

THE CONCEPT OF VARNA IN AYURVEDA: CORRELATION OF BHRAJAK PITTA, SKIN PHYSIOLOGY AND MELANIN

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ABSTRACT

Healthy and radiant skin is often associated with good health and overall well-being. Modern science explains that a person's skin complexion is largely inherited through genetic factors. At the same time, environmental influences such as sunlight exposure, nutrition, lifestyle, and psychological stress can also affect skin colour and overall appearance. Similarly, *Ayurveda* describes several factors that contribute to the maintenance of healthy complexion and skin radiance. In *Ayurveda*, this concept is described as *Varna*, which includes not only skin colour but also the natural glow, brightness, and vitality of an individual. *Ayurveda* explains that *Bhrajak Pitta*, located in the skin (*Twak*), plays a key role in maintaining healthy complexion and normal skin functions. As *Bhrajak Pitta* is considered an important factor responsible for maintaining *Varna*, this review mainly explores its role and its possible correlation with modern concepts of skin pigmentation and

melanin. In modern science, skin colour is mainly influenced by melanin, a pigment produced by melanocytes that helps protect the skin from ultraviolet (UV) radiation. This review explores the Ayurvedic concept of *Varna* and examines its relationship with *Bhrajak Pitta*, skin physiology, and melanin. A review of classical Ayurvedic texts and modern scientific literature suggests that *Bhrajak Pitta* and melanin perform similar functions in maintaining skin appearance and supporting skin health. However, *Varna* is a broader concept that represents not only pigmentation but also the radiance and well-being of an individual. By bringing together Ayurvedic principles and modern scientific knowledge, this review aims to

provide a better understanding of skin complexion and its underlying factors, while highlighting the need for further research in this area.

KEYWORDS: *Varna, Bhrajak Pitta, Twak, Melanin, Skin Pigmentation, Ayurveda.*

INTRODUCTION

The appearance of the skin is influenced by many factors, including its colour, texture, and natural shine. Since ancient times, healthy and radiant skin has been considered a reflection of good health. Therefore, understanding the factors responsible for skin complexion has always been an important area of study in both Ayurveda and modern science.

Ayurveda describes skin complexion through the concept of *Varna*. *Varna* is a broad term that signifies not only the colour of the skin but also its glow, clarity, and overall healthy appearance. According to Ayurvedic principles, the quality of *Varna* depends upon the proper functioning of various bodily factors. Among them, *Bhrajak Pitta*, which resides in the skin, is believed to play a significant role in maintaining complexion and supporting normal skin activities. Here we will mainly focus on *bhrajak pitta dosha*. *Pitta* is very essential entity as it is mainly concerned with the process of digestion. *Pitta dosha* has five subtypes i.e. *pachak pitta*, *ranjak pitta*, *bhrajak pitta*, *aalochak pitta* and *sadhak pitta*. *Bhrajak pitta* is one of a type of *pitta*. *Bhrajak pitta* as its name suggests that it is responsible for *bhrajan* i.e. providing lustre and natural colour to the skin. It has also been stated that it governs the normal and abnormal temperature of the body. According to *Sushruta* and *Vagbhat*, its main seat is *twacha* (skin) and its function include *bhrajan*, *pacahan* and for maintenance of *prakrit varna* (normal texture) of skin.

Modern science explains skin colour mainly on the basis of pigmentation. Melanin, a natural pigment produced by melanocytes, is primarily responsible for variations in skin colour. Besides determining pigmentation, melanin also helps protect the skin from environmental damage, especially ultraviolet radiation.

Although the concepts described in *Ayurveda* and modern science differ in terminology, both emphasize the importance of maintaining healthy skin. The role of *Bhrajak Pitta* in preserving *Varna* and the role of melanin in skin pigmentation show certain similarities that deserve scientific exploration. Understanding these concepts together may provide a broader view of skin complexion and its relationship with overall health.

- **Definition of Varna**

Varna (complexion) The term “*Varna*” stands for skin colour / complexion.^[1] *Varna* can be categorized as *prakrit* (natural) and *vaikrit* (abnormal). The *Prakrit varna* (natural/normal complexion) are *Krishna* (black), *Shyama* (brown), *Shyamavadat* (brown white) and *Avadat* (white) and the *Vaikrit Varna* (abnormal complexion) are *Nila*(bluish), *Shyav*, *Tamra* (coppery), *Harita* (green) and *Shukla* (albinotic).^[2]

Acharya Harita explains about an additional *Varna* i.e. *Pingala Varna* (*pitta+rakta*)⁽³⁾ that is of abnormal kind.

- **Importance of Varna**

In *Ayurveda*, *Varna* is much more than the colour of the skin. It represents the natural glow, radiance, clarity, and overall healthy appearance of an individual. *Ayurveda* considers the skin to be a mirror of internal health; therefore, a healthy complexion is often regarded as a sign of physical well-being, mental balance, and proper functioning of the body's physiological processes.

The quality of *varna* is influenced by the equilibrium of the three *doshas*-*Vata*, *Pitta*, and *Kapha*. When these doshas are balanced, the skin appears healthy, bright, and lustrous. Any imbalance may manifest as changes in complexion, such as dryness, dullness, redness, or pigmentation. Among the various factors responsible for maintaining skin health, *Bhrajaka Pitta*, a subtype of *Pitta* located in the skin, plays a crucial role in preserving its colour and radiance. *Ayurveda* also emphasizes the importance of proper digestion and metabolism in maintaining healthy *varna*. Efficient digestion ensures that nutrients are adequately absorbed and utilized by the body, providing nourishment to all tissues, including the skin. Consequently, well-nourished tissues contribute to a healthy and glowing complexion, whereas poor digestion and the accumulation of metabolic waste products may adversely affect skin appearance.

Another important determinant of *varna* is *ojas*, the essence of all body tissues and the basis of vitality, immunity, and strength. Individuals possessing good *ojas* often exhibit a natural radiance and attractive complexion, making healthy *varna* an outward sign of inner vitality and wellness. The condition of *varna* is also closely linked to mental and emotional health. Stress, anxiety, anger, and other negative emotions can influence skin appearance, while a

calm and positive state of mind promotes a healthy complexion. This highlights the intimate relationship between psychological well-being and skin health described in Ayurvedic literature.

Furthermore, lifestyle practices such as a balanced diet, adequate sleep, regular physical activity, and proper daily routines play a significant role in maintaining healthy *varna*. Thus, Ayurveda views *varna* as a holistic indicator of overall health, reflecting the combined influence of dosha balance, proper digestion, tissue nourishment, *ojas*, mental well-being, and healthy lifestyle practices. In this way, *varna* serves not merely as a measure of skin colour but as an important marker of an individual's overall state of health and quality of life.

❖ Factors Influencing Varna

1. Garbhaj Bhav

Acharya Charak opined Varna can be achieved from *Atmaj* (previous deeds of soul) and *Satmyaj* (habituation) *bhav* in the intrauterine life.^{[4]a}

But Acharya Sushrut said Varna is achieved from *Satmyaj bhav* And *Rasaj bhav*.^{[4]b}

2. Panchmahabhut

The foetus is *Panchabhautik* as per the *Shukra* and *Shonit* are *Panchbhautik*. *Teja dhatu* (*Agni*) is the chief causative factor for determination of complexion.^[5]

Acharya Dalhan opined that the *Avbhasini* which is the outermost layer, responsible for the illustration of various complexions like *Gaura* or *Shyama* and it illustrates five types of *Prabha* and *Chhaya* of the body with the presence of *Bhrajak agni* within this layer.^[6]

Along with the *Teja Mahabhuta* the predominance of other four *Mahabhuta* determine the skin complexion like. *Varna* (complexion) by *Sushrut and Charak*

$$1. \text{ Gaura} = T+J / T+J+A$$

$$2. \text{ Krishna} = T+P / T+V+P$$

$$3. \text{ Gaurashyam} = T+J+A$$

$$4. \text{ Krishnashyam} = T+P+A$$

$$5. \text{ Shyam} = T+A+V+J+P$$

(A-akash, J-jala, P-prithvi, T-teja, V vayu).

3. Sharir Dosha and Dhatu

Acharya Charak has explained *Tridosha* (*Vata*, *Pitta* and *Kapha*) in the state of equilibrium bestows *upachaya* (anabolism), *bala* (strength), and *varna prasada* (bright complexion) and its imbalance condition cause diseases.^[7]

Udana *vayu* present in the skin has function like *Bala* (strength), *Swara* (voice) and *Varna* (complexion)^[8]

The functions of balanced *Pitta dosha* are *Dehamardava* (softness) and *Prabha* (lustre) to the skin. *Prabha* is the radiance of the skin which is expressed from a distance. *Acharya Charak* has described that the *Rakta sara* individual have reddish and unctuous skin^[9]

The normal state of *Rasa*, *Rakta* and *Mansa dhatu* are responsible for a healthy skin.

4. Sharir Prakriti

At the time of Union of *Shukra* (sperm) and *Shonita* (ovum), the predominance *Dosha* determines someone's *Prakriti*. *Acharya Charak* explained the *Kapha* and *Pitta Prakriti* individual have fair/whitish complexion (*Avadat Varna*)^[10]

5. Colour of Shukra

The colour of foetus depends upon the colour of *Shukra* (semen). If the colour is like *ghritamanda* (*ghee*) then the colour of offspring will be fair (*Gaura*), if it is of colour of *taila* (oil), the offspring will be black (*Krishna*) and if the colour of semen is of the colour of *Madhu* (honey), the progeny will be bluish black or brown (*Shyam*).^[11]

6. Ahar and Vihar

Acharya Charak has explained intake of appropriate quantity of healthy food, certainly helps the individual in bringing about strength, complexion (*Varna*), happiness, longevity.^[12]

The diet of mother also influences the complexion of the progeny. Consumption of nutritious diet along with healthy lifestyle and good thoughts during pregnancy reassure the health of mother as well as the health of baby. Some *Acharya* say that the colour of foetus will be the same as the colour of the food the pregnant woman partakes.^[13]

Excessive intake of *Madhura rasa* (sweets) diet and *Jalakrida* (water spots) during pregnancy establishes *Gaura* (fair) *Varna* of the progeny. Excessive intake of *tila* (sesame) and *vidahi anna* (which causes burning sensation) responsible for *Krishna* (blackish) *Varna* and excessive intake of mix type of diet the progeny will be *Shyama* (bluish black or brown).^[14]

Acharya Charak opined, foetus gets nutrition from *ahara rasa* of mother through the *upsveda* (diffusion through uterine wall) and *upsneha* {through *Apara* (placenta)} during various periods of fetal life. The *Bala* (strength) and *Varna* (complexion) of the offspring depends upon the *ahara rasa* of mother.^[15]

Excessive intake of *kashaya rasa* (astringent) during pregnancy causes *Shyaba* (brownish) *Varna* and excessive use of *amla rasa* (sour) diet causes various skin disorders to the progeny.^[16]

7. Manas dosha

As Acharya Charak says the mind (*Mana/Chetas*) has permanent relationship with the skin. The other four senses (*indriya*) are situated in circumstance of skin. *Cheta* is one of the chief components participates at the time of attainment of the special sensations. So the unfavourable reaction of either of the senses influence the status of mind and the mind has permanent relation with the skin, so these conditions may affect the skin complexion. On the other hand, the mental state of mother during pregnancy can also influence the *Sattva*, *Rajas* and *Tamas* guna (characters of *Mana*) of foetus. *Charak Samhita* and *Ashtang Hridaya* have clearly accepted the role of *Manasa sthiti* of the pregnant woman on the complexion of the progeny. The thoughts of the mother will influence the three *Manas dosha*. These three characters further influences the *Panchabhautik* dominance (*Akash Mahabhut* is a predominance *Sattva*, *Vayu* is a predominance of *raja*, *Agni* is a predominance of *sattva* and *raja*, *Jala* is the predominance of *Sattva* and *Tama*, *Prithvi* is a predominance of *tamas* determines the complexion of the baby. Therefore, *Rupa* and *Varna* of the offspring will be in accordance with the thoughts of the pregnant woman.^[17]

8. Agni

Acharya Charak defines the function of *Agni* (status of digestion) is to provide *Varna* (complexion), *Bala* (strength), *Svasthya* (health), *Utsaha* (enthusiasm), *Upachaya* (plumpness), *Prabha* (glory), *Oja*, and *Teja* etc.^[18]

The word “*Bhrajak*” is derived from “*Bhraj*” *dhatu* which literally means *Prabha*. Acharya Dalhan opined *Agni* present in the *Twak* known as *Bhrajak agni*, present in the *Avbhasini* layer of skin is responsible for absorption of substances used in the form of *abhyanga* and *pariseka* etc. It also helps in the expression of *Chhaya* (shades and colour) and *Prabha* of the skin.^[19]

9. Oja

The essence (*Sar*) of all *Dhatu* is known as *Oja*. *Oja* can be compared with the strength (immunity) of the body. This strength (*Bala*) bestows the brightness of colour/complexion along with other functions. While describing symptoms of *Oja vyapat* there is description of discolouration of skin.^[20]

Acharya Charak also defines loss of complexion (*duchhaya*) is due to *Oja kshya* (loss)^[21] Hence the *Oja* present in body has role in the skin complexion. *Desa* The people living in northern part have fair (*gaura*) complexion, living in southern area have black (*krishna*) complexion and living in central region have brown (*shyam*) complexion.^[22]

TWAK (SKIN): AYURVEDIC PERSPECTIVE

Definition of Twak

Twak (skin) *Twakendriya* / *Sparsanedriya* is one among five *Gyanendriya* (sense organs).^[23]

Twak (skin) is the organ responsible for *Sparsha* (touch).^[24]

The *vishay* (objective) of *Twakendriya* is *Sprasha*.^[25]

Twakendriya alone permeates all the senses. It is permanently associated with the mind,^[26] while the mind is the *ubheyendriya* and has role towards perception of all special sensations. The synonyms used for *Twak* are *twacha*, *charma*, *dehachama*, *sharirvaranam*, *spashan*, *chavi*, *kruti*, *romabhumi*, *asrukdhara* and *chadani* etc.

Development of Twak

The union of *Shukra* (sperm) and *Shonita* (ovum) while being processed by heat, further development takes place and consequently seven layers of *Twak* (skin) come into existence just like formation of cream when milk is boiled.^[27]

While describing the monthly development of foetus *Acharya Charak* explained *Twakendriya* along with other senses are formed in the third month of intrauterine life.^[28] and the *Varna* (complexion) of the foetus become clear in sixth month of intrauterine life.^[29]

Layers of twak There are different opinions regarding layers of skin in *Ayurveda* texts. In *Sushrut samhita*, *Astanga Hridaya*, *Saranagdhara samhita* and *Bhavprakash samhita* there is description of seven layers of *twak*. But in *Charak samhita*, *Bhela samhita* and *Astanga Sangraha* there is report of six layers of *Twak*. These layers are described on the basis of thickness, their various functions and associated diseases.

Acharya Sushrut has described the first layer (outer most) as *Avbhasini*, it expresses all types of *Varna* (complexion) and illuminates the five kind of *Chhaya* (shades of colour). It measures about eighteenth parts of *vrihi* (paddy /rice grain). Other layers are *Lohita*, *Sweta*, *Tamra*, *Vedini*, *Rohini*, and *Mansadhara* from outside to inward.^[30]

But *Acharya Charak* has described there is six layers in *Twak*, namely *Udakadhara*, *Asrikdhara*, *Tritiya*, *Chaturthi*, *Panchami* and *Shasthi*.^[31] from superficial to deep.

❖ SKIN MORDEN PERSPECTIVE

- The skin is the largest organ of the human body, covering its entire external surface. It serves as a protective barrier and plays a vital role in maintaining overall health. The thickness of the skin varies in different regions of the body, ranging from approximately 0.5 mm on the eyelids to about 4 mm on the heels.
- Structurally, the skin consists of two main layers: the epidermis and the dermis. The epidermis is the outer, thinner layer composed primarily of epithelial tissue, while the dermis is the deeper layer made up of connective tissue. Beneath the dermis lies the hypodermis or subcutaneous tissue, which, although closely associated with the skin, is not considered a part of it.
- The epidermis is mainly composed of keratinocytes arranged in distinct layers representing different stages of cellular development. In most areas of the body, the: Epidermis the outer layer is divided into five layers:
 - 1) Stratum corneum
 - 2) Stratum lucidum
 - 3) Stratum granulosum
 - 4) Rete mucosum
 - 5) Cutis vere
- The deepest layer of rete mucosum after contains granules of pigment melanin, which occurs, in abundance, in coloured races. It is also produced in white races due to exposure to the sun. Melanin pigment is synthesized from the amino acid tyrosine, in the melanoblast cell found in the basal layer of epidermis. The colour of skin depends upon the distribution of melanoblasts, the melanin concentration and, perhaps, its state can be reduced from a black to tan form.
- In regions subjected to greater friction, such as the palms and soles, an additional layer known as the stratum lucidum is present, forming what is referred to as thick skin. The

epidermis is composed of four main types of cells: keratinocytes, melanocytes, Langerhans cells, and Merkel cells. Among these, keratinocytes are the most abundant, accounting for nearly 90% of all epidermal cells. These cells are arranged in multiple layers and are responsible for producing keratin, a tough structural protein that provides strength, protection, and waterproofing to the skin.

- Melanocytes make up about 8% of the epidermal cell population. They originate from the ectoderm during embryonic development and are primarily responsible for the production of melanin, the pigment that gives colour to the skin, hair, and eyes. Melanocytes possess long, branching extensions through which they transfer melanin-containing granules to neighboring keratinocytes.
- Melanin may appear yellow-red, brown, or black, depending on its type and concentration. It plays a crucial protective role by absorbing and scattering harmful ultraviolet (UV) radiation from sunlight, thereby helping to reduce skin damage and protecting underlying tissues from the harmful effects of excessive UV exposure.
- The skin is affected by various external factors, such as environment and routine care. Underneath the surface the skin is affected by more permanent factor the genes. Genetics are complicated by the fact that there is no specific skin gene-many genes work together to affect a single trait and many traits can be affected by a single gene. Genes have a significant influence on skin because skin is made up of so many proteins like Collagen, forms basic structure of the skin which gives it strength is a protein. So is melanin, which is the pigment gives the skin its colour.
- The structural basis of Skin colour Different human races have different skin complexions because of cultural, environmental, and biological differences. Melanin, carotene, and hemoglobin are three pigments that impact wide variety of color of skin.
- According to modern physiology, the skin in all animals perform these functions

1] Protection: The skin acts as the body's first line of defense against the external environment. It protects the underlying tissues and organs from physical injuries, harmful chemicals, microorganisms, and excessive water loss. The skin also prevents the entry of foreign substances and pathogens, thereby helping to maintain the body's overall health and integrity.

2] Sensory Function and Temperature Regulation: The skin serves as an important sensory organ, containing specialized receptors that detect touch, pressure, pain, vibration,

and temperature changes. These sensory signals help the body respond appropriately to the surrounding environment. In addition, the skin plays a crucial role in regulating body temperature through mechanisms such as sweating and changes in blood flow to the skin. By releasing heat through sweat and adjusting blood vessel dilation or constriction, the skin helps maintain a stable internal body temperature and supports normal physiological functioning.

3] Varna (Complexion): The skin is also responsible for the manifestation of *Varna* (complexion), which reflects the colour, radiance, and overall appearance of the body. In Ayurveda, healthy *Varna* is considered an indicator of balanced *doshas*, proper nourishment of tissues, and good overall health.

- **Pitta**

Pitta is second dosha which is responsible for physical and chemical changes in our body. The *Pitta Dosha* is considered as the alternate number in the *Dosha* trio after *Vata Dosha*. The term *Pitta* deduced from the root which means to heat, to burn or to warm. *Pitta* is having the predominance of *Agni Mahabhuta*.^[32]

Charaka Acharya has mentioned that the *Agni* which is located in the *Pitta Dosha* gives rise to dangerous or favourable consequences when it's in abnormal or normal condition independently.^[33]

- **Sthana of Pitta**

They are *Nabhi* (umbilicus), *Aamashaya* (stomach), *Sweda* (sweat), *Lasika* (serum), *Rudhir* (blood), *Rasa*, *Drik* (eyes), *Sparshanedriya* (skin)^[34]

Pitta has *Aalochak*, *Ranjak*, *Sadhak*, *Pachak* and *Bhrajak* five subtypes.^[35]

According to *Arundatta*, *pachan* of *lepan dravya*, *abhynga dravya* etc. is carried out by *Bhrajak Pitta*.^[36]

There are five types of *Pitta* named according to the functions. They're *Pachaka*, *Ranjaka*, *Sadhaka*, *Alochaka* and *Bhrajaka*.^[37]

- **Physiological functions of Pitta**

Charak Samhita Darshan (visual acuity) *Pachan* (digestion), maintenance of skin temperature, hunger, thirst, smoothens the skin, provide lustre to the skin.^[38]

Sushruta Samhita Ras Ranjan, *Pachan* (digestion), *Roopa darshan* (visual acuity), development of *Medha* (intelligence), development of heat.^[39]

Ashtang Sangraha Heat generation, thirst, hunger, provide lustre, happiness, visual acuity, intelligence.^[40]

Ashtang Hridya Pachan (digestion), heat generation, visual acuity, thirst, hunger, intelligence.^[40]

• Types of Pitta

	Pitta Bheda	Location	Karma (functions)
1	<i>Ranjak pitta</i>	<i>Yakrit, pliha(su), aamashya (va), hridya (sha)</i>	<i>Rasdhātu ranjan</i>
2	<i>Pachak pitta</i>	<i>Pakvashya aamashya Madhya Rasdhātu ranjan (su and va) agnashya (sha)</i>	<i>Dehen, pachan, saar, kitta vivechanang</i> providing strength to other subtypes of <i>pitta</i> .
3	<i>Aalochak pitta</i>	<i>Drishti</i> (visual acuity)	<i>Rupa</i> and <i>gyan darshan</i>
4	<i>Sadhak pitta</i>	<i>Hridya</i>	<i>Budhi, medha, abhiman, utsah</i> and <i>abhipretarth</i> (<i>dharma, artha, kaam, moksha sadhan</i>)
5	<i>Bhrajak pitta</i>	<i>Twacha</i>	<i>Prakashan</i> of <i>twacha, abhyang, parishek, aalepan, pachan</i> and <i>chaya prakashak</i> .

• Bhrajak Pitta - Ayurvedic aspect

This is one of five subtypes of pitta which resides in skin and do *bhrajan* (provide lustre) to the skin. Skin is the main site of *bhrajak pitta*.

Out of five subtypes *Bhrajak Pitta* is located in the skin. Main function of *Bhrajak Pitta* is to maintain colour and lustre of skin.^[42]

Sthan (site) of Bhrajak Pitta^[43]

Avbhasini which is the first layer of skin is the main site where *bhrajak pitta* resides.

Aacharya Sushruta, Bhela and *Vagbhata* have mention separate types of *Pitta*. According to *Sushruta*, the *pitta* is located in the skin is called as *Bharjakagni*.^[44]

Bhrajaka Pitta which is responsible for the production of “*Bha*” (complexion) of skin is called as *Bhrajaka*. It's mentioned that the production of normal and abnormal temperature of the body as well as normal and abnormal colour of the skin which is mentioned as among the functions of *Pitta* are attributed to *Bhrajaka Pitta*, According to *Bhel samhita*, *Bhrajak Pitta* produce different *Prabhas* (shades) of the head, hands, feet, sides, back, abdomen, thighs, face, nails, eyes and hair it also brighten them.^[45]

Aacharya chakrapani in his commentary has stated that regulation of body heat and variation in colour of body are the functions of *Bhrajak Pitta*.^[46]

It may be stated that *Bhrajak pitta* may represent the factor which are responsible for the colour of skin and other structures. position of *Bhrajak Pitta*, according to *Sushruta* the skin has seven layers viz. *Avabhasini* which is a first layer and it reflect all colour.^[47]

Charaka while enumerating the six layers of skin has named the first two only *udakadhara* and *asrugdhara* which can be included as a place of *Bhrajak Pitta*.^[48]

Vagbhata described 7 layers of skin but has not named them.^[49]

➤ Functions of Bhrajak Pitta

- Provide complexion to the skin.
- *Sneha pachan*.
- *Prakashan* (establishment) of *chaya* (aura) and *prabha* (lusture).

❖ According to *Sushruta*^[50]

The pitta which resides in the skin is known as *bhrajakagni* and it digests the *dravyas* used for various *panchkarma* therapies like *abhyang*, *sechan*, *avgahan* and *aalepanadi* applied over skin.

❖ According to *Ashtang Sangraha*^[51]

Bhrajak pitta resides inside skin. It provides complexion and lusture to the skin. Helps in digestion of various *panchkarma* therapies applied over skin and responsible for establishment for *chaya* (aura).

❖ According to *Ashtang Hridaya*^[52]

The pitta which resides in outermost layer of skin (*avbhasini twacha*) is *bhrajak pitta*. It provides complexion to the skin.

❖ According to *Aacharya Sharangdhar*^[53]

Sharangdhar has mentioned in *purva khand* 5th chapter that the pitta which resides in skin, provides complexion and which do digesion of *dravyas* used in *lepa*, *abhyang* etc is known as *bhrajak pitta*.

• Physiology of Bhrajak Pitta

In *Ayurveda*, *Bhrajak Pitta* is the subtype of *Pitta* that resides in the skin and is responsible for many of its important functions. It acts as the metabolic force of the skin, helping to maintain its health, appearance, and normal physiological activities.

Bhrajak Pitta plays a key role in maintaining the varna (complexion), lustre, glow, and softness of the skin. When it remains in a balanced state, the skin appears healthy, radiant, and attractive. Any disturbance in *Bhrajak Pitta* may lead to alterations in skin color, texture, and overall appearance.

Another important function of *Bhrajak Pitta* is the absorption and transformation of substances applied externally to the skin, such as medicated oils, herbal pastes, and Panchakarma therapies. This property helps the skin utilize these substances effectively and enhances their therapeutic action.

Bhrajak Pitta is also involved in the various metabolic processes occurring within the skin. These processes help maintain proper nourishment of the skin and support its natural glow and complexion. In addition, *Bhrajak Pitta* contributes to the regulation of body temperature, thereby helping the body adapt to environmental changes and maintain thermal balance.

Bhrajak Pitta is closely associated with the production of Sweda (sweat). By stimulating the activity of sweat glands, it promotes sweating, which helps regulate body temperature and keeps the skin soft and moisturized.

Therefore, *Bhrajak Pitta* is considered an essential factor in maintaining healthy skin. It influences skin complexion, radiance, temperature regulation, and various metabolic activities, thereby contributing to overall health and well-being.

- ***Bhrajak Pitta* - Modern Perspective**

According to modern science, the skin's outermost layer is the epidermis, which contains cells responsible for producing skin pigment. Melanin, the pigment that gives colour to the skin, is produced by specialized cells called melanocytes. The amount of melanin present in the skin largely determines an individual's complexion. Greater melanin production leads to a darker complexion, whereas lower melanin levels result in a lighter complexion.

Sunlight plays an important role in stimulating melanin synthesis. As a protective response to ultraviolet (UV) radiation, the skin increases melanin production when exposed to sunlight. Therefore, people living in regions with greater sun exposure, especially near the equator, generally have higher melanin levels than those living in colder regions with less sunlight.

This close relationship between heat, sunlight, and melanin production provides a basis for understanding skin pigmentation from an Ayurvedic perspective. Since *Bhrajak Pitta* is responsible for maintaining skin complexion (*Varna*), radiance, and metabolic activities within the skin, the process of melanin formation and its influence on complexion may be considered a modern physiological correlate of *Bhrajak Agni*.

- **Structural Basis of Skin Colour**

Skin colour varies among individuals due to genetic, biological, and environmental factors. It is mainly determined by three pigments: melanin, carotene, and haemoglobin. Melanin is the primary pigment responsible for skin complexion, while carotene contributes a yellowish tone and haemoglobin gives the skin a pinkish or reddish appearance. The combined effect of these pigments produces the natural variations in human skin colour.

- **Melanocytes**

A melanin forming cell found in the skin. They produce melanin by the process known as melanogenesis. It leads to long lasting pigmentation of skin. Lighted skin people have low basal level of melanogenesis. The purpose of melanogenesis is to protect the hypodermis, the layer under the skin. Tyrosine is required for melanocytes to produce melanin from the amino acid tyrosine. On exposure to UV rays UV rays' exposure cause increase production of melanocytes, thus increasing concentration of melanin. Melanin protects the skin from UV rays from the sun.

- **Melanin**

Melanin is formed by melanoblasts which are present normally, in the basal layer of epidermis and dermis.

- **Composition of melanin**

The exact chemical composition is not known but, it is generally believed to be a polymer of tyrosine. The melanin producing cells contain an enzyme dopa oxidase. Which, in the presence of di-hydroxy phenylalanine, produces a dark cytoplasmic colour reaction. The number and distribution of melanin producing cells of the body vary from individual to individual and they are genetically determined. Frequently, there is a congenital absence of these cells in various regions of the body, resulting in splotchy areas of depigmentation known as vitiligo. Occasionally there is a total absence of melanoblasts in the skin, resulting in the production of albinism.

- **Role of melanin**

The amount of melanin causes the skin's colour to vary from pale yellow to reddish brown to black. The number of melanocytes is about the same in all people but the difference in skin colour, mainly due to the amount of pigment the melanocytes produce and transfer to keratinocytes. Melanocytes synthesize melanin from the amino acids tyrosine in the presence of an enzyme called tyrosinase. Synthesis occurs in an organelle called a melanosome.

Exposure to UV light increases the enzymatic activity within melanosomes and thus increases melanin production. Both amount and darkness of melanin depends upon UV exposure. It implies the people live near the equator, in tropical areas with intense sunlight like Australia, Melanesia, South Asia, and Africa have dark skin and the area away from the equator generally closer to pole have a lower concentration of UVR, so they have light skin complexion. Migration from one place to other also affects the complexion depending upon the intensity of UV radiation in that particular area. Modern medical science also favours on the concept of *Desa* (place) on *Varna*. On the other hand, melanoblasts (or dendritic cells) of the epidermis and the nervous system has same embryological origin from the neural crest so the factors which affect the nervous system may affect the skin.

- **Role of haemoglobin**

Dark skinned individuals have large amounts of melanin in the epidermis. But light skinned individuals have little melanin in the epidermis. Thus, the epidermis appears translucent and skin colour ranges from pink to red depending on the oxygen content of blood moving through capillaries in the dermis. The dermis houses an extensive network of blood vessels that carry 8-10% of the total blood flow in a resting adult. The red colour is due to haemoglobin, the oxygen carrying pigment in red blood cells.

- **Role of carotene**

Carotene is a yellow-orange pigment that gives egg yolk and carrots their colour. This precursor of vitamin A, which is used to synthesize pigments needed for vision. So much carotene intake may be deposited in the skin after eating large amounts of carotene-rich foods that the skin actually turns orange, which is usually apparent in light skinned individuals. The colour of skin mainly depends upon the pigment melanin and MSH (melanin stimulating hormone) secreted from the pituitary. Melanocytes located in abundance between the dermis

and epidermis of the skin, MSH stimulates formation of the black pigment melanin from the melanocytes and disperses it to the epidermis.^[54]

• Relation of Stress with ACTH, Cortisol, and Skin Complexion

Physical and mental stress stimulate the release of ACTH from the pituitary gland, which in turn increases cortisol secretion. ACTH is derived from proopiomelanocortin (POMC), a precursor that also gives rise to melanocyte-stimulating hormone (MSH). Increased MSH stimulates melanocytes to produce more melanin, influencing skin pigmentation.

At the same time, elevated cortisol levels can slow skin cell turnover, leading to the accumulation of dead skin cells and a dull appearance. Stress also reduces blood flow to the skin, decreasing the supply of oxygen and nutrients. As a result, prolonged stress can negatively affect skin complexion, making the skin appear pale, tired, and less radiant.^[55]

• Correlation of Varna, Bhrajak Pitta, and Melanin

According to *Ayurveda*, *Varna* represents the natural complexion, radiance, and healthy appearance of the skin. The maintenance of *Varna* is primarily governed by *Bhrajak Pitta*, which is responsible for skin colour, lustre, and various metabolic activities occurring in the skin. From a modern perspective, melanin is the main pigment responsible for skin colour and is produced by melanocytes in the epidermis. The amount and distribution of melanin determine an individual's complexion.

A correlation can be drawn between *Bhrajak Pitta* and melanin, as both play an important role in determining skin colour and appearance. While *Bhrajak Pitta* maintains healthy *Varna* through its metabolic functions, melanin contributes to skin pigmentation biologically.

<i>Bhrajak Pitta</i>	Melanin
Responsible for <i>Varna</i>	Responsible for Skin Colour
Located in <i>Twak</i>	Produced by Melanocytes in Epidermis
Gives <i>Prabha</i> and <i>Tejas</i>	Provides Pigmentation and Photoprotection
Influenced by <i>Dosha</i>	Influenced by Hormones and Genetics
Maintains healthy complexion	Maintains skin pigmentation

• DISCUSSION

Varna in *Ayurveda* refers not only to skin colour but also to the natural glow, radiance, and healthy appearance of the skin. It reflects the overall status of *Doshas*, *Agni*, *Dhatus*, *Ojas*, and mental well-being. Normal complexion (*Prakrit Varna*) is influenced by hereditary,

nutritional, environmental, and psychological factors, while abnormal changes in complexion (*Vaikrit Varna*) may occur due to disease, stress, or *Dosha* imbalance.

Bhrajak Pitta, located in the skin, is responsible for maintaining *Varna* and *Prabha*. From a modern perspective, melanin is the primary pigment responsible for skin colour. Since both *Bhrajak Pitta* and melanin play a key role in determining complexion, melanin may be considered a physiological correlate of the pigmentation-related functions of *Bhrajak Pitta*.

While modern science explains skin colour mainly through melanin production, genetics, and environmental factors, Ayurveda provides a broader understanding by considering the influence of *Doshas*, *Agni*, diet, lifestyle, and mental health. Thus, correlating, *Varna Bhrajak Pitta* and melanin helps bridge Ayurvedic and modern concepts and enhances the understanding of skin pigmentation and overall skin health.

• CONCLUSION

Varna is a multidimensional Ayurvedic concept that represents not only skin colour but also the glow, radiance, and overall health of the skin. Its formation begins during intrauterine life and is influenced by genetic factors, *Mahabhuta* predominance, maternal diet and mental status, and continues to be modified after birth by factors such as *Dosha* balance, *Agni*, *Ojas*, diet, lifestyle, season, geographical location, and sun exposure.

Bhrajak Pitta, located in the skin, plays a vital role in maintaining complexion and regulating skin metabolism. Modern science attributes skin pigmentation primarily to melanin produced by melanocytes under the influence of various factors, including melanocyte-stimulating hormone (MSH). Since both *Bhrajak Pitta* and melanin are involved in determining skin colour and are influenced by heat and environmental factors, their functions show notable similarities. Although they are not identical entities, melanin may be considered a physiological correlate of the pigmentation-related functions of *Bhrajak Pitta*.

Thus, correlating the Ayurvedic concepts of *Varna* and *Bhrajak Pitta* with the modern understanding of melanin provides an integrative perspective on skin complexion and contributes to a better understanding of skin health and pigmentation.

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