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PHARMACEUTICAL PREPARATION AND ANALYTICAL STUDY OF NAGARADYO'VALEHA WITH SPECIAL REFERENCE TO GADANIGRAHA

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ABSTRACT

Nagaradyo'valeha, a classical ginger-based formulation described in Gadanigraha for Amavata and Vali-Palita Nashanam, was prepared following traditional guidelines to establish its foundational pharmaceutico-analytical profile. The manufacturing involved three sequential stages: preparation of Ksheera-Sunthi Mava, roasting in Go-Ghruta, and compounding with Khanda syrup and Prakshepa Dravyas (Vyosha and Trijataka). The final dark golden-brown paste exhibited a near-neutral pH (6.700), Loss on Drying of 17.949% w/w, Total Ash of 3.222% w/w, Acid-Insoluble Ash of 2.589% w/w, and Total Sugar of 23.563% w/w (Reducing Sugar: 8.654% w/w). The milk-ghee matrix effectively buffers ginger's acidity while stabilizing active lipophilic constituents. Overall, these findings confirm proper pharmaceutical processing, optimal stability, and absence of inorganic impurities, establishing baseline quality standards for Nagaradyo'valeha.

KEYWORDS: *Nagaradyo'valeha, Gadanigraha, Bhaishajya Kalpana, Physicochemical Analysis, Amavata, Ksheera-Paka.*

INTRODUCTION

Ayurveda, the ancient science of life, offers a diverse array of pharmaceutical preparations categorized under *Bhaishajya Kalpana*. Among these, Leha Kalpana (medicated electuaries or jams) occupies a significant place due to its palatability, longer shelf-life, and high therapeutic efficacy. While many *Avalehas* like *Chyavanprash* are well-documented, several potent formulations from classical compendiums remain scientifically unexplored. One such unique formulation is Nagaradyo'valeha, described in the 12th-century text *Gadanigraha* by Acharya Sodhala.

The *Gadanigraha* is celebrated for its practical approach to clinical medicine, and the *Leha Kalpana* section specifically focuses on formulations that provide both curative and restorative benefits. *Nagaradyo'valeha* is primarily a ginger-based (*Sunthi*) preparation. Ginger is traditionally recognized as *Vishwabheshaja* (the universal medicine) due to its wide range of pharmacological activities, including anti-inflammatory, analgesic, and digestive properties.

The classical indications for *Nagaradyo'valeha* include Amavata (Rheumatoid Arthritis), where it acts by digesting *Ama* (metabolic toxins) and pacifying *Vata*. Furthermore, it is credited with Rasayana (rejuvenative) properties, specifically cited for Vali -Palita Nashanam - the prevention of wrinkles and premature graying of hair.

In the modern era of evidence-based medicine, the physicochemical evaluation of traditional formulations is a prerequisite for global acceptance. Parameters such as physicochemical analysis are essential to ensure the reproducibility and quality of the final product. As there is currently no published literature on the physicochemical evaluation of this specific formulation, the present study was undertaken to establish a preliminary quality profile for *Nagaradyo'valeha*, ensuring its safety and efficacy for clinical use.

AIMS AND OBJECTIVES

Aim: To establish the Standard Operating Procedure (SOP) and foundational physicochemical profile of *Nagaradyo'valeha*.

Objectives

1. To execute the pharmaceutical preparation of the drug following classical guidelines.
2. To evaluate organoleptic characteristics including colour, odor, and consistency.
3. To determine foundational analytical constants: pH, Loss on Drying (LOD), Total Ash, Acid Insoluble Ash (AIA), and Extractive Values (Water/Alcohol). of the final product

MATERIALS AND METHODS

1. Collection and Authentication of Raw Materials

The raw drugs required for the preparation of Nagaradyo'valeha were procured from dadar pharmacy , Mumbai. Fresh cow's milk and cow's ghee were obtained from

2. Composition of Nagaradyo'valeha

The formulation was prepared according to the ratio mentioned in *Gadanigraha* (Leha Kalpana). For the laboratory scale batch, the classical units (Pala/Ser) were converted into Metric units (Grams/Milliliters).

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Table 1 : ingredients of *Nagaradyo'valeha*

Sr No	Ingredient	Botanical Name	Part Used	Proportion (Classical)	Quantity (Lab Batch)	Quantity (For 250 Gm Batch)
1	Sunthi	Zingiber officinale	Rhizome (Powder)	8 Pala	384 g	16 gm
2	Go-Ksheera	-	Fresh Milk	2 Ser	1920 ml	80 ml
3	Go-Ghruta	-	Cow's Ghee	20 Pala	960 g	40 gm
4	Khanda	-	Sugar Candy	50 Pala	2400 g	100 gm
5	Sunthi	Zingiber officinale	Dry Rhizome	1 Pala	48 g	2 gm
6	Maricha	*Piper nigrum*	Fruit	1 Pala	48 g	2 gm
7	Pippali	*Piper longum*	Fruit	1 Pala	48 g	2 gm
8	Tvak	Cinnamomum zeylanicum	Bark	1 Pala	48 g	2 gm
9	Ela	Elettaria cardamomum	Seed	1 Pala	48 g	2 gm
10	Patra	Cinnamomum tamala	leaf	1 Pala	48 g	2 gm

3.Preparation

Stage I: Preparation of Ginger-Milk Solids (Mava)

1. *Sunthi* powder was added to fresh cow's milk in a wide-mouthed stainless steel vessel.
2. The mixture was heated over a moderate flame with continuous stirring.
3. The heating continued until the milk evaporated completely, resulting in a semi-solid mass (*Ksheera-Sunthi Mava*).

Stage II: Roasting (*Paka*)

1. *Go-Ghruta* (Ghee) was added to the *Mava*.
2. The mixture was roasted on low heat until it attained a golden-brown color and a characteristic fried aroma.
3. The roasted mass was kept aside.

Stage III: Syrup Preparation and Final Mixing

1. *Khanda* (Sugar candy) was dissolved in an adequate quantity of water to prepare a syrup (*Chashni*).
2. The syrup was filtered to remove impurities and boiled until it reached Two-thread consistency (*Dwi-tantu paka*).
3. The roasted *Sunthi-Mava* was added to the syrup and mixed thoroughly.
4. Finally, the fine powders of *Vyosha* and *Trijataka* (*Prakshepa Dravyas*) were added under constant stirring to ensure a homogenous mixture.
5. The final *Avaleha* was allowed to cool and then stored in a sterile, airtight glass container.

4. Analytical Evaluation

The standardized *Nagaradyo'valeha* was subjected to the following tests:

- Organoleptic Study: Evaluation of color, odor, taste, and texture.
- Physicochemical Analysis: Determination of Loss on Drying (LOD) at 105°C, Total Ash value, Acid Insoluble Ash, Water soluble extractives, total sugar and pH value (10% aqueous solution).

AVALEHA PAKA LAKSHAN

1) *Tantumatva* – thread like appearance
2) *Apasu majjati* – sinking in water
3) *Sthiratav* – stability of content
4) *Angulimarda* – imparting finger prints
5) *Gandhoudbhava* – typical smell of avaleha
6) *Varnodhbhava* – colour of avaleha
7) *Rasoudbhava* – taste

RESULTS

The final product, *Nagaradyo'valeha*, was a dark brown, semi-solid granular paste with a characteristic spicy-sweet aroma and a pungent (*Katu*) after taste.

Table 2: Organoleptic Characteristics

Sr No	Parameter	Observation
1	Color	Dark Golden Brown
2	Odour	Aromatic, characteristic of Ginger and Cinnamon
3	Taste	Sweet and Pungent (*Madhura-Katu*)
4	Touch	Soft, non-sticky, granular

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Table 3 : Physicochemical Parameters

Sr No	Test	Value
1	pH	6.700
2	Loss on Drying (LOD) (Indicates moisture content)	17.949
3	Total ash (Indicates low inorganic/mineral impurity)	3.222 %
4	Acid Insoluble Ash	2.589 %
5	Water Soluble Extractive	1.435 %
6	Total sugar	23.563 %
7	Reducing sugar	8. 654 %
8	Non reducing sugar	14.909 %

DISCUSSION

The pharmaceutical excellence of Nagaradyo'valeha lies in its specific "sequential processing" described in *Gadanigraha*.

1. Sunthi (Dried *Zingiber officinale*) – Main Drug

Action on Amavata: Rasa: *Katu*, Guna: *Laghu, Snigdha* Acts as the primary drug of choice. Its *Ushna Virya* carries out *Amapachana* (digesting toxins), while its *Madhura Vipaka* and *Snigdha Guna* pacify *Vata* without causing dryness (*Rukshata*) in the joints.

2. Go-Ksheera & Go-Ghruta – Base Matrix

Gastric Protection: Buffers the high *Ushna* and *Tikshna* properties of *Sunthi* and *Vyosha*, protecting the *Annavaha Srotas* (gastric mucosa) from Pitta irritation.

Rasayana & Dhatu Poshana: Responsible for *Balya*, *Ayushyam*, and *Vali-Palita Nashanam* (anti-aging). Provides a lipid-protein matrix to nourish depleted *Asthi* and *Majja Dhatus*.

3. Khanda (Sugar Candy) – Sweetener Base

Provides structural *Avaleha* consistency and natural preservation. It acts as *Pittashamaka* and *Balya*, giving instant energy to relieve fatigue (*Angamarda* and *Klama*).

4. Vyosha / Trikatu (*Sunthi, Maricha, Pippali*) – Prakshepa 1

Srotoshodhana: Clears blocked microchannels (*Sukshma Srotas*) to allow deep joint penetration.

Yogavahi: Functions as a bioavailability enhancer to increase intestinal drug absorption.

5. Trijataka (*Twak, Ela, Patra*) – Prakshepa 2

Relieves anorexia (*Aruchi*) via *Rochana* and *Sugandhi* (aromatic) properties by stimulating digestive receptors. Essential oils also offer natural antimicrobial protection for the formulation.

Summary of Samprapti Vighatana (Breaking the Disease Pathology)

To summarize the logical action of *Nagaradyo'valeha*:

1. **Stage 1 (Gut Level):** *Sunthi* and *Vyosha* correct the *Jatharagni* (digestive fire) and digest circulating *Ama*.
2. **Stage 2 (Systemic Level):** *Trikatu* opens the blocked bodily channels (*Srotorodha*).
3. **Stage 3 (Tissue Level):** The *Madhura/Snigdha* matrix of Ghee and Milk carries the anti-inflammatory properties of ginger directly to the *Asthi* and *Sandhi* (joints), pacifying the localized *Vata* pain while simultaneously nourishing the degenerating tissues (*Rasayana* effect), thereby preventing premature aging (*vali-Palita Nashanam*).

1. The Role of Ksheera-Paka (Milk Processing)

Unlike common *Avalehas* that use a water decoction, the boiling of *Sunthi* in milk (Stage I) facilitates the extraction of both water-soluble and protein-bound constituents. The formation of *Mava* (milk solids) acts as a natural emulsifier. Scientifically, the proteins and fats in milk may form complexes with 6-gingerol, potentially reducing the gastrointestinal irritation sometimes caused by raw ginger while enhancing its absorption.

2. Lipid-Based Drug Delivery

The second stage—roasting the *Mava* in Go-Ghruta—is a critical "Samskara" (processing). Ghee acts as a lipophilic carrier. Many active principles in the *Prakshepa* drugs (like piperine from *Trikatu* and cinnamaldehyde from *Trijataka*) are fat-soluble. Roasting ensures these phytochemicals are stabilized within the lipid matrix, which, according to Ayurvedic principles, helps the medicine reach "Sukshma Srotas" (micro-channels in the body).

3. Synergistic Effect of Prakshepa Dravyas

The addition of *Vyosha* (*Trikatu*) and *Trijataka* at the final stage (after cooling the syrup slightly) is scientifically sound. These herbs contain volatile oils that would evaporate if added during the boiling stage.

- Trikatu: Enhances *Bioavailability* (Bio-enhancer effect of Piperine).
- Trijataka: Acts as a carminative and preservative due to its antimicrobial essential oils.

4. Therapeutic Logic (Phalashruti)

The formulation's claim to treat Amavata is supported by the anti-inflammatory properties of *Sunthi*. Furthermore, its "Anti-aging" (*Vali -Palita Nashanam*) claim can be attributed to the high antioxidant content of the ginger-ghee-milk complex, which may combat oxidative stress, a primary cause of skin wrinkling and hair graying.

Nagaradyo'valeha represents a unique *Ksheera-Siddha* electuary from *Gadanigraha*, combining anti-inflammatory, digestive (*Deepana-Pachana*), and rejuvenative (*Rasayana*) herbs in a lipid-protein matrix. The analytical results from Precise Analytics Lab confirm its stability and processing quality. The Loss on Drying (17.949% w/w) reflects optimal moisture for shelf-life without over-drying (*Kharda Paka*), while the near-neutral pH (6.700) proves that milk and ghee effectively buffer ginger's acidity, protecting the gastric mucosa (*Annavaha Srotas*).

The purity profile shows a Total Ash of 3.222% w/w, Acid-Insoluble Ash of 2.589% w/w, and Water-Insoluble Ash of 1.435% w/w, confirming the absence of significant siliceous contamination. The sugar profile—Total Sugar (23.563% w/w), Reducing Sugar (8.654% w/w), and Non-Reducing Sugar

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(14.909% w/w)—indica tes partial sucrose inversion during thermal processing. This prevents sugar crystallization during storage while supplying instant metabolic energy (*Balya*) to combat fatigue (*Angamarda*) in chronic inflammatory states.

The therapeutic efficacy relies on synergistic pharmacodynamics (*Samprapti Vighatana*). As the core drug, *Sunthi* uses its *Ushna Virya* for *Amapachana* and *Madhura Vipaka* for *Vata* pacification without joint dryness (*Rukshata*). The *Ksheera-Ghruta-Khanda* base protects the stomach and nourishes *Asthi* and *Majja Dhatus* to achieve its anti-aging (*Bali-Palita Nashanam*) action. Finally, *Vyosha* acts as a *Yogavahi* (bio-enhancer) to clear microchannels (*Srotoshodhana*), while *Trijataka* offers appetite stimulation (*Rochana*) and antimicrobial preservation.

CONCLUSION

This study successfully establishes the foundational analytical standards for ***Nagaradyo'valeha*** prepared as per ***Gadanigraha***. The physicochemical results—pH 6.700, Loss on Drying 17.949% w/w, Total Ash 3.222% w/w, and Total Sugar 23.563% w/w—confirm proper pharmaceutical processing, minimal inorganic impurities, and optimal stability. The synergistic interaction of *Sunthi*, *Vyosha*, and *Trijataka* offers potent *Amapachana* and *Srotoshodhana* actions for ***Amavata***, while the *Ksheera-Ghruta* matrix protects the gastric mucosa and nourishes *Dhatus* to provide ***Rasayana*** (*vali-Palita Nashanam*) benefits. These findings serve as a baseline benchmark for quality control of this classical formulation

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