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STANDARDIZED MANUFACTURING PROCESS AND PHARMACEUTICAL CHARACTERIZATION OF KADARYA SIDDHA NARIKELA TAILA

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ABSTRACT

Background: *Sneha Kalpana* represents a complex pharmaceutical process in *Ayurveda* that aims to improve drug delivery using lipid media. *Kaidarya* (*Murraya koenigii*) processed in *Narikela Taila* (*Cocos nucifera*) produces a medicated oil traditionally used for hair and scalp issues. However, detailed documentation of its preparation and pharmaceutical properties is limited.

Aim and Objective: The goal is to standardize the manufacturing process of *Kaidarya Siddha Narikela Taila* and document its pharmaceutical, sensory, and physical-chemical characteristics.

Materials and Methods: The formulation was created using *Kaidarya Kashaya*, and *Narikela Taila* (*Sneha Dravya*) in classical proportions (1:4). *Sneha Paka* was performed with controlled heating (*Mandagni*) until the desired classical *Sneha Siddhi Lakshana* were achieved.

Results: The final product was a dull, greenish-yellow, oily substance with a distinct, pleasant odour. The physico-chemical parameters obtained were within acceptable limits, indicating that the formulation was stable and of good quality.

Conclusion: This study outlines a reproducible pharmaceutical process for *Kaidarya Siddha Narikela Taila* and explains its potential use in Keshagata disorders through lipid-based delivery of bioactive ingredients.

Keywords: *Kaidarya, Narikela Taila, Sneha Kalpana, Khalitya, Transdermal delivery*

INTRODUCTION

Ayurveda, the established Indian system of medicine, utilizes varied formulations from natural sources-herbal, animal, and mineral for the management of varied disorders [1]. It emphasizes the process, widely known as *Samskara*. The effectiveness of a formulation depends not just on the choice of drugs but also on how they are processed. The concept of *Samskara* in *Bhaishajya Kalpana* states that pharmaceutical transformation can greatly change how a substance acts in the body, affecting its absorption, availability, and targeting of tissues [2].

Sneha Kalpana is an evolved form within this framework that uses lipid media such as *Taila* or *Ghrita* to extract and stabilize active plant compounds. The process involves controlled heating (*Agnipaka*), creating a system that can incorporate both water-soluble and fat-soluble components. From a modern perspective, this can be viewed as a heating process that improves the compatibility of phytonutrients with biological membranes, particularly for delivery through the skin [3].

Kaidarya (*Murraya koenigii*) is known for its properties of *Keshya*, *Rasayana*, and *Deepana*, indicating its role in nourishing tissues and supporting metabolism [4]. Recent studies have found carbazole alkaloids, flavonoids, and phenolic compounds in

Kaidarya, many of which show antioxidant and anti-inflammatory effects [5]. These properties are especially relevant in hair disorders such as *Khalitya* and *Palitya*, where oxidative stress, inflammation, and follicular degeneration are key factors [6].

Narikela Taila (*Cocos nucifera*) is commonly used as a base for topical applications due to its favorable physical and biological properties. It contains medium-chain fatty acids like lauric acid, which strongly attract hair proteins and improve penetration into the hair shaft. Its moisturizing, antimicrobial, and barrier-supporting traits also help maintain scalp health [7].

The creation of *Kaidarya Siddha Narikela Taila* through *Sneha Paka* brings together these properties, where the lipid medium acts as a carrier and also influences the delivery and stability of active compounds. Despite its clinical significance, there is not much standardized documentation of its pharmaceutical preparation [8].

This study aims to document the preparation process in detail, assess its pharmaceutical properties, and provide an understanding of the formulation from both *Ayurvedic* and modern scientific perspectives.

MATERIALS AND METHODS

Collection and Authentication of Raw Materials

Fresh *Kaidarya* leaves were collected from a farm in Hulikavi, Belagavi (**Figure 1**) and authenticated according to the standards of the Ayurvedic Pharmacopoeia of India at the AYUSH-approved Drug Testing Laboratory, Central Research Facility, CRF authentication



Figure 1: Kaidarya Sample for preparation of Taila

Preparation of *Kaidarya Siddha Narikela Taila*

The *Kaidarya Siddha Narikela Taila* was prepared in accordance with Ayurvedic methodology at the GMP-certified KLE Ayurveda Pharmacy, Khasbag, Belagavi, in line with the guidelines of the Ayurvedic Formulary of India for the preparation of the

report BMK/CRF/370/2024-2025. The sample was examined for visible characteristics and basic physico-chemical parameters to ensure quality. The analysis revealed 0.049% foreign matter, 5.544% ash value, 1.021% acid-insoluble ash, 10.446% water-soluble extractive, and 8.854% alcohol-soluble extractive, all of which fall within the API standards.

oil, under the supervision of pharmacy experts. Pharmaceutical-grade *Narikela Taila* was sourced from a reliable supplier in Belagavi, and the taila was prepared. All materials were handled in clean conditions to maintain quality throughout the preparation. The ingredients and quantities are listed in **Table 1**.

Table 1: Ingredients and Quantity Used for *Kaidarya Siddha Narikela Taila*

S. No.	Ingredient	Prescribed Quantity	Ingredient used	Part Used	Quantity
1.	<i>Sneha Dravya</i> (Oil base)	1 part	<i>Narikela Taila</i> (<i>Cocos nucifera</i> L.)	Oil	30 Kg
2.	<i>Drava Dravya</i> (<i>Kashaya-Decoction</i>)	4 parts	<i>Kaidarya Kashaya</i> (<i>Murraya koenigii</i> (Linn.) Spreng)	Leaves	120 L

Preparation of *Kaidarya*

Kaidarya plants (~60Kg) were washed thoroughly and dried in the shade. The

obtained leaves (~30Kg) were ground coarsely (*yavakuta churna*) to maximize

surface area for extraction while ensuring uniform mixing during heating (**Figure 2**).

Preparation of *Drava Dravya*

Kaidarya Kashaya (decoction prepared with *Kaidarya*) was made by boiling coarsely powdered leaves (~30Kg) in *yavakuta* form in

16 times water (~480L), reducing the volume to one-fourth (~120L), and filtering to obtain a clear decoction (2). The quantity of *Drava Dravya* used is 4 times that of the *Sneha* (30 litres ×4), resulting in 120L of *Kashaya* to be used. (**Figure 3**)



Figure 2: Dried *Kaidarya* leaves



Figure 3: Preparation of *Kaidarya Kashaya*

Sneha Paka Patra (vessel)

A stainless steel vessel was utilised for *Taila Paka*. A ladle (*darvi*) was used to

continuously and carefully stir the mixture to ensure uniform heat distribution and avoid sedimentation and carbonisation.

Type of Heat

Mandagni was utilised for the preparation of *Kaidarya Siddha Narikela Taila* as postulated in the *Taila Paka Vidhi* of classical ayurvedic literature.

Duration of *Sneha Paka*

The *Sneha Paka* process continued until the classical *Sneha Siddhi Lakshana* were observed, maintaining temperatures between 60°C and 90°C. The *Taila Paka* lakshanas were assessed based on *Sharangadharokta Sneha Siddhi Lakshanas*.

Procedure of *Taila Paka*

30 Kg *Narikela Taila* was gently heated and slowly combined with the prepared *Kaidarya Kashaya* (~120L), and the mixture underwent controlled heating (*Mandagni*, approximately

60-90°C) with continuous stirring until the aqueous phase evaporated completely, allowing the phytoconstituents to be integrated into the lipid medium. As the mixture was heated, the water content decreased, leading to a semi-solid residue from the plant material in the *Kashaya*. With further heating under controlled conditions, this residue thickened and showed qualities similar to *Kalka*. In the later stages of *Sneha Paka*, the material became cohesive, non-sticky, and could be rolled between the fingers, indicating that *Sneha Siddhi Lakshana* had been achieved [9]. The process ended at this point, and the oil was filtered to produce the final product. (Figure 4) The *Sneha Siddhi Lakshanas* are listed in Table 2.

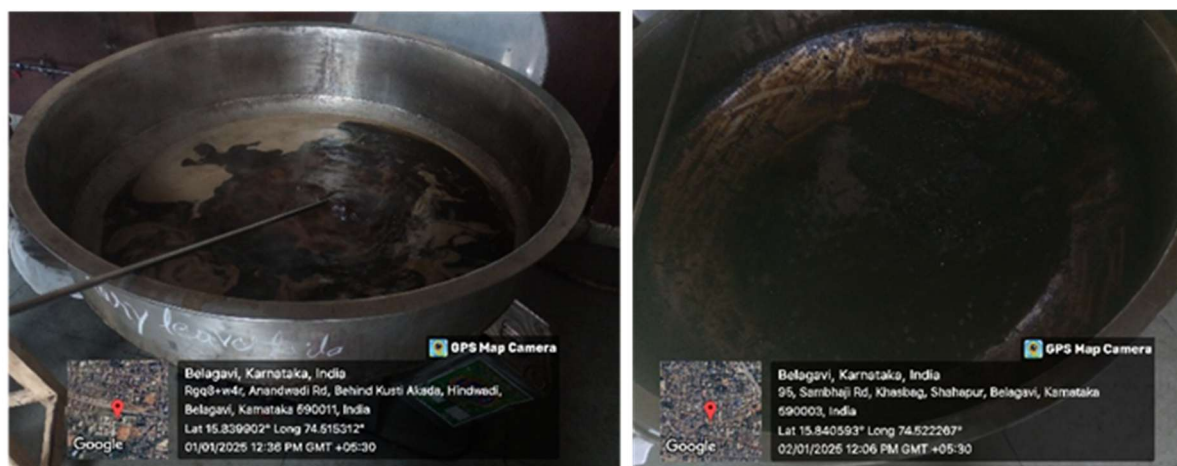


Figure 4: Preparation of *Kaidarya Siddha Narikela Taila*

Table 2: *Sneha Siddhi Lakshana*

S. No.	<i>Sneha Siddhi Lakshana</i>	Residue	<i>Taila</i>
1.	<i>Sanyav eve niryase</i>	+	-
2.	<i>Madhye darvi vimunchati</i>	+	-
3.	<i>Shabda hino agni nikshipta</i>	-	+
4.	<i>Phenodgama</i>	-	+
5.	<i>Gandha, varna, Rasotpatti</i>	-	+

(+): Positive, (-): Negative

Packaging

The final product was filtered and packed in 150 ml high-density polyethylene (HDPE) containers with airtight closures to minimize exposure to moisture and oxidative factors.

The containers were labelled and stored under controlled conditions to preserve the physicochemical stability of the formulation (**Figure 5**).



Figure 5: Final packed *Taila*

RESULTS

Yield: Approximately 31.2 L of oil was produced. The marginal increase in volume relative to the initial oil quantity may be due

to the retention of fine suspended fractions within the oil matrix. The sensory characteristics and physico-chemical characteristics are enumerated in **Table 3**.

Table 3: Pharmaceutical Characteristics

S. No.	Parameter	Observation
1.	Color	Dull, Greenish yellow colour
2.	Odour	Pleasant odour
3.	Touch	<i>Taila</i> (oily)
4.	Loss on drying	0.425%
5.	Saponification value	203.341
6.	Iodine value	55.613
7.	Refractive index	1.463
8.	Specific gravity	0.913
9.	Acid value	2.794
10.	Rancidity	Negative

DISCUSSION

Kaidarya Siddha Narikela Taila is a Sneha Kalpana (formulation) where the therapeutic effects come not just from individual ingredients, but from their transformation through a controlled pharmaceutical process.

This study standardizes this preparation and offers a framework to understand how traditional processing affects both the chemical structure and functional activity of the final product. Sneha Paka operates as a biphasic extraction system under sustained

heat. The water phase (Drava Dravya) aids in extracting water-soluble phytoconstituents like phenolics and glycosides, while the lipid phase (Sneha Dravya) gradually incorporates fat-soluble compounds. As heating progresses, the plant cells break down, enhancing the transfer of materials, and the decreasing water content shifts the system toward a lipid-dominant phase. This results in the concentration, stabilization, and partial transformation of bioactive molecules in the oil [3]. Such a process likely increases the proportion of lipid-compatible phytoconstituents, which are more suitable for skin and follicle delivery.

Kaidarya (*Murraya koenigii*) provides a rich pharmacological profile with carbazole alkaloids (like mahanimbine and girinimbine), flavonoids, and phenolic antioxidants [5,10-12]. These substances can neutralize reactive oxygen species, prevent lipid damage, and affect inflammation pathways, including those mediated by NF- κ B [5, 13]. In hair disorders, oxidative stress and inflammation contribute to follicle shrinkage, disrupted hair growth, and melanin dysfunction [6].

Including these antioxidant and anti-inflammatory compounds in a lipid vehicle supports the traditional use of Kaidarya for Khalitya and Palitya.

Narikela Taila (*Cocos nucifera*) also plays a vital role in this formulation. Its high medium-chain fatty acid content, especially lauric acid, has a strong attraction to hair keratin, aiding in penetration into the hair shaft [7]. This reduces protein loss and helps retain active compounds at the follicle level. Its moisturizing and occlusive properties also help keep the scalp hydrated, while its proven antimicrobial effects help manage the scalp microbiome, which is increasingly recognized as a factor in hair and scalp issues [14]. Thus, Narikela Taila acts as a solvent, carrier, and active ingredient in maintaining follicle health.

The integration of Kaidarya's phytonutrients into this lipid medium through Sneha Paka may also alter their absorption characteristics. Lipid-based delivery systems improve local availability by enhancing skin penetration and forming reserves within the skin [3]. This allows for sustained release of active ingredients where they are applied. In Ayurvedic terms, these characteristics match the Sukshma (subtle, penetrating) and Vyavayi (spreading quickly) nature attributed to Taila, paralleling modern drug delivery methods.

Achieving Sneha Siddhi Lakshana in this study indicates that the transformation process is complete. Classical signs, like no froth,

specific sensory changes, and proper residue consistency, reflect important physico-chemical transitions [9], including moisture removal, phase stabilization, and optimal integration of phytonutrients. The explored physicochemical parameters further confirm the quality and consistency of the preparation. The marginal increase in volume relative to the initial oil quantity may be explained by the assimilation of lipid-soluble and semi-solid constituents derived from the decoction during thermal processing, along with possible retention of fine suspended fractions within the oil matrix.

This variation in yield reflects the dynamic nature of Sneha Paka, where the incorporation of plant-derived constituents into the lipid phase [15] can alter the final volume and mass of the formulation.

In summary, this formulation can be seen as a lipid-based herbal medicine in which traditional Ayurvedic processing improves the extraction, stability, and delivery of bioactive substances. The combined antioxidant, anti-inflammatory, skin-supporting, and penetration-enhancing properties [16] provide a solid reason for its use in Keshagata Vikara.

CONCLUSION

This study establishes a standardized method for preparing Kaidarya Siddha Narikela Taila,

showing that traditional Sneha Kalpana principles can be consistently and reliably applied in a reproducible process. Beyond standardization, the formulation presents a well-explained system where antioxidant and other beneficial properties converge.

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CONFLICTS OF INTEREST

There are no conflicts of interest related to this work.

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