. Sushruta Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2013. p. 47
- [5] Anil Baran Singha Mahapatra. Essentials of Medical physiology. Second edition. Kolkata, Mumbai. Current Books International, 2006. p.299
- [6] Chandi Charan Chatterjee, Human Physiology, Vol. 2. Calcutta, Medical Allied Physiology, 2004. p.1- 68
- [7] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2006. p.919
- [8] Anantaram Sharma. Sushruta Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2013. p. 47
- [9] Anil Baran Singha Mahapatra. Essentials of Medical physiology. Second edition. Kolkata, Mumbai. Current Books International, 2006. p.299
- [10] Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.391
- [11] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.391
- [12] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.880
- [13] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 2, Varanasi: Chaukhamba Subharti Prakashan, 2011. p.553
- [14] Brahmanand Tripathi. Charak Samhita (Hindi translation) Vol. 2, Varanasi: Chaukhamba Subharti Prakashan, 2011. p.1020
- [15] Dr. Brahmanand Tripathi, AstangaHridayam of Srimadvagbhata, Delhi- Chaukhamba Sanskrit Pratishtan. 2009. p. 173
- [16] Anantaram Sharma. Sushruta Samhita (Hindi translation) Vol. 1, Varanasi: Chaukhamba Subharti Prakashan, 2013. p. 180
- [17] Anil Baran Singha Mahapatra. Essentials of Medical physiology. Second edition. Kolkata, Mumbai. Current Books International, 2006. p.300
- [18] Chandi Charan Chatterjee, Human Physiology, Vol. 2. Calcutta, Medical Allied Physiology, 2004. p.1- 72
- [19] K. Sembulingam. Essential of medical physiology, 3rd edition, JAYPEE, 2005. p. 324
- [20] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.822
- [21] Chandi Charan Chatterjee, Human Physiology, Vol. 2. Calcutta, Medical Allied Physiology, 2004. p.2-2
- [22] Cyril. A. Keele, Et.al. Samson Wrights applied physiology, 13th Edition, Oxford University press, 2006. p. 349

- [23] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.823
- [24] Cyril. A. Keele, Et.al. Samson Wrights applied physiology, 13th Edition, Oxford University press, 2006. p. 347
- [25] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.826
- [26] C. Guyton and Hall. Medical physiology, 10th edition, Saunder- An imprint of Elsevier. 2003. p.828
- [27] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005.p.411
- [28] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.735
- [29] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.171
- [30] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.374
- [31] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.60
- [32] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.413
- [33] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.174
- [34] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.161
- [35] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.212
- [36] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.522
- [37] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.201
- [38] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.597
- [39] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.772
- [40] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.360
- [41] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.507
- [42] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.710
- [43] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.784
- [44] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.150
- [45] Prof. P.V Sharma, Dravyaguna Vijnana Vol. 2, Varanasi-Chaukhamba Bharati Academy, 2005. p.456