Review Article

www.ijrap.net

(ISSN Online:2229–3566, ISSN Print:2277–4343)

# A REVIEW ON PALITYA AND DHATRYADI RASAYANA

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Received on: 24/04/23 Accepted on: 22/05/23

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**DOI: 10.7897/2277-4343.140390**

**ABSTRACT**

Hair is a valuable anatomical structure of the body, having cosmetological and sociological importance in drafting the beauty and personality of an individual. Greying of hair represents the sign of ageing known as Palitya in Ayurveda. But when hair starts greying before the usual age of onset, known as premature greying of hair. Premature hair greying is called Akalaja Palitya, which occurs due to various factors resulting in the vitiation of Pitta dosha. Due to mankind's hectic, sedentary and busy schedule, the current scenario is witnessing several challenges, and premature greying of hair is one among them. Premature hair greying has multifactorial aetiology, including oxidative stress, nutritional deficiency, smoking, and dysfunctional thyroid hormones, but the exact aetiology is still unknown. Acharyas have mentioned various rasayana for preventing and treating premature hair greying, i.e., Akalaja Palitya. Rasayana therapy aims primarily to promote the strength and vitality of the body. It also helps maintain the integrity of sapta dhatus (fundamental structural component) by improving digestive power resulting in the sound production of successive dhatus and their malas. Dhatryadi rasayana is a polyherbal formulation consisting of three ingredients, i.e., Dhatri (*Emblica officinalis* Gaertn.), Bhringraj (*Eclipta alba* Hassk.) and Tila (*Sesamum indicum* Linn.). All three plants have the keshya property. *Emblica officinalis* Gaertn. and *Sesamum indicum* Linn. both act as a 5α-reductase inhibitor. *Eclipta alba* Hassk. stimulates the proliferation of follicular keratinocytes by downregulating the TGF-β1 (Transforming Growth Factor Beta 1) expression. Furthermore, all ingredients of Dhatryadi rasayana have antioxidant properties and contribute to essential nutritional supplements required for proper hair development and growth.

**Keywords:** Premature hair greying, Palitya, Dhatryadi Rasayana, Ayurveda

## INTRODUCTION

Greying, depigmentation or failure of pigmentation of hair has been variously referred to as "achromotrichia", "achromachia", and "canities," which is a physiological and age-related phenomenon. When greying begins before the usual age of onset, it is termed premature canities. Hair is said to grey prematurely when it occurs before age 20 in whites, 25 in Asians and 30 in Africans.[1] The colour of human hair is due to the pigment melanin produced by melanocytes which are neural crest derivatives. Melanocytes are situated in the bulb of the follicle, where they transfer melanin to cortical keratinocytes of the hair shaft, thus defining the hair pigmentation unit.[2] The large variety of hair colour results from variable amounts and mixing of different melanin, specifically eumelanin and phaeomelanin, in the hair cortex. Eumelanin is responsible for the black and brown colour of skin, eyes and hair. Phaeomelanin is a reddish-yellow sulfur-containing melanin pigment that imparts a range of yellowish to reddish colours. Melanogenesis in the hair is closely associated with phases of the hair cycle. There are four phases of hair growth, namely anagen (growing phase), catagen (regressing phase), telogen (resting phase) and exogen (shedding phase), each with a distinct duration.

As per the Ayurvedic view, greying of hair is termed Palitya, a type of kshudra Roga (minor disease). There are two types of Palitya; Akala Palitya (premature grey hair) and Kala Palitya (senile grey hair). Akala Palitya (premature grey hair) is rasapradoshaja vyadhi [3] (diseases due to vitiated rasa), as skin and hair reflect rasa dhatus status. Akala Palitya occurs mainly due to the aggravation of Pitta dosha, especially Bhrajaka Pitta (Pitta for the complexion). Bhrajaka Pitta provides natural colour to our skin and hair seated in the superficial layer of skin (avabhasini). A disproportion in Bhrajaka Pitta leads to inadequate production of melanin, which in turn results in premature greying of hair. Acharya Vagbhata has mentioned that rasayana (rejuvenation therapy) can be prescribed for treating Palitya.[4] Dhatryadi rasayana is one of the polyherbal rasayana incorporating three ingredients: Dhatri (*Emblica Officinalis* Gaertn.), Bhringraj (*Eclipta alba* Hassk.) and Tila (*Sesamum indicum* Linn.). This Rasayana revitalises the human body, helps inhibit premature greying of hair and provides long, strong, shiny and black hair.

### Samprapti (Pathogenesis) of Palitya

Greying of hair is known as Palitya, which is considered kshudra roga by various acharyas. Shoka (excessive grief), shrama (overwork) and krodha (anger) all these factors result in the vitiation of dehoshma (body heat). This ushma (heat), along with

Pitta dosha accompanied by other doshas, enters toward the shirah (head) and ultimately results in Palitya. [5,6]

**Probable pathogenesis for premature greying of hair (PGH)**

Premature greying of hair has been considered a multifactorial aetiology that includes genetic components, environmental factors, nutritional deficiency, smoking and oxidative stress etc., but the exact pathogenesis is still not known.

**Oxidative stress:** Anagen phase involves tyrosine hydroxylation and dihydroxyphenylalanine oxidation to melanin causing enormous accumulative oxidative stress.[7] Oxidative stress is generated by various environmental and endogenous challenges such as ultraviolet (UV) rays, pollution, emotional factors or inflammatory causes etc. Furthermore, experiments also demonstrated that exogenous oxidative stress increases melanocyte apoptosis in the hair follicles.[8] An experiment was conducted on mice which manifested that superoxide radicals, generated by the interaction of UV-A light with the sensitiser, initiated the formation of secondary products with well-known DNA damaging effects as well as oxidative damage to hair follicles resulting in greying of hair.[9]

**Nutritional deficiency:** A study revealed that deficiency of serum ferritin, calcium, and Vitamin $D_3$ levels is closely associated with premature hair greying. [10] Another study exhibited the association between zinc deficiency and canities, illustrating that zinc homeostasis is essential for optimal melanogenesis.[11] Vitamin $B_{12}$ deficiency can cause premature greying of hair (PGH) through an unknown mechanism. A study displayed an association between the early greying of hair and pernicious anaemia.[12]

**Smoking:** Smoking has been deliberated as an etiological agent in the premature greying of hair; there was a significant correlation between smoking and premature hair greying.[13-16]

**Dysfunctional thyroid hormonal:** Decreased thyroid hormones cause premature greying, alopecia, and changes in hair morphology. Thyroid hormones $T_3$ and $T_4$ act on hair follicles directly to increase melanogenesis.[17]

**Probable mode of action of Dhatryadi rasayana in Palitya or Premature greying of hair**

Acharya Charaka delineated that an ideal rasayana (rejuvenator) provides longevity, enhances memory and intellect, bestows wellness, provides youthfulness, improves the lustre of the body, tones the voice and speech, escalates the acuity of all the sensory and motor organs, capability over phonetics, provide fair complexion and prevent diseases thereby help an individual to lead an energetic life.[18] Dhatryadi rasayana is one of the polyherbal formulations consisting of three ingredients: Dhatri (*Emblica officinalis* Gaertn.), Bhringraj (*Eclipta alba* Hassk.) and Tila (*Sesamum indicum* Linn.). It is depicted in classical texts such as Chakradutta[19], Bhaishajya Ratnavali[20], Rasa Kamadhenu[21], Vrindamadhava or Siddha yoga[22], and Yoga Ratnakara[23]. Rasayana therapy aims especially at promoting the strength and vitality of the body. It has been stated as a measure to contribute excellency and maintain the integrity of sapta dhatus (fundamental structural component). Rasayana drugs improve digestive power. Thus, the proper production of rasadi dhatus takes place, which in turn helps in the sound production of the successive dhatus (fundamental body tissue) along with their malas (by-products resulting from physiological and metabolic activities). According to Acharya Charaka[24] and Acharya Sharangdhara[25], hair is the by-product of asthi (bone) dhatu and updhatu (supportive structural component) of majja (bone marrow), respectively. All the ingredients of Dhatryadi rasayana have keshya property. Keshya word suggests that the formulation is helpful in keshavardhana (promotes hair growth) and kesharanjana (provides dark black colour to hair) as well as provides proper nourishment. All these factors result in the cessation of premature greying of hair, i.e., Palitya.

**Table 1: Rasa Panchaka (Ayurvedic Pharmacological principles) of Dhatryadi rasayana**

| Ingredients | Rasa (Taste) | Guna (Quality) | Virya (Potency) | Vipaka (Post digestive state) | Karma (Pharmacological actions) |
|---|---|---|---|---|---|
| ***Emblica officinalis* Gaertn.**[26] | Amla (sour), Madhura (sweet), Kashaya (Astringent), Tikta (bitter), Katu (pungent) | Guru (heaviness), Ruksha (dryness), Sheeta (coldness) | Sheeta (cold) | Madhura (sweet) | Rasayana (rejuvenating), keshya, dipana (appetising action), anulomana (ordinary course of movement), medhya (nootropic), balya (increasing strength), tridoshahara |
| ***Eclipta alba* Hassk.**[27] | Katu (pungent), Tikta (bitter) | Ruksha (dryness), Tikshna (sharpness), Laghu (lightness) | Ushna (hot) | Katu (pungent) | Rasayana (rejuvenating), keshavardhana (trichogenic), dipana (appetising action), pachana (digestive action), Kapha-Vata hara |
| ***Sesamum indicum* Linn.**[28] | Madhura (sweet), Kashaya (Astringent), Tikta (bitter), Katu (pungent) | Guru (heaviness), Snigdha (unctuousness), Sukshma (minuteness), Vyavayi (substance spreading all over the body before being digested) | Ushna (hot) | Madhura (sweet) | Keshya, dipana (appetising action), medhya (nootropic), balya (increasing strength), snehana, tridoshahara |

***Emblica officinalis* Linn.**

**Ayurvedic Pharmacological action of *Emblica officinalis* Linn.:** Madhura, kashaya, tikta rasa, guru, sheeta guna besides sheeta virya and madhura vipaka pacifies the Pitta dosha, a paramount factor accountable for Palitya. Ruksha guna aids in eliminating the obstruction (caused by Kapha and aam) of srotas (channels). Due to its tridoshahara properties, it helps to establish balance and coordination among all three doshas.

**Pharmacological actions of *Emblica officinalis* Linn. in the prevention of premature hair greying**

**5α-reductase inhibitor:** *Emblica officinalis* Gaertn. or *Phyllanthus emblica* Linn. (Indian gooseberry or Amla), a significant medicinal plant believed to slow down the ageing process. It is a potent inhibitor of 5*α*-reductase, which promotes the growth of the hair of C57BL/6 mice.[29] Moreover, it acts as a diuretic, laxative, liver tonic, refrigerant, stomachic, restorative,

antipyretic, anti-inflammatory, hair tonic, antiulcer, anti-dyspeptic and digestive agent.[30] A fixed oil is obtained from these gooseberries, which strengthens and promotes hair growth. Dried fruit, which improves hair hygiene, has long been utilised as an essential ingredient of shampoo and hair oil.[31] *Emblica officinalis* Gaertn. is a rich source of vitamin C (ascorbic acid). Thus, the Indian gooseberry is used as a hair tonic in traditional recipes for enriching hair growth and pigmentation.

**Antioxidant activity:** It primarily contains tannins, alkaloids, phenolic compounds, amino acids, vitamins and carbohydrates.[32] Fruits have 28% of the total tannins distributed in the whole plant. It contains hydrolysable tannins - emblicanin A and B, punigluconin, pedunculagin, chebulinic acid (ellagitannin), chebulagic acid (benzopyran tannin), corilagin (ellagitannin), geraniin (dehydroellagitannin), ellagotannin; alkaloids-phyllantine, phyllembein, phyllantidine; phenolic compounds - gallic acid, methyl gallate, ellagic acid, trigallayl glucose; flavonoids - quercetin, kaempferol; organic acids - citric acid. Compounds isolated from *Emblica officinalis* were gallic acid, ellagic acid, 1-O-galloyl-beta-D-glucose, 3,6-di-O-galloyl-D-glucose, chebulinic acid, quercetin, chebulagic acid, corilagin, 1,6-di-O-galloyl beta D glucose, 3 ethylgallic acid (3 ethoxy 4,5 dihydroxy benzoic acid) and isostrictiniin.[33] The ameliorative effect of *Emblica officinalis* Gaertn. in preventing premature hair greying might be due to tannins, alkaloids, phenolic compounds, vitamin C etc.

**Nutritional supplements:** Amla is a competent source of vitamin C and is also ample in various essential amino acids - glutamic acid, proline, aspartic acid, alanine, cystine, lysine and carbohydrates - pectin. L-lysine is responsible for premature hair greying in iron and zinc uptake.[34]

***Eclipta alba* Hassk.**

**Ayurvedic Pharmacological action of *Eclipta alba* Hassk.:** The dominance of tikta rasa of Eclipta alba Hassk. is said to be Pitta shamaka. Tikta and katu rasa present in Bhringraj possess antagonistic properties to that of Kapha and ama (toxic substances formed due to poor digestion and metabolism). Ushna virya helps eliminate the obstruction of the srotas. The karma (action) of the drug is keshya and rasayana.

**Pharmacological actions of *Eclipta alba* Hassk. in the prevention of premature hair greying**

**The proliferation of follicular keratinocytes:** Petroleum ether extract (PEE) of *Eclipta alba* Hassk. stimulates the proliferation of follicular keratinocytes and delays the hair regression phase by downregulating the TGF- β1 (Transforming Growth Factor Beta1) expression.[35] The overexpression of TGF-β1 in the epidermis leads to the suppression of epithelial cell proliferation and the eventual inhibition of normal skin development.[36]

**Induction of Anagen phase in telogen phase:** The methanol extract of *Eclipta alba* Hassk. promotes hair growth by inducing anagen in the telogen (resting) phase hair follicles.[37] A polyherbal formulation containing *Eclipta alba* Hassk., *Hibiscus rosa-sinensis* Linn., and *Nardostachys jatamansi* exhibited excellent hair growth activity in Wistar albino rats. The time required for complete hair growth and hair growth initiation time were significantly reduced. Treatment with the formulation exhibited a more significant number of hair follicles in the anagenic phase.[38]

**Antioxidant activity:** *Eclipta alba* Hassk. contains a wide range of active principles, which includes coumestans, alkaloids, flavonoids, glycosides, polyacetylenes and triterpenoids. Ecliptal (a terthienyl aldehyde), α-terthienyl-methanol, sixteen polyacetylenic thiophenes, 5′-senecioyloxymethylene-2-(4-isovaleroxybut-3-ynyl) dithiophene, 5′-tigloyloxymethylene-2-(4-isovaleryloxybut-3-ynyl) dithiophene, luteolin-7-0-glucoside, wedelolactone, desmethyl wedelolactone and its 7-0-glucoside, nicotine; β-amyrin, stigmasterol, polypeptide on hydrolysis gave five amino acids viz., cystine, glutamic acid, phenylalanine, tyrosine and methionine (leaves/aerial parts); 5′-isovaleryloxy methylene-2- (4-isovateroxybut-3-ynyl) dithiophene, heptacosanol, hentriacontanol, stigmasterol (root); steroidal alkaloids major alkaloid as (20S) (25S)-22,26-imino-cholesta-5,22 (N)-dien-3 beta-ol (verazine,3); new alkaloids, 20-epi-3-dehydroxy-3-oxo-5,6-dihydro-4,5-dehydroverazine, ecliptalbine{(20 R)-20 pyridyl-cholesta-5-ene-3 beta, 23 diol, (20 R)-4 beta- hydroxyverazine}, 4 beta-hydroxy verazine, (20 R)-25 beta- hydroxyverazine and 25 beta-hydroxyverazine (leaves).[27] Several oxidants, such as hydrogen peroxide, nitric oxide, nitrous oxide etc., are considered one of the foremost genesis of premature hair greying. Various constituents exist in *Eclipta alba* Hassk, such as coumestans, alkaloids, flavonoids, glycosides, polyacetylenes, triterpenoids etc., which account for its antioxidant property.

***Sesamum indicum* Linn.**

**Ayurvedic Pharmacological action of *Sesamum indicum* Linn.:** Madhura, kashaya, tikta rasa, guru guna, and madhura vipaka help in pacifying the Pitta dosha. Due to its vyavayi guna can quickly spread in the body and bring about its desired effect even before digestion. Ushna virya helps in removing the obstruction of the srotas.

**Pharmacological actions of *Sesamum indicum* Linn. in the prevention of premature hair greying**

**5α-reductase inhibitor:** The type1 5α-reductase, the primary enzyme causing hair loss, predominated in the human scalp skin, especially dermal papilla. The 5α-reductase inhibition activity of sesamin was related to its antioxidant activities. Moreover, the metal ion chelating activity may reduce the excess Cu level in the occipital area and blood circulation, thereby controlling the balance of hair growth and hair loss in androgenic alopecia patients. [39]

**Induction of melanin content and tyrosinase activity:** Melanin and tyrosinase activity increased with increased sesamin concentrations. It has been reported to mediate pigment biosynthesis through the cAMP pathway as well as also increase the gammα-glutamyl transpeptidase and tyrosinase-reactive cells, resulting in the induction of melanin production with the escalated level of tyrosinase activity. [39]

**Antioxidant activity and nutritional properties:** Neutral lipids, glycolipids and phospholipids (also in flowers), arginine, cystine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, tyrosine, valine, α- and β-globulins, p-aminobenzoic acid, ascorbic acid, biotin, choline, folic acid, inositol, niacin, nicotinic acid, pantothenic acid, pyridoxine, riboflavin, thiamine, α- and β-tocopherols, galactose, glucose, lychnose, plantiose, raffinose, sesamose, sucrose and pentosans, 2-acetyl-3-methylfuran, 2 acetylpyrrole, acetylpyrazine, 2-ethyl-pyrazine, 2,5-diethylpyrazines, 2,3-dimethyl and 2,5-dimethylpyrazine, 2-furfurylalcohol, a-formylpyrrole, guaiacol, hexacosanoate, sesamin, sesamolin, sesamolinol, sesamol, undecadienal, 3-methylbutanal, octanal, phenol, 2,4-arachidic, hexadecenoic, linoleic, lignoceric, myristic, oleic, palmitic, phytic and stearic acids, astaxanthin (carotenoid), tocopherol, sitosterol, campesterol, A-avenasterol and stigmasterol,

sesaminol glucosides -sesaminol 2' O-beta-D-glucopyranoside, sesaminol 2'-O-beta-D-glucopyranosyl (1 to 2)-0 beta-D-glucopyranoside and sesaminol 2'-O-beta-D-glucopyranosyl (1 to 2)-0 {beta-D-glucopyranosyl (1 to 6)-beta-D-glucopyranoside (seeds); pedaliin (leaves); pinoresinol, tetrahydro-1[3-methoxy-4-hydroxyphenoxy]-4-[3,4 (methylenedioxy)phenyl]-1H, 3H-furo [3,4-C] furan, salicylates (plant) are various constituents present in *Sesamum indicum* Linn.[28]. The principal antioxidant agent of sesame is tocopherols. R-tocopherol is the major tocopherol in sesame seeds, whereas α-and δ-tocopherols are present in smaller amounts. Various other phytoconstituents such as sesamin, sesamolin, sesamol, their glucosylated forms sesaminol glucosides etc., are responsible for the antioxidant activity of *Sesamum indicum* Linn.[28]

## DISCUSSION

Dhatri, commonly known as Indian gooseberry, has been acclaimed for its antioxidant, antiaging, nutritional supplement and hepatoprotective activities. In the indigenous system of medicine, Bhringraj is recognised as the "King of hair". It is proclaimed for blackening and promoter of hair growth along with other therapeutic properties such as hepatoprotective, antioxidant, anti-inflammatory, analgesic etc. Tila seeds are depicted as "seeds of immortality" for their resistance to oxidation and rancidity even when stored at ambient air temperature; they are also acknowledged as the "Queen of oilseeds" due to the affluent oil content (50 – 60%) of their seed.

Tikta, kshaya and madhura rasa, guru, sheeta and ruksha guna, sheeta virya, madhura vipaka, said to be Pitta shamaka. All the ingredients have tikta rasa, whereas Dhatri and Tila possess kshaya, madhura rasa, guru guna and madhura vipaka, which pacifies the Pitta dosha. Apart from this, Dhatri and Bhringraj own ruksha guna, which mollifies the Pitta dosha. Bhringraj has ushna virya, which acts as a good sroto shodhaka (open channels) and also possesses katu vipaka, which has antagonistic properties to that of Kapha and ama. All three ingredients are known to have the keshya property. Dhatri and Bhringraj possess rasayana property and nourish rasadi dhatu, Kesha (hair) is the by-product of asthi dhatu. So due to this rasayana property, Dhatryadi rasayana helps in the proper development and growth of hair and helps prevent premature greying of hair.

All constituents of Dhatryadi rasayana have antioxidant properties, as oxidants are one of the significant factors for premature hair greying. Therefore, Dhatryadi rasayana helps in prevention and treatment of premature greying of hair. *Emblica officinalis* Gaertn. and *Sesamum indicum* Linn. both act as 5α-reductase inhibitors. The 5α-reductase enzyme is a microsomal enzyme responsible for reducing 3-oxo-$\Delta^4$ steroidal compounds such as testosterone, progesterone and corticosterone. In humans, this enzyme plays a major role in lowering testosterone into a more potent androgen, i.e., dihydrotestosterone (DHT). If the level of this enzyme increases, more testosterones will be converted into DHT, resulting in more significant hair loss. Thus, *Emblica officinalis* Gaertn. and *Sesamum indicum* Linn. helps prevent premature greying of hair. *Eclipta alba* Linn. stimulates the proliferation of follicular keratinocytes by downregulating the TGF- β1 (Transforming Growth Factor Beta 1) expression. *Sesamum indicum* Linn. also helps in the induction of melanin content (a pigment responsible for imparting colour to hair) and tyrosinase activity. Here, tyrosinase enhances hair growth in association with the promotion of melanogenesis. This enzyme is located in melanocytes, the specialised cells responsible for melanin production. Thus, Dhatryadi rasayana provides nutritional supplements indispensable for preventing premature hair greying accompanying the development and growth of healthy hair.

## CONCLUSION

Synthetic drugs used for the treatment of premature hair greying are questionable in safety as well as side effects point of view. So, people focus on herbal medicines to overcome such challenges or ailments. For preventing and treating premature hair greying not only topical uses such as taila, ghrita etc. are essential, but oral remedies are also of equal significance. Dhatryadi rasayana is potent and efficacious to overwhelm such ailments, as all its ingredients have antioxidant activity and bring forth essential nutritional supplements together with keshya properties resulting in the inducement of melanogenesis.

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**Cite this article as:**

Sheenam Rani, Usha Sharma, Sanjay Kumar Singh and Khem Chand Sharma. A review on Palitya and Dhatryadi rasayana. Int. J. Res. Ayurveda Pharm. 2023;14(3):95-99
DOI: http://dx.doi.org/10.7897/2277-4343.140390

Source of support: Nil, Conflict of interest: None Declared