



PHARMACEUTICO-ANALYTICAL EVALUATION OF MADHUKADI TAILA AND ITS FORMULATION DEVELOPMENT INTO A SEMI-SOLID DOSAGE FORM

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ABSTRACT

Taila Paka is a distinctive pharmaceutical process described in classical Ayurveda. It represents a specialized method of lipophilic extraction, where oil (Sneha) is used as the primary medium. This approach enables the extraction and preservation of non-polar, lipid-soluble phytoconstituents from plant materials – compounds that are typically not obtained through water-based preparations. By using oil as a solvent, the process enhances both the stability and bioavailability of these active components.

As one of the principal forms within the Mahasneha category, Taila performs a dual role. It not only acts as an effective carrier (Anupana), facilitating deeper tissue penetration, but also exerts an inherent Vata-pacifying (anti-degenerative) effect. This makes it especially valuable in conditions associated with dryness, degeneration, and impaired tissue nourishment.

Madhukadi Taila, a classical formulation described in the text Sahasrayoga under the context of Netraroga (eye disorders), is known for its clarifying (Raktaprasadan) properties. Traditionally, it is administered through Nasya (nasal route) for disorders affecting Netra. However, considering its pharmacological profile and composition, it also shows promising potential for topical use as a new dosage form of vidalaka i.e ointment, particularly those requiring soothing, nourishing, and restorative effects.

KEYWORD: Taila Paka, Sneha Kalpana, Madhukadi Taila, Sahasrayoga, Nasya Karma, Urdhvajatrugata Vikara, Netraroga, Oil-in-Water Emulsion, Ointment

INTRODUCTION

Ayurvedic pharmaceuticals is grounded in the concept of *Samskara*, referring to deliberate processing techniques aimed at enhancing the efficacy, bioavailability, and stability of raw therapeutic substances. Within this framework, *Sneha Kalpana* represents a sophisticated lipid-based drug delivery system capable of extracting and preserving both hydrophilic and lipophilic phytoconstituents. The process of *Taila Paka* functions as a targeted lipid extraction strategy, wherein medicated oil serves as a dynamic solvent, enabling efficient solubilisation and stabilization of non-polar bioactive compounds that are otherwise inadequately extracted through aqueous media.

As a principal member of the *Mahasneha* group, Taila exhibits a dual pharmacodynamics role—acting as an efficient carrier (*Anupana*) that facilitates deeper tissue penetration, while also exerting intrinsic *Vata-hara* effects. This lipid-mediated delivery is particularly advantageous in the management of *Urdhvajatrugata Vyadhi*, where drug permeation across mucosal and cutaneous barriers is critical for achieving therapeutic efficacy.

Classical Ayurvedic literature, particularly *Sushruta Samhita (Uttara Tantra)*, outlines a comprehensive therapeutic approach for *Timira*, including modalities such as *Snehapana*, *Raktamokshana*, *Virechana*, *Nasya*, *Anjana*, *Shirobasti*, *Basti*, *Tarpana*, *Mukhalepa*, and *Seka*. Furthermore, *Sahasrayoga* emphasizes the application of Madhukadi Taila in both *Nasya* and *Lep* for ocular disorders, highlighting its versatility in clinical practice.

Madhukadi Taila, described under *Netraroga Nidana-Chikitsa*, comprises key ingredients such as *Madhuka (Mahua)* and is characterized by *Katu Vipaka* and *Prasadana* properties.

Daruharidra is been quoted as '*netrakarnaasyaroganut*' Traditionally indicated for nasal administration in ophthalmic conditions, its phytochemical profile—enriched with quercetin and polyphenolic compounds—suggests significant therapeutic potential, including anti-inflammatory, antioxidant, and tissue-protective effects, thereby supporting its relevance in ophthalmic issues like *Daha*(burning in eyes), *Ashru*(watering from eyes), *Raga*(redness in eyes), *Ruja*(pain in eyes).

Despite the established therapeutic benefits of medicated oils, their clinical acceptability is often limited by issues such as greasiness, inconvenience in application, and reduced patient compliance. Addressing these challenges, the present study undertakes a comprehensive pharmaceutico-analytical evaluation of Madhukadi Taila and explores its transformation into a patient-friendly Ointment as a new dosage form. The development of a stable oil-in-water (O/W) emulsion aims to improve physicochemical characteristics, enhance Spreadability, absorption and ultimately optimize therapeutic delivery without compromising classical integrity.

AIM

To conduct a comprehensive Pharmaceutico-Analytical evaluation of Madhukadi Taila and its innovative formulation into a stable, semi-solid Ointment for enhanced topical application.

OBJECTIVE

1. To prepare Madhukadi Taila
2. To develop a contemporary Oil-in-Water (O/W) emulsion (madhukadi ointment) by incorporating the medicated Taila
3. Analytical study of Madhukadi Taila and Madhukadi Taila ointment



THE RATIONALE FOR CONVERSION: FROM NASYA TO MUKHALEPA

The transition of Madhukadi Taila into an ointment represents a bridge between ancient wisdom and modern delivery systems. While Nasya targets the central nervous system and periorbital congestion through the nasal mucosa, an ointment-based lep enhances patient compliance and local bioavailability. By emulsifying the Taila into a semi-solid matrix, the Spreadability and absorption rate are optimized, allowing the Madhuka complexion-enhancing actives to provide superior results in periorbital rejuvenation.

MATERIALS AND METHODS

The raw material were collected from the field as when required and subjected to the standardization based on the data provided in Ayurveda pharmacopoeia.

Raw material: The samples were collected under the supervision of our unit head.

INGREDIENTS OF MADHUKADI TAILA

“दसिद्ध मधूकक्रिमिजमरिचामरदारुभिः॥

मक्षीरं नावनं तैलं पिष्टैलोपो मुखस्य च॥”

(Sahasrayoga)

SR. NO.	RAW DRUG	LATIN NAME	PART USED	QUANTITY
1.	MAHUA	MADHUCA INDICA	ROOT	16GM
2.	VIDANG	EMBELIA RIBES	FRUIT	16GM
3.	MARICH	PIPER NIGRUM	FRUIT	16GM
4.	DEV DARU	CEDRUS DEODARA	BARK	16GM
5.	MURCHITA TILA TAILA			500ML
6.	WATER			256ML
7.	GODUGDHA			2000ML

METHOD OF PREPARATION OF MADHUKADI TAILA

“कल्काच्चतुर्गुणीकृत्य धृतं वा तैलमेव वा।

चतुर्गुणे द्रवे साध्यं तस्य मात्रा पलोन्मिता ।”

(Sh. Ma.9/1)

“दध्नि रसे तत्रे कल्को देयोऽष्टमांशकः।

कल्कस्य सम्यक्पाकार्थं तोयमत्र चतुर्गुणम् ।”

(Sh. Ma. 9/7)

1. One part each of Mahua, Vidanga, Maricha and Devadaru are taken in Kalka form.
2. The Kalka and drav are mixed together, Sneha is then added, boiled and stirred continuously so that the Kalka is not allowed to adhere to the vessel.
3. When all the drav-dravyas have evaporated, the moisture in the Kalka will also begin to evaporate; at this stage, it has to be stirred more often to ensure that the kalka does not stick to the bottom of vessel.
4. This combination is boiled on mild fire till we get samyak taila siddha lakshana. The kalka is taken out of the ladle and tested from time to time to know the condition and the stage of paka.
5. Processing begins and concludes over mild heat (Mridu Agni) with constant stirring to prevent the carbonization of the Kalka at the vessel's base. As the Sneha paak involves godugdha then, Sneha siddhi lakshana is achieved in 2 days to enhance fat soluble absorption of ingredients.

Review of Madhukadi Tail Drug

Content	Rasa	Guna	Virya	Vipaka	Pharmacological Action	Classical Categorization
Mahua	Madhur, Kashaya	Guru, Snigdha	Sheet	Madhur	Antihyperglycemic, Antispasmodic, Spermicidal, Antidiabetic, Anti-inflammatory, Antimicrobial, Antifungal Antioxidant, Wound healing, Antipyretic, Anticancer	Jeevaniya, Sandhananiya, Varnya, Kanthya, Kandughna, Chardinigraha, Shonitsthapana, Mutravirajniya, Snehopag, Vamanopaga, Asthapanopaga
Vidang	Katu, Kashaya	Laghu, Ruksha, Teekshna	Ushna	Katu	Antimicrobial, Antifungal, Antioxidant	Krimighna, Kushthaghna, Truptighna
Marich	Katu	Laghu, Teekshna, Sukshma	Ushna	Katu	Antibacterial, Anticolon Toxin, Antidepressant, Antifungal, Antidiarrheal,	Deepaniya, Shoolanut, Shula Prashamana, Krimighna, Shirovirechanopaga



					Anti-Inflammatory, Antimutagenic, Antimetastatic, Antispasmodic, Antithyroid, Hepatoprotective	
Devdaru	Tikta, Katu, Kashaya	Rooksha, Laghu	Ushna	Katu	Analgesic, Anti-Inflammatory, Anxiolytic, Anticonvulsant, Antiulcer, Antifungal	Dushtavrana Shodhan, Krumihara, Kaphahara, Kusthahara, Anilahara, Kasahara, Amahara, Shwasahara, Hidhmahara, Jwarahara, Meha-ghna, Vibandhahara, Adhmanahara, Kandughna, Shophhara, Asrajit, Peenasahara, Amahara, Pramehahar,

PREPARATION OF MADHUKADI TAILA OINTMENT

Madhukadi Taila ointment was prepared using Madhukadi Taila according to the procedure mentioned in a textbook of cosmetic formulations.

Sr. No	Raw Drug	Quantity Taken
1	Madhukadi tail	15gm
2	E.wax	4gm
3	Stearic acid	4gm
4	Glycerine	5ml
5	Cetyl alcohol	2gm
6	Distilled water	30ml
7	Preservative	0.25gm

PHARMACEUTICAL SOP: CONVERSION PROCESS

To transform the oil into a stable ointment, a Base (Aqueous phase) and an Emulsifier is required.

Phase	Ingredients	Quantity	Role in formulation
Oil Phase	Madhukadi Taila	15gm	Active Ingredient (Lipid-soluble)
	Emulsifying Wax	4gm	Primary Emulsifier
	Stearic Acid	4gm	Thickener / Texture Enhancer
	Cetyl Alcohol	2gm	Co-emulsifier / Emollient
Water Phase	Distilled Water	30ml	Vehicle / Solvent
	Glycerine	5ml	Humectant (Prevents drying)
	Sodium Benzoate	0.25gm	Preservative
Cooling Phase	Rose Water / Fragrance	0.25gm	Aesthetic Appeal

PROCEDURE FOR MADHUKADI TAILA OINTMENT

Heating: Separately heat Phase A and Phase B to exactly 70°C. Heating them to the same temperature prevents "shocking" the emulsion.

Mixing: Slowly add the Oil Phase (A) into the Water Phase (B) while stirring continuously in one direction.

Homogenization: Use a high-speed stirrer or homogenizer to break the oil droplets into microscopic sizes.

Cooling: Continue slow stirring until the mixture cools down to room temperature (around 35°C-40°C). Natural fragrances or essential oils at this stage was added.

OBSERVATION

Observations during Preparation of Madhukadi Taila

- Initial stage:** A uniform, light-coloured and fluid mixture was obtained after combining Kalka, Drava Dravyas and Sneha.
- After addition of Godugdha:** The preparation became lighter and more fluid, followed by mild frothing during heating.

- Early Paka:** Gradual evaporation of the aqueous portion was observed with a progressive increase in viscosity.
- Intermediate Paka:** Frothing decreased, while the characteristic colour and odour of the formulation became more pronounced.
- Advanced Paka:** The Kalka became increasingly compact and granular due to progressive loss of moisture, necessitating frequent stirring.
- Final Paka:** The Sneha became distinctly separated from the Kalka, and the characteristic Taila Siddhi Lakshana were observed without evidence of burning or carbonization.
- Completion:** On attainment of Samyak Taila Siddhi Lakshana, heating was discontinued. The preparation was filtered while warm and a homogeneous Madhukadi Taila was obtained

Observation during preparation of Madhukadi ointment Mixture A and Mixture B after continuous stirring starts emulsifying and Semisolid constituency of yellow cream was obtained. 66 gm of light yellowish coloured Madhukadi taila Ointment was obtained.

The prepared Madhukadi Taila & Madhukadi Taila ointment was analysed in authenticated laboratory. To evaluate

the formulation prepared, quality control tests including organoleptic Assessment and physicochemical controls such as Acid value, Iodine value, Saponification, pH, SG were performed.



RESULT

Tila taila was taken 1000ml & final product of Murchita Tila oil obtained was 850ml.

Murchita oil was taken 500ml & final product of madhukadi taila obtained was 350ml

In present study, analytical evaluation of Madhukadi Taila and madhukadi tail ointment was carried out. The samples were analysed first of all on the basis of organoleptic characters. Physico-chemical parameters was checked.

Analytical values of Madhukadi Taila

Sr. No	Test	Result
1	Appearance	Clear Oil
2	Colour	Light Brown
3	Odour	Characteristic
4	Refractive Index	1.43
5	Specific Gravity	0.935gm/ml
6	Saponification Value	180
7	Acid Value	3.2
8	pH	6.2
9	Iodine Value	82

Analytical values of Madhukadi Taila Ointment

Sr. No	Test	Result
1	Appearance	Smooth Ointment
2	Colour	Light yellowish cream
3	Odour	Faint
4	Texture	Smooth
5	Density	0.986
6	pH	6.9
7	Moisture content	7.67%
8	Rancidity	Negative
9	Fat content	8.50%
10	Spreadability	Uniformly spreadable

DISCUSSION

The therapeutic effectiveness of any formulation largely depends on the quality of its raw materials. In the present study, all ingredients confirmed to the standards laid down in the Ayurvedic Pharmacopoeia of India, ensuring their purity and appropriateness for pharmaceutical use, consistent with the classical principle of *Shuddha Dravya*. Physicochemical



evaluation served as a key quality control measure to determine the stability, uniformity, and reproducibility of the Taila preparation. Organoleptic parameters such as *Rupa* (appearance), *Gandha* (odour), and *Sparsha* (touch) were found to be within acceptable limits, supporting its suitability for further application, as emphasized in classical Ayurvedic texts.

The prepared Taila demonstrated satisfactory physicochemical stability, maintaining the *Mrudu Paka* stage, which is essential for Nasya and local therapeutic use. Classical descriptions in *Sneha Kalpana* highlight that adequate processing duration is crucial for effective transfer of active principles into the lipid medium. The selection of *Tila Taila* as the base is justified due to its *Sukshma*, *Vyavayi* and *Yogavahi* properties, which facilitate deeper tissue penetration and enhance drug efficacy.

Madhukadi Taila containing *Mahua*, *Maricha*, *Vidang* and *Devadaru* predominantly exhibits *Katu Vipaka*, which supports its role in the management of ocular disorders. The formulation reflects the scientific rationale of classical Acharyas for targeted therapeutic action. The modified Madhukadi Taila cream showed favourable pharmaceutical characteristics, including semi-solid consistency, appropriate pH and good spreadability, making it suitable for external application as *eye ointment for external application*.

Vidalaka is the application of medicated paste to the outer surface of the eye lids except at eye lashes. It is indicated in Daha, Upadeha, Asru, Sopha, Raga, Toda, Bheda, Kandu, and Gharsa. Thickness of the paste in Bidalaka is similar to that of Mukhalepa like Dosagna Vidalaka is 4 Angula, Visagna is 2 Angula, and Varnya is ½ Angula. Medicine is absorbed through skin as in Pindi and Seka. Mechanical effect of pressure helps in reducing IOP by vasodilatation and aqueous drainage. Ointments and gels increases bioavailability of drugs by increasing the tissue contact time and by preventing dilution and drainage of active ingredients. Ocuserts form a system of drug delivery through membrane. These can be placed in upper or lower fornix for a week. The corneal epithelial tight junction provides mechanical and chemical barrier for the drug absorption. The lipophilic and hydrophilic substance can be effectively delivered. Permeability across the sclera depends on size and weight of molecules.

Administration of drugs through Nasya provides both local and systemic effects due to the highly vascular and innervated nasal mucosa. The nasal route enables rapid access to the cranial region via olfactory and trigeminal pathways, allowing efficient absorption and targeted action in disorders of the *Uttamanga*, including eye diseases. In Ayurvedic understanding, Nasya acts as a direct pathway to *Shiras*, facilitating the clearance of accumulated Doshas, particularly Kapha, from the supraclavicular region, and aiding in the pacification of residual vitiated Doshas.

Through these mechanisms, Nasya helps in improving visual function by enhancing nourishment to ocular tissues, reducing symptoms such as eye strain and fatigue and supporting optimal functioning of the *Indriyas* through improved circulation and neural activity. Thus, it plays a significant role in the management of ocular disorders by integrating systemic delivery with localized Doshas regulation.

Overall, both formulations demonstrated acceptable stability and safety for external use. However, further clinical

studies are required to establish their therapeutic efficacy on a larger scale.

CONCLUSION

The formulated ointment demonstrates therapeutic potential comparable to that described for Madhukadi Taila in classical literature. While Madhukadi Taila is traditionally administered as Nasya in the management of Netra Roga, its efficacy is largely attributed to the deep penetration ability of lipid-based formulations.

The development of the ointment aims to provide a more convenient and patient-friendly alternative to lep, particularly for localized application over periorbital region for eye disorders. Despite the change in dosage form, the formulation is designed to retain the core therapeutic attributes of the original Taila. Overall, the observed physicochemical parameters indicate that the prepared ointment possesses suitable characteristics for external application over the eyelid as an alternative of Vidalaka. However, these parameters alone are not sufficient to establish the safety for ophthalmic ointment. Further evaluation particularly sterility, particulate matter, ocular irritation and stability for ocular use is also required as per FDA Guidelines

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