

“KULAJA VARNOTPATTI IN AYURVEDA AND MODERN SCIENCE” A REVIEW

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ABSTRACT

The color, appearance and texture of the skin are known as complexion. *Varna* is attributed to complexion which is important biologically, cosmetically and socially. *Varna* in Ayurveda doesn't only mean to complexion but it includes a broader aspect of parameters necessary for a healthy skin. The concept of *Varna* has been described very well in *Ayurveda*. This *Varna* is affected by many factors of human life. In *Ayurveda*, a concept for *Varna* is *Kulaja*~ heredity also described. According to modern science, the main pigment is other factor like haemoglobin, carotene, hormonal influence and environmental factors should be mentioned in literature. In some study, it found that melanin pigment formation also depends on genes.

Keywords: *Varna*, *Kulaja*, Melanin, Genes

INTRODUCTION

In *Ayurveda*, some of theories are described for color formation. These are-

1. Theory of *Agni*
2. Theory of *Mahabhuta*
3. Theory of *Shukra*
4. Theory of *Ahara* and *Vihara*
5. Theory of *Bhrajaka Pitta*
6. Effect of *Kula in varnotpatti*

1. Theory of *Agni*:

Susruta said that *Tejo-Dhatu* is responsible for all color.¹ He has given an example that different colors are formed as if when milk is heated and it gradually changes the color.

Similarly, due to *Paka Kriya*, previous color is given up and new color is formed. *Paka Kriya* is described as phenomenon due to the contact of *Agni*. Therefore, *Agni* which is responsible for *Paka* is the main cause of transformation of color.

2. Theory of *Mahabhuta*:

According to *Sushruta*, the *Tejo-Dhatu* (fiery principle) of the organism, which is originator of all colors of the skin (complexion), happening to mix largely with the watery principle of the body at the time of conception, serves to make the child a fair complexioned

one (*Gaura Varna*); mixed with a large quantity of the *Prathivi Mahabhuta* (earth) of the body, it makes the child a dark complexioned one (*Krishana Varna*). In combinations with a large quantity of earth and ethereal principle of the organism, it imparts a dusky (*KrishanShyama*) complexion (to the full developed foetus) a similar combination of watery and ethereal principle serve to make the child dusky yellow (*Gaura Shyama*).² According to *Charaka* the *Agni Mahabhuta* when associated with *Jala* and *Akasha Mahabhuta* also produce *Avadata* (white) complexion. Associated with *Prithivi* and *Vayu* it produces *Krishna* (black) complexion and with all the *Mahabhuta* in equal proportion, it produces *Shyama* complexion.³

3. Theory of *shukra*:

Acharya Vridha Vagabhata said that the color of *Shukra* determines the skin color of child. If color of *Shukra* is *Shukla* or *Ghritha-Mandhabha Varnat* than skin color is *GauraVarna*. If color of *shukra* is *Taila Varna* than skin color is *Krishna Varna*. If color of *Shukra* is *Madhu Varna* than skin color is *ShyamaVarna*.⁴

4. Theory of *Ahara* and *Vihara*:

Other on the contrary says that the complexion of the child is determined by the colors of the food taken by its mother during the period of gestation.⁵ the dominancy of the *Dosha* depends upon the *Ahara* taken by pregnant women. The quality of the *Ahara* depends upon *Mahabhautika* constitution. *Ahara* has impact on the *Dosha* and *Dosha* have impact on color formation. *Charaka* said that if an eight month pregnant women take the combination of *Kshira+Ghee+Yavagu*, then the color of the skin will be Reddish-brown or

yellowish-brown. So, if the quality of *AharaisKaphaVardhakathen* the color of the skin will be white.⁶

5. Theory of *BhrajakaPitta*-

The *Bhrajakagni*: The *Pitta*, which has its seat in the skin, is called the *Bhrajakagni* (illuminating or irradiating heat) inasmuch as it absorbs the substances used in the shape of unguents, lubrication, etc. and irradiate the glow of one is natural complexion.⁷

6. Effect of *Kulaja in Varnotpatti*:

According to *Vagbhatacharya*, the color of the child will be different even in accordance with the *Desa* (region), *Kula* (race) and *Anuvritti*(occupation).⁸ *AcharyaGhanekar* explaining *Varna* according to *Kula* stated that their *Ahara* as main causative factor. Any person either Europeans or Chinese or Japanese, stay in any country, if possible they do not change their diet. It is obvious that their saplings are having the same kind of *Varna* as their parents have. For instance, that of the Negroes are having darker complexion, that of Chinese or Japanese are having yellowish complexion and that of Europeans have fairer. In India, also, *Varna* differs among particular races, *Momedians* and *Brahmans* have fairer complexion, while some other races have the darker one. This shows the uniqueness of color due to genetic factor.⁹

In modern science gene effect on melanin described for color formation-

Melanin and genes¹⁰-Melanin is produced by cells called melanocytes in a process called melanogenesis. Melanin is made within small membrane bound packages called melanosomes. As they become full of melanin, they move into the slender arms of melanocytes,

from where they are transferred to the keratinocytes. Under normal conditions, melanosomes cover the upper part of the keratinocytes and protect them from genetic damage. One melanocyte supplies melanin to thirty-six keratinocytes according to signals from the keratinocytes. They also regulate melanin production and replication of melanocytes. People have different skin colors mainly because their melanocytes produce different amount and kinds of melanin.

The genetic mechanism behind human skin color is mainly regulated by the enzyme tyrosinase, which creates the color of the skin, eyes, and hair shades. Differences in skin color are also attributed to differences in size and distribution of melanosomes in the skin.¹² Melanocytes produce two types of melanin. The most common form of biological melanin is eumelanin, a brown-black polymer of dihydroxyindole carboxylic acids, and their reduced forms. Most are derived from the amino acid tyrosine. Eumelanin is found in hair, areola, and skin, and the hair colors gray, black, blond, and brown. In humans, it is more abundant in people with dark skin. Pheomelanin, a pink to red hue is found in particularly large quantities in red hair, the lips, nipples, glans of the penis, and vagina.

Both the amount and type of melanin produced is controlled by a number of genes that operate under incomplete dominance. One copy of each of the various genes is inherited from each parent. Each gene can come in several alleles, resulting in the great variety of human skin tones. Melanin controls the amount of ultraviolet (UV) radiation from the sun that penetrates the skin by absorption. While UV radiation can assist in the produc-

tion of vitamin D, excessive exposure to UV can damage health.

Dark skin- All modern humans share a common ancestor who lived around 200,000 years ago in Africa. Comparisons between known skin pigmentation genes in chimpanzees and modern Africans show that dark skin evolved along with the loss of body hair about 1.2 million years ago and that this common ancestor had dark skin. Investigations into dark skinned populations in South Asia and Melanesia indicate that skin pigmentation in these populations is due to the preservation of this ancestral state and not due to new variations on a previously lightened population.

MC1R- The melanocortin 1 receptor (MC1R) gene is primarily responsible for determining whether pheomelanin and eumelanin is produced in the human body. Research shows at least 10 differences in MC1R between African and chimpanzee samples and that the gene has probably undergone a strong positive selection (a selective sweep) in early Hominins around 1.2 million years ago. This is consistent with positive selection for the high-eumelanin phenotype seen in Africa and other environments with high UV exposure.

Light skin- For the most part, the evolution of light skin has followed different genetic paths in European and East Asian populations. Two genes however, KITLG and ASIP, have mutations associated with lighter skin that have high frequencies in both European and East Asian populations. They are thought to have originated after humans spread out of Africa but before the divergence of the European and Asian lineages around 30,000 years ago, two subsequent genome-wide association studies

found no significant correlation between these genes and skin color, and suggest that the earlier findings may have been the result of incorrect correction methods and small panel sizes, or that the genes have an effect too small to be detected by the larger studies.

KITLG- the KIT ligand (KITLG) gene is involved in the permanent survival, proliferation and migration of melanocytes. A mutation in this gene, A326G (rs642742), has been positively associated with variations of skin color in African-Americans of mixed West African and European descent and is estimated to account for 15–20% of the melanin difference between African and European populations¹¹. This allele shows signs of strong positive selection outside Africa and occurs in over 80% of European and Asian samples, compared with less than 10% in African samples.

ASIP- Agouti signaling peptide (ASIP) acts as an inverse agonist, binding in place of alpha-MSH and thus inhibiting eumelanin production. Studies have found two alleles in the vicinity of ASIP are associated with skin color variation in humans. One, rs2424984[39] has been identified as an indicator of skin reflectance in a forensics analysis of human phenotypes across Caucasian, African-American, South Asian, East Asian, Hispanic and Native American populations and is about 3 times more common in non-African populations than in Africa. The other allele, 8188G (rs6058017) is significantly associated with skin color variation in African-Americans and the ancestral version occurs in only 12% of European and 28% of East Asian samples compared with 80% of West African samples.

A person's natural skin color affects their reaction to exposure to the sun. Generally, those who start out with darker skin color and more melanin have better abilities to tan. Individuals with very light skin and albinos have no ability to tan.¹²

There are two different mechanisms involved. Firstly, the UV radiation creates oxidative stress, which in turn oxidizes existing melanin and leads to rapid darkening of the melanin, also known as IPD (immediate pigment darkening). Secondly, there is an increase in production of melanin known as melanogenesis.¹³

CONCLUSION

After studying the above facts, it seems that Complexion of a person is influenced by various factors. According to modern medical science also skin color in human beings is affected by many factors although the most important substance is the melanin pigment. Melanin is produced in the skin cell called melanocytes and it is the main determinant of the skin color of darker skinned humans. Gene MC1R produces more eumelanin and skin will be darker in South Africa. Two genes however, KITLG and ASIP, have mutations associated with lighter skin. After studying all these facts, in modern science gene effects have been reported in melanin formation. In Ayurveda color formation is described by various theories like *Mahabhuta*, *Shukra* etc. In these theories effect of *kulas* in color formation is also very important and the color of the child will be different even in accordance with the *Desa*, *Kula*, *Anuvritti* and *Ahara*.

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