IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Exploring The Depigmentary Effect Of An Anthraquinone – Rich Constituent Of Manjistha In The Management Of Melasma - A Case Study

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Abstract: Melasma, a common pigmentary disorder poses therapeutic challenges due to its chronic nature and recurrence. Ayurvedic medicine offers a unique perspective with herbs like Rubia cordifolia (Manjistha), which possess varnya and depigmentary properties. In this case study, an external application of lepa of Manjistha (Rubia cordifolia) which is rich in anthraquinone compounds like purpurin, alizarin, and rubiadin mixed with Madhu (honey) was applied to a 52-year-old female patient with chronic melasma. These anthraquinones provide tyrosinase inhibition and antioxidant effects, reducing melanin synthesis.

Result - After 2 months of daily application alongside lifestyle recommendations (pathya-apathya), significant depigmentation was observed without side effects. This integrated Ayurvedic-modern approach supports Manjistha's potential as a safe and effective treatment for melasma.

I. INTRODUCTION

Melasma is one of the most common pigmentary disorders, characterized by chronic, relapsing hypermelanosis of the skin. It typically appears on sun-exposed areas of the face such as the cheeks, nose, forehead, chin, and upper lip and predominantly affects females. Although the exact cause of melasma remains unclear, multiple factors are known to contribute to its development. These include ultraviolet (UV) radiation, hormonal changes, inflammation, oxidative stress, air pollution, cosmetic use, psychological stress, dietary habits (especially high intake of junk or fast food), and the use of certain drugs such as phenytoin and oral contraceptive pills (OCPs).[1]

A central role in melanin production is played by the enzyme tyrosinase, By inhibiting tyrosinase activity, melanin synthesis can be reduced, making it a critical target for depigmentation therapies in melasma management.[2]

In modern dermatological practice, topical steroids are frequently used to treat facial melanosis. However, prolonged or inappropriate use of these agents, along with excessive use of cosmetic products, can lead to skin irritation and potentially worsen the condition. Therefore, careful evaluation and individualized treatment plans are essential for effective and safe management of melasma.

In Ayurveda, melasma is corelated with Vyanga, Acharya Charak referred to it as Raktapradoshaj Vikar [3], while Acharya Sushruta and Vagbhatta described it as Kshudra Roga [4][5] . Despite being seen as a minor

illness, or Kshudra Roga, it is a significant cosmetic issue in society. It is distinguished by the presence of bluish-black spots on the face called Shavyavarna Mandalas which are Tanu (thin), and Niruja (painless)[6]. According to Charya Sushruta, the primary causes of Vyanga are Krodha(anger),Shoka(grief) and Ayasa(Exertion)[7] , which is also supported by Yogratnakar [8] and Madhavnidan [9] .

Manjistha (Rubia cordifolia) is a classical Ayurvedic herb classified as Varnya (complexion-enhancing) and Raktashodhaka (blood purifier)[10]. It is used traditionally in the form of Lepa (paste) for facial discoloration. Modern studies show that Manjistha is rich in anthraquinone compounds that have depigmentary action.[11][12]

II. Material And Methods

CASE REPORT -

A 52-year-old female patient from Nagpur visited the OPD with the complaint of dark brownish hyperpigmented patches on both cheeks for the past 2 years. The lesions were symmetrical, gradually progressive, and became more prominent on sun exposure. There was no associated pain, itching, or burning sensation.

On examination, the patient had bilaterally symmetrical hyperpigmented patches over the malar region. The skin texture was normal, with no erythema, scaling, or discharge. The pigmentation appeared brownish and clearly demarcated. General examination revealed a pulse rate- of 78/min, BP- 140/90 mmHg, and no signs of pallor, icterus, or edema.

She has a history of hypertension for 5 years, she was on medicine Amlodipine. She attained menopause at the age of 49 and reported disturbed sleep and hot flushes since then. There was no history of thyroid dysfunction, diabetes, or any hormonal therapy. She denied any use of topical steroids or cosmetic creams.

The patient follows a mixed diet, maximum spicy and fermented with moderate appetite and regular bowel movements. She reported daily exposure to sunlight during gardening and shopping. She had emotional stress and anxiety, especially post-menopausal.

Clinical Assessment –

On clinical assessment, the patient was found to have a Vata-Pitta Prakriti, with evident signs of Vata-Pitta Dushti. The pigmentation appeared dry, dark, and sharply demarcated, indicating Vata involvement, while progressive nature, burning sensation during sun exposure (though minimal), and hyperpigmentation hinted at Pitta Dushti.

There were no signs of inflammation or infection, supporting the diagnosis of non-inflammatory dermatosis. The mental health evaluation revealed chronic stress, disturbed sleep, and emotional suppression, which contributed to Manasika Nidana like Krodha and Shoka that playing a key role in Dosha Prakopa.

The etiological factors (Nidana) identified in this case included:

Atapasevana (sun exposure)

Vega-dharana (emotional suppression)

Krodha, Shoka (mental stress)

Vata-Pitta Prakopaka Ahara and Vihara like spicy food, fermented items, overthinking, and lack of proper hydration

This clearly follows a Raktaja Twak Vikara Samprapti, where Vata-Pitta disturb Rakta Dhatu, affecting the Twak (skin), leading to discoloration, roughness, and darkness without any pain or discharge.

Thus, the clinical picture was consistent with Vyanga (Melasma) – Vata-Pitta Dushti Janya, precipitated by sun exposure, stress, and post-menopausal hormonal imbalance.

Medical Intervention –

The patient was treated with:

1. External Application:
Manjistha churna + Madhu lepa[13], applied locally on the affected area for 30 minutes daily for 2 month.

2. Oral Medications:
Manjishtadi Kwath - 20 ml BD with lukewarm water for 1.5 months
Tab Avipattikar - 1 HS for 1.5 months
Swanand vati - 1 BD for 1.5 months

3. Pathya-Apathya Advice:
Pathya: Light, cooling diet; fruits like pomegranate; ghee, cow milk, moong dal
Apathya: Spicy, sour, fermented food; curd, pickles; sun exposure; emotional triggers

III. Observation And Result

After 2 months of treatment, the patient showed significant reduction in pigmentation. The brownish-black patches became lighter, and the skin tone became more even. There was also improvement in sleep and a reduction in stress levels. No adverse reactions were reported, and the patient was satisfied with the outcome.

before

after

IV. DISCUSSION

Vyanga, as described in Ayurveda, is a Raktapradoshaj Vikara[3] characterized by Niruja (painless), Tanu (thin), Shyava (bluish-black or brown) discoloration on the face, predominantly caused by Vata and Pitta Dosha vitiation[6][7]. Nidanas such as Krodha (anger), Shoka (grief), Vega-dharana (emotional suppression), Atapa (sun exposure), and Rakta Dushti are clearly outlined in classical texts like Charaka Samhita and Ashtanga Hridaya. These factors disturb the equilibrium of Vata and Pitta, leading to impairment of Rakta Dhatu, which then affects Twak (skin), resulting in discoloration.

In modern dermatology, melasma is understood as acquired hypermelanosis, triggered by UV radiation, hormonal changes, emotional stress, and oxidative stress. These factors stimulate melanocytes, increasing melanin synthesis primarily via activation of the enzyme tyrosinase, which is a key regulator of melanin biosynthesis. Oxidative stress, caused by reactive oxygen species (ROS), also accelerates pigmentation[13].

Depigmentary effect of an anthroquinone rich constituents of Manjistha:

Manjistha (Rubia cordifolia) is a renowned raktashodhak and Varnya dravya[14] in Ayurveda. It acts on Rakta, Rasa, and Twak, pacifies Pitta and Kapha, and balances Rakta Dushti. It possesses Madhur,Tikta, Kashaya Rasa, Ushna Virya, and katu Vipaka. Its Prabhava is Rakta Prasadaka, Tvachya, and Varnyakara.[15][16][17]

From a modern pharmacological view, Manjistha contains potent anthraquinone compounds such as: Rubiadin , Munjistin , Alizarin, Purpurin, lucidin, xnathopurpurin[18]

These constituents have been scientifically proven to:

Specifically, purpurin and rubiadin, an anthraquinone compound, has been shown in studies to bind to the active site of tyrosinase, thereby blocking melanin biosynthesis[19]. This mimics the modern approach of tyrosinase inhibitors like kojic acid and hydroquinone, but with fewer side effects.

Additionally, Manjistha aids in detoxifying Rakta dhatu, improving microcirculation, and clearing dushti from deeper dhatus, as per Ayurvedic principles. This directly corrects the Ayurvedic Samprapti of Vyanga by pacifying both Vata and Pitta, and restoring the purity of Rakta and Twak.

Role of Madhu (Honey):

The selection of Madhu (honey) as the vehicle (anupana) for lepa preparation is rooted in both traditional texts and contemporary evidence. According to Ayurveda, Madhu is Tridoshaghna (especially Pitta-Vata pacifying), and has Madhura-Kashaya rasa, Ruksha guna, and Sheeta virya, making it ideal for calming inflamed skin, reducing Pitta-induced pigmentation, and cleansing the microchannels (srotas). Its Lekhana (scraping) property aids in gentle exfoliation of pigmented cells, while Sandhana, Ropana, and Shodhana karma help in skin rejuvenation and repair[22].

Modern science corroborates this with honey's antibacterial, antioxidant, anti- inflammatory, and hydrating effects. Its low pH, high viscosity, and hydrogen peroxide content contribute to tissue repair and melanin modulation. Honey also enhances transdermal absorption of herbal constituents, helping Manjistha's active principles to penetrate deeper into skin layers[22]

Thus, the synergistic use of Manjistha and Madhu offers a holistic approach to treating melasma—targeting the root cause (Rakta Dushti and Pitta Vitiation), correcting pigmentation at the molecular level (tyrosinase inhibition), and promoting skin healing and rejuvenation.

Action of Manjistha	Mechanism	Effect
1. Inhibition of Tyrosinase Enzyme Activity[19]	Anthraquinones like purpurin inhibit tyrosinase, the key enzyme in melanin biosynthesis, by competitively binding to its active site.	Decreases melanin production → helps in reducing hyperpigmentation.
2. Antioxidant Activity[20]	Anthraquinones scavenge reactive oxygen species (ROS) that stimulate melanocyte activity[21].	Prevents oxidative stress-induced melanin overproduction.
3.Anti-inflammatory Effect[20]	Suppresses inflammatory cytokines like TNF-α, IL-1β, and IL-6.	Controls post-inflammatory hyperpigmentation.
4.Hormonal Modulation and Stress Relief (Ayurveda view)	Manjistha balances Pitta dosha, reducing internal heat and hormonal triggers of pigmentation. Scientific evidence suggests its anti-stress and mild nootropic properties[23], contributing to neuroendocrine stabilization.	Regulate Stress and hormonal imbalance induced melanocyte activity.

IV. Conclusion

In conclusion, the combination of Manjistha and Madhu, with proper internal medicines like Manjishtadi Kwath, provided both systemic detoxification and local pigment reduction. The classical Ayurvedic principles and modern pharmacological understanding perfectly align in this case, justifying the effectiveness of this traditional formulation in treating melasma (Vyanga) naturally, safely, and holistically.

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