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An Appraisal of Skin Lightening (*Varnya*) effect of Ingredients of *Panchang Kumkumadi Taila*

Shilpa Patil[1]*, Prashant Sasane[2], Anand Chaudhary[3]

1. Assistant Professor, Department of Rasa Shastra and Bhaishajya Kalpana, All India Institute of Ayurveda, Dhargal, Pernem, North Goa, Goa, India – 403513. Email ID : drshilpapatil66@gmail.com
2. Assistant Professor, Department of Kayachikitsa, All India Institute of Ayurveda, Dhargal, Pernem, North Goa, Goa, India - 403513
3. Professor, Department of Rasa Shastra and Bhaishajya Kalpana, Faculty of Ayurveda, Banaras Hindu University, Varanasi, Uttar Pradesh, India - 221005

Corresponding Author*

Dr. Shilpa Patil
Assistant Professor,
Department of Rasa Shastra and Bhaishajya Kalpana,
All India Institute of Ayurveda,
Dhargal, Pernem, North Goa, Goa, India – 403513
Email id: drshilpapatil66@gmail.com

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Abstract

Background:
Ayurveda though advocated for healthy life and disease treatment but it is full of literature of cosmetic uses specially for *Varnya* (skin lightening effect). one such formulation available in Chakradatta a book of 11th B.C. popularly known as "*Panchang kumkumadi taila*"(PKT) for the treatment of *vyanga* (hyperpigmentation) due to its *varnya* (skin lightening) effect. The ingredients that cause the enhancement in the texture of skin, makes its blemish free and improves the glow of the skin are termed as *varnya*.
Aim: To establish the probable mode of action of the ingredients of (PKT) based on Ayurvedic principles as well as the on the basis of pharmacological actions.
Material and method: Intensive search of Ayurvedic literature on individual ingredients of PKT for lit's *rasa, guna veerya, vipaka prabhav* and targeting tyrosinase inhibitor action possibly of all the major ingredients of PKT.
Result: Ayurvedic doctorine establishes that ingredients of PKT are acting on virtue of Rasa Panchak, they pacifies *bhrajak pitta* thereby *ranjak pitta*, establish balance between the *doshas*,nourishes the *ojas.* Scientific study establishes them as tyrosinase inhibitors for causing *varnya* effect.

Introduction

Ayurvedic system of medicine an age-old heritage advocated for wellbeing of human civilization. The concept of "*varna*" is as old as mankind.*varnya* represents anything that is good for complexion, glow and natural radiance [1]. Anything that causes *varnahani* ultimately leads to cosmetic morbidity. Exposure to ultraviolet radiation, stress, lack

of nutrition, air pollution is contributing to various skin diseases like Acne, hyperpigmentation, atopic dermatitis and psoriasis. [2] Ayurveda is full of literature of cosmetic care of face along with general health care, one such formulation available in Chakradatta a book of 11th B.C. popularly known as "*Panchang kumkumadi taila*" containing five major ingredients *manjishtha*, (*Rubia cordifolia Linn.) yashtimadhu* **(***Glycyrrhiza glabra Linn*), *keshar(Crocus sativus Linn.)*,*rakta chandan(Pterocarpus santalinus) laksha* **(***Laccifer lacca*) and *aja dugdha* (Goat's milk) for the treatment of *vyanga* (hyperpigmentation) due to its *varnya* (skin lightening) effect.[3]

Though the *Lepa kalpa* (topical preparations) are available in the variety of dosages form like *Kalka* (paste), *Churna* (powders),*kwatha* (decoctions) *siddha taila* (medicated oils), *siddha ghrita* (medicated clarified butter) but most potent among them are *taila* and *ghrita* because of their unique method of preparation whereby we ensure the mass transfer of active ingredients i.e. water soluble and lipid soluble simultaneously into the final product and they act on the principle of liposomal drug delivery system.[4]

Material and method

Primary search of the ingredients of *Panchang Kumkumadi taila i.e..manjishtha*, (*Rubia cordifolia* Linn.*) yashtimadhu* **(***Glycyrrhiza glabra* Linn), *keshar (Crocus sativus* Linn.*)*,*rakta chandan (Pterocarpus santalinus) laksha* **(***Laccifer lacca*) *aja dugdha* (Goat's milk) and *tila taila* were searched in Ayurvedic literature for their *rasa pancha* i.e. pharmacological attribute The literature available in technical reports, online scientific records such as SciFinder, Google Scholar, MEDLINE, EMBASE, Scopus directory were explored for phytochemistry, pharmacology and biomedicine by applying the keywords like "*Varnya*" " *manjishtha*" ,*Rubia cordifolia Linn.,yashtimadhu* **,***Glycyrrhiza glabra Linn*, *keshar***,** *Crocus sativus Linn,*,*rakta Chandan, Pterocarpus santalinus, laksha* **,***Laccifer lacca*, *aja dugdha*, goat's milk, *tila taila,* sesame oil, "oxidative stress", "anti-inflammatory", "immunomodulator", "antioxidant", "tyrosinase inhibitor "mechanism of action" with their corresponding medical subject headings (MeSH) terms using conjunctions OR/AND. The search was focused on identifying Ayurvedic claims in the available ethnomedicinal, phytochemical, preclinical and clinical reports to understand the role of ingredients of PKT on skin lightening. The result is depicted as under mentioned.

Result and Discussion

The probable mechanism of action of these *vranya* herbs may be on virtue of "*rasapanchak"*. Most of the herbs possess *tikta Rasa* predominantly**.** *Yashtimadhu* is *Madhur* in *Rasa* and as well as in *vipaka* and having *Sheet Virya. Manjishtha* have *kashay, tikta* and *maadhur rasa, rakta chandan* is having *tikta madhur rasa* and *sheet virya. Laksha* is having *tikta kashay rasa* and *sheet virya.* Except *keshar* rest all 4 drugs may act as *varnya* by their *tikta, kashay* and *madhur rasa* which pacifies the vitiated *pitta* responsible for dullness of skin.When *pitta* gets pacifies it pacifies the *rakta dushti* which is main reason of all skin diseases by *ashreya- ashyree bhava. Keshar* may act by enhancing the *bharajakagni* that facilities the entry of active ingredients through skin layer. It is responsible for digesting the local medicaments applied externally on the skin in the form of *abhyanga*, *parisheka*, *avagaha* and *alepa.*

Tikta Rasa has direct action on the promotion of *Medha*. It performs their function by its

laghu property, deepana-*paachana* and *srotoshodhaka* action. *Madhura rasa* also by promoting the formation of *Oja* nourishes five senses, *mana* and *medha.* Hence *Medhya* drugs appear to be predominantly *tikta,,madhura rasa*. Majority of drugs are having *madhura vipaka* which nourishes *Medha* by formation of *Oja*. All these actions are specifically mentioned for internal administration. But good complexion is reflection of normal health and *Ojas* reflect the normal healthy condition and thereby normal *varna* reflection. [5]

Different Mechanisms of Action of *Varnya* Drugs

1.Inhibition of tyrosinase transcription
2.Tyrosinase inhibition
3.Epidermal turnover accelerant
4.Inhibition of melanosome transfer
5.Anti-inflammatory
6.Free radical trapping

The individual ingredients of PKT when searched for their skin lightening effect most of them acts by the tyrosinase inhibition.

Manjishtha:

It contains glucosides known as "manjisthin" and "purpurin" along with resins, lime salts and coloring agents. Methanolic extract of this herb has been reported to show 14.80% mean inhibition of tyrosinase activity thereby acting as skin whitening agent. [6]

Yashtimadhu

Licorice extract improves hyperpigmentation by dispersing the melanin, inhibition of melanin biosynthesis and inhibition of cyclooxygenase activity thereby decreasing free radical production. Glabridin, a polyphenolic flavonoid is the main component of licorice extract. Studies have shown that glabridin prevents Ultraviolet B (UVB) induced pigmentation and exerts anti-inflammatory effects by inhibiting superoxide anion and cyclooxygenase activity. [7]

Rakta Chandan

Bioautographic assays indicated that alpha-santalol, the major constituent of the oil, is a strong inhibitor of both tyrosinase and cholinesterase in vitro, and hence there is a great potential of the essential oil for use in skin-care.[8]

Keshar

kaempferol isolated fromthe petals of *Crocus sativus* has been found to inhibit the oxidation of L-3-,4dihydroxyphenylalanine (L-DOPA) catalyzed by mushroom tyrosinase with an IC50 value of 67µg/mL thus exhibiting skin whitening potential. Kaempferol presumably comes from its ability to chelate copper. this copper chelation mechanism can be applicable for all of the flavonols as long as their 3-hydroxyl group is free. [9]

Goat's milk

Goats millk inhibit tyrosinase activity by the two substrates LTyrosine ((Monophenolase) and L-DOPA (Diphenolase). The Inhibition activity of fermented goat milk used are not as good as inhibitory activity of kojic acid at concenteration of 62.5 ppm as positive control. Another important action of this milk acts as moisturizing. In addition, lactic acid bacteria-fermented milk gives effect on suppressing melanogenesis in B16F0 melanocytes cell culture. [10]

Tila Taila

Sesamol exhibited the highest inhibition of mushroom tyrosinase activity, but lipophilic sesamolin exhibited the highest cellular tyrosinase inhibition (IC_{50} of 1.6 µM) followed by sesamin, sesamol, and kojic acid, respectively. Sesamolin and sesamin successfully inhibited cellular tyrosinase

activity and respectively decreased TRP-1/TRP-2 (36%/15%) and TRP-1 levels (16%), thereby inhibiting melanogenesis via antityrosinase activity. No cytotoxicity to SK-MEL2 or Vero (normal) cell lines was observed at the lignan concentrations that exerted an antimelanogenic effect. [11]

Mechanism of action as tyrosinase inhibition for *Varnya* effect

Melanin, responsible for pigmentation of the skin, is produced in melanosomes which are located in the melanocytes. The synthesis of melanin involves oxidative processes, whereby L-tyrosine is converted into L-dihydroxy phenylalanine (L-DOPA) by the enzyme tyrosinase. L-DOPA is then finally converted to melanin by a complex chain of oxidative reactions Transcription and expression of the tyrosinase enzymatic protein is an upstream process before melanin formation can start. By inhibiting transcription of RNA on the endoplasmatic reticulum the tyrosinase expression is reduced. Reduction of ROS levels in melanocytes may prevent activation of melanogenesis. In various studies, extracts from plants or fruit or other species were tested for their antioxidant capacity by using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical-scavenging assay or the oxygen radical absorbance capacity (ORAC)Ascorbic acid is considered a skin whitening agent and more stable derivatives such as ascorbyl glucoside and ascorbyl palmitate are already being used in different skin whitening formulations

Inhibition of the production of inflammatory mediators (Il1α and TNF-α) was reported. Via this indirect way stimulation of melanogenesis in the pigment cells could be prevented. [12]

All the above-mentioned drugs are reported for their anti-inflammatory and anti-oxidant activity.

Most of the above-mentioned plants contains flavonids and it also has positive skin lightening effect. The effects of many flavonoids on the oxidation of L-DOPA have been studied. Isoflavones, including glycitein, daidzein, and genistein, showed antityrosinase activity, but 6,7,40 - trihydroxyisoflavone has been identified as a potent tyrosinase inhibitor stronger than kojic acid. Flavanones, such as hesperidin, eriodictyol, and naringenin, have a structure that is similar to that of hydroquinone. When concentrated in nano capsules, they are protected until they reach the active site of melanin synthesis, where they exert a powerful reducing action and antiradical activity, and act as a substrate competitor for tyrosinase. [13]

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